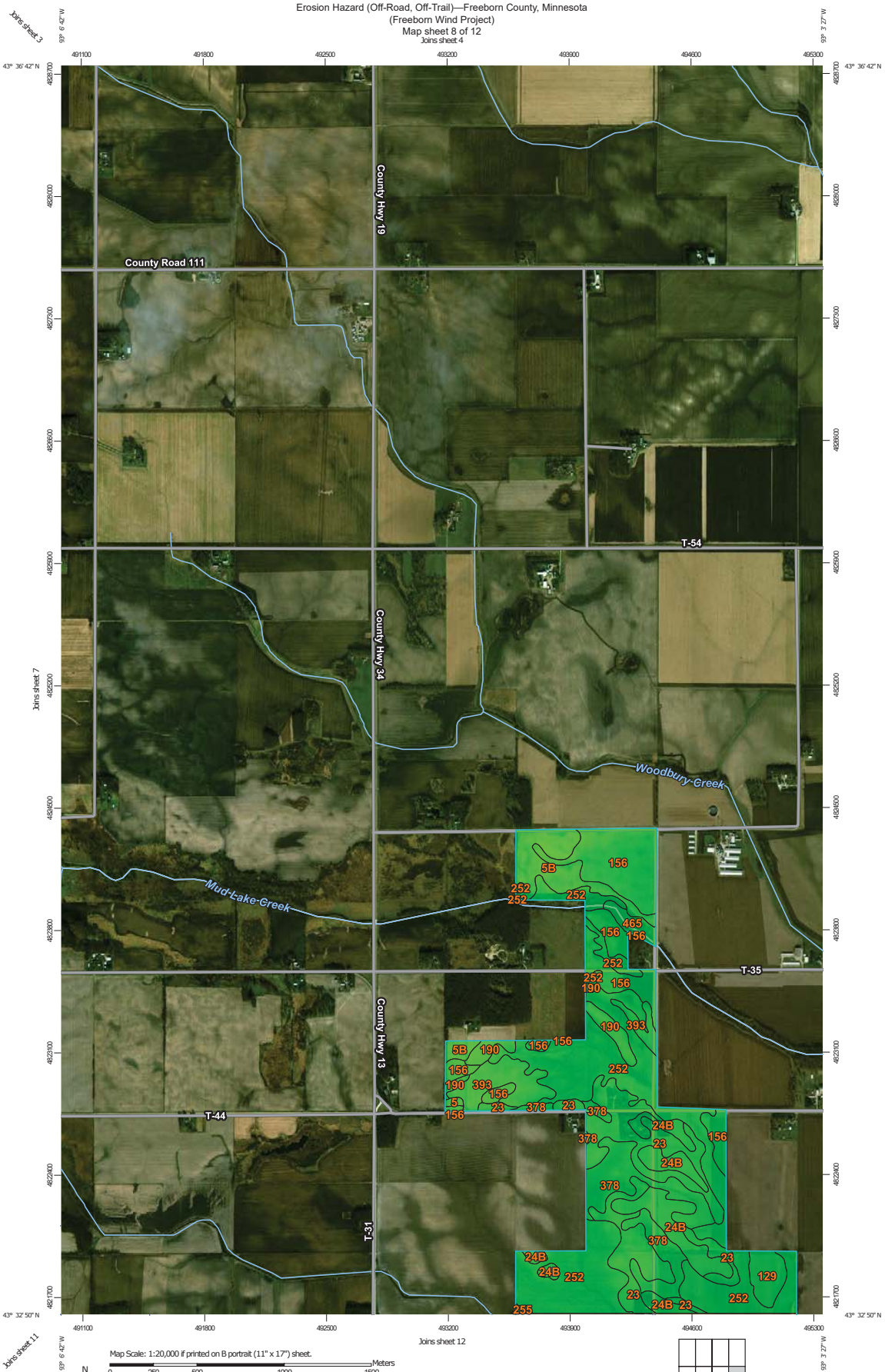
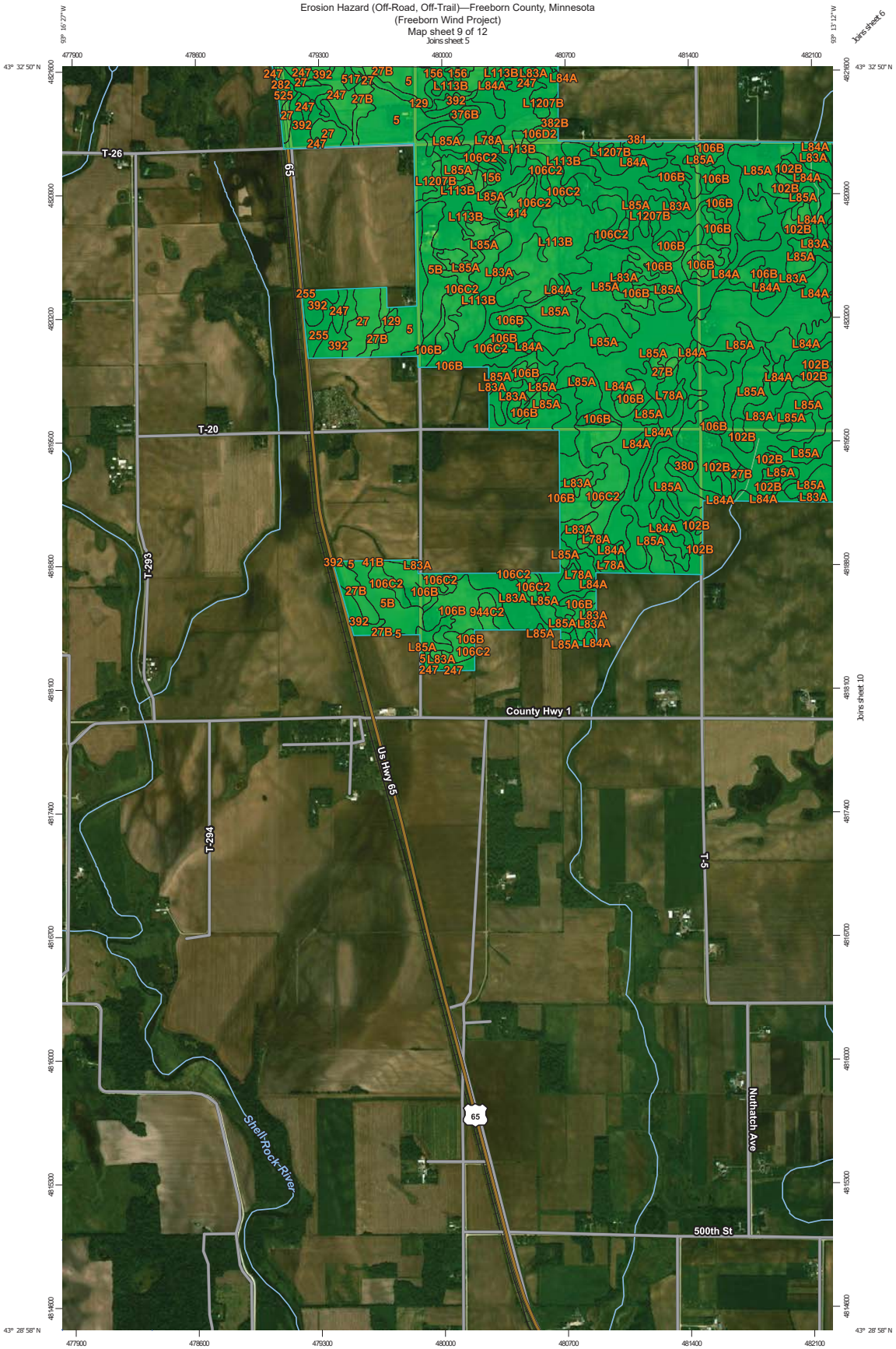

Erosion Hazard (Off-Road, Off-Trail)—Freeborn County, Minnesota
(Freeborn Wind Project)
Map sheet 8 of 12
Joins sheet 4
Joins sheet 3
Joins sheet 7
Joins sheet 11
Joins sheet 12
County Road 111
County Hwy 19
County Hwy 34
County Hwy 13
T-54
T-35
T-44
T-31
Mud Lake Creek
Woodbury Creek
5B
156
252
465
190
393
23
378
24B
129
255
Map Scale: 1:20,000 if printed on B portrait (11" x 17") sheet.
Meters
Feet
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84
Natural Resources Conservation Service
Web Soil Survey
National Cooperative Soil Survey
Map Sheet Location
7/30/2019
Page 9 of 26

Erosion Hazard (Off-Road, Off-Trail)—Freeborn County, Minnesota
(Freeborn Wind Project)
Map sheet 9 of 12
Joins sheet 5



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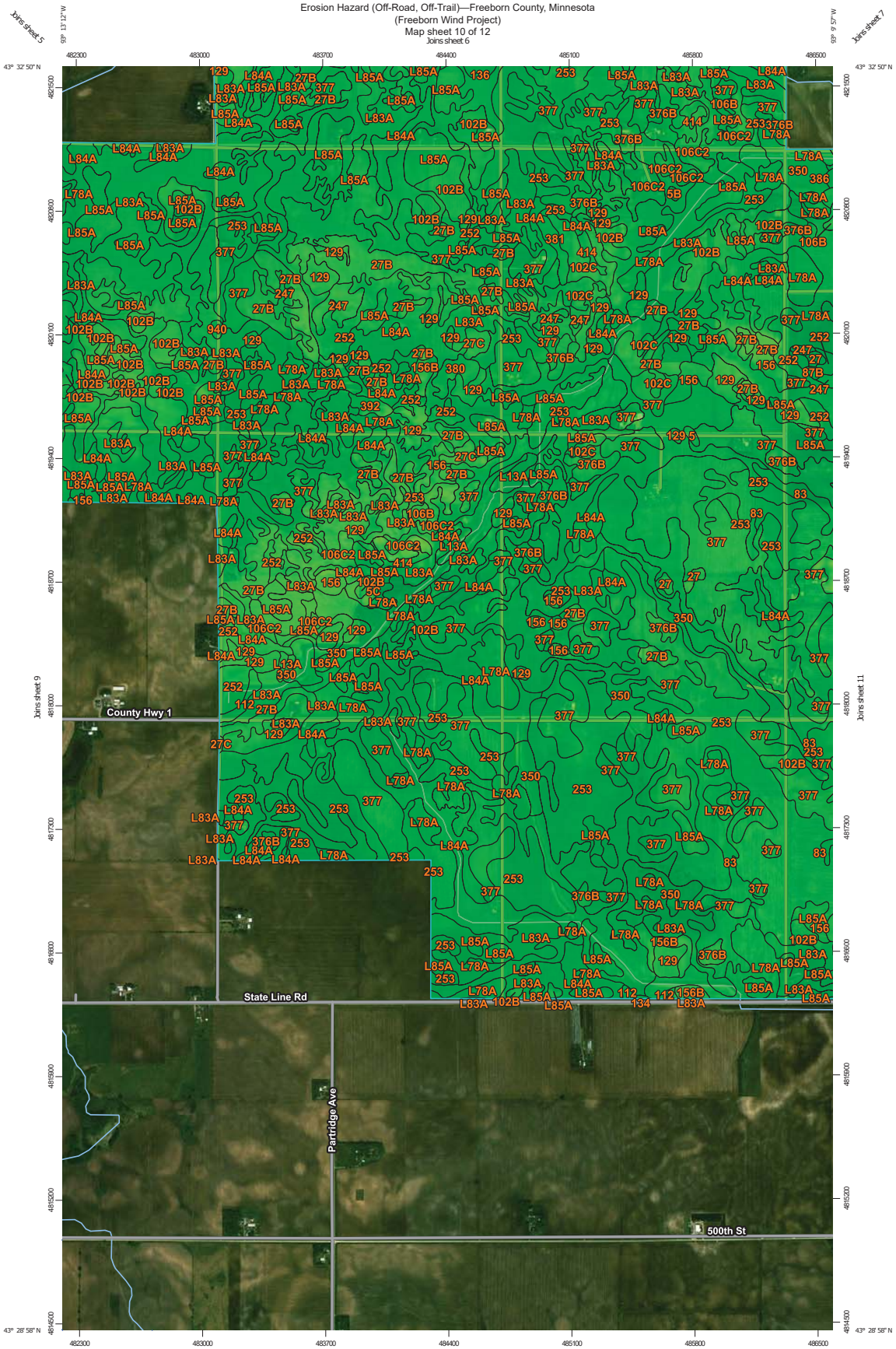
Meters: 0 250 500 1000 1500
Feet: 0 500 1000 2000 3000
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84

Map Sheet Location

Natural Resources Conservation Service

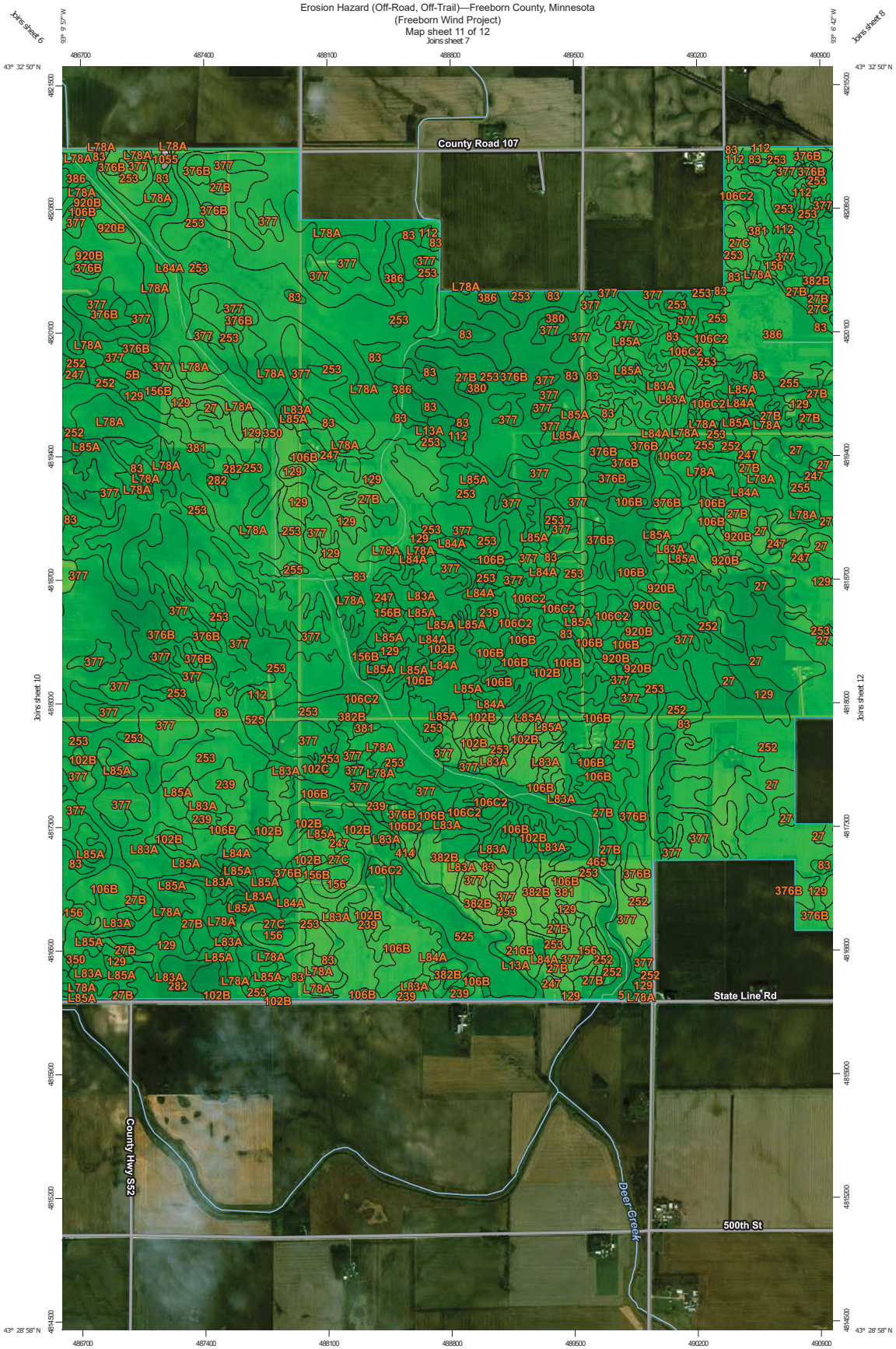
Web Soil Survey
National Cooperative Soil Survey

AFCL Exhibit E



AFCL Exhibit E

Erosion Hazard (Off-Road, Off-Trail)—Freeborn County, Minnesota
(Freeborn Wind Project)
Map sheet 11 of 12



Map Scale: 1:20,000 if printed on B portrait (11" x 17") sheet.

Meters: 0 250 500 1000 1500

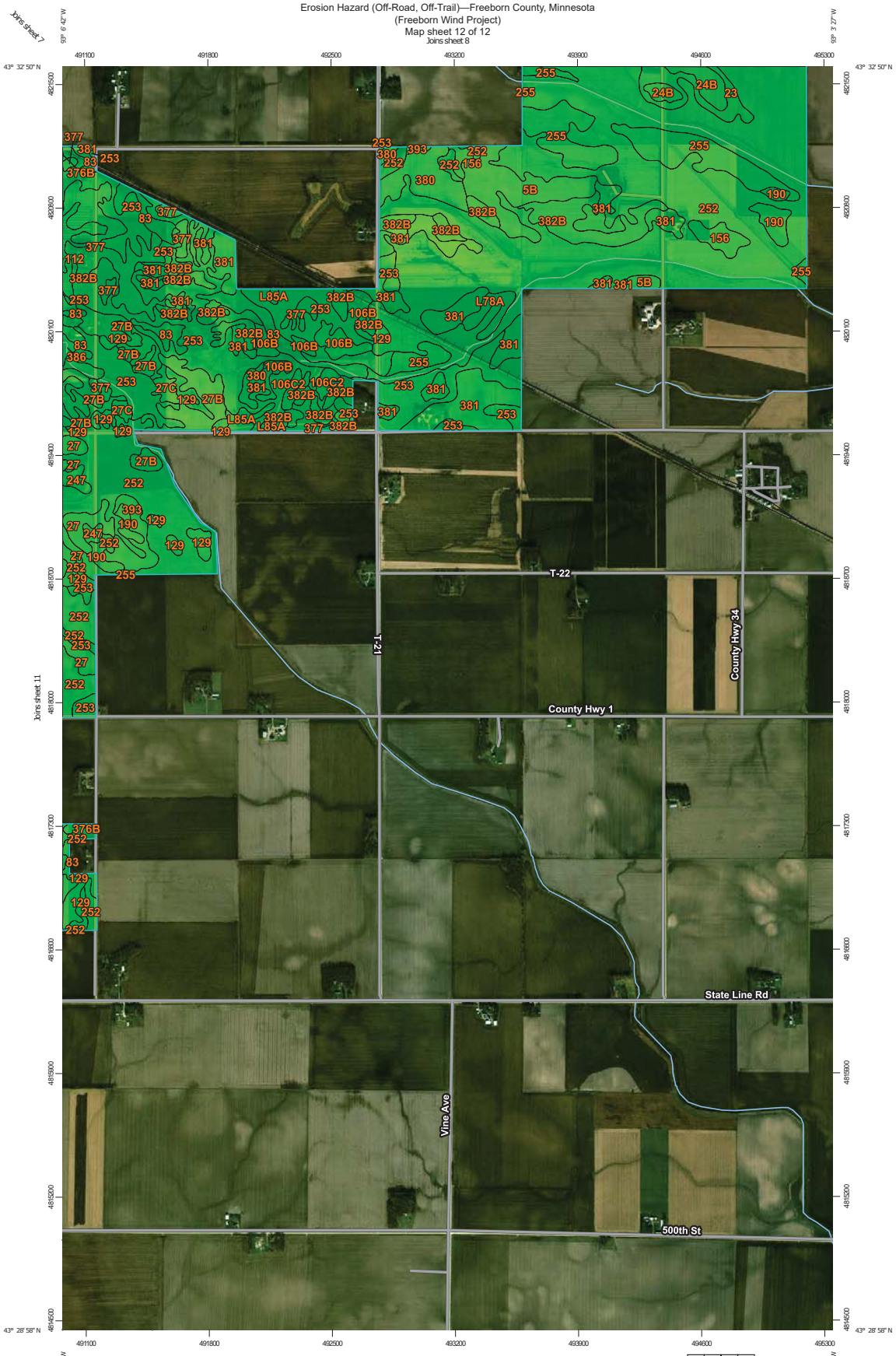
Feet: 0 500 1000 2000 3000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84

Map Sheet Location

AFCL Exhibit E

Erosion Hazard (Off-Road, Off-Trail)—Freeborn County, Minnesota
(Freeborn Wind Project)
Map sheet 12 of 12



Map Scale: 1:20,000 if printed on B portrait (11" x 17") sheet.
Meters: 0 250 500 1000 1500
Feet: 0 500 1000 2000 3000
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84

Map Sheet Location

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- Very severe
- Severe
- Moderate
- Slight
- Not rated or not available

Soil Rating Lines
- Very severe
- Severe
- Moderate
- Slight
- Not rated or not available

Soil Rating Points
- Very severe
- Severe
- Moderate
- Slight
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Freeborn County, Minnesota
Survey Area Data: Version 14, Sep 12, 2018

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 1, 2013—Feb 17, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

AFCL Exhibit E
Docket No. IP-6946/WS-17-410
Compliance Filing-Section 5.2.6
Attachment A
Page 123 of 221

Erosion Hazard (Off-Road, Off-Trail)

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
5	Dakota loam, 0 to 2 percent slopes	Slight	Dakota (87%)		129.1	0.5%
			Estherville (4%)			
			Lamont (3%)			
			Biscay (3%)			
			Hanska (3%)			
5B	Dakota loam, 2 to 6 percent slopes	Slight	Dakota (85%)		173.3	0.7%
			Estherville (5%)			
			Lamont (3%)			
			Salida (3%)			
			Biscay (2%)			
			Hanska (2%)			
5C	Dakota loam, 6 to 14 percent slopes	Slight	Dakota (85%)		19.3	0.1%
			Estherville (5%)			
			Lamont (3%)			
			Salida (3%)			
			Biscay (2%)			
			Hanska (2%)			
23	Skyberg silt loam, 0 to 3 percent slopes	Slight	Skyberg (95%)		105.9	0.4%
			Clyde (5%)			
24B	Kasson silt loam, 1 to 4 percent slopes	Slight	Kasson (85%)		62.7	0.2%
			Oran (10%)			
			Tripoli (5%)			
27	Dickinson fine sandy loam, 0 to 2 percent slopes	Slight	Dickinson (93%)		236.4	0.9%
			Hanska (3%)			
			Estherville (2%)			
			Chelsea (2%)			
27B	Dickinson fine sandy loam, 2 to 6 percent slopes	Slight	Dickinson (93%)		389.9	1.5%
			Estherville (2%)			
			Linder (2%)			
			Hanska (2%)			
			Chelsea (1%)			
27C	Dickinson fine sandy loam, 6	Slight	Dickinson (93%)		54.4	0.2%
			Hanska (2%)			

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
	to 16 percent slopes		Biscay (2%)			
			Estherville (1%)			
			Chelsea (1%)			
			Linder (1%)			
41	Estherville sandy loam, 0 to 2 percent slopes	Slight	Estherville (91%)		5.8	0.0%
			Salida (3%)			
			Hanska (3%)			
			Biscay (3%)			
41B	Estherville sandy loam, 2 to 6 percent slopes	Slight	Estherville (85%)		33.3	0.1%
			Dickinson (8%)			
			Wadena (6%)			
			Biscay (1%)			
41C	Estherville sandy loam, 6 to 12 percent slopes	Slight	Estherville (92%)		48.7	0.2%
			Salida (2%)			
			Hanska (2%)			
			Biscay (2%)			
			Linder (2%)			
62	Barrington silt loam, 1 to 3 percent slopes	Slight	Barrington (94%)		3.1	0.0%
			Madelia (2%)			
			Webster (2%)			
			Spicer (1%)			
			Grays (1%)			
83	Maxcreek silty clay loam, swales	Slight	Maxcreek, swales (85%)		832.3	3.3%
			Havana (5%)			
			Spicer (5%)			
			Madelia (3%)			
			Okoboji (2%)			
87B	Chelsea loamy fine sand, 4 to 10 percent slopes	Slight	Chelsea (94%)		5.1	0.0%
			Lamont (2%)			
			Linder (2%)			
			Hanska (2%)			
94B	Terril loam, 2 to 6 percent slopes	Slight	Terril (80%)		17.7	0.1%
			Delft (8%)			
			Storden, moderately eroded (7%)			
			Clarion (5%)			

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
102B	Clarion loam, 2 to 6 percent slopes	Slight	Clarion (85%)		335.1	1.3%
			Storden, moderately eroded (5%)			
			Webster (5%)			
			Nicollet (5%)			
102C	Clarion loam, 6 to 10 percent slopes	Slight	Clarion (85%)		62.5	0.2%
			Storden, moderately eroded (10%)			
			Nicollet (5%)			
102D	Clarion loam, 12 to 18 percent slopes	Slight	Clarion (90%)		0.7	0.0%
			Webster (4%)			
			Terril (3%)			
104B	Hayden loam, 2 to 6 percent slopes	Slight	Hayden (85%)		24.9	0.1%
			Le Sueur (10%)			
			Glencoe (5%)			
104C	Hayden loam, 6 to 10 percent slopes	Slight	Hayden (85%)		31.2	0.1%
			Le Sueur (10%)			
			Dundas (5%)			
104D	Hayden loam, 10 to 22 percent slopes	Slight	Hayden (85%)		3.5	0.0%
			Dundas (8%)			
			Le Sueur (5%)			
			Storden, moderately eroded (2%)			
106B	Lester loam, 2 to 6 percent slopes	Slight	Lester (80%)		678.7	2.7%
			Le Sueur (10%)			
			Cordova (5%)			
			Webster (5%)			
106C2	Lester loam, 6 to 10 percent slopes, moderately eroded	Slight	Lester, moderately eroded (85%)		346.3	1.4%
			Storden, moderately eroded (10%)			
			Le Sueur (3%)			
			Hamel (2%)			
106D2	Lester loam, 10 to 16 percent slopes, moderately eroded	Slight	Lester, moderately eroded (85%)		9.1	0.0%

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
			Storden, moderately eroded (10%)			
			Lester, moderately eroded (3%)			
			Le Sueur (2%)			
110	Marna silty clay loam, 0 to 2 percent slopes	Slight	Marna (85%)		3.5	0.0%
			Okoboji (7%)			
			Guckeen (5%)			
			Brownton (3%)			
112	Harps clay loam, 0 to 2 percent slopes	Slight	Harps (85%)		99.8	0.4%
			Glencoe (10%)			
			Okoboji (3%)			
			Canisteo (2%)			
123	Dundas silt loam, 0 to 2 percent slopes	Slight	Dundas (85%)		224.6	0.9%
			Le Sueur (10%)			
			Webster (5%)			
129	Cylinder loam, 0 to 2 percent slopes	Slight	Cylinder (85%)		419.5	1.6%
			Biscay (10%)			
			Biscay, depressional (5%)			
134	Okoboji silty clay loam, 0 to 1 percent slopes	Slight	Okoboji (85%)		112.1	0.4%
			Canisteo (10%)			
			Harps (5%)			
136	Madelia silty clay loam, 0 to 2 percent slopes	Slight	Madelia (85%)		293.1	1.1%
			Kingston (6%)			
			Spicer (5%)			
			Chetomba (4%)			
140	Spicer silty clay loam, 0 to 2 percent slopes	Slight	Spicer (90%)		217.4	0.8%
			Okoboji (5%)			
			Madelia (3%)			
			Kingston (2%)			
156	Fairhaven loam, 0 to 2 percent slopes	Slight	Fairhaven (90%)		307.5	1.2%
			Biscay (2%)			
			Hanska (2%)			
			Linder (2%)			
			Dickinson (2%)			

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
			Salida (2%)			
156B	Fairhaven loam, 2 to 6 percent slopes	Slight	Fairhaven (90%)		60.5	0.2%
			Dickinson (2%)			
			Biscay (2%)			
			Hanska (2%)			
			Linder (2%)			
			Salida (2%)			
190	Hayfield silt loam, 1 to 3 percent slopes	Slight	Hayfield (85%)		60.9	0.2%
			Marshan (10%)			
			Udolpho (5%)			
216B	Lamont fine sandy loam, 2 to 6 percent slopes	Slight	Lamont (90%)		8.0	0.0%
			Chelsea (4%)			
			Hanska (3%)			
			Dakota (3%)			
227	Lemond loam, 0 to 2 percent slopes	Slight	Lemond (85%)		4.8	0.0%
			Biscay (10%)			
			Hanska (5%)			
229	Waldorf silty clay loam, 0 to 2 percent slopes	Slight	Waldorf (85%)		33.9	0.1%
			Okoboji (6%)			
			Collinwood (5%)			
			Brownton (4%)			
238B	Kilkenny clay loam, 2 to 6 percent slopes	Slight	Kilkenny (90%)		75.3	0.3%
			Shorewood (5%)			
			Lerdal, moderately eroded (5%)			
238C2	Kilkenny clay loam, 6 to 10 percent slopes, moderately eroded	Slight	Kilkenny, moderately eroded (90%)		123.5	0.5%
			Shorewood (5%)			
			Lerdal, moderately eroded (5%)			
238E	Kilkenny clay loam, 16 to 30 percent slopes	Moderate	Kilkenny (90%)	Slope/erodibility (0.50)	2.4	0.0%
			Belview (3%)	Slope/erodibility (0.50)		
239	Le Sueur loam, 1 to 3 percent slopes	Slight	Le Sueur (80%)		185.7	0.7%
			Cordova (10%)			
			Lester (5%)			

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
			Webster (5%)			
247	Linder sandy loam, 0 to 3 percent slopes	Slight	Linder (90%)		154.0	0.6%
			Biscay (3%)			
			Hanska (3%)			
			Dickinson (2%)			
			Estherville (2%)			
252	Marshan silt loam	Slight	Marshan (85%)		1,309.9	5.1%
			Shandep (5%)			
			Hayfield (3%)			
			Maxcreek (3%)			
			Mayer (2%)			
			Udolpho (2%)			
253	Maxcreek silty clay loam	Slight	Maxcreek (85%)		4,451.6	17.4%
			Merton (5%)			
			Newry (3%)			
			Canisteo (3%)			
			Palms (2%)			
			Havana (2%)			
255	Mayer loam, 0 to 2 percent slopes	Slight	Mayer (85%)		431.9	1.7%
			Biscay (10%)			
			Cylinder (3%)			
			Linder (2%)			
259B	Grays silt loam, 1 to 6 percent slopes	Slight	Grays (90%)		10.8	0.0%
			Webster (3%)			
			Madelia (3%)			
			Barrington (2%)			
			Lester (2%)			
282	Hanska loam, 0 to 2 percent slopes	Slight	Hanska (85%)		53.9	0.2%
			Lemond (10%)			
			Linder (5%)			
286B	Shorewood silty clay loam, 1 to 6 percent slopes	Slight	Shorewood (90%)		15.2	0.1%
			Lerdal, eroded (3%)			
			Minnetonka (3%)			
			Kilkenny (2%)			
			Lester (2%)			
300	Dassel mucky loam	Slight	Dassel (94%)		75.7	0.3%

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
			Fieldon (2%)			
			Hanska (2%)			
			Canisteo (1%)			
			Lemond (1%)			
318	Mayer loam, swales	Slight	Mayer, swales (90%)		28.9	0.1%
			Hanska (2%)			
			Lemond (2%)			
			Linder (2%)			
			Cylinder (2%)			
			Adrian (1%)			
			Blue Earth, variant (1%)			
350	Canisteo clay loam, depressional, 0 to 1 percent slopes	Slight	Canisteo, depressional (85%)		215.3	0.8%
			Glencoe (12%)			
			Harps (3%)			
376B	Moland silt loam, 2 to 6 percent slopes	Slight	Moland (85%)		288.3	1.1%
			Maxcreek (5%)			
			Merton (5%)			
			Clarion (5%)			
377	Merton silt loam, 1 to 3 percent slopes	Slight	Merton (85%)		1,850.0	7.2%
			Maxcreek (5%)			
			Moland (3%)			
			Havana (3%)			
			Blooming (2%)			
			Barrington (2%)			
378	Maxfield silty clay loam, 0 to 2 percent slopes	Slight	Maxfield (90%)		54.0	0.2%
			Klinger (10%)			
380	Havana silt loam	Slight	Havana (85%)		864.8	3.4%
			Newry (10%)			
			Blooming (5%)			
381	Newry silt loam, 1 to 3 percent slopes	Slight	Newry (85%)		889.0	3.5%
			Havana (5%)			
			Maxcreek (3%)			
			Barrington (3%)			
			Le Sueur (2%)			

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
			Blooming (2%)			
382B	Blooming silt loam, 2 to 6 percent slopes	Slight	Blooming (85%)		603.7	2.4%
			Havana (5%)			
			Maxcreek (5%)			
			Newry (5%)			
386	Wacousta mucky silt loam	Slight	Wacousta (93%)		116.4	0.5%
			Glencoe (3%)			
			Spicer (2%)			
			Hamel (2%)			
391	Spicer silt loam, depressional	Slight	Spicer, depressional (94%)		27.0	0.1%
			Marna (2%)			
			Madelia (2%)			
			Waldorf (1%)			
			Canisteo (1%)			
392	Biscay clay loam, 0 to 2 percent slopes	Slight	Biscay (85%)		203.1	0.8%
			Biscay, depressional (10%)			
			Mayer (3%)			
			Okoboji (2%)			
393	Udolpho silt loam	Slight	Udolpho (93%)		80.3	0.3%
			Marshan (4%)			
			Fairhaven (3%)			
414	Hamel loam, 0 to 2 percent slopes	Slight	Hamel (85%)		340.4	1.3%
			Terril (10%)			
			Glencoe (5%)			
465	Kalmarville loam, frequently flooded	Slight	Kalmarville, frequently flooded (93%)		70.2	0.3%
			Biscay (2%)			
			Shandep (1%)			
			Mayer (1%)			
517	Shandep loam	Slight	Shandep (97%)		52.9	0.2%
			Webster (2%)			
			Mayer (1%)			
525	Muskego soils, 0 to 1 percent slopes	Slight	Muskego, drained (45%)		75.2	0.3%

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
			Muskego, ponded (40%)			
			Klossner, drained (8%)			
			Glencoe (4%)			
			Canisteo (3%)			
920B	Clarion-Estherville complex, 2 to 6 percent slopes	Slight	Clarion (45%)		65.1	0.3%
			Estherville (40%)			
			Nicollet (10%)			
			Webster (5%)			
920C	Clarion-Storden-Pilot Grove complex, 6 to 10 percent slopes, moderately eroded	Slight	Clarion, moderately eroded (47%)		11.4	0.0%
			Storden, moderately eroded (30%)			
			Pilot Grove, moderately eroded (20%)			
			Terril (2%)			
			Delft (1%)			
920D	Omsrud-Storden-Pilot Grove complex, 10 to 16 percent slopes, moderately eroded	Slight	Omsrud, moderately eroded (45%)		5.2	0.0%
			Storden, moderately eroded (30%)			
			Pilot Grove, moderately eroded (20%)			
			Terril (5%)			
921B	Clarion-Swanlake complex, 2 to 6 percent slopes	Slight	Clarion (60%)		2.0	0.0%
			Swanlake (25%)			
			Webster (5%)			
			Storden, moderately eroded (5%)			
			Nicollet (5%)			
921C	Clarion-Storden complex, 6 to 10 percent slopes, moderately eroded	Slight	Clarion, moderately eroded (45%)		2.9	0.0%
			Storden, moderately eroded (40%)			
			Terril (10%)			

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
			Delft (5%)			
940	Maxcreek-Barbert complex	Slight	Maxcreek (65%)		175.5	0.7%
			Barbert (25%)			
			Madelia (3%)			
			Merton (3%)			
			Newry (2%)			
			Havana (2%)			
944B	Lester-Estherville complex, 2 to 6 percent slopes	Slight	Lester (65%)		5.3	0.0%
			Estherville (25%)			
			Le Sueur (4%)			
			Webster (3%)			
			Dundas (3%)			
944C2	Lester-Estherville complex, 6 to 12 percent slopes, eroded	Slight	Lester, eroded (65%)		7.3	0.0%
			Estherville (25%)			
			Webster (2%)			
			Glencoe (2%)			
			Hamel (2%)			
			Biscay (2%)			
			Terril (1%)			
			Le Sueur (1%)			
1027	Udorthents, wet substratum	Not rated	Udorthents, wet substratum (100%)		0.3	0.0%
1030	Pits, sand and gravel	Not rated	Pits, sand and gravel (95%)		29.0	0.1%
			Water, sand and gravel (5%)			
1055	Aquents and Histosols, ponded	Not rated	Aquents, ponded (45%)		20.5	0.1%
			Histosols, ponded (45%)			
1078	Udorthents	Not rated	Udorthents (100%)		0.5	0.0%
1818	Adrian muck, deep	Slight	Adrian, deep (90%)		3.5	0.0%
			Glencoe (3%)			
			Maxcreek (3%)			
			Muskego (2%)			
			Caron (2%)			

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
L13A	Klossner muck, 0 to 1 percent slopes	Slight	Klossner, drained (90%)		474.5	1.9%
			Okoboji (5%)			
			Canisteo (5%)			
L78A	Canisteo clay loam, 0 to 2 percent slopes	Slight	Canisteo (75%)		1,982.3	7.7%
			Okoboji (13%)			
			Harps (5%)			
			Webster (5%)			
			Glencoe (2%)			
L83A	Webster clay loam, 0 to 2 percent slopes	Slight	Webster (85%)		2,198.9	8.6%
			Nicollet (5%)			
			Okoboji (5%)			
			Glencoe (3%)			
			Canisteo (2%)			
L84A	Glencoe clay loam, 0 to 1 percent slopes	Slight	Glencoe (80%)		1,095.4	4.3%
			Okoboji (10%)			
			Webster (5%)			
			Canisteo (5%)			
L85A	Nicollet clay loam, 1 to 3 percent slopes	Slight	Nicollet (85%)		1,212.5	4.7%
			Webster (5%)			
			Okoboji (5%)			
			Clarion (5%)			
L113B	Reedslake-Le Sueur complex, 1 to 6 percent slopes	Slight	Reedslake (59%)		139.3	0.5%
			Le Sueur (30%)			
			Cordova (7%)			
			Swanlake (4%)			
L1207B	Le Sueur-Reedslake-Cordova complex, 0 to 5 percent slopes	Slight	Le Sueur (50%)		45.9	0.2%
			Reedslake (29%)			
			Cordova (21%)			
W	Water	Not rated	Water (100%)		22.8	0.1%
Totals for Area of Interest					**25,604.5**	**100.0%**

Rating	Acres in AOI	Percent of AOI
Slight	25,528.9	99.7%
Moderate	2.4	0.0%
Null or Not Rated	73.2	0.3%

Rating	Acres in AOI	Percent of AOI
Totals for Area of Interest	**25,604.5**	**100.0%**

Description

The ratings in this interpretation indicate the hazard of soil loss from off-road and off-trail areas after disturbance activities that expose the soil surface. The ratings are based on slope and soil erosion factor K. The soil loss is caused by sheet or rill erosion in off-road or off-trail areas where 50 to 75 percent of the surface has been exposed by logging, grazing, mining, or other kinds of disturbance.

The ratings are both verbal and numerical. The hazard is described as "slight," "moderate," "severe," or "very severe." A rating of "slight" indicates that erosion is unlikely under ordinary climatic conditions; "moderate" indicates that some erosion is likely and that erosion-control measures may be needed; "severe" indicates that erosion is very likely and that erosion-control measures, including revegetation of bare areas, are advised; and "very severe" indicates that significant erosion is expected, loss of soil productivity and off-site damage are likely, and erosion-control measures are costly and generally impractical.

Numerical ratings indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the specified aspect of forestland management (1.00) and the point at which the soil feature is not a limitation (0.00).

The map unit components listed for each map unit in the accompanying Summary by Map Unit table in Web Soil Survey or the Aggregation Report in Soil Data Viewer are determined by the aggregation method chosen. An aggregated rating class is shown for each map unit. The components listed for each map unit are only those that have the same rating class as listed for the map unit. The percent composition of each component in a particular map unit is presented to help the user better understand the percentage of each map unit that has the rating presented.

Other components with different ratings may be present in each map unit. The ratings for all components, regardless of the map unit aggregated rating, can be viewed by generating the equivalent report from the Soil Reports tab in Web Soil Survey or from the Soil Data Mart site. Onsite investigation may be needed to validate these interpretations and to confirm the identity of the soil on a given site.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

RUSLE2 Related Attributes

This report summarizes those soil attributes used by the Revised Universal Soil Loss Equation Version 2 (RUSLE2) for the map units in the selected area. The report includes the map unit symbol, the component name, and the percent of the component in the map unit. Soil property data for each map unit component include the hydrologic soil group, erosion factors Kf for the surface horizon, erosion factor T, and the representative percentage of sand, silt, and clay in the mineral surface horizon. Missing surface data may indicate the presence of an organic surface layer. .

Report—RUSLE2 Related Attributes

Soil properties and interpretations for erosion runoff calculations. The surface mineral horizon properties are displayed. Organic surface horizons are not displayed.

RUSLE2 Related Attributes–Freeborn County, Minnesota								
Map symbol and soil name	Pct. of map unit	Slope length (ft)	Hydrologic group	Kf	T factor	Representative value		
						% Sand	% Silt	% Clay
5—Dakota loam, 0 to 2 percent slopes								
Dakota	87	151	B	.28	4	42.0	37.5	20.5
5B—Dakota loam, 2 to 6 percent slopes								
Dakota	85	151	B	.28	4	42.0	37.5	20.5
5C—Dakota loam, 6 to 14 percent slopes								
Dakota	85	125	B	.28	4	42.0	37.5	20.5
23—Skyberg silt loam, 0 to 3 percent slopes								
Skyberg	95	298	C/D	.37	5	26.0	54.0	20.0
24B—Kasson silt loam, 1 to 4 percent slopes								
Kasson	85	200	C	.32	5	19.0	58.0	23.0
27—Dickinson fine sandy loam, 0 to 2 percent slopes								
Dickinson	93	102	A	.20	3	66.1	19.9	14.0
27B—Dickinson fine sandy loam, 2 to 6 percent slopes								
Dickinson	93	151	A	.20	3	66.1	19.9	14.0
27C—Dickinson fine sandy loam, 6 to 16 percent slopes								
Dickinson	93	125	A	.20	3	66.1	19.9	14.0

RUSLE2 Related Attributes–Freeborn County, Minnesota								
Map symbol and soil name	Pct. of map unit	Slope length (ft)	Hydrologic group	Kf	T factor	Representative value		
						% Sand	% Silt	% Clay
41—Estherville sandy loam, 0 to 2 percent slopes								
Estherville	91	302	A	.15	3	68.3	19.7	12.0
41B—Estherville sandy loam, 2 to 6 percent slopes								
Estherville	85	98	A	.20	2	57.0	26.0	17.0
41C—Estherville sandy loam, 6 to 12 percent slopes								
Estherville	92	125	A	.15	3	68.3	19.7	12.0
62—Barrington silt loam, 1 to 3 percent slopes								
Barrington	94	203	C	.37	5	9.4	67.1	23.5
83—Maxcreek silty clay loam, swales								
Maxcreek, swales	85	203	B/D	.24	5	6.9	63.1	30.0
87B—Chelsea loamy fine sand, 4 to 10 percent slopes								
Chelsea	94	203	A	.20	5	84.5	6.5	9.0
94B—Terril loam, 2 to 6 percent slopes								
Terril	80	98	B	.28	5	46.0	33.0	21.0
102B—Clarion loam, 2 to 6 percent slopes								
Clarion	85	98	C	.24	5	41.0	34.0	25.0
102C—Clarion loam, 6 to 10 percent slopes								
Clarion	85	98	B	.24	5	41.0	34.0	25.0
102D—Clarion loam, 12 to 18 percent slopes								
Clarion	90	125	B	.20	5	39.2	37.3	23.5
104B—Hayden loam, 2 to 6 percent slopes								
Hayden	85	98	C	.28	5	39.0	37.0	24.0
104C—Hayden loam, 6 to 10 percent slopes								
Hayden	85	98	C	.24	5	39.0	37.0	24.0
104D—Hayden loam, 10 to 22 percent slopes								
Hayden	85	98	C	.24	5	39.0	37.0	24.0
106B—Lester loam, 2 to 6 percent slopes								
Lester	80	98	C	.28	5	39.0	37.0	24.0

RUSLE2 Related Attributes–Freeborn County, Minnesota								
Map symbol and soil name	Pct. of map unit	Slope length (ft)	Hydrologic group	Kf	T factor	Representative value		
						% Sand	% Silt	% Clay
106C2—Lester loam, 6 to 10 percent slopes, moderately eroded								
Lester, moderately eroded	85	98	C	.32	5	39.0	37.0	24.0
106D2—Lester loam, 10 to 16 percent slopes, moderately eroded								
Lester, moderately eroded	85	98	C	.32	5	39.0	37.0	24.0
110—Marna silty clay loam, 0 to 2 percent slopes								
Marna	85	98	C/D	.32	5	7.0	54.0	39.0
112—Harps clay loam, 0 to 2 percent slopes								
Harps	85	82	C/D	.24	5	30.0	38.0	32.0
123—Dundas silt loam, 0 to 2 percent slopes								
Dundas	85	82	C/D	.37	5	25.0	55.0	20.0
129—Cylinder loam, 0 to 2 percent slopes								
Cylinder	85	89	B/D	.20	3	42.0	34.0	24.0
134—Okoboji silty clay loam, 0 to 1 percent slopes								
Okoboji	85	82	C/D	.32	5	11.0	53.0	36.0
136—Madelia silty clay loam, 0 to 2 percent slopes								
Madelia	85	98	C/D	.32	5	7.0	62.0	31.0
140—Spicer silty clay loam, 0 to 2 percent slopes								
Spicer	90	98	C/D	.37	5	8.0	62.0	30.0
156—Fairhaven loam, 0 to 2 percent slopes								
Fairhaven	90	151	B	.20	3	39.8	37.7	22.5
156B—Fairhaven loam, 2 to 6 percent slopes								
Fairhaven	90	151	B	.20	3	39.8	37.7	22.5
190—Hayfield silt loam, 1 to 3 percent slopes								
Hayfield	85	151	C	.28	3	24.8	52.7	22.5
216B—Lamont fine sandy loam, 2 to 6 percent slopes								
Lamont	90	151	A	.17	4	67.3	20.2	12.5

RUSLE2 Related Attributes–Freeborn County, Minnesota								
Map symbol and soil name	Pct. of map unit	Slope length (ft)	Hydrologic group	Kf	T factor	Representative value		
						% Sand	% Silt	% Clay
227—Lemond loam, 0 to 2 percent slopes								
Lemond	85	89	B/D	.24	3	50.0	35.0	15.0
229—Waldorf silty clay loam, 0 to 2 percent slopes								
Waldorf	85	98	C/D	.32	5	7.0	54.0	39.0
238B—Kilkenny clay loam, 2 to 6 percent slopes								
Kilkenny	90	98	D	.32	5	33.0	37.0	30.0
238C2—Kilkenny clay loam, 6 to 10 percent slopes, moderately eroded								
Kilkenny, moderately eroded	90	98	D	.32	5	33.0	37.0	30.0
238E—Kilkenny clay loam, 16 to 30 percent slopes								
Kilkenny	90	98	C	.28	5	33.0	37.0	30.0
239—Le Sueur loam, 1 to 3 percent slopes								
Le Sueur	80	82	C/D	.28	5	39.0	37.0	24.0
247—Linder sandy loam, 0 to 3 percent slopes								
Linder	90	102	B/D	.15	3	65.1	18.9	16.0
252—Marshan silt loam								
Marshan	85	203	B/D	.24	3	24.8	52.7	22.5
253—Maxcreek silty clay loam								
Maxcreek	85	253	B/D	.24	5	6.9	63.1	30.0
255—Mayer loam, 0 to 2 percent slopes								
Mayer	85	82	B/D	.24	3	36.0	39.0	25.0
259B—Grays silt loam, 1 to 6 percent slopes								
Grays	90	151	B	.32	5	9.5	68.0	22.5
282—Hanska loam, 0 to 2 percent slopes								
Hanska	85	89	B/D	.28	3	50.0	35.0	15.0
286B—Shorewood silty clay loam, 1 to 6 percent slopes								
Shorewood	90	151	C	.20	5	17.3	47.7	35.0
300—Dassel mucky loam								
Dassel	94	203	A/D	.24	3	43.3	39.7	17.0

RUSLE2 Related Attributes–Freeborn County, Minnesota								
Map symbol and soil name	Pct. of map unit	Slope length (ft)	Hydrologic group	Kf	T factor	Representative value		
						% Sand	% Silt	% Clay
318—Mayer loam, swales								
Mayer, swales	90	403	B/D	.24	4	39.1	36.9	24.0
350—Canisteo clay loam, depressional, 0 to 1 percent slopes								
Canisteo, depressional	85	82	C/D	.28	5	26.0	42.0	32.0
376B—Moland silt loam, 2 to 6 percent slopes								
Moland	85	151	B	.32	5	24.8	52.7	22.5
377—Merton silt loam, 1 to 3 percent slopes								
Merton	85	203	B/D	.24	5	24.8	52.7	22.5
378—Maxfield silty clay loam, 0 to 2 percent slopes								
Maxfield	90	298	C/D	.37	5	7.0	65.0	28.0
380—Havana silt loam								
Havana	85	203	C/D	.28	5	24.8	52.7	22.5
381—Newry silt loam, 1 to 3 percent slopes								
Newry	85	203	C	.24	5	24.8	52.7	22.5
382B—Blooming silt loam, 2 to 6 percent slopes								
Blooming	85	203	B	.28	5	24.8	52.7	22.5
386—Wacousta mucky silt loam								
Wacousta	93	403	B/D	.37	5	9.5	67.5	23.0
391—Spicer silt loam, depressional								
Spicer, depressional	94	403	B/D	.37	5	9.5	68.0	22.5
392—Biscay clay loam, 0 to 2 percent slopes								
Biscay	85	89	C/D	.24	3	36.0	37.0	27.0
393—Udolpho silt loam								
Udolpho	93	203	B/D	.28	3	24.8	52.7	22.5
414—Hamel loam, 0 to 2 percent slopes								
Hamel	85	82	C/D	.24	5	40.0	37.0	23.0
465—Kalmarville loam, frequently flooded								
Kalmarville, frequently flooded	93	203	B/D	.28	3	41.1	36.9	22.0

RUSLE2 Related Attributes–Freeborn County, Minnesota								
Map symbol and soil name	Pct. of map unit	Slope length (ft)	Hydrologic group	Kf	T factor	Representative value		
						% Sand	% Silt	% Clay
517—Shandep loam								
Shandep	97	203	B/D	.24	4	37.9	35.6	26.5
525—Muskego soils, 0 to 1 percent slopes								
Muskego, drained	45	689	C/D	.49	1	10.0	75.0	15.0
Muskego, ponded	40	689	C/D	.49	1	10.0	75.0	15.0
920B—Clarion-Estherville complex, 2 to 6 percent slopes								
Clarion	45	98	C	.24	5	41.0	34.0	25.0
Estherville	40	98	A	.20	2	57.0	26.0	17.0
920C—Clarion-Storden-Pilot Grove complex, 6 to 10 percent slopes, moderately eroded								
Clarion, moderately eroded	47	98	B	.28	5	46.0	33.0	21.0
Storden, moderately eroded	30	98	B	.28	5	46.0	33.0	21.0
Pilot Grove, moderately eroded	20	98	A	.20	5	57.0	26.0	17.0
920D—Omsrud-Storden-Pilot Grove complex, 10 to 16 percent slopes, moderately eroded								
Omsrud, moderately eroded	45	98	B	.28	5	46.0	33.0	21.0
Storden, moderately eroded	30	98	B	.28	5	46.0	33.0	21.0
Pilot Grove, moderately eroded	20	98	A	.20	5	57.0	26.0	17.0
921B—Clarion-Swanlake complex, 2 to 6 percent slopes								
Clarion	60	98	C	.24	5	41.0	34.0	25.0
Swanlake	25	98	B	.28	5	42.0	34.0	24.0
921C—Clarion-Storden complex, 6 to 10 percent slopes, moderately eroded								
Clarion, moderately eroded	45	98	B	.28	5	46.0	33.0	21.0
Storden, moderately eroded	40	98	B	.28	5	46.0	33.0	21.0
940—Maxcreek-Barbert complex								
Maxcreek	65	203	B/D	.24	5	6.9	63.1	30.0
Barbert	25	203	B/D	.32	5	24.8	52.7	22.5

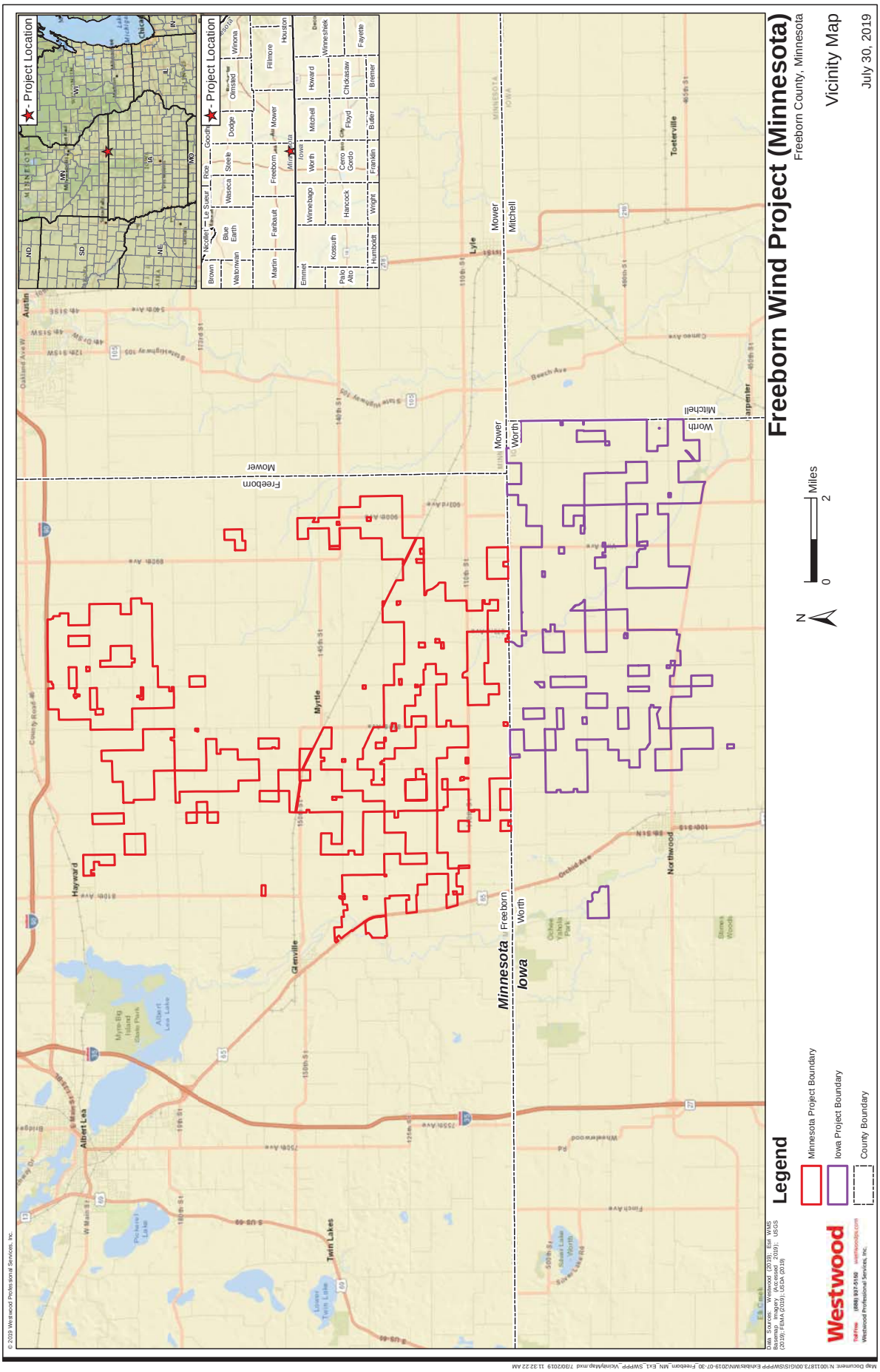
RUSLE2 Related Attributes–Freeborn County, Minnesota								
Map symbol and soil name	Pct. of map unit	Slope length (ft)	Hydrologic group	Kf	T factor	Representative value		
						% Sand	% Silt	% Clay
944B—Lester-Estherville complex, 2 to 6 percent slopes								
Lester	65	125	B	.28	5	39.5	37.5	23.0
Estherville	25	—	A	.15	3	68.3	19.7	12.0
944C2—Lester-Estherville complex, 6 to 12 percent slopes, eroded								
Lester, eroded	65	131	B	.28	5	39.5	37.5	23.0
Estherville	25	—	A	.15	3	68.3	19.7	12.0
1818—Adrian muck, deep								
Adrian, deep	90	203	B/D	.37	1	9.1	65.9	25.0
L13A—Klossner muck, 0 to 1 percent slopes								
Klossner, drained	90	689	C/D	.32	1	14.0	53.0	33.0
L78A—Canisteo clay loam, 0 to 2 percent slopes								
Canisteo	75	82	C/D	.28	5	30.0	38.0	32.0
L83A—Webster clay loam, 0 to 2 percent slopes								
Webster	85	82	C/D	.28	5	25.0	42.0	33.0
L84A—Glencoe clay loam, 0 to 1 percent slopes								
Glencoe	80	82	C/D	.28	5	22.0	45.0	33.0
L85A—Nicollet clay loam, 1 to 3 percent slopes								
Nicollet	85	82	C/D	.28	5	31.0	39.0	30.0
L113B—Reedslake-Le Sueur complex, 1 to 6 percent slopes								
Reedslake	59	164	C	.24	5	45.0	33.0	22.0
Le Sueur	30	164	C/D	.28	5	31.0	41.0	28.0
L1207B—Le Sueur-Reedslake-Cordova complex, 0 to 5 percent slopes								
Le Sueur	50	164	C/D	.28	5	31.0	41.0	28.0
Reedslake	29	164	C	.24	5	45.0	33.0	22.0
Cordova	21	164	C/D	.28	5	34.2	37.8	28.0

Data Source Information

Soil Survey Area: Freeborn County, Minnesota
Survey Area Data: Version 14, Sep 12, 2018

Attachment D

Pre and Post Drainage Maps, Impaired / Special Water Maps



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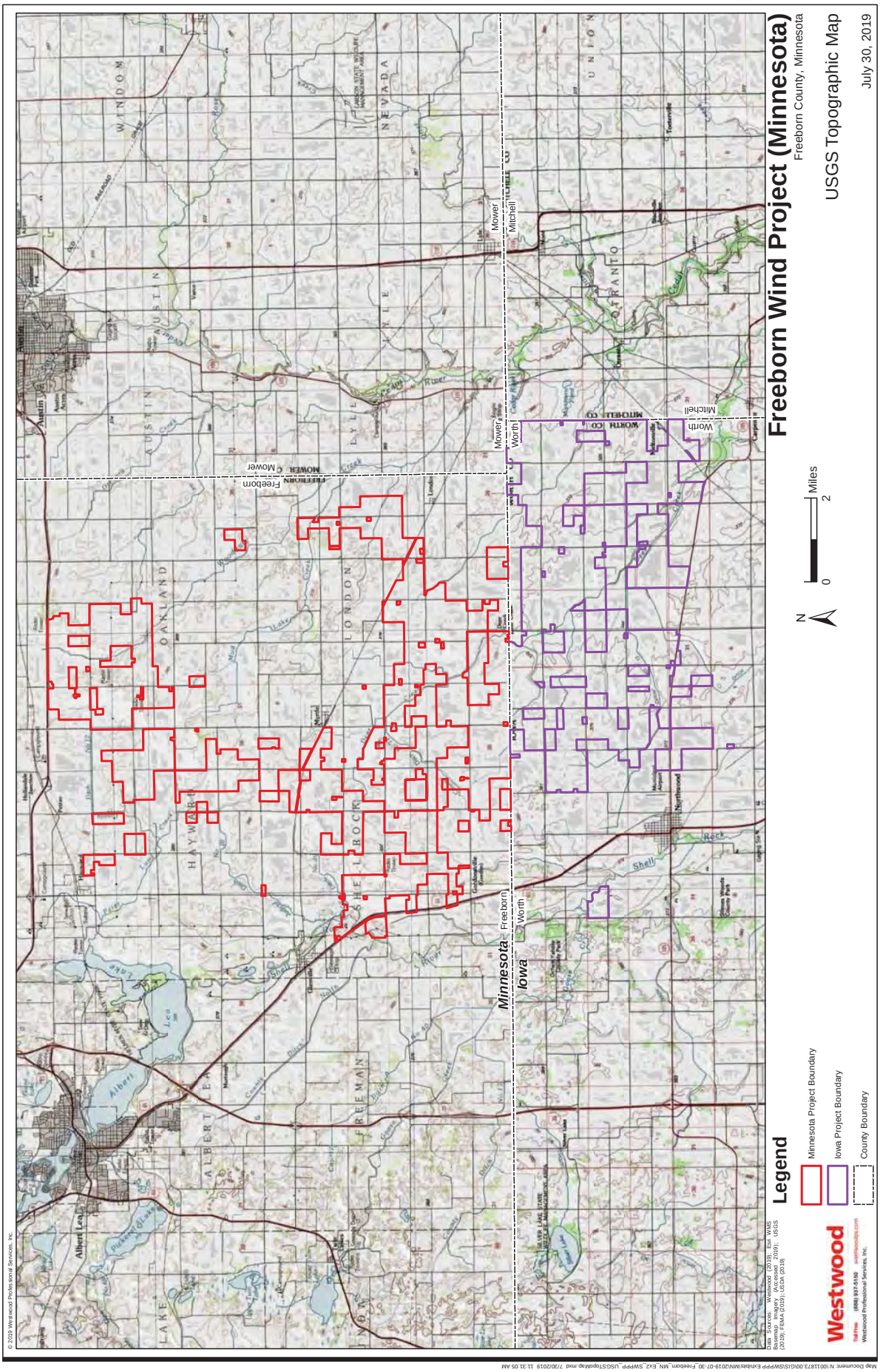
Freeborn Wind Project (Minnesota)
Freeborn County, Minnesota
USGS Topographic Map
July 30, 2019
Legend
Minnesota Project Boundary
Iowa Project Boundary
County Boundary
Miles
0
2
N
Minnesota
Iowa
Freeborn
Worth
Mower
Mitchell
Albert Lea
Austin
Westwood
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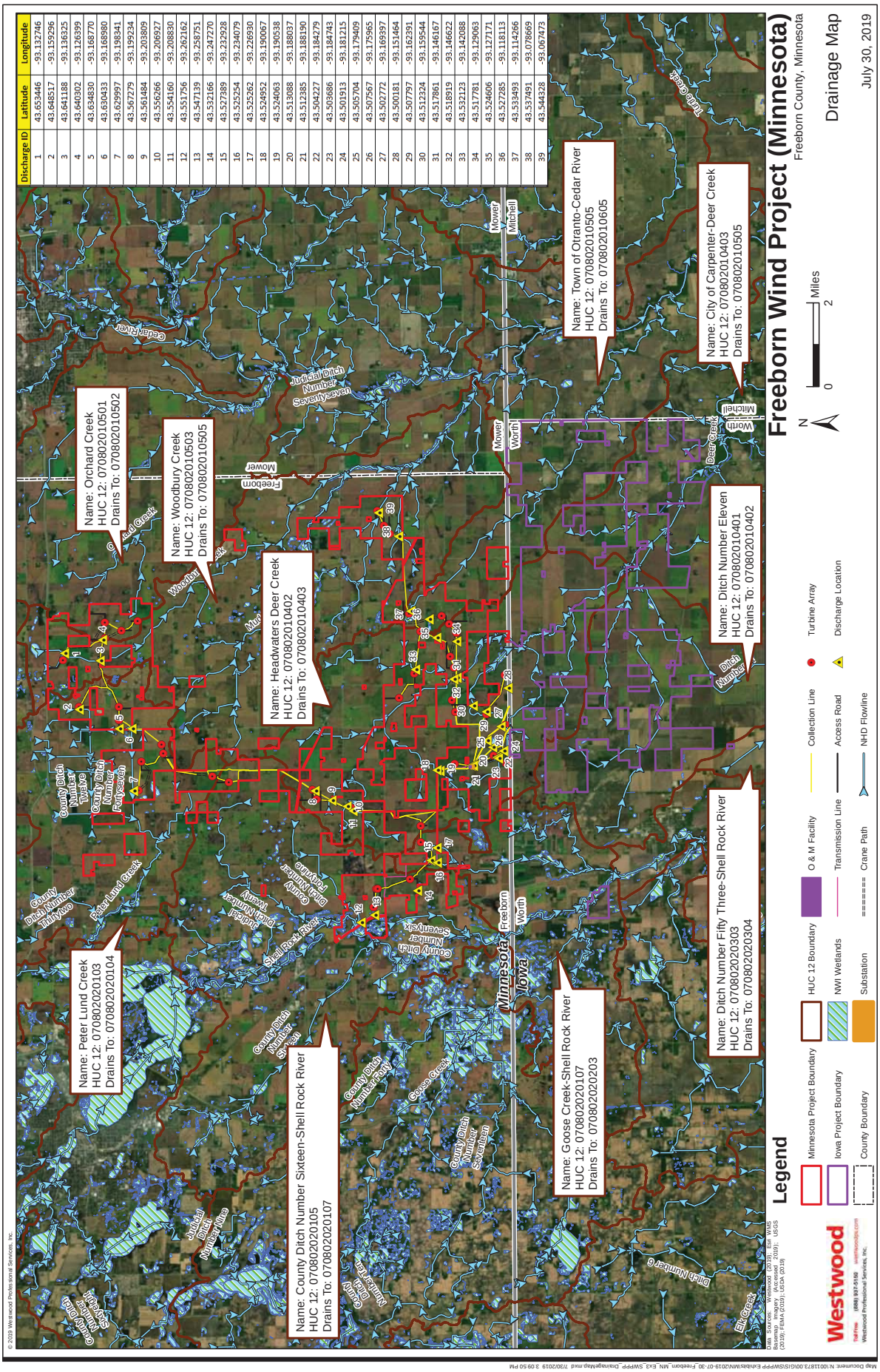

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3	43.641188	-93.136325
4	43.640302	-93.126399
5	43.634830	-93.168770
6	43.630433	-93.168980
7	43.629997	-93.198341
8	43.567279	-93.199234
9	43.561484	-93.203809
10	43.556266	-93.206927
11	43.554160	-93.208830
12	43.551756	-93.262162
13	43.547139	-93.258751
14	43.532166	-93.247270
15	43.527389	-93.232928
16	43.525254	-93.234079
17	43.525262	-93.226930
18	43.524952	-93.190067
19	43.524063	-93.190538
20	43.513088	-93.188037
21	43.512385	-93.188190
22	43.504227	-93.184279
23	43.503686	-93.184743
24	43.501913	-93.181215
25	43.505704	-93.179409
26	43.507567	-93.175965
27	43.502772	-93.169397
28	43.500181	-93.151464
29	43.507797	-93.162391
30	43.512324	-93.159544
31	43.517861	-93.146167
32	43.518919	-93.146622
33	43.532123	-93.142088
34	43.517781	-93.129063
35	43.524606	-93.127171
36	43.527285	-93.118113
37	43.533493	-93.114266
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39	43.544328	-93.067473

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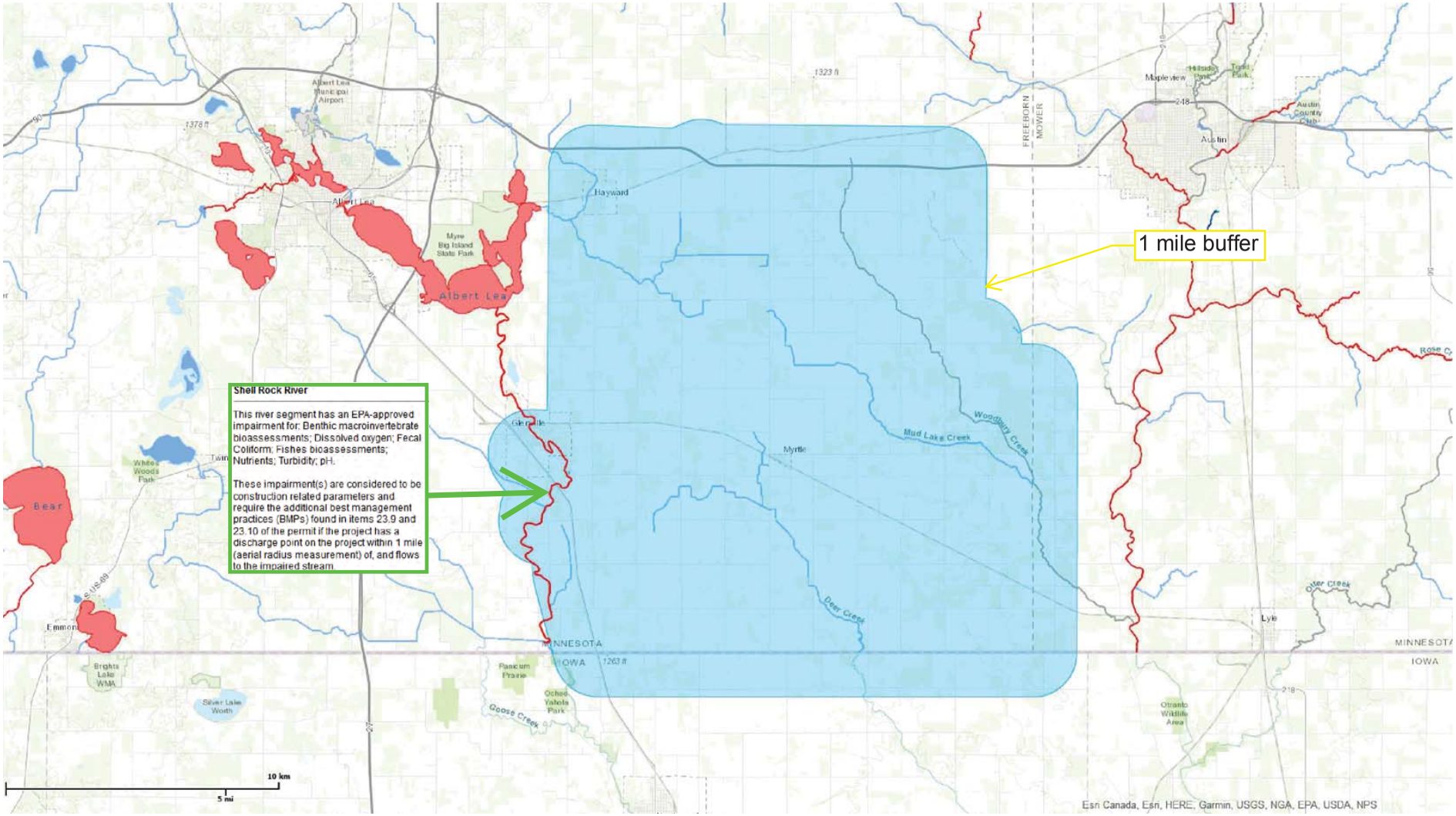
Map Document: N:\00118\73.00\GIS\SWPPP Exhibits\MN\2019-07-30_Freeborn_MN_Ex3_SWPPP_DrainageMap.mxd 7/30/2019 3:09:50 PM

Impaired Waters Map

Freeborn Wind Project



Fri Jul 26 2019 02:02:46 PM.

Impaired stream

Shell Rock River:
07080202-501

Impaired and a TMDL study is required.

New impairments:
None
TMDL required for:
Benthic macroinvertebrate bioassessments; Dissolved oxygen; Fishes bioassessments; Nutrients; Turbidity; pH
Approved TMDL plan for:
Fecal Coliform
Natural background impairment:
None
Non-pollutant impairment :
None

AFCL Exhibit E

Attachment E

Site Plans, Erosion and Sediment Control Plans, Details

90% Civil Construction Plans

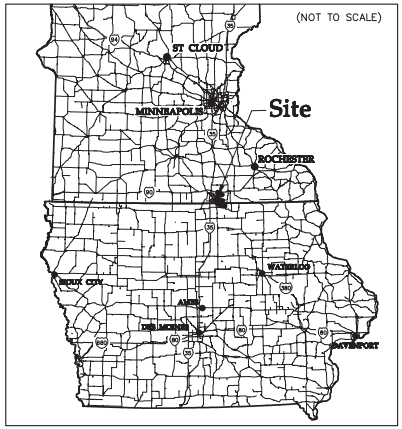
for

Wind Turbines, Access Roads, Drainage, and Erosion Control

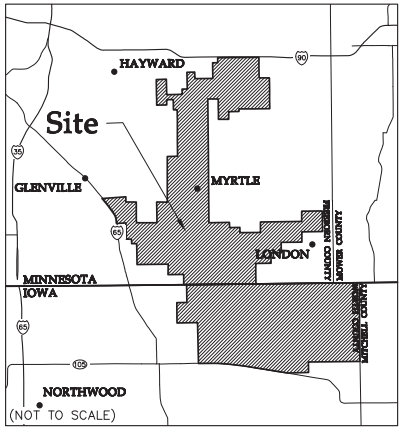
Freeborn Wind Project

Freeborn County, Minnesota & Worth County, Iowa

State Map



Vicinity Map



Sheet List Table	
Sheet Number	**Sheet Title**
NH-276086-1	Cover
NH-276086-2	Turbine Coordinates & Culvert Schedule
NH-276086-3-1	Overall Plan – MN
NH-276086-3-2	Overall Plan – IA
NH-276086-4-1	Delivery Flow Plan – MN
NH-276086-4-2	Delivery Flow Plan – IA
NH-276086-5-1	Construction Details
NH-276086-5-2	Construction Details
NH-276086-5-3	Construction Details
NH-276086-5-4	Construction Details
NH-276086-6	SWPPP Details
NH-276086-7-1	Construction Notes
NH-276086-7-2	Construction Notes
NH-276086-8-1	Site Plan T-3
NH-276086-8-2	Site Plan T-4
NH-276086-8-3	Site Plan T-8 T-9
NH-276086-8-4	Site Plan
NH-276086-8-5	Site Plan T-11 T-12 T-16
NH-276086-8-6	Site Plan T-6
NH-276086-8-7	Site Plan T-7 T-13 T-14
NH-276086-8-8	Site Plan T-17
NH-276086-8-9	Site Plan T-18
NH-276086-8-10	Site Plan T-19
NH-276086-8-11	Site Plan T-20 T-21
NH-276086-8-12	Site Plan T-22
NH-276086-8-13	Site Plan T-23
NH-276086-8-14	Site Plan T-24
NH-276086-8-15	Site Plan T-34
NH-276086-8-16	Site Plan T-25
NH-276086-8-17	Site Plan T-26 T-27
NH-276086-8-18	Site Plan T-28
NH-276086-8-19	Site Plan T-29
NH-276086-8-20	Site Plan T-30 T-31
NH-276086-8-21	Site Plan T-32 T-33
NH-276086-8-22	Site Plan T-37
NH-276086-8-23	Site Plan T-38 T-39
NH-276086-8-24	Site Plan T-40 T-41
NH-276086-8-25	Site Plan T-42 T-43 T-44
NH-276086-8-26	Site Plan T-45 T-46
NH-276086-8-27	Site Plan T-47 T-48
NH-276086-8-28	Site Plan T-49
NH-276086-9-1	Site Plan T-100 – T-102
NH-276086-9-2	Site Plan T-103 – T-105
NH-276086-9-3	Site Plan T-105 T-106
NH-276086-9-4	Site Plan T-107 T-108
NH-276086-9-5	Site Plan T-109 – T-111
NH-276086-9-6	Site Plan T-112 T-113
NH-276086-9-7	Site Plan T-114
NH-276086-9-8	Site Plan T-127
NH-276086-9-9	Site Plan T-119 T-120
NH-276086-9-10	Site Plan T-121 T-132
NH-276086-9-11	Site Plan T-122 T-123 T-133
NH-276086-9-12	Site Plan T-124 T-134 T-135
NH-276086-9-13	Site Plan T-136 – T-139
NH-276086-9-14	Site Plan T-125 T-140 – T-142
NH-276086-9-15	Site Plan T-143 – T-145
NH-276086-9-16	Site Plan T-126 T-146 T-147 T-162 T-163
NH-276086-9-17	Site Plan T-152
NH-276086-9-18	Site Plan T-153
NH-276086-9-19	Site Plan T-154 – T-156
NH-276086-9-20	Site Plan T-157
NH-276086-9-21	Site Plan T-158 T-159
NH-276086-9-22	Site Plan T-172
NH-276086-9-23	Site Plan T-169 T-170 T-179 T-180
NH-276086-9-24	Site Plan T-181 – T-183

DATA SET INFORMATION			
BASE FILE	FILE NAME / NOTES	PROVIDER	DATE
AERIAL IMAGE	AERIAL-MNCompImgry-GM.jp2	Minnesota Composite Imagery	11/3/2017
LAND CONTROL	freeborn_parcelstatus_20190410.shp	Invenergy	4/10/2019
TOPOGRAPHY	FR_ThinnedLidar_MKP_171103.xyz	National Elevation Dataset (NED)	11/3/2017
TURBINE ARRAY	L079 Freeborn Turbines 190610.shp	Invenergy	6/10/2019
UNDERGROUND COLLECTION	Freeborn_Collection_L079DL.shp	Invenergy	6/6/2019
STREAMS/WETLANDS	Wetland_Waterbody_Field_Data.shp	Invenergy	5/20/2019

Westwood

Phone (952) 937-5150 12701 Whitewater Dr
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Toll Free (888) 937-5150 www.westwoodps.com
Professional Services, Inc.

NO	REVISION	ZONE	DATE	BY	CHK	ENG
A	30% CIVIL PLANS		11/21/18	SNK	DJN	DJN
B	60% CIVIL PLANS		7/3/19	SNK	DJN	DJN
C	90% CIVIL PLANS		9/12/19	TDD	DJN	DJN

NO	REVISION	ZONE	DATE	BY	CHK	ENG

REFERENCE DRAWINGS		
DWG NO.	MANUFACTURER	DESCRIPTION

Xcel Energy®
NORTHERN STATES POWER COMPANY
FREEBORN WIND FARM
Freeborn County, MN and Worth County, IA

DWN: TDD	DATE:	CHK:	DATE:
ENG: DJN	DATE:	CHK:	DATE:
PM: DJN	DATE:	PROJ. NO: 22586	
APVD:	DATE:	SCALE: NONE	

THIS MAP/DOCUMENT IS A TOOL TO ASSIST EMPLOYEES IN THE PERFORMANCE OF THEIR JOBS. YOUR PERSONAL SAFETY IS PROVIDED FOR BY USING SAFETY PRACTICES, PROCEDURES, AND EQUIPMENT AS DESCRIBED IN THE SAFETY TRAINING PROGRAMS AND MANUALS.

ENERGY SUPPLY
ENGINEERING & CONSTRUCTION

UNIT 0
CIVIL ACCESS ROADS

COVER SHEET/DRAWING INDEX

NH-276086-1

REV C

AFCL Exhibit E

Docket No. IP-6946/WS-17-410
Compliance Filing-Section 5.2.6
Attachment A
Page 150 of 221

TURBINE COORDINATES

Freeborn Wind Project - Minnesota					
Turbine Number	Turbine Type	WGS84		FreebornMN-F	
		Longitude	Latitude	Easting	Northing
T-3	V120	-93.15810993	43.64854557	709599.7251	155150.4611
T-4	V110	-93.13572186	43.65393591	715522.3196	157172.8800
T-6	V120	-93.19815202	43.62821682	699083.8095	147641.8742
T-7	V120	-93.18453198	43.62723906	702693.4859	147318.2399
T-8	V120	-93.16861609	43.63483886	707940.7628	150137.8815
T-9	V120	-93.15813432	43.63473357	709646.6215	150115.6955
T-11	V120	-93.12552857	43.63929875	718273.2109	151863.9700
T-12	V120	-93.13816939	43.62925045	720221.5144	151865.8147
T-13	V120	-93.13073473	43.61957566	703724.8600	144534.0638
T-14	V120	-93.17927633	43.62010393	706803.2503	144757.6069
T-16	V120	-93.12138868	43.63362735	719244.2145	149806.0951
T-17	V120	-93.11784189	43.62798388	720444.2456	149751.8496
T-18	V110	-93.19192815	43.60161863	700817.0704	138325.9589
T-19	V120	-93.19451211	43.59694308	700151.3612	136257.7449
T-20	V120	-93.20331802	43.56671235	697917.7149	125211.4194
T-21	V120	-93.19862990	43.56813925	699155.7490	125740.9513
T-22	V110	-93.25468564	43.54736156	684361.5307	118087.4772
ALT-23	V120	-93.24629468	43.54838244	686589.8576	117899.1306
T-23	V110	-93.24627042	43.54584860	686597.4371	117505.1936
T-24	V110	-93.28752644	43.55488065	676854.1293	120863.1736
T-25	V120	-93.26152197	43.53461142	680891.4696	113419.4283
T-26	V120	-93.22403797	43.53072497	692495.4973	112042.1311
T-27	V120	-93.21692408	43.53775842	694586.5742	112072.9220
T-28	V120	-93.19553870	43.53773777	710682.3594	114785.4930
T-29	V110	-93.16403289	43.53247431	713752.8034	112876.3222
T-30	V120	-93.12396662	43.53021075	719082.6776	112103.5875
T-31	V120	-93.11541346	43.54809259	721386.9570	113541.2521
T-32	V120	-93.10776958	43.54066111	733455.3864	115977.5826
T-33	V110	-93.07395283	43.54249119	732458.8041	116717.7013
T-34	V110	-93.09625393	43.54472300	734732.9972	117551.2042
T-37	V120	-93.18606137	43.51885260	702413.1811	107793.7065
T-38	V120	-93.16249509	43.51841176	708905.2037	107703.2529
T-39	V120	-93.15698622	43.51951867	710465.5858	108121.6467
T-40	V120	-93.14140018	43.51877479	714499.6953	107889.4163
T-41	V110	-93.13632027	43.52000398	715869.5473	108350.9140
T-42	V110	-93.12463403	43.51776613	718950.9850	107565.5490
T-43	V120	-93.12067952	43.52021053	719990.8047	108467.0301
T-44	V120	-93.11602245	43.52779011	721054.9797	109418.0815
T-45	V120	-93.11868600	43.50116744	720487.6132	101356.8908
T-46	V120	-93.13684371	43.50511518	715418.8692	102877.5257
T-48	V120	-93.16960300	43.50763364	708648.5563	103771.6674
T-49	V120	-93.14509689	43.50118312	713581.4047	101467.4528

Freeborn Wind Project - Iowa					
Turbine Number	Turbine Type	WGS84		Iowa State Plane North NAD 83 - 2011 Adjustment	
		Longitude	Latitude	Easting	Northing
T-100	V120	-95.17674060	43.49196705	5030528.7094	4006958.2249
T-101	V120	-95.17346109	43.49408928	5007506.9178	4007726.0441
T-102	V120 STE	-95.16941249	43.49552389	5003979.2484	4008264.2027
T-103	V120 STE	-95.15812422	43.49408992	5013976.8794	4007753.2882
T-104	V120	-95.15328295	43.49570031	5017259.3506	4008345.5437
T-105	V120	-95.14263789	43.48399289	5010887.8217	4007516.1851
T-106	V120	-95.13598989	43.49345489	5018008.8327	4007546.9814
T-107	V120	-95.11519417	43.49435711	5023969.3049	4007903.2560
T-108	V120	-95.10755899	43.49389811	5025986.4697	4007741.6023
T-109	V120	-95.10191494	43.49448588	5026893.1238	4007962.8572
T-110	V120	-95.09291486	43.49346675	5029283.2828	4007933.9583
T-111	V120	-95.08657541	43.49356861	5030965.5319	4007948.0188
T-112	V120	-93.07334589	43.49250636	5034478.6917	4007276.2265
T-113	V120	-93.06872722	43.48737770	5036235.1017	4007240.2529
T-114	V120	-93.05742628	43.49428576	5038699.8053	4007958.5501
T-116	V120	-95.04237969	43.49392912	5042746.6481	4007840.0892
T-117	V120	-93.03328881	43.49117376	5045083.3105	4007577.5045
ALT-118	V120	-93.02684838	43.49332566	5046869.8548	4007898.0572
T-119	V120	-93.19208800	43.48529131	5002975.3343	4004511.3625
T-120	V120	-93.18197059	43.48455194	5005661.7051	4004253.7740
T-121	V120	-93.16725108	43.48475548	5009568.2812	4004340.8531
T-122	V120	-93.15801537	43.48422531	5011834.6199	4004156.7650
T-123	V120	-93.15448598	43.48594120	5012554.7136	4004786.8017
T-124	V120	-93.13889325	43.48432503	5017093.3327	4004397.2062
T-125	V120	-93.08963947	43.48624517	5030165.5422	4004974.4864
T-126	V120	-93.04677502	43.48566650	5041543.1983	4004832.5534
T-127	V120	-93.03728567	43.48908055	5044055.0652	4006079.7475
T-131	V120	-95.17206113	43.47788554	5028301.2945	4003355.4014
T-132	V120	-95.16380784	43.47948975	5031491.2715	4003260.6049
T-133	V120	-95.15325981	43.47551978	5031295.6607	4000889.2856
T-134	V120	-95.14211253	43.47470845	5032656.1265	4000705.8561
T-135	V120	-95.13375208	43.47471086	5033871.2024	4001700.4407
T-136	V120	-95.12238497	43.47486009	5021492.9782	4000762.0261
T-137	V120	-95.11670458	43.47603303	5022998.7707	4001215.2410
T-138	V120	-95.11237567	43.48597811	5024140.6536	4002907.3545
T-139	V120	-95.10680308	43.48118872	5025618.4896	4003109.6643
T-140	V120	-93.09003980	43.48127766	5027678.9552	4001151.8304
T-141	V120	-93.08374274	43.47617980	5029093.9081	4001300.2066
T-142	V120	-93.08584086	43.47617044	5030928.7307	4001305.5995
T-143	V120	-95.07862255	43.47977153	5033101.1401	4002629.0799
T-144	V120	-93.07365552	43.48116672	5034417.0284	4003144.2915
T-145	V120	-95.06649786	43.48112403	5036817.0038	4003138.3567
T-146	V120	-93.05975018	43.48108847	5038038.1727	4003134.5425
ALT-147	V120	-93.25048664	43.47942008	5048570.7726	4005035.4253
T-152	V120	-93.16687016	43.46737503	5009694.3681	3998005.8261
T-153	V120	-93.15225138	43.46030145	5013586.1753	3995442.9768
T-154	V120	-93.13858639	43.46026942	5017214.5349	3995446.5087
T-155	V120	-93.13331816	43.46186034	5018611.2393	3995970.4817
T-156	V120	-93.12930606	43.46172884	5019726.5767	3996738.4320
T-157	V120	-93.11835952	43.46396750	5022569.6427	3996818.0759
T-158	V120	-93.10252478	43.45709405	5026778.2263	3997977.1688
T-159	V120	-93.09604756	43.46718726	5028497.7411	3998019.2676
ALT-160	V120	-93.07566962	43.46875624	5033905.2123	3998699.4718
ALT-161	V120	-93.08858829	43.47034793	5030779.7027	3999170.9458
T-162	V120	-93.06758628	43.47459617	5037338.2483	4000764.0061
T-163	V120	-93.05586850	43.47461728	5039150.8653	4000781.1480
T-169	V120	-95.15487578	43.45222495	5012901.3478	3992495.0828
T-170	V120	-95.14877419	43.45562185	5014516.5463	3993740.8599
ALT-172	V120	-93.08217851	43.46144756	5032190.2494	3995944.9990
T-179	V120	-93.15035925	43.44736013	5014136.6524	3990727.8039
T-180	V120	-93.14378444	43.44864154	5015851.9677	3991274.9774
T-181	V120	-93.13728662	43.44957500	5017589.1310	3991699.5125
T-182	V120	-93.13098127	43.45038334	5019249.7200	3991853.7113
T-183	V120	-93.12668734	43.45224319	5020987.0594	3992534.5179

DRAINAGE CROSSING SCHEDULE

Freeborn Wind Project - Minnesota						
Crossing Number	Design Options: Low Water Crossing: Design	Design Options: Low Water Crossing: Length (LF)	Culvert Sizing (CMP)	Plan Sheet	Access Road	Station
1	FLEXAMAT	50	1-36", 3-30", 3-24"	8-1	Road 1	07+63
2	FLEXAMAT	550	-	8-2	Road 4	09+61
3	FLEXAMAT	300	-	8-2	Road 4	20+36
4	FLEXAMAT	450	1-36", 3-30", 3-24"	8-6	Road 6	01+68
5	FLEXAMAT	300	1-48", 2-30", 3-24"	8-3	Road 8	05+00
6	FLEXAMAT	50	1-36", 2-30", 3-24"	8-3	Road 8	13+43
7	FLEXAMAT	370	1-54", 2-42", 3-36"	8-5	Road 12	22+87
8	FLEXAMAT	50	1-18"	8-7	Road 14	22+33
9	-	-	1-36", 2-24", 3-18"	8-7	Road 14	93+55
10	-	-	5-30", 2-24", 3-18"	8-5	Road 16	04+03
11	FLEXAMAT	50	-	8-5	Road 18	06+46
12	-	-	1-48", 2-36", 3-30"	8-10	Road 19	10+61
13	FLEXAMAT	100	1-48", 2-36", 3-30"	8-11	Road 21	06+48
14	FLEXAMAT	50	1-30", 2-24", 3-18"	8-11	Road 21	17+43
15	FLEXAMAT	50	1-18"	8-11	Road 21	23+91
16	FLEXAMAT	170	1-36", 2-24", 3-18"	8-11	Road 23	26+27
17	FLEXAMAT	50	1-48", 2-36", 3-30"	8-11	Road 21	35+83
18	FLEXAMAT	50	1-42", 2-30", 3-24"	8-12	Road 22	08+48
19	FLEXAMAT	50	-	8-12	Road 22	13+43
20	FLEXAMAT	130	-	8-14	Road 24	04+48
21	FLEXAMAT	130	1-48", 2-36", 3-30"	8-16	Road 25	07+13
22	FLEXAMAT	60	1-30", 2-24", 3-18"	8-16	Road 25	15+00
23	FLEXAMAT	80	1-30", 2-24", 4-18"	8-17	Road 26	04+37
24	FLEXAMAT	50	1-84", 2-66", 3-54"	8-19	Road 29	13+00
25	FLEXAMAT	180	1-42", 2-36", 3-30"	8-20	Road 31	17+25
26	FLEXAMAT	50	1-36", 2-30", 3-24"	8-23	Road 38	04+50
27	FLEXAMAT	70	1-48", 2-30", 3-30"	8-23	Road 39	08+21
28	FLEXAMAT	60	1-30", 2-24", 4-18"	8-24	Road 40	07+00
30	FLEXAMAT	120	1-24", 2-18"	8-24	Road 41	03+09
31	FLEXAMAT	50	1-30", 2-24", 3-18"	8-25	Road 42	07+64
32	FLEXAMAT	50	1-30", 2-24", 3-18"	8-25	Road 44	03+20
33	FLEXAMAT	50	-	8-26	Road 46	05+00
34	FLEXAMAT	120	1-30", 2-24", 4-18"	8-27	Road 48	05+27
35	FLEXAMAT	50	-	8-28	Road 49	04+75

Freeborn Wind Project - Iowa						
Crossing Number	Design Options: Low Water Crossing: Design	Design Options: Low Water Crossing: Length (LF)	Culvert Sizing (CMP)	Plan Sheet	Access Road	Station
36	FLEXAMAT	130	1-36", 2-30", on 5-24"	9-1	Road 102	38+30
37	FLEXAMAT	330	-	9-2	Road 102	05+79
38	FLEXAMAT	50	1-18"	9-2	Road 106	07+07
39	FLEXAMAT	50	3-42", 2-30", 6-24"	9-5	Road 108	05+46
40	FLEXAMAT	250	1-18"	9-5	Road 108	16+47
41	FLEXAMAT	50	1-24", 1-18"	9-5	Road 108	19+00
42	FLEXAMAT	50	1-24", 2-18"	9-5	Road 110	02+85
43	-	-	2-54", 2-42", 3-36"	9-6	Road 113	12+85
44	FLEXAMAT	50	1-36", 2-30", 3-24"	9-7	Road 114	23+00
45	FLEXAMAT	70	1-36", 2-30", 3-24"	9-8	Road 117	05+71
46	FLEXAMAT	50	1-30", 2-24", 4-18"	9-10	Road 121	07+00
47	FLEXAMAT	50	1-36", 2-30", 3-24"	9-11	Road 123	07+00
48	FLEXAMAT	50	1-24", 2-18"	9-11	Road 123	16+18
49	FLEXAMAT	50	1-30", 2-24", 3-24"	9-12	Road 125	10+00
50	FLEXAMAT	50	1-24", 2-18"	9-15	Road 138	38+00
51	FLEXAMAT	50	-	9-13	Road 138	08+00
52	FLEXAMAT	50	3-42", 2-30", 6-24"	9-14	Road 140	48+40
53	FLEXAMAT	50	3-30", 2-24", 3-18"	9-14	Road 140	38+90
54	FLEXAMAT	50	3-42", 2-30", 3-24"	9-15	Road 146	20+54
55	FLEXAMAT	50	3-30", 2-24", 3-18"	9-16	Road 146	29+50
56	FLEXAMAT	50	3-42", 2-30", 3-24"	9-15	Road 146	25+22
57	FLEXAMAT	50	-	9-19	Road 156	01+70
58	FLEXAMAT	50	-	9-19	Road 156	03+80
59	FLEXAMAT	50	3-30", 2-24", 3-18"	9-21	Road 158	10+75
60	FLEXAMAT	50	1-18"	9-21	Road 158	21+17
61	FLEXAMAT	50	2-30", 2-24", 4-18"	9-23	Road 169	09+43
62	FLEXAMAT	50	1-36", 2-30", 3-24"	9-23	Road 170	04+50
63	FLEXAMAT	50	1-18"	9-23	Road 179	22+53
64	FLEXAMAT	100	1-36", 2-24", 4-18"	9-23	Road 179	16+72
65	FLEXAMAT	50	-	9-24	Road 181	03+53
66	FLEXAMAT	50	-	9-24	Road 182	03+33

PUBLIC ROAD ENTRANCE CULVERTS

Freeborn Wind Project - Minnesota				
Crossing Number	Type	2-Year Size	Plan Sheet	Public/Access Road Intersection
1	CMP	1-18"	8-1	300th St/Road 3
2	CMP	1-24", 2-18"	8-2	210th St/Road 4
3	CMP	1-18"	8-6	190th St/Road 6
4	CMP	1-18"	8-7	840th St/Road 7
5	Existing	-	8-3	850th St/Road 8
6	CMP	1-18"	8-3	190th St/Road 9
7	CMP	1-18"	8-5	200th St/Road 13
8	CMP	1-18"	8-5	200th St/Road 12
9	CMP	1-18"	8-7	180th St/Road 14
10	CMP	1-18"	8-5	190th St/Road 16
11	CMP	1-18"	8-8	190th St/Road 17
12	CMP	1-18"	8-9	170th St/Road 18
13	CMP	1-18"	8-10	170th St/Road 19
14	CMP	1-18"	8-11	830th St/Road 21
15	CMP	1-18"	8-12	810th St/Road 23
16	CMP	1-42", 2-30", 4-24"	8-13	830th St/Road 21
17	CMP	1-18"	8-16	830th St/Road 25
18	CMP	1-18"	8-17	170th St/Road 26
19	CMP	1-18"	8-18	130th St/Road 28
20	CMP	1-18"	8-19	860th St/Road 29
21	CMP	1-18"	8-20	120th St/Road 33
22	CMP	1-24", 2-18"	8-20	880th St/Road 31
23	CMP	1-18"	8-21	900th St/Road 33
24	CMP	1-18"	8-15	900th St/Road 34
25	CMP	1-18"	8-23	840th St/Road 37
26	CMP	1-24", 2-18"	8-23	110th St/Road 39
27	CMP	1-18"	8-24	870th St/Road 40
28	CMP	1-24", 2-18"	8-25	110th St/Road 44
29	CMP	1-18"	8-26	510th St/Road 45
30	CMP	1-24", 2-18"	8-27	950th St/Road 48

Freeborn Wind Project - Iowa				
Crossing Number	Type	2-Year Size	Plan Sheet	Public/Access Road Intersection
31	CMP	1-18"	9-1	500th St/Road 102
32	CMP	1-18"	9-2	Raven Ave/Road 104
33	CMP	1-18"	9-3	510th St/Road 106
34	CMP	1-18"	9-4	Thrush Ave/Road 107
35	CMP	1-18"	9-6	500th St/Road 113
36	CMP	1-18"	9-7	500th St/Road 114
37	CMP	1-18"	9-8	Yarrow Ave/Road 116
38	CMP	1-18"	9-8	Zinnia Ave/Road 117
39	CMP	1-18"	9-9	500th St/Road 119
40	CMP	1-18"	9-9	500th St/Road 120
41	CMP	1-18"	9-10	Raven Ave/Road 121
42	CMP	1-18"	9-11	500th St/Road 122
43	CMP	1-18"	9-11	500th St/Road 123
44	CMP	1-18"	9-12	500th St/Road 124
45	CMP	1-18"	9-14	500th St/Road 125
46	CMP	1-18"	9-16	500th St/Road 126
47	CMP	1-18"	9-8	500th St/Road 127
48	CMP	1-18"	9-10	Raven Ave/Road 132
49	CMP	1-18"	9-11	Raven Ave/Road 133
50	CMP	1-18"	9-11	490th St/Road 134
51	CMP	1-18"	9-12	490th St/Road 135
52	CMP	1-18"	9-13	490th St/Road 136
53	CMP	1-18"	9-13	490th St/Road 137
54	CMP	1-18"	9-13	490th St/Road 138
55	CMP	1-18"	9-14	Vine Ave/Road 140
56	CMP	1-18"	9-15	Vine Ave/Road 146
57	CMP	1-18"	9-17	490th St/Road 152
58	CMP	1-18"	9-18	480th St/Road 153
59	CMP	1-36", 2-24", 4-18"	9-19	480th St/Road 154
60	CMP	1-18"	9-19	Thrush Ave/Road 156
61	CMP	1-18"	9-20	Thrush Ave/Road 157
62	CMP	1-18"	9-23	Raven Ave/Road 166
63	CMP	1-18"	9-24	480th St/Road 170
64	CMP	1-18"	9-23	480th St/Road 179
65	CMP	1-18"	9-24	Spruce Ave/Road 181
66	CMP	1-18"	9-24	Thrush Ave/Road 182

NOTES:

1. DRAINAGE CROSSING AND PUBLIC ENTRANCE CULVERT DESIGN IS BASED ON A 2-YEAR HYDRAULIC ANALYSIS. CULVERTS WITHIN THE PUBLIC ROW SHALL BE VERIFIED WITH LOCAL JURISDICTION PRIOR TO INSTALLATION.
2. WHERE MULTIPLE DESIGN OPTIONS ARE LISTED, EITHER A LWC OR CULVERT IS ACCEPTABLE. BOTH ARE NOT REQUIRED.
3. FINAL LWC INSTALLATION LOCATIONS SHALL BE AGREED TO BY OWNER AND CONTRACTOR. ANY INCREASES OR DEDUCTIONS SHALL BE TRUED UP PRIOR TO SUBSTANTIAL COMPLETION.
4. MULTIPLE SIZING OPTIONS FOR CULVERTS ARE LISTED FOR FLEXIBILITY. CONTRACTOR SHALL CHOOSE THE BEST FIT DURING INSTALLATION.

Westwood
Phone (952) 937-5150 12701 Whitewater Dr
Fax (952) 937-5822 Minnetonka, MN 55343
Toll Free (888) 937-5150 westwoodps.com
Westwood Professional Services, Inc

NO	REVISION	ZONE	DATE	BY	CHK	ENG	NO	REVISION	ZONE	DATE	BY	CHK	ENG
A	30% CIVIL PLANS		11/21/18	SNK	DJN	DJN							
B	60% CIVIL PLANS		7/3/19	SNK	DJN	DJN							
C	90% CIVIL PLANS		9/12/19	TDD	DJN	DJN							

REFERENCE DRAWINGS		
DWG NO.	MANUFACTURER	DESCRIPTION

Xcel Energy®
NORTHERN STATES POWER COMPANY
FREEBORN WIND FARM
Freeborn County, MN and Worth County, IA

DWN: TDD	DATE:	CHK:	DATE:
ENG: DJN	DATE:	CHK:	DATE:
PM: DJN	DATE:	PROJ. NO: 22586	
APVD:	DATE:	SCALE: NONE	

THIS MAP/DOCUMENT IS A TOOL TO ASSIST EMPLOYEES IN THE PERFORMANCE OF THEIR JOBS. YOUR PERSONAL SAFETY IS PROVIDED FOR BY USING SAFETY PRACTICES PROCEDURES, AND EQUIPMENT AS DESCRIBED IN THE SAFETY TRAINING PROGRAMS AND MANUALS.

ENERGY SUPPLY
ENGINEERING & CONSTRUCTION

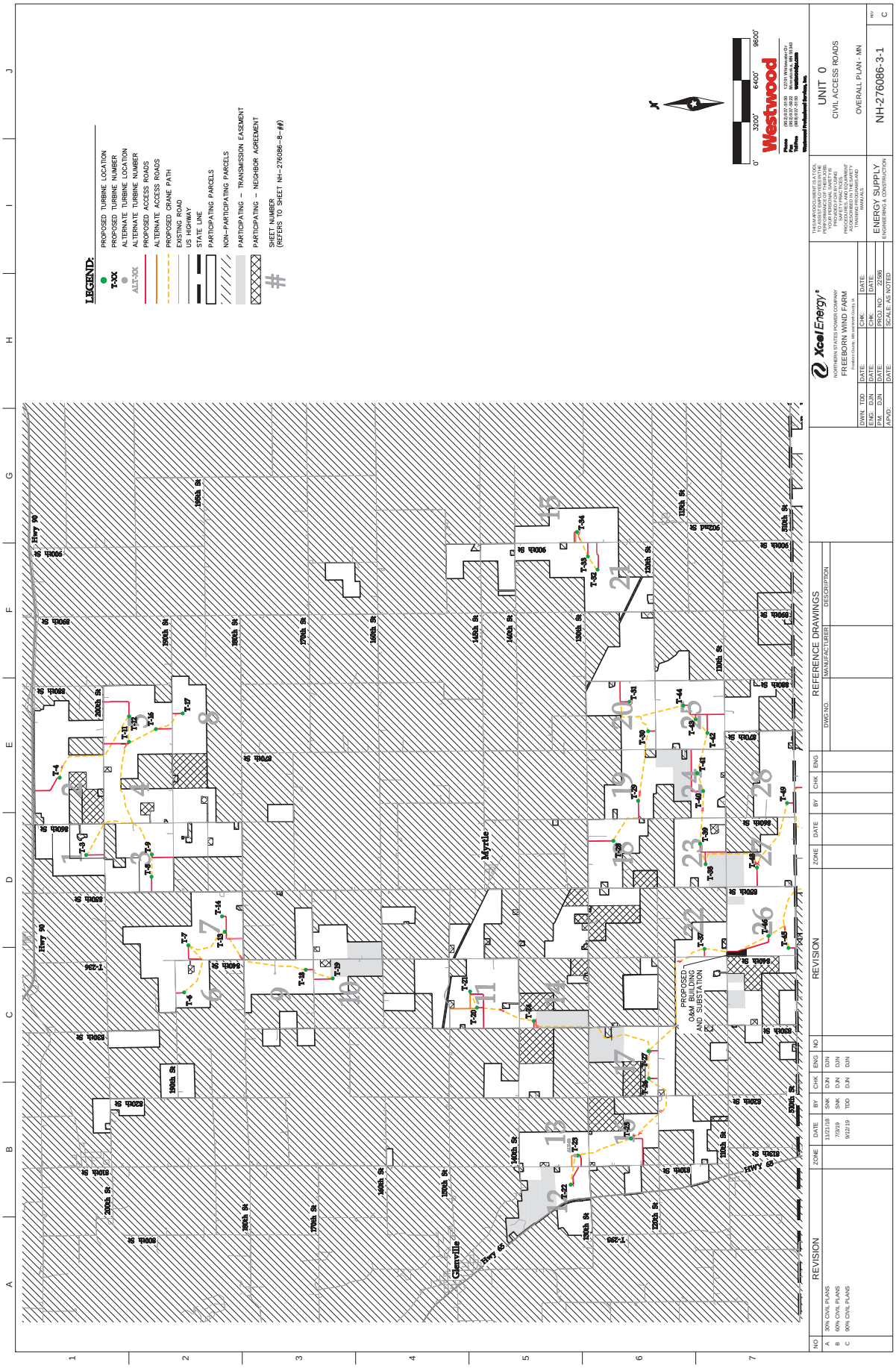
UNIT 0
CIVIL ACCESS ROADS
TURBINE COORDINATES & CULVERT SCHEDULE

NH-276086-2

REV C

AFCL Exhibit E

Docket No. IP-6946/WS-17-410
Compliance Filing-Section 5.2.6
Attachment A
Page 151 of 221


LEGEND:
PROPOSED TURBINE LOCATION
T-XX
PROPOSED TURBINE NUMBER
ALTERNATE TURBINE LOCATION
ALT-XX
ALTERNATE TURBINE NUMBER
PROPOSED ACCESS ROADS
ALTERNATE ACCESS ROADS
PROPOSED CRANE PATH
EXISTING ROAD
US HIGHWAY
STATE LINE
PARTICIPATING PARCELS
NON-PARTICIPATING PARCELS
PARTICIPATING – TRANSMISSION EASEMENT
PARTICIPATING – NEIGHBOR AGREEMENT
SHEET NUMBER
(REFERS TO SHEET NH-276086-8-##)
#
PROPOSED O&M BUILDING AND SUBSTATION
Myrtle
Glenville
Hwy 65
Hwy 69
REVISION
NO
ZONE
DATE
BY
CHK
ENG
30% CIVIL PLANS
60% CIVIL PLANS
90% CIVIL PLANS
REFERENCE DRAWINGS
DWG NO.
MANUFACTURER
DESCRIPTION
Xcel Energy
NORTHERN STATES POWER COMPANY
FREEBORN WIND FARM
Freeborn County, MN and Worth County, IA
DWN: TDD
ENG: DJN
PM: DJN
APVD:
DATE:
CHK:
PROJ. NO: 23580
SCALE: AS NOTED
THIS APPROVED DOCUMENT IS A TOOL TO ASSIST EMPLOYEES WITH THE PERFORMANCE OF WORK. IT IS NOT YOUR PERSONAL SAFETY IS PROTECTED BY FOLLOWING SAFETY PRACTICES PROVIDED IN MANAGEMENT ASSESSMENT TRAINING AND HSE MANUALS.
UNIT 0
CIVIL ACCESS ROADS
OVERALL PLAN - MN
ENERGY SUPPLY
ENGINEERING & CONSTRUCTION
NH-276086-3-1
REV
C
3200'
6400'
9600'
Westwood
Phone
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Westwood Professional Services, Inc.
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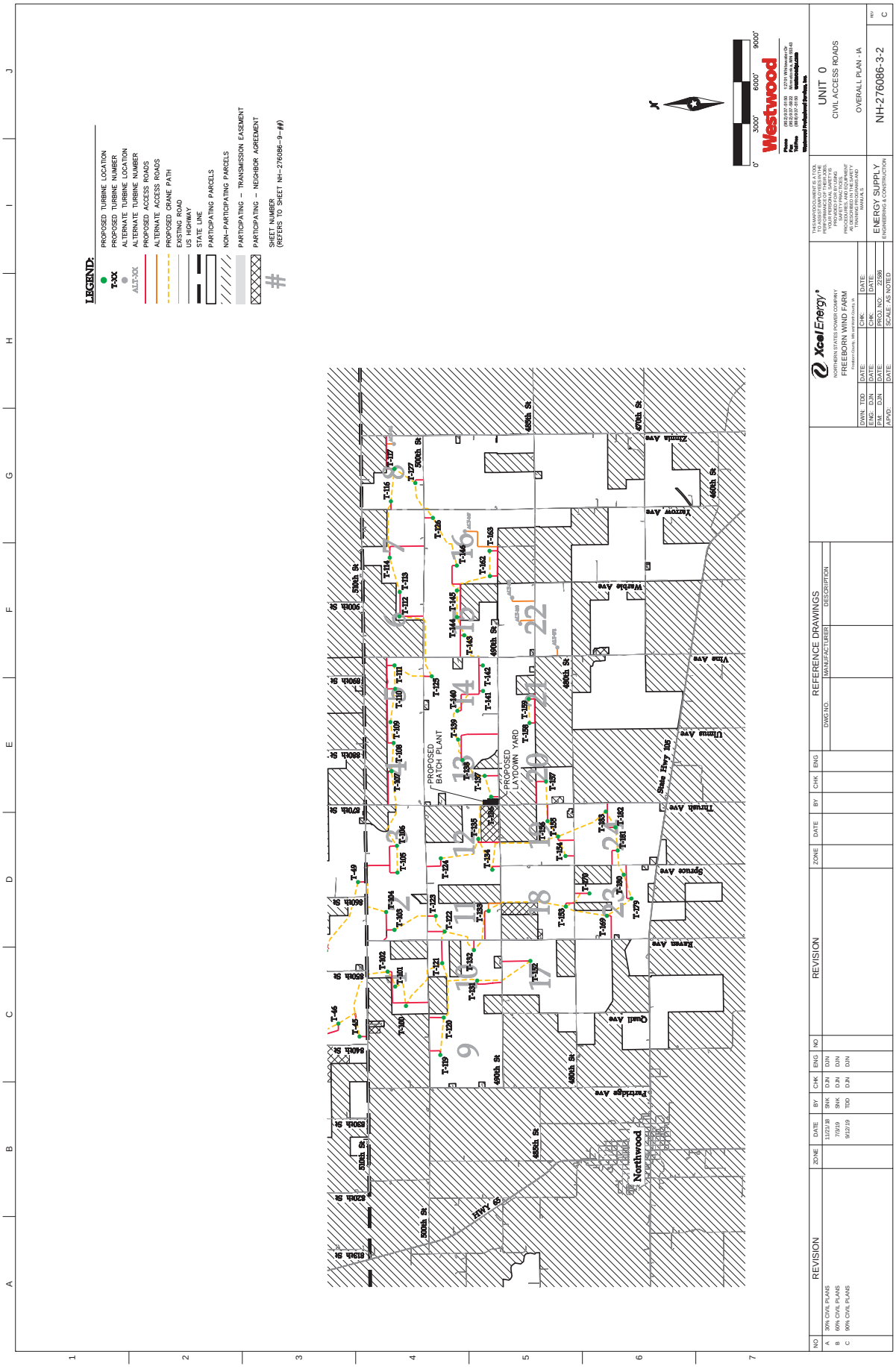
www.westwoodps.com


LEGEND:
PROPOSED TURBINE LOCATION
PROPOSED TURBINE NUMBER
ALTERNATE TURBINE LOCATION
ALTERNATE TURBINE NUMBER
PROPOSED ACCESS ROADS
ALTERNATE ACCESS ROADS
PROPOSED CRANE PATH
EXISTING ROAD
US HIGHWAY
STATE LINE
PARTICIPATING PARCELS
NON-PARTICIPATING PARCELS
PARTICIPATING – TRANSMISSION EASEMENT
PARTICIPATING – NEIGHBOR AGREEMENT
SHEET NUMBER
(REFERS TO SHEET NH-276086-9-##)
PROPOSED BATCH PLANT
PROPOSED LAYDOWN YARD
Northwood
Xcel Energy
FREEBORN WIND FARM
Freeborn County, MN and Worth County, IA
Westwood
UNIT 0
CIVIL ACCESS ROADS
OVERALL PLAN - IA
ENERGY SUPPLY
NH-276086-3-2
REVISION
REFERENCE DRAWINGS