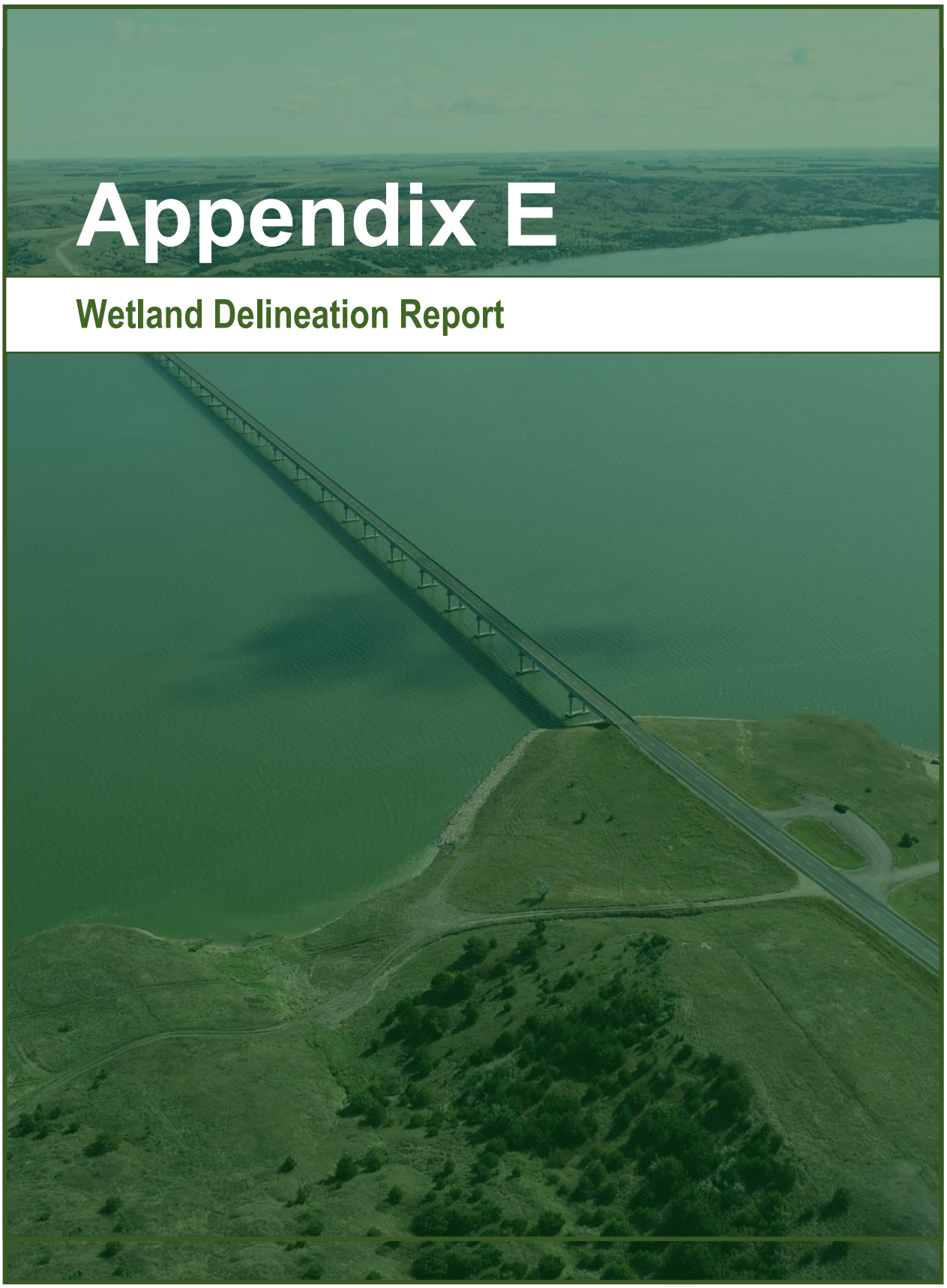

Appendix E

Wetland Delineation Report

WETLAND DELINEATION REPORT

SD 44 Platte-Winner Bridge
Corridor Study and Environmental Assessment

CHARLES MIX AND GREGORY COUNTIES, SOUTH DAKOTA

March 2018

Prepared for:
South Dakota DOT Environmental Office

Prepared by:
HR Green, Inc.
Sioux Falls, South Dakota

HRGreen

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Figures

Appendices

1. INTRODUCTION

HR Green completed a wetland delineation for South Dakota DOT (SDDOT) as part of the SD Highway 44/Platte-Winner Bridge and Corridor Study.

The study area includes areas being considered that would be impacted by bridge, bridge approaches, or staging areas used during construction. The study area crosses the east and west banks of Lake Francis Case, a Missouri River reservoir, and parts of Snake Creek Recreation Area and the West Bridge Recreation Area boat ramp.

Land use in the study area is rural right-of-way (ROW) with recreation area, a boat ramp, and rangeland.

The study area is located within the Land Resource Region F – Northern Great Plains Spring Wheat Region, 55C – Southern Black Glaciated Plains east of the bridge and LRR G – Western Great Plains Range and Irrigated Region, 63B-Southern Rolling Pierre Shale Plains west of the bridge (NRCS 2006).

HR Green wetland scientist Ted McCaslin (Minnesota Wetland Delineator Certified #1180) and HR Green project scientist Pete Lovell conducted field wetland delineation on June 15, 2017. The delineation used methods described in the 1987 *Corps of Engineers Wetlands Delineation Manual* and the 2010 *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Great Plains Region (Version 2.0).* The following sections describe the background data collected and reviewed, delineation methods used, and the results of the wetland delineation.

2. BACKGROUND DATA COLLECTION AND REVIEW

Prior to the field investigation, several data sources were consulted to identify potential wetlands and streams within the study area. These included:

- U.S. Geologic Survey (USGS) 1:24,000 Scale Topographic Maps (See Figure 1).
- 2017 Project Lidar (See Figure 2).
- 2016 NAIP Aerial Photography, USDA (See Figure 2).
- National Wetlands Inventory, U.S. Fish and Wildlife Service, 2016 (See Figure 3).
- USDA Soils Data (See Figure 3 and Appendix C).
- FEMA Floodplain Mapping (See Figure 4).
- Antecedent rainfall and climate data, NRCS (See Appendix D).
- Average Pool Depth, Fort Randall Dam (See Appendix E).

2.1 USGS Quadrangle Map and LiDAR Data

The USGS Quadrangle Digital Raster Graphic was downloaded from South Dakota DENR (See Figure 1) and LiDAR data (project specific data gathered by HR Green in 2017) were observed (See Figure 2).

The USGS Quadrangle for the project area shows Lake Francis Case (Missouri River) at an elevation of 1,354 feet in the center of the study area. The east half of the study area shows

elevations along gently rolling hills from 1,354 feet at the lake to a high point of 1,568 feet at the east end of the study area along SD 44. Elevations at the lake are generally abrupt except for an intermittent stream and inlet in the southeast quadrant of the study area south of the bridge. The west half shows elevations along gently rolling hills between 1,354 feet at the lake and 1,620 feet with an elevation of 1,550 at the west end of the study area along SD 44. Elevations above the lake are generally abrupt except for a backwater in the southwest quadrant south of the bridge.

Lidar data shows a high point of 1,582 feet at the east end of the study area along SD 44 in the east half and a high point of 1,631 at the top of a river bluff south of SD 44 on the south side. Elevations are similar to those observed in the USGS Quadrangle.

2.2 National Wetlands Inventory Map

Four NWI polygons are present in the study area associated with the lake. The center of Lake Francis Case is L1UBHh (Lacustrine, Limnetic, Unconsolidated Bottom, Permanently Flooded, diked/impounded) and the other three are along the lake fringe are L1UBGh (Lacustrine, Limnetic, Unconsolidated Bottom, Intermittently Exposed, diked/impounded). See Figure 3 for NWI polygon locations.

2.3 NRCS Soil Data

A NRCS web soil survey was conducted for the project study area and reviewed. No hydric soil units are present. (See Figure 3 and Appendix C).

Table 1 - Soil map units in study area

Map Unit Symbol	Map Unit Name	Hydric?
BdF	Betts loam, 25 to 40 percent slopes	No
LcF	Labu-Sansarc clays, 15 to 50 percent slopes	No
LoB	Lowry silt loam, 2 to 6 percent slopes	No
LoC	Lowry silt loam, 6 to 9 percent slopes	No
ObE	Okaton-Lakoma silty clays, 15 to 50 percent slopes	No
PrB	Promise clay, 3 to 6 percent slopes	No
SnF	Sansarc clay, 25 to 70 percent slopes	No
SoF	Sansarc-Boyd complex, 15 to 40 percent slopes	No
SuE	Sully silt loam, 9 to 25 percent slopes	No
W	Water	Unranked

2.4 FEMA Floodplains

The FEMA Flood Map Service Center was queried for floodplain mapping for the study areas. FEMA has completed a study for Gregory County. Lake Francis Case and several inlet areas are mapped Zone A – 100-year floodplain without base flood elevation (See Figure 4).

2.5 Antecedent Precipitation

Antecedent precipitation and WETS tables climate data were reviewed for the Academy, South Dakota weather station from the NRCS Electronic Field Office for South Dakota (See Appendix D). The delineation was completed mid-June. Dryer than normal precipitation was recorded January, February, March, May, and June with normal precipitation in April.

2.6 Lake Francis Case Pool Levels

The average 12:00 a.m. elevation of the reservoir at Fort Randall dam (i.e. Lake Francis Case) was reviewed for annual and seasonal variability (See Appendix E). The elevation in June 2017 was 1355.0 (ft msl). In the twelve months prior to the delineation the minimum monthly average elevation was 1,338.0 (December 2016) and high was 1357.1 (June 2016). Between 1967 and 2016 the minimum June elevation was 1352.1 and maximum was 1370.1. Overall, the minimum average elevation for that time period was 1320.7 observed in 1969 and maximum was 1,370.5 observed in May 1997. Fluctuating pool levels for the year before the delineation appear to be close to annual norms.

3. METHODS

Wetlands within the Project Area were identified and their boundaries delineated using the Routine On-Site Determination Method defined in the 1987 *Corps of Engineers Wetlands Delineation Manual* and 2010 Regional Supplement to the *Corps of Engineers Wetland Delineation Manual: Great Plains Region (Version 2.0).* A field wetland delineation was completed for the study area on June 15, 2018. Great Plains Region data forms were completed for accessible plant communities and representative wetland and non-wetland sites within the study area. Data forms are included in Appendix A.

Wetland boundaries were identified in the field, drawn on high resolution photographs, and recorded with GPS equipment with sub-meter accuracy. Representative photographs taken during the field delineation are in Appendix B.

Wetland vegetation, soil indicators, hydrology indicators and other data were recorded on Great Plains Supplement data forms at 11 sample points within the study area. Data forms were recorded for most wetlands. Additional plots were sampled throughout the study area to refine the wetland boundaries before the boundaries were recorded.

4. RESULTS

Seven wetlands totaling 4.151 acres were identified with the study area. Additionally, 249.5 acres of Lake Francis Case are within the study area. Table 3 shows name, observed Cowardin classification, acres in study area, observed jurisdictional status, and location data for each wetland. See the map series in Figure 4 for wetland locations. Individual wetlands are described below.

Table 2 – Delineated Wetlands and in Study Area

Feature/ Station	Lat°	Long°	Observed Jurisdictional Status	Observed Cowardin Classification	Acres
Lake Francis Case	43.385609	-99.133368	WOUS	L1UBHh	249.471
SE-1	43.39062	-99.115361	WOUS/EO11990	PUBFh	0.349
NW-1	43.384475	-99.143849	WOUS/EO11990	PEMA	0.091
NW-2	43.383694	-99.145089	EO11990	PEMB	0.02
SW-1	43.379519	-99.143379	WOUS/EO11990	PEMJ	2.435
SW-2	43.38007	-99.143125	WOUS/EO11990	PEMB	0.658
SW-3	43.381232	-99.143222	WOUS/EO11990	PEMA	0.180
SW-4	43.380501	-99.144453	WOUS/EO11990	PEMB	0.419

*WOUS = Water of the United States. EO 11990 = Executive Order 11990 Protection of Wetlands

Lake Francis Case

The study area includes a bridge over Lake Francis Case, a Missouri River reservoir with water levels controlled at Fort Randall Dam. Average pool levels (See Appendix E) show significant flux in water levels. The average pool level for June 2017 was 1,355.0, near a 12-month high of 1,357.1 from June 2016. However, levels as high as 1,338.0 were recorded for the pool within the prior 12 months. The Ordinary High Water Mark of Lake Francis Case was determined by identifying a line absent of vegetation where evidence of prolonged inundation and/or flow were also apparent. This line was readily apparent for much of the study area.

Photo 1 - Looking northeast, OHWM of Lake Francis Case at center of photo. SD 44 bridge at right near boat ramp in SW bridge quadrant.

Wetlands

Wetland SE-1 is located in the southeast quadrant of the bridge along the fringe of an impounded recreational fishing pond. Sample points SE-2 Wet and SE-2 Up were used for the delineation. Obligate (OBL) hydrophytic vegetation including hybrid cattail (*Typha X glauca*) and reed canary grass (*Phalaris* arundinacea) Facultative Wet (FACW) were observed along the edge of the pond. Hydric soil indicators Hydrogen Sulfide (A4) and Redox Dark Surface (F6) were observed. Hydrology primary indicator Hydrogen Sulfide Odor (C1) was observed. Wetland boundaries are abrupt around the pond into maintained rock shoreline or hillslope. Sample point SE-2 Up was taken within a drainage pathway into the pond down from SD 44 and found to be upland.

Photo 2 - Looking east, Wetland SE-1 in foreground. Fishing pond at right of photo.

Wetland NW-1 is located in a small inlet of Lake Francis Case at the toe of a long slope in the northwest quadrant of the study area. Sample points NW-1 Wet and NW-1 Up were used to delineate the wetland. Hydrophytic vegetation reed canary grass was observed and other vegetation indicated recent disturbance including a cover crop of oats (*Avena sativa*). Soils were disturbed and recent soil placement or erosion from upgradient bank stabilization work likely impacted soils within the wetland. Three secondary hydrology indicators – Saturation Visible on Aerial Imagery (C9), Geomorphic Position (D2), and FAC-Neurtal Test (D5) were apparent. Hydrology is impacted by lake water levels. The wetland boundary is gradual into hillslopes on three sides.

Photo 3 - Looking south, sample point NW-1 Wet in wetland NW-1.

Wetland NW-2 is a small, narrow wetland within the crease of the hillslope up approximately 60 feet from the shoreline of Lake Francis Case. No sample point was taken within the small wetland, but narrow leaf cattail (*Typha angusifolia*) and sedges (*Carex spp.*) were observed within the small wetland.

Photo 4 - Looking east, Wetland NW-2 in foreground.

Wetland SW-1 is located in a large, flat backwater of Lake Francis Case. Sample points SW-1 Wet and SW-2 Up were used to delineate the wetland. The herb stratum was sparse indicating likely recent inundation. Dominant hydrophytic vegetation includes FACW foxtail barley (*Hordeum jubatum*). Hydric Soil indicator Redox Depressions (F8) was observed and primary hydrology indicators Sediment Deposits (B2), Inundation Visible on Aerial Imagery (B7), and Dry Season Water Table (C2) were observed. The wetland borders Wetland SW-2 and Wetland SW-4. Wetland boundaries are very gradual to three sides and to Francis Case Lake to the east. Driftwood was observed up to 600 feet west of the lake shoreline at the edge of the wetland.

Photo 5 - Looking north, sample point SW-1 in Wetland SW-1

Wetland SW-2 abuts the north boundary of Wetland SW-1 and is 2-3 feet higher in elevation than Wetland SW-1. Wetland SW-2 displays a distinct change in vegetative community from flood-impacted SW-1. Sample points SW-2 Wet and SW-2 Up were used to delineate the wetland. Obligate hydrophytic vegetation includes three square rush (*Schoenoplectus pungens*) and spikerush (*Eleocharis palustris*). Hydric soil indicators A4 and Loamy Gleyed Matrix (F2) were observed. Primary hydrology indicators High Water Table (A2), Saturation (A3), B7, and C1 were observed. Wetland boundaries are distinct to upland to the north and west and SW-2 borders wetland SW-1 to the south and Lake Francis Case to the east.

Photo 6 - Looking south, Wetland SW-2 at right of photo.

Wetland SW-3 is situated at the toe the slope off of a boat ramp parking lot and a small inlet on with the West Bridge Lake Side Use Area. Sample points SW-3 Wet and SW-2 Up were used to delineate the wetland. FACW hydrophytic vegetation includes reed canary grass and common reed (*Phagmites australis*). Hydric soil indicator F6 and primary hydrology indicators C2 and Oxidized Rhizospheres on Living Roots (C3) were observed. Wetland boundaries are distinct to hillslope to the north, south, and west and borders Lake Francis Case to the east.

Photo 7 - Looking north, Sample point SW-3 Wet.

Wetland SW-4 is located within a wet drainage from approximately 390 feet south of the SD 44 ROW the toe the slope where SW-1 is located. SW-1 Wet and SW-2 Up were used to delineate the wetland. FACW hydrophytic vegetation includes reed canary grass and hybrid cattail. Hydric soil indicator F6 and primary hydrology indicators A2, A3, C2, and Oxidized Rhizospheres on Living Roots (C3) were observed. Wetland boundaries are distinct to hillslope on all sides. The wetland appears to begin in a spring or drain tile outlet at the top of the slope.

Photo 8 - Looking east, top of Wetland SW-4 with bridge in background of photo

5. SUMMARY

Seven wetlands acres and Lake Francis Case were identified within the study area. Wetlands were identified using the using the Routine On-Site Determination Method defined in the 1987 *Corps of Engineers Wetlands Delineation Manual* and 2010 Regional Supplement to the *Corps of Engineers Wetland Delineation Manual: Great Plains Region*.

FIGURES

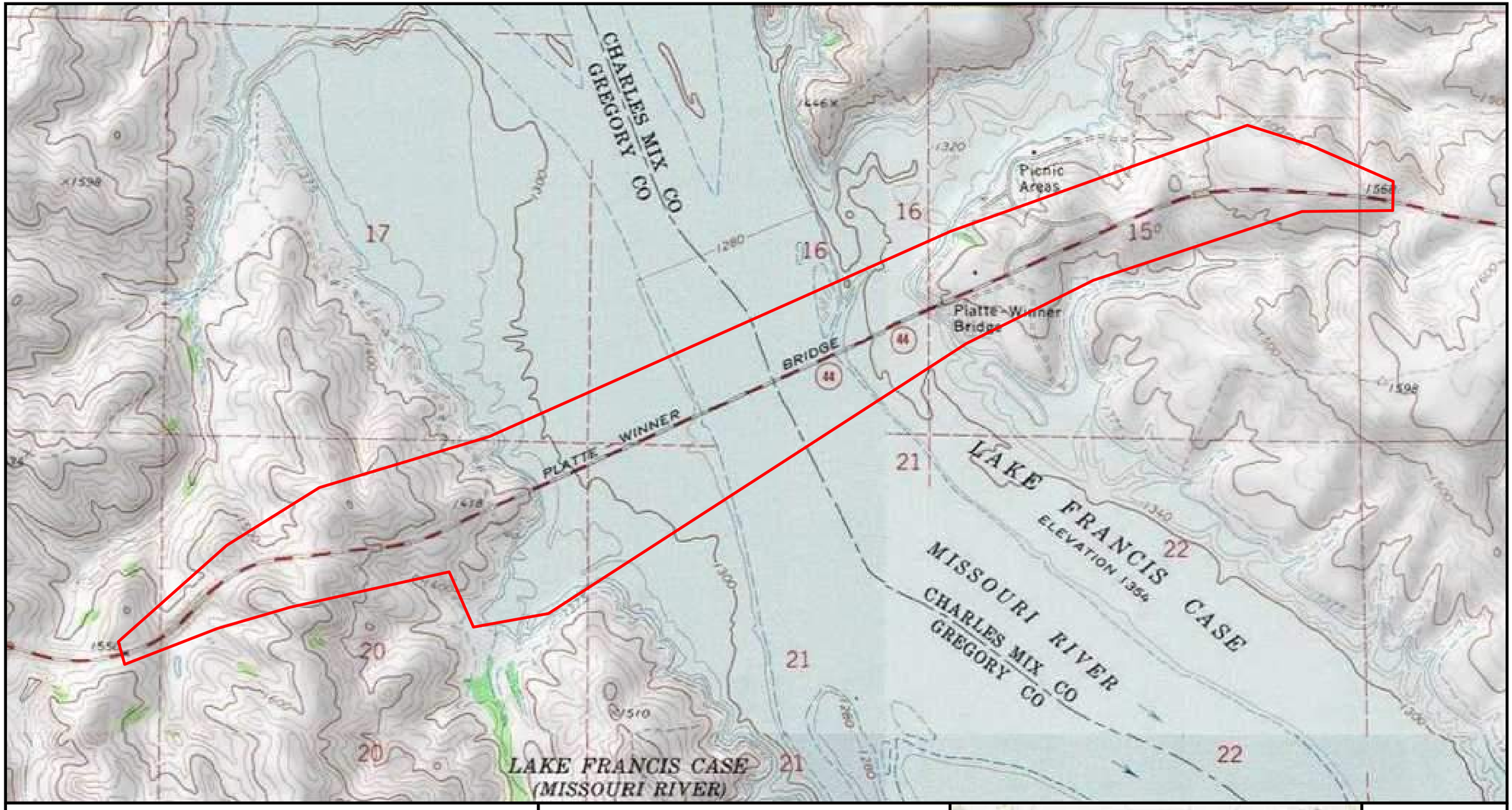


FIGURE 1

USGS QUAD / LOCATION MAP

SD44 / Platte-Winner Bridge Corridor Study Wetland Delineation

Wetland Delineation Report

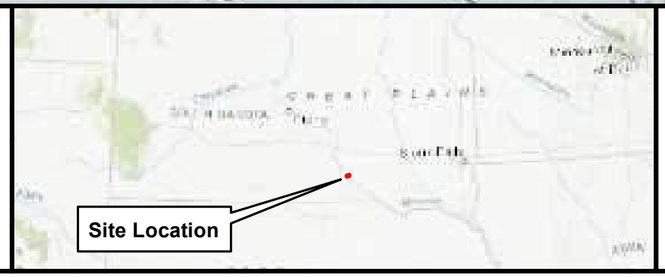
Legend - Main Map

Wetland Study Area

N

0 600 1,200 Feet

1 inch = 1,200 feet



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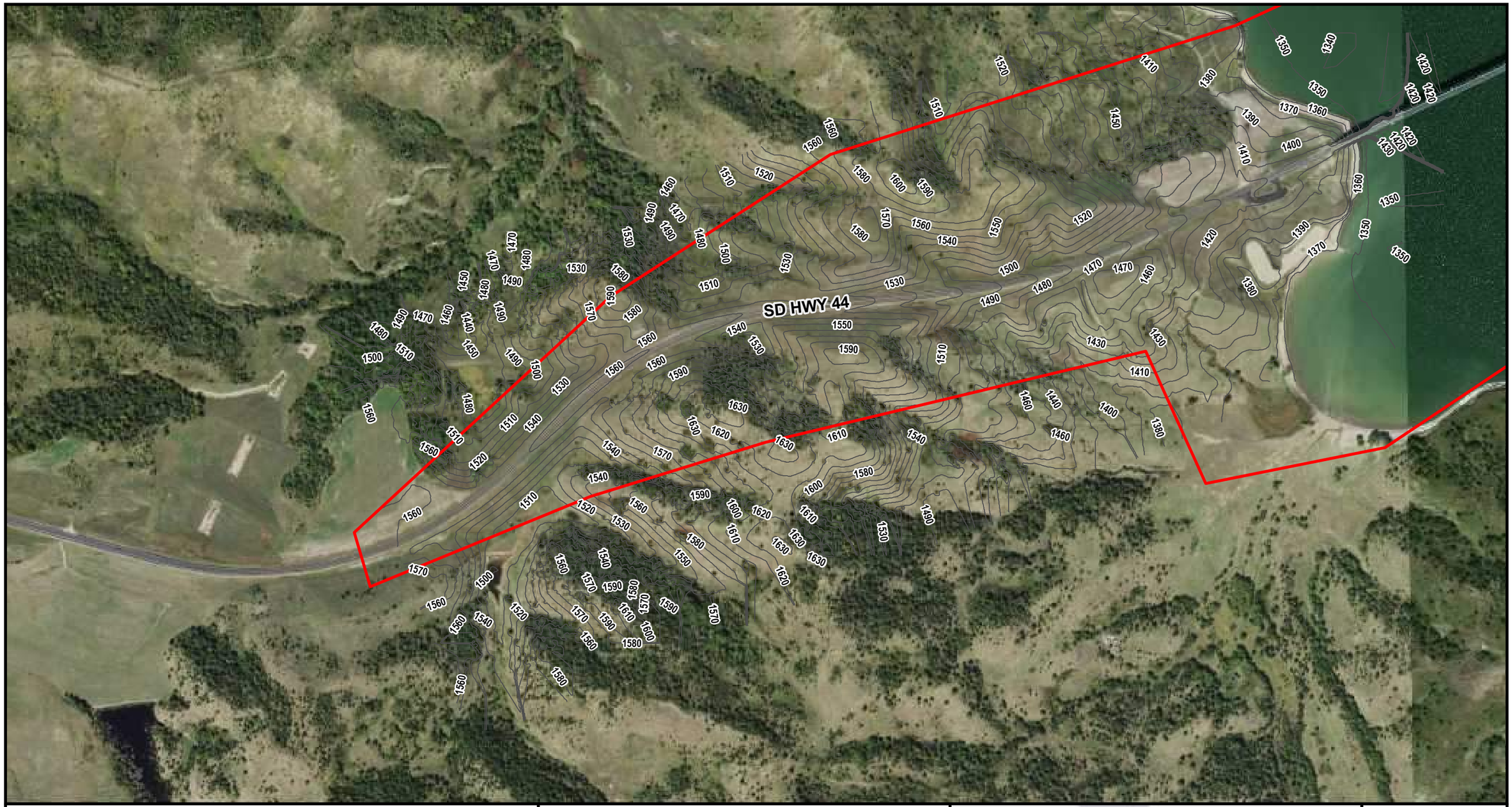

FIGURE 2 - PAGE 1

AERIAL PHOTO / CONTOURS

SD44 / Platte-Winner Bridge Corridor Study Wetland Delineation

Wetland Delineation Report

Legend - Main Map

Wetland Study Area

10-ft Lidar Contours

N

0 250 500 Feet

1 inch = 500 feet

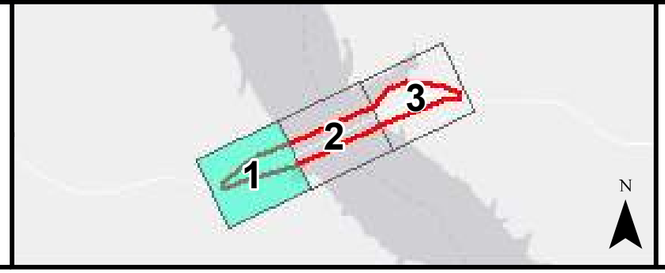

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FIGURE 2 - PAGE 2

AERIAL PHOTO / CONTOURS

SD44 / Platte-Winner Bridge Corridor Study Wetland Delineation

Wetland Delineation Report

Legend - Main Map

Wetland Study Area

10-ft Lidar Contours

N

0 250 500 Feet

1 inch = 500 feet

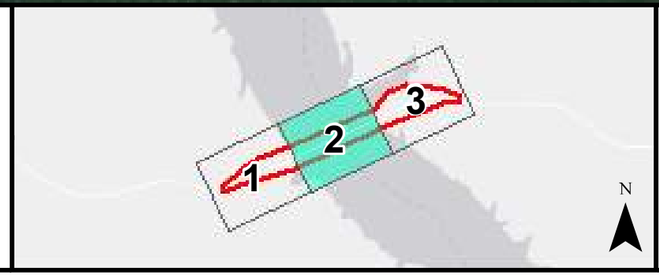

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FIGURE 2 - PAGE 3

AERIAL PHOTO / CONTOURS

SD44 / Platte-Winner Bridge Corridor Study Wetland Delineation

Wetland Delineation Report

Legend - Main Map

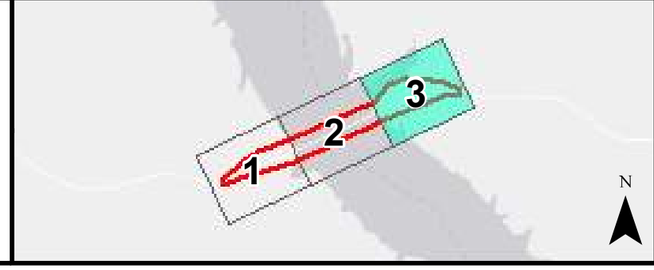
Wetland Study Area

10-ft Lidar Contours

N

0 250 500 Feet

1 inch = 500 feet



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Mapunit Symbol	Mapunit Name	Hydric?
BdF	Betts loam, 25 to 40 percent slopes	No
LcF	Labu-Sansarc clays, 15 to 50 percent slopes	No
LoB	Lowry silt loam, 2 to 6 percent slopes	No
LoC	Lowry silt loam, 6 to 9 percent slopes	No
ObE	Okaton-Lakoma silty clays, 15 to 50 percent slopes	No
PrB	Promise clay, 3 to 6 percent slopes	No
SnF	Sansarc clay, 25 to 70 percent slopes	No
SoF	Sansarc-Boyd complex, 15 to 40 percent slopes	No
SuE	Sully silt loam, 9 to 25 percent slopes	No
W	Water	Unranked

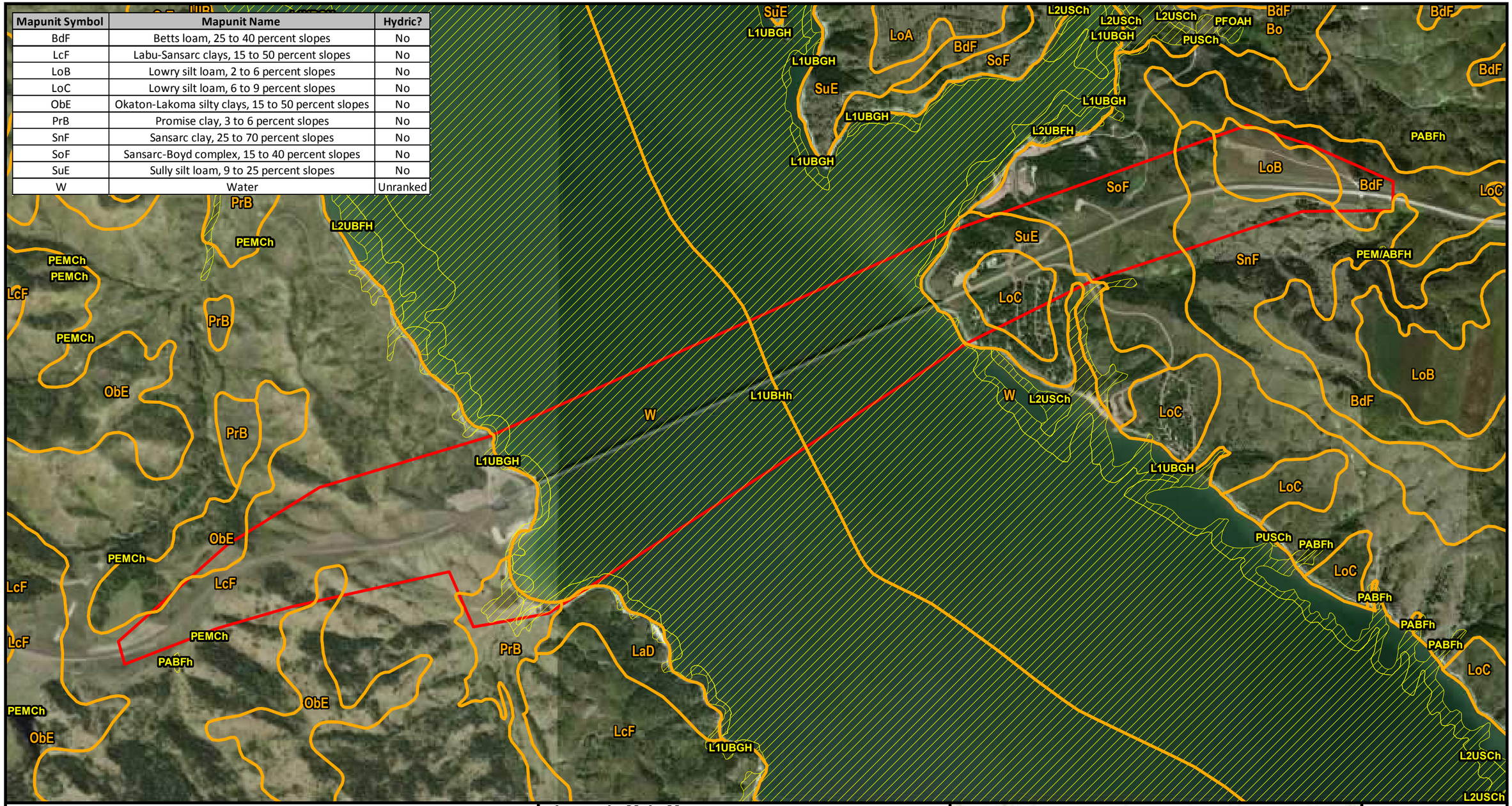

FIGURE 3

USDA SOILS/USFWS NATIONAL WETLANDS INVENTORY

SD44 / Platte-Winner Bridge Corridor Study Wetland Delineation

Wetland Delineation Report

Legend - Main Map

- Map Units
- NWI Wetlands
- Wetland Study Area

N

0 600 1,200 Feet

1 inch = 1,200 feet

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FIGURE 4

FEMA FLOOD HAZARD ZONES (Gregory Co. no mapped)

SD44 / Platte-Winner Bridge Corridor Study Wetland Delineation

Wetland Delineation Report

Legend - Main Map

Wetland Study Area

N

0 600 1,200 Feet

1 inch = 1,200 feet

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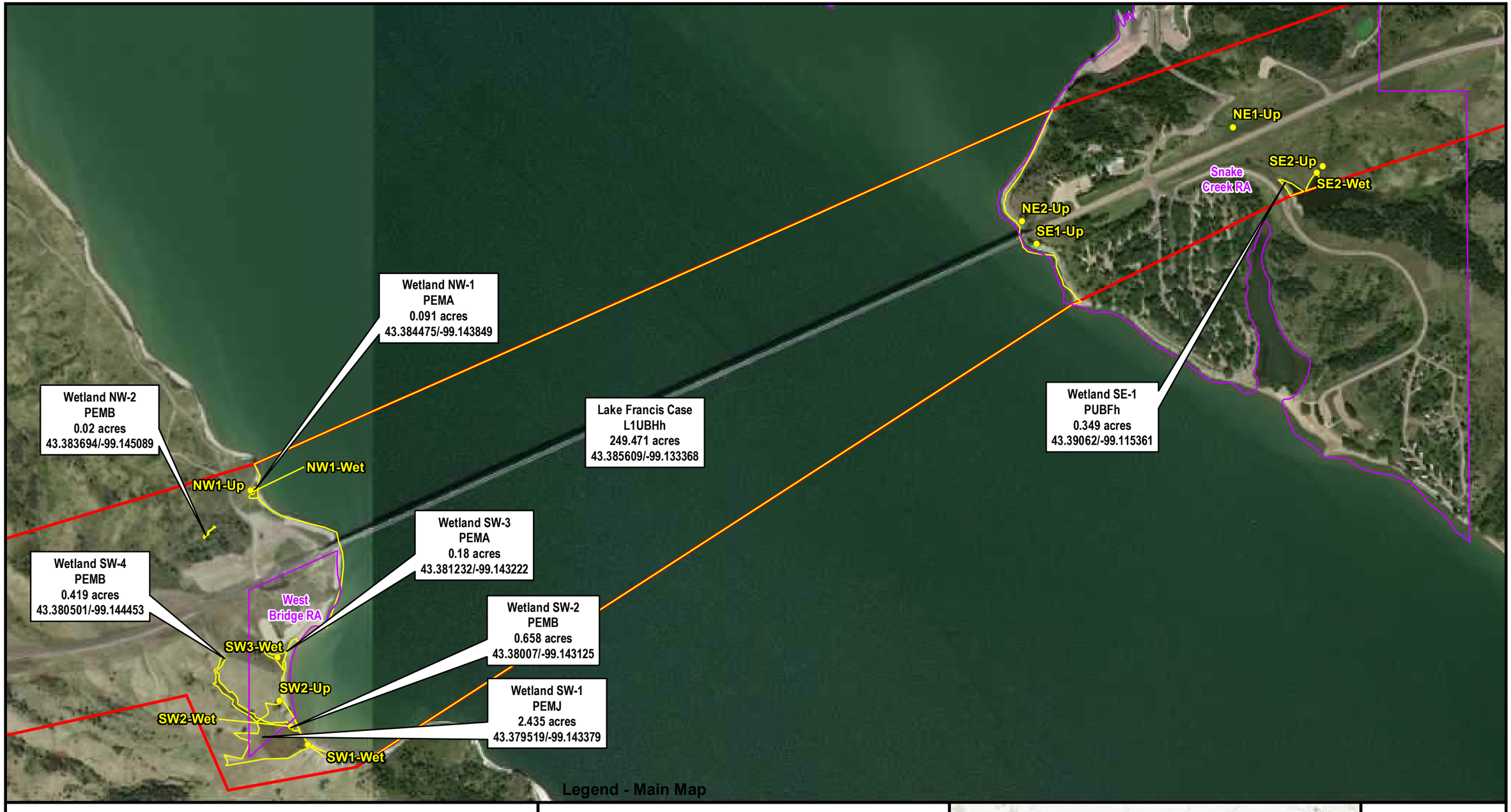


FIGURE 5

DELINEATED WETLANDS OVERVIEW

SD44 / Platte-Winner Bridge Corridor Study Wetland Delineation

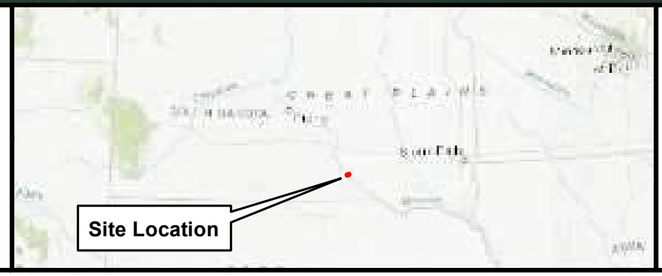
Wetland Delineation Report

- Sample Point
- Parks and Recreation Areas
- Delineated Wetlands
- Wetland Study Area

N

0 700 Feet

1 inch = 700 feet



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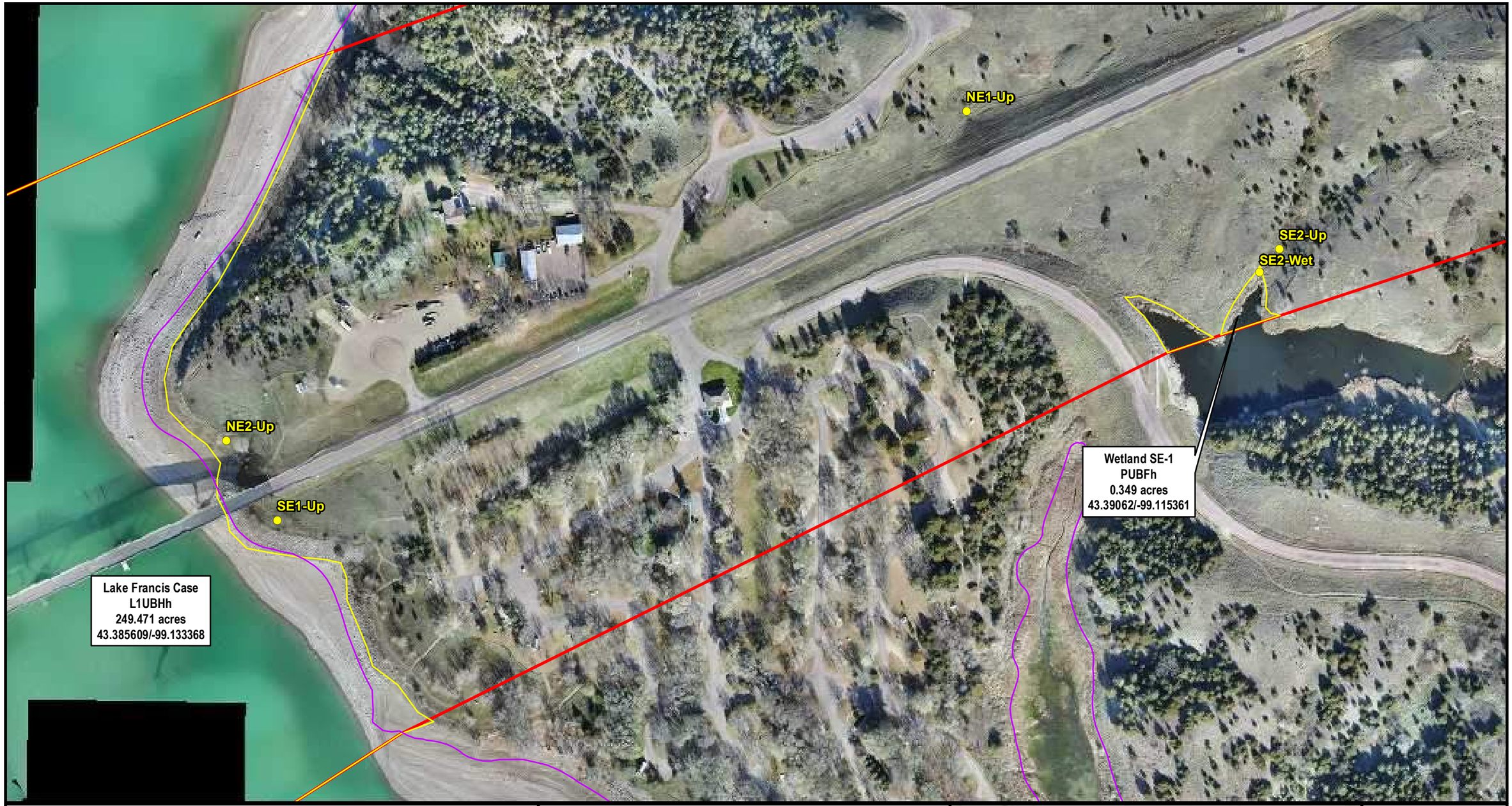

FIGURE 6

DELINEATED WETLANDS DETAIL EAST

SD44 / Platte-Winner Bridge Corridor Study Wetland Delineation

Wetland Delineation Report

Legend - Main Map

- Sample Point
- Parks and Recreation Areas
- Delineated Wetlands
- Wetland Study Area

N

0 200 Feet

1 inch = 200 feet

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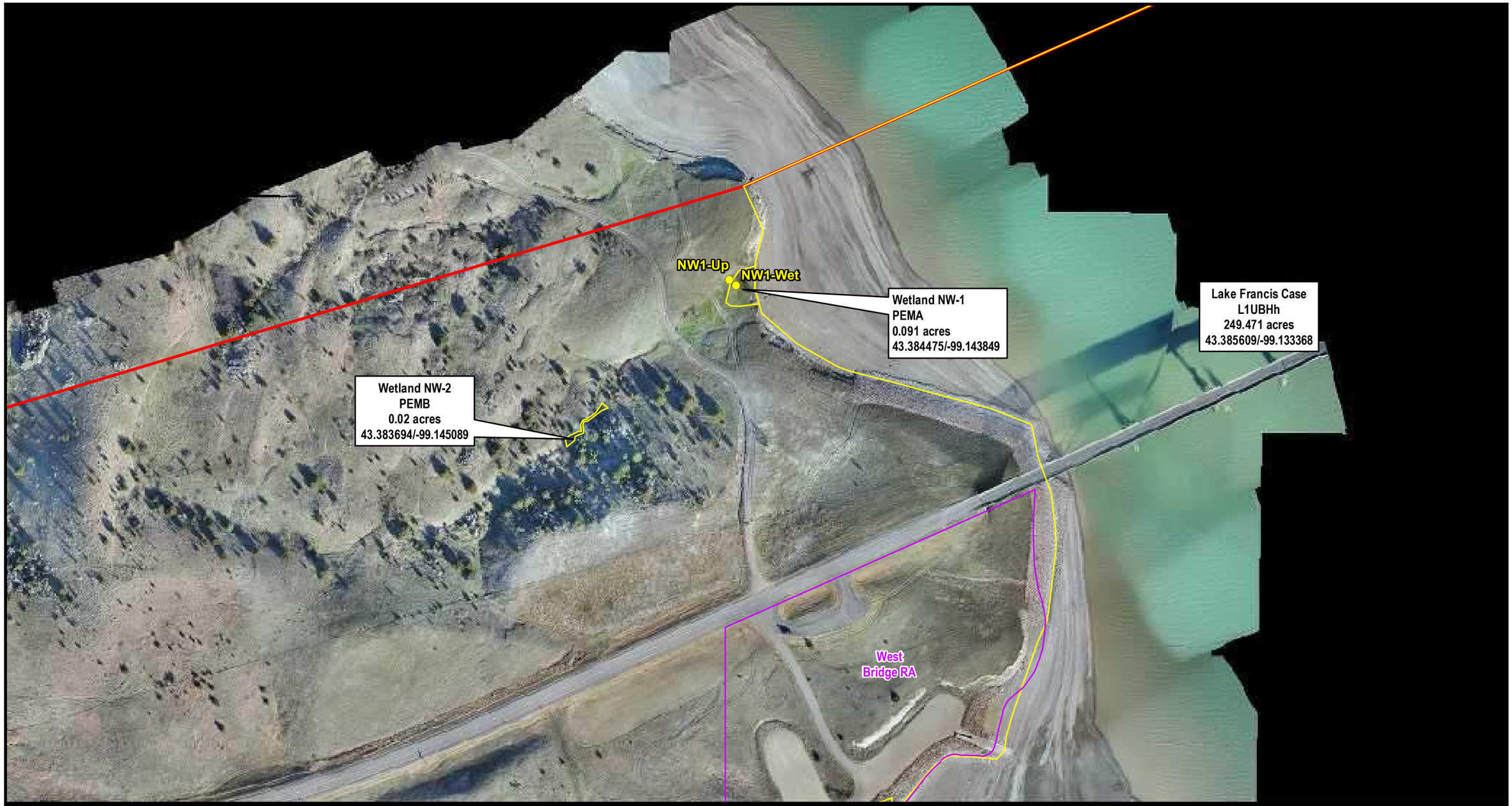

FIGURE 7

DELINEATED WETLANDS DETAIL NORTHWEST

SD44 / Platte-Winner Bridge Corridor Study Wetland Delineation

Wetland Delineation Report

Legend - Main Map

- Sample Point
- Parks and Recreation Areas
- Delineated Wetlands
- Wetland Study Area

N

0 200 Feet

1 inch = 200 feet

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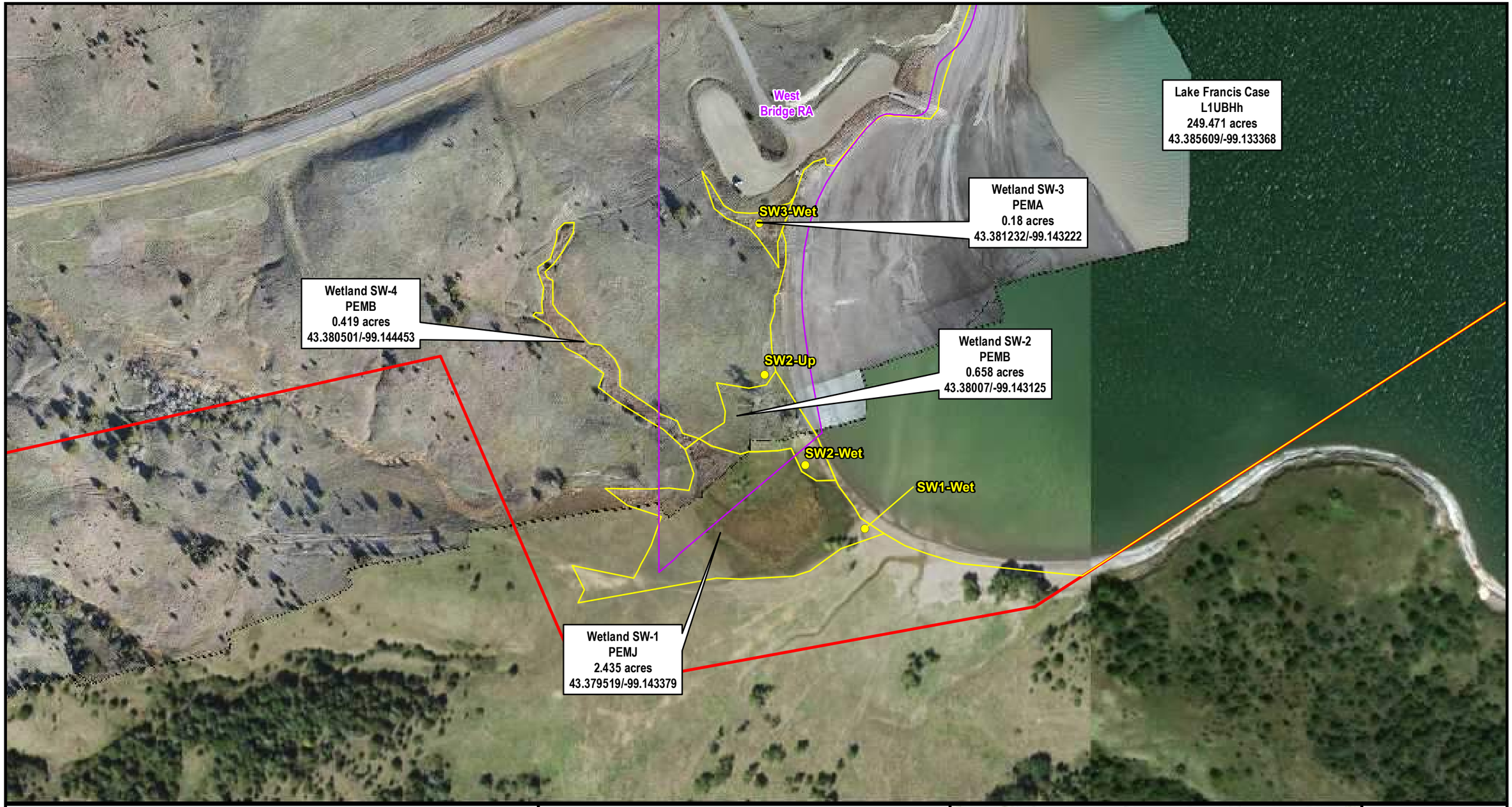


FIGURE 7

DELINEATED WETLANDS DETAIL SOUTHWEST

SD44 / Platte-Winner Bridge Corridor Study Wetland Delineation

Wetland Delineation Report

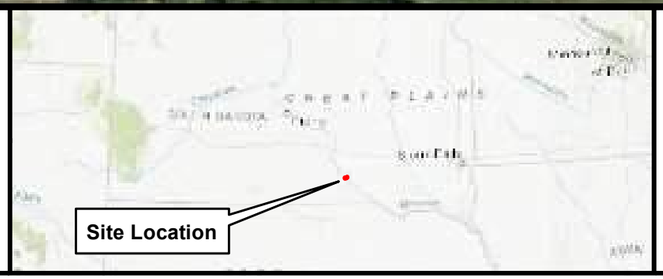
Legend - Main Map

- Sample Point
- Parks and Recreation Areas
- Delineated Wetlands
- Wetland Study Area

N

0 200 Feet

1 inch = 200 feet



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Appendix A – Wetland Data Forms

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: SD 44 Bridge PCN 05X0 | City/County: Charles Mix | Sampling Date: 6/15/17

Applicant/Owner: SDDOT | State: SD | Sampling Point: NE1-Up

Investigator(s): Ted McCaslin & Pete Lovell | Section, Township, Range: Sec 15, Twp 99N, Rng 70W

Landform (hillslope, terrace, etc.): toe of slope | Local relief (concave, convex, none): concave

LRR F | Lat: 43.391779 | Long: -99.117224 | Datum: GCS

Soil Map Unit Name: Sully silt loam, 9 to 25 percent slopes | NWI Classification: none

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks) | Slope (%): 0

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? | Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic?

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

Hydrophytic vegetation present? N	**Is the sampled area within a wetland?** N
Hydric soil present? N	If yes, optional wetland site ID:
Indicators of wetland hydrology present? N	

Remarks: (Explain alternative procedures here or in a separate report.)

Sample point in bowl-shaped depression above dry culvert. Near toe of SD44 road slope

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	= Total Cover		
Sapling/Shrub stratum (Plot size: 15)			
1			
2			
3			
4			
5			
	0 = Total Cover		
Herb stratum (Plot size: 5)			
1 *Poa pratensis*	100	Y	FACU
2 *Solidago canadensis*	15	N	FACU
3 *Elymus repens*	5	N	FACU
4			
5			
6			
7			
8			
9			
10			
	120 = Total Cover		
Woody vine stratum (Plot size: 30)			
1			
2			
% Bare Ground in Herb Stratum	0 = Total Cover		

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across all Strata: 1 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 0.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	120	x 4 =	480
UPL species	0	x 5 =	0
Column totals	120 (A)		480 (B)

Prevalence Index = B/A = 4.00

Hydrophytic Vegetation Indicators:

- ___ Rapid test for hydrophytic vegetation
- ___ Dominance test is >50%
- ___ Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? N

Remarks: (Include photo numbers here or on a separate sheet)

Occasionally mowed

SOIL

Sampling Point: NE1-Up

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-24	10YR 3/2	100					clay loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR F)
- ___ 1 cm Muck (A9) (LRR F, G, H)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (LRR G, H)
- ___ 5 cm Mucky Peat or Peat (S3) (LRR F)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils:

- ___ 1 cm Muck (A9) **(LRR I, J)**
- ___ Coast Prairie Redox (A16) **(LRR F, G, H)**
- ___ Dark Surface (S7) **(LRR G)**
- ___ High Plains Depressions (F16) **(LRR H outside of MLRA 72 & 73)**
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? N

Remarks:

Soils appears mixed, disturbed. Communication lines and culvert nearby.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) **(where not tiled)**
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where tilled)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) **LRR (F)**

Surface water present?	Yes	___	No	X	Depth (inches):	
Water table present?	Yes	___	No	X	Depth (inches):	
Saturation present? (includes capillary fringe)	Yes	___	No	X	Depth (inches):	

Indicators of wetland hydrology present? N

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: SD 44 Bridge PCN 05X0 | City/County: Charles Mix | Sampling Date: 6/15/17

Applicant/Owner: SDDOT | State: SD | Sampling Point: NE2-Up

Investigator(s): Ted McCaslin & Pete Lovell | Section, Township, Range: Sec 15, Twp 99N, Rng 70W

Landform (hillslope, terrace, etc.): hillslope | Local relief (concave, convex, none): none

LRR F | Lat: 43.389907 | Long: -99.122971 | Datum: GCS

Soil Map Unit Name: Sully silt loam, 9 to 25 percent slopes | NWI Classification: none

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks) | Slope (%): 3

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? | Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic?

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

Hydrophytic vegetation present? N	
Hydric soil present? N	**Is the sampled area within a wetland?** N
Indicators of wetland hydrology present? N	If yes, optional wetland site ID:

Remarks: (Explain alternative procedures here or in a separate report.)

Sample point north of bridge, above bank, below two drainage gullies in loess bluffs above

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species	Indicator Staus
1 *Populus deltoides*	30	Y	FAC
2			
3			
4			
5			
	= Total Cover		
Sapling/Shrub stratum (Plot size: 15)			
1			
2			
3			
4			
5			
	0 = Total Cover		
Herb stratum (Plot size: 5)			
1 *Bromus inermis*	45	Y	UPL
2 *Melilotus officinalis*	25	Y	FACU
3 *Solanum dulcamara*	10	N	FACU
4 *Oenothera biennis*	7	N	FACU
5 *Nepeta cataria*	3	N	FACU
6			
7			
8			
9			
10			
	90 = Total Cover		
Woody vine stratum (Plot size: 30)			
1			
2			
% Bare Ground in Herb Stratum ____	0 = Total Cover		

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across all Strata: 3 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 33.33% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	30	x 3 =	90
FACU species	45	x 4 =	180
UPL species	45	x 5 =	225
Column totals	120 (A)		495 (B)

Prevalence Index = B/A = 4.13

Hydrophytic Vegetation Indicators:

- ____ Rapid test for hydrophytic vegetation
- ____ Dominance test is >50%
- ____ Prevalence index is ≤3.0*
- ____ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ____ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? N

Remarks: (Include photo numbers here or on a separate sheet)

Somewhat sparse, likely recent disturbance

SOIL **Sampling Point:** NE2-Up

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-18	10YR 3/3	100					sandy silt	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR F)
- ___ 1 cm Muck (A9) (LRR F, G, H)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (LRR G, H)
- ___ 5 cm Mucky Peat or Peat (S3) (LRR F)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils:

- ___ 1 cm Muck (A9) **(LRR I, J)**
- ___ Coast Prairie Redox (A16) **(LRR F, G, H)**
- ___ Dark Surface (S7) **(LRR G)**
- ___ High Plains Depressions (F16) **(LRR H outside of MLRA 72 & 73)**
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: Gravel
Depth (inches): 18

Hydric soil present? N

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) **(where not tiled)**
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where tilled)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) **LRR (F)**

Surface water present?	Yes	___	No	X	Depth (inches): ___
Water table present?	Yes	___	No	X	Depth (inches): ___
Saturation present? (includes capillary fringe)	Yes	___	No	X	Depth (inches): ___

Indicators of wetland hydrology present? N

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: SD 44 Bridge PCN 05X0 | City/County: Charles Mix | Sampling Date: 6/15/17

Applicant/Owner: SDDOT | State: SD | Sampling Point: SE1-Up

Investigator(s): Ted McCaslin & Pete Lovell | Section, Township, Range: Sec 15, Twp 99N, Rng 70W

Landform (hillslope, terrace, etc.): hillslope | Local relief (concave, convex, none): none

LRR F | Lat: 43.389454 | Long: -99.122572 | Datum: GCS

Soil Map Unit Name: Sully silt loam, 9 to 25 percent slopes | NWI Classification: none

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks) | Slope (%): 15

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? | Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic?

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

Hydrophytic vegetation present?	N		
Hydric soil present?	N	**Is the sampled area within a wetland?**	N
Indicators of wetland hydrology present?	N	If yes, optional wetland site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)

Sample point on hillslope south of bridge above heavily-rip-rapped slope

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species	Indicator Staus
1 *Celtis occidentalis*	25	Y	FACU
2 *Morus rubra*	15	Y	FACU
3 *Juniperus virginiana*	5	N	UPL
4			
5			
	45	= Total Cover	

Sapling/Shrub stratum (Plot size: 15)			
1			
2			
3			
4			
5			
	0	= Total Cover	

Herb stratum (Plot size: 5)			
1 *Bromus inermis*	90	Y	UPL
2 *Yucca glauca*	7	N	UPL
3			
4			
5			
6			
7			
8			
9			
10			
	97	= Total Cover	

Woody vine stratum (Plot size: 30)			
1			
2			
% Bare Ground in Herb Stratum	0	= Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across all Strata: 3 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 0.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	40	x 4 =	160
UPL species	102	x 5 =	510
Column totals	142 (A)		670 (B)

Prevalence Index = B/A = 4.72

Hydrophytic Vegetation Indicators:

- ___ Rapid test for hydrophytic vegetation
- ___ Dominance test is >50%
- ___ Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? N

Remarks: (Include photo numbers here or on a separate sheet)

SOIL

Sampling Point: SE1-Up

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-24	10 YR 3/2	100					loamy silt	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR F)
- ___ 1 cm Muck (A9) (LRR F, G, H)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (LRR G, H)
- ___ 5 cm Mucky Peat or Peat (S3) (LRR F)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils:

- ___ 1 cm Muck (A9) **(LRR I, J)**
- ___ Coast Prairie Redox (A16) **(LRR F, G, H)**
- ___ Dark Surface (S7) **(LRR G)**
- ___ High Plains Depressions (F16) **(LRR H outside of MLRA 72 & 73)**
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? N

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) **(where not tiled)**
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where tilled)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) **LRR (F)**

Surface water present?	Yes	___	No	X	Depth (inches): ___
Water table present?	Yes	___	No	X	Depth (inches): ___
Saturation present? (includes capillary fringe)	Yes	___	No	X	Depth (inches): ___

Indicators of wetland hydrology present? N

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: SD 44 Bridge PCN 05X0 | City/County: Charles Mix | Sampling Date: 6/15/17

Applicant/Owner: SDDOT | State: SD | Sampling Point: SE2-Up

Investigator(s): Ted McCaslin & Pete Lovell | Section, Township, Range: Sec 15, Twp 99N, Rng 70W

Landform (hillslope, terrace, etc.): hillslope | Local relief (concave, convex, none): concave

LRR F | Lat: 43.391 | Long: -99.114792 | Datum: GCS

Soil Map Unit Name: Sansarc-Boyd complex, 15 to 40 percent slopes | NWI Classification: none

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks) | Slope (%): 5

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? | Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic?

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

Hydrophytic vegetation present? N	**Is the sampled area within a wetland?** N
Hydric soil present? N	If yes, optional wetland site ID:
Indicators of wetland hydrology present? N	

Remarks: (Explain alternative procedures here or in a separate report.)

Sample point in crease in hillslope above impounded fishing pond

VEGETATION -- Use scientific names of plants.

	Absolute % Cover	Dominant Species	Indicator Staus
Tree Stratum (Plot size: 30)			
1 *Juniperus virginiana*	20	Y	UPL
2			
3			
4			
5			
	20 = Total Cover		
Sapling/Shrub stratum (Plot size: 15)			
1 *Juniperus virginiana*	5	Y	UPL
2			
3			
4			
5			
	5 = Total Cover		
Herb stratum (Plot size: 5)			
1 *Elymus repens*	45	Y	FACU
2 *Poa pratensis*	40	Y	FACU
3 *Hordeum jubatum*	15	N	FACW
4 *Cirsium arvense*	15	N	FACU
5 *Bromus inermis*	10	N	UPL
6 *Apocynum cannabinum*	3	N	FAC
7			
8			
9			
10			
	128 = Total Cover		
Woody vine stratum (Plot size: 30)			
1			
2			
% Bare Ground in Herb Stratum	0 = Total Cover		

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across all Strata: 4 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 0.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:			
OBL species	0	x 1 =	0
FACW species	15	x 2 =	30
FAC species	3	x 3 =	9
FACU species	100	x 4 =	400
UPL species	55	x 5 =	275
Column totals	173 (A)		714 (B)

Prevalence Index = B/A = 4.13

Hydrophytic Vegetation Indicators:

- ___ Rapid test for hydrophytic vegetation
- ___ Dominance test is >50%
- ___ Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? N

Remarks: (Include photo numbers here or on a separate sheet)

SOIL

Sampling Point: SE2-Up

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-2	10YR 3/2	100					loamy clay	
2-10	10YR 3/2	100					clay loam	
10-24	10YR 3/2	72	10YR 4/1	25			clay loam	
			10YR 4/4	3				

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR F)
- ___ 1 cm Muck (A9) (LRR F, G, H)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (LRR G, H)
- ___ 5 cm Mucky Peat or Peat (S3) (LRR F)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils:

- ___ 1 cm Muck (A9) **(LRR I, J)**
- ___ Coast Prairie Redox (A16) **(LRR F, G, H)**
- ___ Dark Surface (S7) **(LRR G)**
- ___ High Plains Depressions (F16) **(LRR H outside of MLRA 72 & 73)**
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? N

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) **(where not tiled)**
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where tilled)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) **LRR (F)**

Surface water present?	Yes	___	No	X	Depth (inches): ___
Water table present?	Yes	___	No	X	Depth (inches): ___
Saturation present? (includes capillary fringe)	Yes	___	No	X	Depth (inches): ___

Indicators of wetland hydrology present? N

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: SD 44 Bridge PCN 05X0 | City/County: Charles Mix | Sampling Date: 6/15/17

Applicant/Owner: SDDOT | State: SD | Sampling Point: SE2-Wet

Investigator(s): Ted McCaslin & Pete Lovell | Section, Township, Range: Sec 15, Twp 99N, Rng 70W

Landform (hillslope, terrace, etc.): hillslope | Local relief (concave, convex, none): concave

LRR F | Lat: 43.390872 | Long: -99.114943 | Datum: GCS

Soil Map Unit Name: Sansarc-Boyd complex, 15 to 40 percent slopes | NWI Classification: none

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks) | Slope (%): 5

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? | Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic?

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

Hydrophytic vegetation present? Y	**Is the sampled area within a wetland?** Y
Hydric soil present? Y	If yes, optional wetland site ID:
Indicators of wetland hydrology present? Y	

Remarks: (Explain alternative procedures here or in a separate report.)

Sample point in wetland fringe of impounded fishing pond

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	= Total Cover		
Sapling/Shrub stratum (Plot size: 15)			
1			
2			
3			
4			
5			
	0 = Total Cover		
Herb stratum (Plot size: 5)			
1 *Typha X glauca*	80	Y	OBL
2 *Phalaris arundinacea*	20	N	FACW
3 *Cirsium arvense*	5	N	FACU
4			
5			
6			
7			
8			
9			
10			
	105 = Total Cover		
Woody vine stratum (Plot size: 30)			
1			
2			
% Bare Ground in Herb Stratum	0 = Total Cover		

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across all Strata: 1 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	80	x 1 =	80
FACW species	20	x 2 =	40
FAC species	0	x 3 =	0
FACU species	5	x 4 =	20
UPL species	55	x 5 =	275
Column totals	160 (A)		415 (B)

Prevalence Index = B/A = 2.59

Hydrophytic Vegetation Indicators:

- ___ Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

SOIL

Sampling Point: SE2-Wet

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-3	10YR 3/1	100					clay loam	
3-24	10YR 3/2	90	10YR 3/6	10			loamy clay	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- X Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR F)
- ___ 1 cm Muck (A9) (LRR F, G, H)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (LRR G, H)
- ___ 5 cm Mucky Peat or Peat (S3) (LRR F)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils:

- ___ 1 cm Muck (A9) **(LRR I, J)**
- ___ Coast Prairie Redox (A16) **(LRR F, G, H)**
- ___ Dark Surface (S7) **(LRR G)**
- ___ High Plains Depressions (F16) **(LRR H outside of MLRA 72 & 73)**
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- X Hydrogen Sulfide Odor (C1)
- ___ Dry Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) **(where not tiled)**
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where tilled)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) **LRR (F)**

Surface water present?	Yes	___	No	X	Depth (inches): ___
Water table present?	Yes	___	No	X	Depth (inches): ___
Saturation present? (includes capillary fringe)	Yes	___	No	X	Depth (inches): ___

Indicators of wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: SD 44 Bridge PCN 05X0 | City/County: Charles Mix | Sampling Date: 6/15/17

Applicant/Owner: SDDOT | State: SD | Sampling Point: NW1-Wet

Investigator(s): Ted McCaslin & Pete Lovell | Section, Township, Range: Sec 20, Twp 99N, Rng 70W

Landform (hillslope, terrace, etc.): toe of slope | Local relief (concave, convex, none): concave

LRR: G | Lat: 43.384497 | Long: -99.143904 | Datum: GCS

Soil Map Unit Name: Labu-Sansarc clays, 15 to 50 percent slopes | NWI Classification: L1UBGH

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks) | Slope (%): 2

Are vegetation X, soil X, or hydrology X significantly disturbed? | Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic?

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

Hydrophytic vegetation present? Y	**Is the sampled area within a wetland?** Y
Hydric soil present? Y	If yes, optional wetland site ID:
Indicators of wetland hydrology present? Y	

Remarks: (Explain alternative procedures here or in a separate report.)

Sample point in saddle-shaped depression near Francis Case Lake.

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species	Indicator Staus
1 *Salix nigra*	5	Y	FACW
2			
3			
4			
5			
	= Total Cover		
Sapling/Shrub stratum (Plot size: 15)			
1			
2			
3			
4			
5			
	0 = Total Cover		
Herb stratum (Plot size: 5)			
1 *Phalaris arundinacea*	70	Y	FACW
2 *Bromus inermis*	50	Y	UPL
3 *Avena sativa*	10	N	FACU
4 *Rumex crispus*	7	N	FAC
5 *Calystegia sepium*	2	N	FAC
6			
7			
8			
9			
10			
	139 = Total Cover		
Woody vine stratum (Plot size: 30)			
1			
2			
% Bare Ground in Herb Stratum	0 = Total Cover		

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across all Strata: 3 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 66.67% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	75	x 2 =	150
FAC species	9	x 3 =	27
FACU species	10	x 4 =	40
UPL species	55	x 5 =	275
Column totals	149 (A)		492 (B)

Prevalence Index = B/A = 3.30

Hydrophytic Vegetation Indicators:

- ____ Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- ____ Prevalence index is ≤3.0*
- ____ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ____ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

Oats indicate covercrop from recent disturbance

SOIL

Sampling Point: NW1-Wet

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-24	10YR 3/2	100					silty clay loam	disturbed/compacted

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR F)
- ___ 1 cm Muck (A9) (LRR F, G, H)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (LRR G, H)
- ___ 5 cm Mucky Peat or Peat (S3) (LRR F)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils:

- ___ 1 cm Muck (A9) **(LRR I, J)**
- ___ Coast Prairie Redox (A16) **(LRR F, G, H)**
- ___ Dark Surface (S7) **(LRR G)**
- ___ High Plains Depressions (F16) **(LRR H outside of MLRA 72 & 73)**
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- X Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Y

Remarks:

recently placed disturbed soils at sample point. Possible overflow erosion from upgradient 2015-2016 work on bridge abutments

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) **(where not tiled)**
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where tilled)
- ___ Crayfish Burrows (C8)
- X Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) **LRR (F)**

Surface water present?	Yes	___	No	X	Depth (inches): ___
Water table present?	Yes	___	No	X	Depth (inches): ___
Saturation present? (includes capillary fringe)	Yes	___	No	X	Depth (inches): ___

Indicators of wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Hydrology directly impacted by lake water level control

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: SD 44 Bridge PCN 05X0 | City/County: Charles Mix | Sampling Date: 6/15/17

Applicant/Owner: SDDOT | State: SD | Sampling Point: NW1-Up

Investigator(s): Ted McCaslin & Pete Lovell | Section, Township, Range: Sec 20, Twp 99N, Rng 70W

Landform (hillslope, terrace, etc.): hillslope | Local relief (concave, convex, none): none

LRR G | Lat: 43.384529 | Long: -99.143958 | Datum: GCS

Soil Map Unit Name: Labu-Sansarc clays, 15 to 50 percent slopes | NWI Classification: none

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks) | Slope (%): 5

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? | Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic?

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

Hydrophytic vegetation present? N	**Is the sampled area within a wetland?** N
Hydric soil present? Y	If yes, optional wetland site ID:
Indicators of wetland hydrology present? Y	

Remarks: (Explain alternative procedures here or in a separate report.)

Sample point on hillslope adjacent to depression

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	= Total Cover		
Sapling/Shrub stratum (Plot size: 15)			
1			
2			
3			
4			
5			
	0 = Total Cover		
Herb stratum (Plot size: 5)			
1 *Melilotus officinalis*	60	Y	FACU
2 *Bromus inermis*	50	Y	UPL
3			
4			
5			
6			
7			
8			
9			
10			
	110 = Total Cover		
Woody vine stratum (Plot size: 30)			
1			
2			
% Bare Ground in Herb Stratum	0 = Total Cover		

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across all Strata: 2 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 0.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	60	x 4 =	240
UPL species	55	x 5 =	275
Column totals	115 (A)		515 (B)

Prevalence Index = B/A = 4.48

Hydrophytic Vegetation Indicators:

- ___ Rapid test for hydrophytic vegetation
- ___ Dominance test is >50%
- ___ Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? N

Remarks: (Include photo numbers here or on a separate sheet)

SOIL

Sampling Point: SW1-Wet

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-24	10YR 3/2							

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR F)
- ___ 1 cm Muck (A9) (LRR F, G, H)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (LRR G, H)
- ___ 5 cm Mucky Peat or Peat (S3) (LRR F)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils:

- ___ 1 cm Muck (A9) **(LRR I, J)**
- ___ Coast Prairie Redox (A16) **(LRR F, G, H)**
- ___ Dark Surface (S7) **(LRR G)**
- ___ High Plains Depressions (F16) **(LRR H outside of MLRA 72 & 73)**
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? N

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) **(where not tiled)**
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where tilled)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) **LRR (F)**

Surface water present?	Yes	___	No	X	Depth (inches):	
Water table present?	Yes	___	No	X	Depth (inches):	
Saturation present? (includes capillary fringe)	Yes	___	No	X	Depth (inches):	

Indicators of wetland hydrology present? N

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: SD 44 Bridge PCN 05X0 | City/County: Charles Mix | Sampling Date: 6/15/17

Applicant/Owner: SDDOT | State: SD | Sampling Point: SW1-Wet

Investigator(s): Ted McCaslin & Pete Lovell | Section, Township, Range: Sec 20, Twp 99N, Rng 70W

Landform (hillslope, terrace, etc.): backwater | Local relief (concave, convex, none): none

LRR: G | Lat: 43.384529 | Long: -99.142376 | Datum: GCS

Soil Map Unit Name: Promise clay, 3 to 6 percent slopes | NWI Classification: L1UBGH

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks) | Slope (%): 0

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? | Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic?

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

Hydrophytic vegetation present? Y	**Is the sampled area within a wetland?** Y
Hydric soil present? Y	If yes, optional wetland site ID:
Indicators of wetland hydrology present? Y	

Remarks: (Explain alternative procedures here or in a separate report.)

Occasionally flooded backwater of Francis Case Lake

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species	Indicator Staus
1 *Salix amygdaloides*	5	Y	FACW
2			
3			
4			
5			
	5	= Total Cover	
Sapling/Shrub stratum (Plot size: 15)			
1			
2			
3			
4			
5			
	0	= Total Cover	
Herb stratum (Plot size: 5)			
1 *Hordeum jubatum*	40	Y	FACW
2 *Bromus ciliatus*	10	N	FAC
3 *Xanthium strumarium*	7	N	FAC
4 *Phleum pratense*	3	N	FACU
5 *Melilotus officinalis*	3	N	FACU
6 *Persicaria maculosa*	2	N	FACW
7 *Polygonum aviculare*	2	N	FACU
8 *Thlaspi arvense*	2	N	FACU
9			
10			
	69	= Total Cover	
Woody vine stratum (Plot size: 30)			
1			
2			
% Bare Ground in Herb Stratum ____	0	= Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across all Strata: 2 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	52	x 2 =	104
FAC species	17	x 3 =	51
FACU species	10	x 4 =	40
UPL species	55	x 5 =	275
Column totals	134 (A)		470 (B)

Prevalence Index = B/A = 3.51

Hydrophytic Vegetation Indicators:

- ____ Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- ____ Prevalence index is ≤3.0*
- ____ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ____ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

sparsely vegetated

SOIL

Sampling Point: NW1-Up

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-4	10YR 3/2	100					clay loam	gravelly
4-12	10YR 3/2	65	G1 4/N	30	D	M	clay loam	some gravel
			7.5YR 4/6	5	C	PL		
12-24	10YR 3/2	55	G1 4/N	40	D	M	clay	
			10YR 3/6	5	C	M		

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR F)
- ___ 1 cm Muck (A9) (LRR F, G, H)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (LRR G, H)
- ___ 5 cm Mucky Peat or Peat (S3) (LRR F)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- X Redox Depressions (F8)
- ___ High Plains Depressions (F16) (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils:

- ___ 1 cm Muck (A9) **(LRR I, J)**
- ___ Coast Prairie Redox (A16) **(LRR F, G, H)**
- ___ Dark Surface (S7) **(LRR G)**
- ___ High Plains Depressions (F16) **(LRR H outside of MLRA 72 & 73)**
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- X Sediment Deposits (B2)
- ___ Iron Deposits (B5)
- X Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- X Dry Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) **(where not tiled)**
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- X Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where tilled)
- ___ Crayfish Burrows (C8)
- X Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) **LRR (F)**

Surface water present?	Yes	___	No	X	Depth (inches): ___
Water table present?	Yes	X	No	___	Depth (inches): 27
Saturation present? (includes capillary fringe)	Yes	X	No	___	Depth (inches): 24

Indicators of wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: SD 44 Bridge PCN 05X0 | City/County: Charles Mix | Sampling Date: 6/15/17

Applicant/Owner: SDDOT | State: SD | Sampling Point: SW2-Wet

Investigator(s): Ted McCaslin & Pete Lovell | Section, Township, Range: Sec 20, Twp 99N, Rng 70W

Landform (hillslope, terrace, etc.): toe of slope | Local relief (concave, convex, none): none

LRR G | Lat: 43.379852 | Long: -99.142839 | Datum: GCS

Soil Map Unit Name: Promise clay, 3 to 6 percent slopes | NWI Classification: L1UBGH

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks) | Slope (%): 0

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? | Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic?

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

Hydrophytic vegetation present? Y	**Is the sampled area within a wetland?** Y
Hydric soil present? Y	If yes, optional wetland site ID:
Indicators of wetland hydrology present? Y	

Remarks: (Explain alternative procedures here or in a separate report.)

Toe of wet draw from spring upgradient

VEGETATION -- Use scientific names of plants.

	Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
		5	= Total Cover	
	Sapling/Shrub stratum (Plot size: 15)			
1				
2				
3				
4				
5				
		0	= Total Cover	
	Herb stratum (Plot size: 5)			
1	*Schoenoplectus pungens*	80	Y	OBL
2	*Eleocharis palustris*	25	N	OBL
3	*Typha angustifolia*	10	N	OBL
4	*Hordeum jubatum*	5	N	FACW
5	*Rumex crispus*	3	N	FAC
6	*Xanthium strumarium*	3	N	FAC
7	*Plantago lanceolata*	2	N	FAC
8	*Schoenoplectus tabernaemontani*	2	N	OBL
9	*Ranunculus hispidus*	2	N	FACW
10				
		132	= Total Cover	
	Woody vine stratum (Plot size: 30)			
1				
2				
	% Bare Ground in Herb Stratum ____	0	= Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across all Strata: 1 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	117	x 1 =	117
FACW species	52	x 2 =	104
FAC species	8	x 3 =	24
FACU species	0	x 4 =	0
UPL species	55	x 5 =	275
Column totals	232 (A)		520 (B)

Prevalence Index = B/A = 2.24

Hydrophytic Vegetation Indicators:

- ____ Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ____ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ____ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

SOIL

Sampling Point: NW1-Up

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-2	10YR 3/2	100					clay loam	
2-5	G1 4/10Y	85	G1 2.5/N	10	D	M	clay loam	soft, almost all clay
			10YR 3/4		C	M		
5-10	G1 2.5/N	93	G1 4/10Y	7	D	M	mucky loam	tacky
10-18	G1 2.5/N	100					mucky loam	
18-24	G1 2.5/N	100					mucky clay	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- X Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR F)
- ___ 1 cm Muck (A9) (LRR F, G, H)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (LRR G, H)
- ___ 5 cm Mucky Peat or Peat (S3) (LRR F)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- X Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils:

- ___ 1 cm Muck (A9) **(LRR I, J)**
- ___ Coast Prairie Redox (A16) **(LRR F, G, H)**
- ___ Dark Surface (S7) **(LRR G)**
- ___ High Plains Depressions (F16) **(LRR H outside of MLRA 72 & 73)**
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Iron Deposits (B5)
- X Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- X Hydrogen Sulfide Odor (C1)
- ___ Dry Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) **(where not tiled)**
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where tilled)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) **LRR (F)**

Surface water present?	Yes	___	No	X	Depth (inches): ___
Water table present?	Yes	X	No	___	Depth (inches): 0
Saturation present? (includes capillary fringe)	Yes	X	No	___	Depth (inches): 0

Indicators of wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: SD 44 Bridge PCN 05X0 | City/County: Charles Mix | Sampling Date: 6/15/17

Applicant/Owner: SDDOT | State: SD | Sampling Point: SW2-Up

Investigator(s): Ted McCaslin & Pete Lovell | Section, Township, Range: Sec 20, Twp 99N, Rng 70W

Landform (hillslope, terrace, etc.): hillslope | Local relief (concave, convex, none): none

LRR: G | Lat: 43.380364 | Long: -99.142839 | Datum: GCS

Soil Map Unit Name: Promise clay, 3 to 6 percent slopes | NWI Classification: none

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks) | Slope (%): 7

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? | Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic?

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

Hydrophytic vegetation present? N	**Is the sampled area within a wetland?** N
Hydric soil present? N	If yes, optional wetland site ID:
Indicators of wetland hydrology present? N	

Remarks: (Explain alternative procedures here or in a separate report.)

Sample point on rise above lakeshore

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	5	= Total Cover	
Sapling/Shrub stratum (Plot size: 15)			
1			
2			
3			
4			
5			
	0	= Total Cover	
Herb stratum (Plot size: 5)			
1 *Elymus repens*	70	Y	FACU
2 *Bromus inermis*	50	Y	UPL
3 *Bromus ciliatus*	10	N	FAC
4 *Melilotus officinalis*	5	N	FACU
5 *Calystegia sepium*	4	N	FAC
6			
7			
8			
9			
10			
	139	= Total Cover	
Woody vine stratum (Plot size: 30)			
1			
2			
% Bare Ground in Herb Stratum	0	= Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across all Strata: 2 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 0.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	52	x 2 =	104
FAC species	14	x 3 =	42
FACU species	75	x 4 =	300
UPL species	55	x 5 =	275
Column totals	196 (A)		721 (B)

Prevalence Index = B/A = 3.68

Hydrophytic Vegetation Indicators:

- ____ Rapid test for hydrophytic vegetation
- ____ Dominance test is >50%
- ____ Prevalence index is ≤3.0*
- ____ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ____ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? N

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** NW1-Up

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-5	10YR 3/2	97	10YR 3/6	3	C	M	silty clay loam	
5-24	5Y 5/1	95	2.5YR 8/4	5	C	M	silty loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR F)
- ___ 1 cm Muck (A9) (LRR F, G, H)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (LRR G, H)
- ___ 5 cm Mucky Peat or Peat (S3) (LRR F)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils:

- ___ 1 cm Muck (A9) **(LRR I, J)**
- ___ Coast Prairie Redox (A16) **(LRR F, G, H)**
- ___ Dark Surface (S7) **(LRR G)**
- ___ High Plains Depressions (F16) **(LRR H outside of MLRA 72 & 73)**
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: _____
Depth (inches): _____

Hydric soil present? N

Remarks:
Possible lake sediments in profile

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) **(where not tiled)**
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where tilled)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) **LRR (F)**

Surface water present?	Yes	___	No	X	Depth (inches): ___
Water table present?	Yes	___	No	X	Depth (inches): ___
Saturation present? (includes capillary fringe)	Yes	___	No	X	Depth (inches): ___

Indicators of wetland hydrology present? N

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Sample point above inundation or saturation in flood level aerial photos.

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: SD 44 Bridge PCN 05X0 | City/County: Charles Mix | Sampling Date: 6/15/17

Applicant/Owner: SDDOT | State: SD | Sampling Point: SW3-Wet

Investigator(s): Ted McCaslin & Pete Lovell | Section, Township, Range: Sec 20, Twp 99N, Rng 70W

Landform (hillslope, terrace, etc.): backwater/toe of slope | Local relief (concave, convex, none): none

LRR: G | Lat: 43.381222 | Long: -99.1432 | Datum: GCS

Soil Map Unit Name: Labu-Sansarc clays, 15 to 50 percent slopes | NWI Classification: none

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks) | Slope (%): 0

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? | Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic?

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

Hydrophytic vegetation present? Y	**Is the sampled area within a wetland?** N
Hydric soil present? N	If yes, optional wetland site ID:
Indicators of wetland hydrology present? N	

Remarks: (Explain alternative procedures here or in a separate report.)

Flat backwater in lake at toe of wet slope

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	5	= Total Cover	
Sapling/Shrub stratum (Plot size: 15)			
1			
2			
3			
4			
5			
	0	= Total Cover	
Herb stratum (Plot size: 5)			
1 *Phalaris arundinacea*	90	Y	FACW
2 *Schoenoplectus pungens*	10	N	OBL
3 *Phragmites australis*	10	N	FACW
4 *Apocynum cannabinum*	3	N	FAC
5 *Cirsium arvense*	2	N	FACU
6			
7			
8			
9			
10			
	115	= Total Cover	
Woody vine stratum (Plot size: 30)			
1			
2			
% Bare Ground in Herb Stratum ____	0	= Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across all Strata: 1 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	10	x 1 =	10
FACW species	52	x 2 =	104
FAC species	3	x 3 =	9
FACU species	2	x 4 =	8
UPL species	55	x 5 =	275
Column totals	122 (A)		406 (B)

Prevalence Index = B/A = 3.33

Hydrophytic Vegetation Indicators:

- ____ Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- ____ Prevalence index is ≤3.0*
- ____ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ____ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

SOIL

Sampling Point: NW1-Up

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-8	10YR 3/1	95	10YR 3/4	5	C	M	loamy clay	
8-24	10YR 3/1	87	10YR 3/4	5	C	M	loamy clay	
			1YR 7/1	8	D	PL		

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR F)
- ___ 1 cm Muck (A9) (LRR F, G, H)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (LRR G, H)
- ___ 5 cm Mucky Peat or Peat (S3) (LRR F)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils:

- ___ 1 cm Muck (A9) **(LRR I, J)**
- ___ Coast Prairie Redox (A16) **(LRR F, G, H)**
- ___ Dark Surface (S7) **(LRR G)**
- ___ High Plains Depressions (F16) **(LRR H outside of MLRA 72 & 73)**
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? N

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- X Dry Season Water Table (C2)
- X Oxidized Rhizospheres on Living Roots (C3) **(where not tiled)**
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where tilled)
- ___ Crayfish Burrows (C8)
- X Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- X FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) **LRR (F)**

Surface water present?	Yes		No	X	Depth (inches):	
Water table present?	Yes	X	No		Depth (inches):	20
Saturation present? (includes capillary fringe)	Yes	X	No		Depth (inches):	18

Indicators of wetland hydrology present? N

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Sample point above inundation or saturation in flood level aerial photos.

Appendix B – Representative Site Photos

Photo 1 - Looking southwest. Sample Point NE2-Up in foreground

Photo 2 - Looking west on top of bluff above Photo 1

Photo 3 - Looking northeast along north side of SD 44 in NE quadrant of study area

Photo 4 - Looking west in upland basin near sample point NE1-Up

Photo 5 - Looking northwest along shoreline in SE quadrant of study area

Photo 6 - Looking east along footpath from campground near top of bluff in SE quadrant

Photo 7 - looking northeast on south side of SD 44 in SE quadrant of study area

Photo 8 - Fishing pond in SE quadrant. Wetland SE-1 at left of photo.

Photo 9 - Looking south under west side of bridge from NW quadrant of study area

Photo 10 - looking southeast from NW quadrant of study area along shore of Lake Francis Case

Photo 11 - Looking east at bridge from above shore in NW quadrant of study area

Photo 12 - Looking west at entry sign to West Bridge Recreation Area in SE quadrant of study area. Sign reads "West Bridge Lake Side Use Area"

Photo 13 - Looking northeast at boat ramp parking area and bridge from SE quadrant

Photo 14 - Looking west at Wetland SW-1 at large previously inundated basin

Photo 15- Looking south at Wetland SW-4 (cattails on left side of photo) upgradient from lake

Photo 16 - Lake edge at interface with Wetland SW-3

Appendix C – NRCS Web Soil Survey

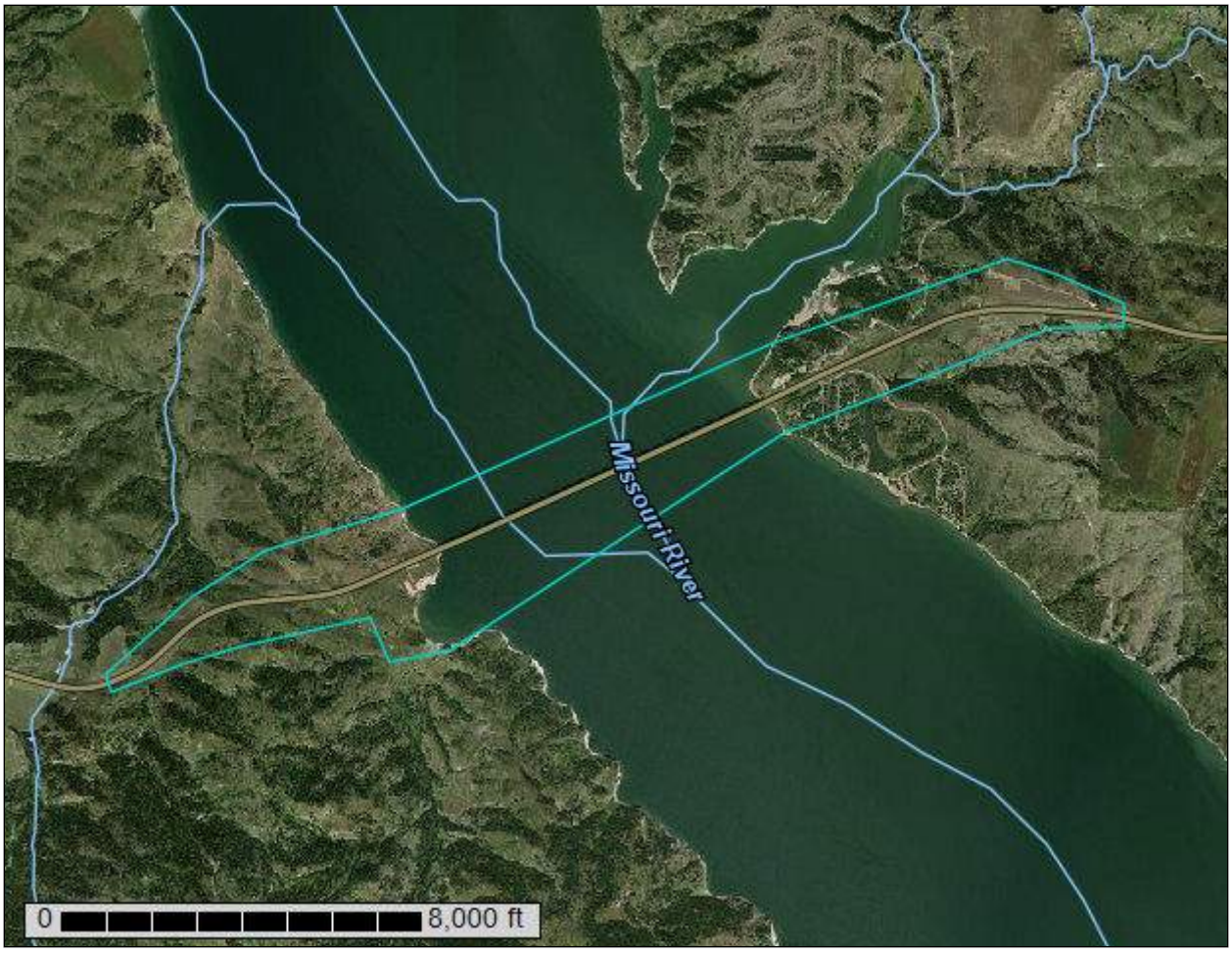
United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Charles Mix County, South Dakota, and Gregory County, South Dakota



March 7, 2018

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

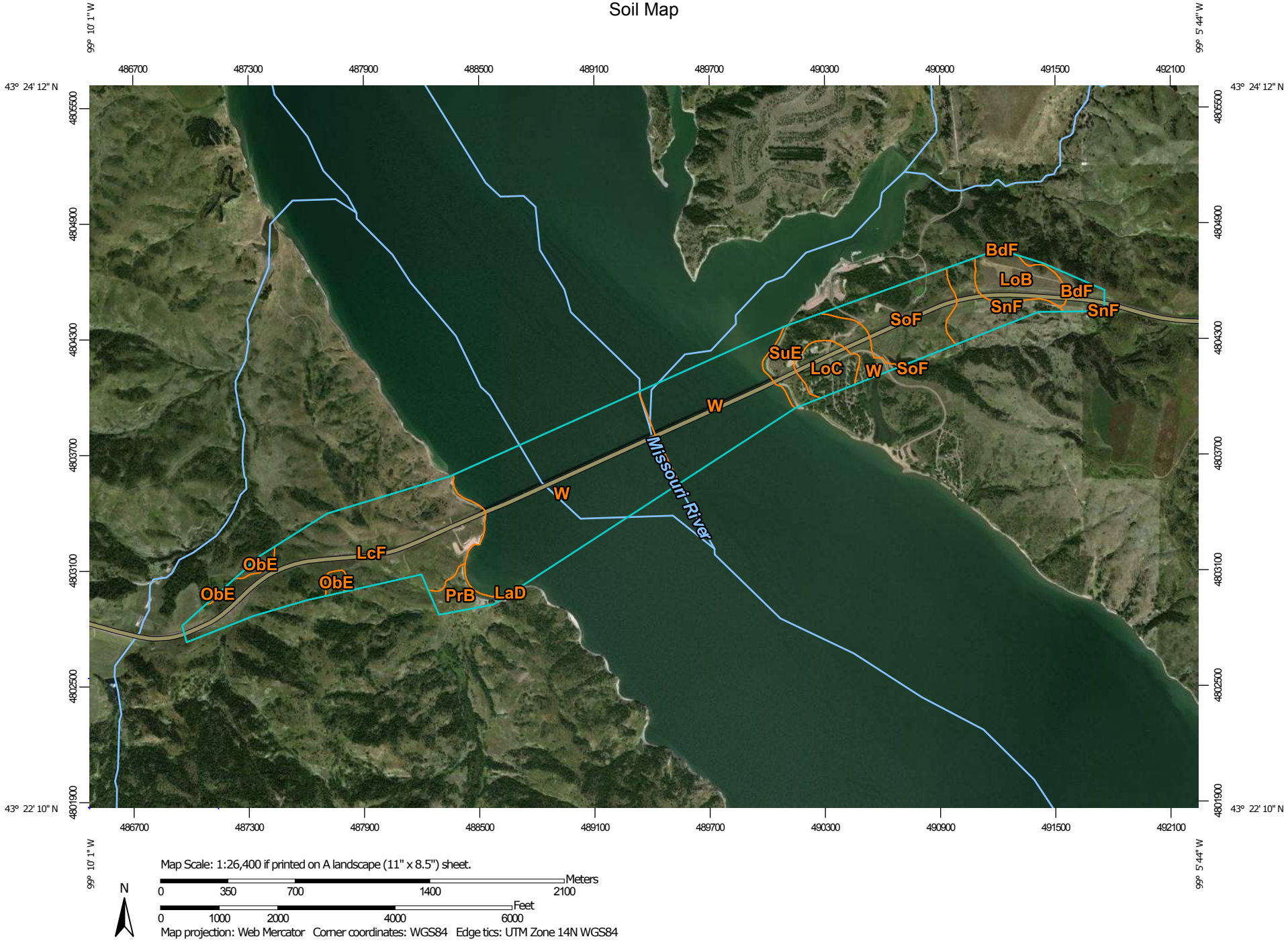
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

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 1:20,000.

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: Charles Mix County, South Dakota
Survey Area Data: Version 24, Oct 6, 2017

Soil Survey Area: Gregory County, South Dakota
Survey Area Data: Version 19, Oct 6, 2017

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

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

Date(s) aerial images were photographed: Oct 20, 2010—Feb 6, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

MAP LEGEND

MAP INFORMATION

imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BdF	Betts-Ethan loams, 15 to 40 percent slopes	9.6	1.7%
LoB	Lowry silt loam, 2 to 6 percent slopes	24.0	4.4%
LoC	Lowry silt loam, 6 to 9 percent slopes	17.9	3.3%
SnF	Sansarc clay, 6 to 35 percent slopes	24.9	4.5%
SoF	Sansarc-Boyd complex, 15 to 40 percent slopes	46.6	8.5%
SuE	Sully silt loam, 9 to 25 percent slopes	31.5	5.7%
W	Water	82.3	14.9%
Subtotals for Soil Survey Area		**236.8**	**43.0%**
Totals for Area of Interest		**551.4**	**100.0%**

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
LaD	Labu clay, 9 to 15 percent slopes	0.2	0.0%
LcF	Labu-Sansarc silty clays, 9 to 35 percent slopes	132.9	24.1%
ObE	Okaton-Lakoma silty clays, 15 to 40 percent slopes	6.2	1.1%
PrB	Promise clay, 3 to 6 percent slopes	10.5	1.9%
W	Water	164.7	29.9%
Subtotals for Soil Survey Area		**314.6**	**57.0%**
Totals for Area of Interest		**551.4**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some

observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The

pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Charles Mix County, South Dakota

BdF—Betts-Ethan loams, 15 to 40 percent slopes

Map Unit Setting

National map unit symbol: 2wkq9
Elevation: 1,120 to 2,230 feet
Mean annual precipitation: 16 to 28 inches
Mean annual air temperature: 43 to 52 degrees F
Frost-free period: 120 to 160 days
Farmland classification: Not prime farmland

Map Unit Composition

Betts and similar soils: 55 percent
Ethan and similar soils: 35 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Betts

Setting

Landform: Ground moraines
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Fine-loamy till

Typical profile

A - 0 to 3 inches: loam
Bk - 3 to 31 inches: clay loam
C - 31 to 79 inches: clay loam

Properties and qualities

Slope: 15 to 40 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 30 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: High (about 9.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: C
Ecological site: Thin Upland (R055CY012SD)
Forage suitability group: Not suited (G055CY000SD)
Hydric soil rating: No

Description of Ethan

Setting

Landform: Ground moraines
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Fine-loamy till

Typical profile

Ap - 0 to 7 inches: loam
Bk - 7 to 33 inches: clay loam
C - 33 to 79 inches: clay loam

Properties and qualities

Slope: 15 to 40 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 30 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: High (about 9.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: C
Ecological site: Thin Upland (R055CY012SD)
Forage suitability group: Limy Upland (G055CY400SD)
Hydric soil rating: No

Minor Components

Clarno

Percent of map unit: 4 percent
Landform: Ground moraines
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Loamy (R055CY010SD)
Hydric soil rating: No

Davis

Percent of map unit: 2 percent
Landform: Ground moraines
Landform position (three-dimensional): Base slope, talf
Down-slope shape: Concave
Across-slope shape: Linear
Ecological site: Loamy (R055CY010SD)
Hydric soil rating: No

Talmo

Percent of map unit: 2 percent
Landform: Ground moraines
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: Very Shallow (R055CY016SD)
Hydric soil rating: No

Betts, very stony

Percent of map unit: 1 percent
Landform: Ground moraines
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: Thin Upland (R055CY012SD)
Hydric soil rating: No

Ethan, very stony

Percent of map unit: 1 percent
Landform: Ground moraines
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: Thin Upland (R055CY012SD)
Hydric soil rating: No

LoB—Lowry silt loam, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: cxg5
Elevation: 1,310 to 1,970 feet
Mean annual precipitation: 18 to 25 inches
Mean annual air temperature: 43 to 50 degrees F
Frost-free period: 130 to 155 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Lowry and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lowry

Setting

Landform: Plains
Landform position (two-dimensional): Backslope
Down-slope shape: Linear
Across-slope shape: Linear

Parent material: Loess

Typical profile

H1 - 0 to 7 inches: silt loam
H2 - 7 to 15 inches: silt loam
H3 - 15 to 60 inches: silt loam

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: High (about 11.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: Loamy (R055CY010SD)
Forage suitability group: Loam (G055CY100SD)
Hydric soil rating: No

Minor Components

Agar

Percent of map unit: 7 percent
Landform: Swales
Landform position (two-dimensional): Footslope
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: Loamy (R055CY010SD)
Hydric soil rating: No

Mobridge

Percent of map unit: 7 percent
Landform: Swales
Landform position (two-dimensional): Footslope
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: Loamy Overflow (R055CY020SD)
Hydric soil rating: No

Tetonka

Percent of map unit: 1 percent
Landform: Potholes
Landform position (two-dimensional): Toeslope
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: Wet Meadow (R055CY004SD)
Hydric soil rating: Yes

LoC—Lowry silt loam, 6 to 9 percent slopes

Map Unit Setting

National map unit symbol: cxg6
Elevation: 1,310 to 1,970 feet
Mean annual precipitation: 18 to 25 inches
Mean annual air temperature: 43 to 50 degrees F
Frost-free period: 130 to 155 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Lowry and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lowry

Setting

Landform: Plains
Landform position (two-dimensional): Backslope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess

Typical profile

H1 - 0 to 8 inches: silt loam
H2 - 8 to 15 inches: silt loam
H3 - 15 to 60 inches: silt loam

Properties and qualities

Slope: 6 to 9 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: High (about 11.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: Loamy (R055CY010SD)
Forage suitability group: Loam (G055CY100SD)
Hydric soil rating: No

Minor Components

Agar

Percent of map unit: 8 percent
Landform: Swales
Landform position (two-dimensional): Footslope
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: Loamy (R055CY010SD)
Hydric soil rating: No

Mobridge

Percent of map unit: 7 percent
Landform: Swales
Landform position (two-dimensional): Footslope
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: Loamy Overflow (R055CY020SD)
Hydric soil rating: No

SnF—Sansarc clay, 6 to 35 percent slopes

Map Unit Setting

National map unit symbol: 2v675
Elevation: 1,260 to 2,490 feet
Mean annual precipitation: 16 to 21 inches
Mean annual air temperature: 43 to 50 degrees F
Frost-free period: 100 to 150 days
Farmland classification: Not prime farmland

Map Unit Composition

Sansarc and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sansarc

Setting

Landform: Hills
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex, linear
Across-slope shape: Convex
Parent material: Residuum weathered from shale

Typical profile

A - 0 to 4 inches: clay
AC - 4 to 10 inches: parachannery clay
C - 10 to 14 inches: very parachannery clay
Cr - 14 to 34 inches: bedrock

Properties and qualities

Slope: 6 to 35 percent
Depth to restrictive feature: 11 to 20 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 6 percent
Gypsum, maximum in profile: 2 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 1.0
Available water storage in profile: Very low (about 1.3 inches)

Interpretive groups

Land capability classification (irrigated): 7e
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: Shallow Clay (R063AY017SD)
Forage suitability group: Not suited (G063AY000SD)
Hydric soil rating: No

Minor Components

Opal

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: Clayey (R063AY011SD)
Hydric soil rating: No

Promise

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Concave
Across-slope shape: Linear
Ecological site: Clayey (R063AY011SD)
Hydric soil rating: No

Bullcreek

Percent of map unit: 3 percent
Landform: Drainageways
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: Dense Clay (R063AY018SD)
Hydric soil rating: No

Badland

Percent of map unit: 2 percent
Landform: Hills
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear, convex
Hydric soil rating: No

SoF—Sansarc-Boyd complex, 15 to 40 percent slopes

Map Unit Setting

National map unit symbol: cxgv
Elevation: 1,310 to 1,640 feet
Mean annual precipitation: 17 to 25 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 135 to 160 days
Farmland classification: Not prime farmland

Map Unit Composition

Sansarc and similar soils: 50 percent
Boyd and similar soils: 30 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sansarc

Setting

Landform: Hills
Landform position (two-dimensional): Shoulder
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Clayey residuum weathered from shale

Typical profile

H1 - 0 to 4 inches: clay
H2 - 4 to 13 inches: clay
Cr - 13 to 60 inches: weathered bedrock

Properties and qualities

Slope: 25 to 40 percent
Depth to restrictive feature: 4 to 20 inches to paralithic bedrock
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Gypsum, maximum in profile: 5 percent

Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 1.0
Available water storage in profile: Very low (about 1.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: Shallow Clay (R063BY017SD)
Forage suitability group: Not suited (G063BY000SD)
Hydric soil rating: No

Description of Boyd

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Clayey residuum weathered from shale

Typical profile

H1 - 0 to 5 inches: silty clay
H2 - 5 to 23 inches: clay
H3 - 23 to 31 inches: clay
Cr - 31 to 60 inches: weathered bedrock

Properties and qualities

Slope: 15 to 25 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Gypsum, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Ecological site: Clayey (R063BY011SD)
Forage suitability group: Not suited (G063BY000SD)
Hydric soil rating: No

Minor Components

Betts

Percent of map unit: 7 percent
Landform: Moraines
Landform position (two-dimensional): Shoulder

Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: Thin Upland (R063BY012SD)
Hydric soil rating: No

Gavins

Percent of map unit: 7 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Thin Upland (R063BY012SD)
Hydric soil rating: No

Sully

Percent of map unit: 6 percent
Landform: Plains
Landform position (two-dimensional): Shoulder
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: Thin Upland (R063BY012SD)
Hydric soil rating: No

SuE—Sully silt loam, 9 to 25 percent slopes

Map Unit Setting

National map unit symbol: cxgx
Elevation: 1,310 to 1,970 feet
Mean annual precipitation: 18 to 25 inches
Mean annual air temperature: 43 to 50 degrees F
Frost-free period: 130 to 155 days
Farmland classification: Not prime farmland

Map Unit Composition

Sully and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sully

Setting

Landform: Plains
Landform position (two-dimensional): Shoulder
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loess

Typical profile

H1 - 0 to 4 inches: silt loam
H2 - 4 to 60 inches: silt loam

Properties and qualities

Slope: 9 to 25 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 20 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: High (about 10.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Ecological site: Thin Upland (R055CY012SD)
Forage suitability group: Limy Upland (G055CY400SD)
Hydric soil rating: No

Minor Components

Betts

Percent of map unit: 7 percent
Landform: Moraines
Landform position (two-dimensional): Shoulder
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: Thin Upland (R055CY012SD)
Hydric soil rating: No

Sansarc

Percent of map unit: 7 percent
Landform: Hills
Landform position (two-dimensional): Shoulder
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: Shallow Clay (R055CY017SD)
Hydric soil rating: No

Talmo

Percent of map unit: 6 percent
Landform: Outwash terraces on moraines
Landform position (two-dimensional): Shoulder
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: Very Shallow (R055CY016SD)
Hydric soil rating: No

W—Water

Map Unit Setting

National map unit symbol: cxh5
Elevation: 1,310 to 1,970 feet
Mean annual precipitation: 18 to 25 inches
Mean annual air temperature: 43 to 50 degrees F
Frost-free period: 130 to 155 days
Farmland classification: Not prime farmland

Map Unit Composition

Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Water

Interpretive groups

Land capability classification (irrigated): None specified
Ecological site: Non-site (R055CY999SD)
Hydric soil rating: Unranked

Gregory County, South Dakota

LaD—Labu clay, 9 to 15 percent slopes

Map Unit Setting

National map unit symbol: cxns
Elevation: 1,310 to 1,640 feet
Mean annual precipitation: 17 to 25 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 135 to 160 days
Farmland classification: Not prime farmland

Map Unit Composition

Labu and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Labu

Setting

Landform: Breaks
Landform position (two-dimensional): Backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from shale

Typical profile

H1 - 0 to 6 inches: clay
H2 - 6 to 30 inches: clay
Cr - 30 to 60 inches: weathered bedrock

Properties and qualities

Slope: 9 to 15 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Available water storage in profile: Low (about 3.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Ecological site: Clayey (R063BY011SD)
Forage suitability group: Clayey Subsoil (G063BY210SD)
Hydric soil rating: No

Minor Components

Sansarc

Percent of map unit: 15 percent
Landform: Breaks

Landform position (two-dimensional): Summit, shoulder
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: Shallow Clay (R063BY017SD)
Hydric soil rating: No

LcF—Labu-Sansarc silty clays, 9 to 35 percent slopes

Map Unit Setting

National map unit symbol: 2wfq7
Elevation: 1,200 to 2,310 feet
Mean annual precipitation: 19 to 28 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 100 to 150 days
Farmland classification: Not prime farmland

Map Unit Composition

Labu and similar soils: 55 percent
Sansarc and similar soils: 25 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Labu

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Residuum weathered from shale

Typical profile

A - 0 to 5 inches: silty clay
Bw - 5 to 25 inches: silty clay
C - 25 to 33 inches: silty clay
Cr - 33 to 43 inches: bedrock

Properties and qualities

Slope: 9 to 35 percent
Depth to restrictive feature: 30 to 38 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent

Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Low (about 4.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Ecological site: Clayey (R063BY011SD)
Forage suitability group: Clayey Subsoil (G063BY210SD)
Hydric soil rating: No

Description of Sansarc

Setting

Landform: Hills
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex, linear
Across-slope shape: Convex
Parent material: Residuum weathered from shale

Typical profile

A - 0 to 4 inches: silty clay
AC - 4 to 10 inches: parachannery clay
C - 10 to 14 inches: very parachannery clay
Cr - 14 to 34 inches: bedrock

Properties and qualities

Slope: 9 to 35 percent
Depth to restrictive feature: 11 to 20 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 6 percent
Gypsum, maximum in profile: 2 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 1.0
Available water storage in profile: Very low (about 1.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: Shallow Clay (R063BY017SD)
Forage suitability group: Not suited (G063BY000SD)
Hydric soil rating: No

Minor Components

Paka

Percent of map unit: 7 percent

Landform: Hills
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: Loamy (R063BY010SD)
Hydric soil rating: No

Verdel

Percent of map unit: 7 percent
Landform: Hills
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Concave
Across-slope shape: Linear
Ecological site: Clayey (R063BY011SD)
Hydric soil rating: No

Wewela

Percent of map unit: 3 percent
Landform: Hills
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Loamy (R063BY010SD)
Hydric soil rating: No

Badland

Percent of map unit: 3 percent
Landform: Hills
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear, convex
Hydric soil rating: No

ObE—Okaton-Lakoma silty clays, 15 to 40 percent slopes

Map Unit Setting

National map unit symbol: 2tj7s
Elevation: 1,230 to 2,620 feet
Mean annual precipitation: 16 to 21 inches
Mean annual air temperature: 43 to 50 degrees F
Frost-free period: 100 to 150 days
Farmland classification: Not prime farmland

Map Unit Composition

Okaton and similar soils: 45 percent

Lakoma and similar soils: 40 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Okaton

Setting

Landform: Hills
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Residuum weathered from shale

Typical profile

A - 0 to 8 inches: silty clay
C - 8 to 14 inches: silty clay
Cr - 14 to 24 inches: bedrock

Properties and qualities

Slope: 15 to 40 percent
Depth to restrictive feature: 10 to 18 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 25 percent
Gypsum, maximum in profile: 2 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 2.0
Available water storage in profile: Very low (about 1.8 inches)

Interpretive groups

Land capability classification (irrigated): 7e
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: Shallow Clay (R063AY017SD)
Forage suitability group: Not suited (G063AY000SD)
Hydric soil rating: No

Description of Lakoma

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Residuum weathered from shale

Typical profile

Ap - 0 to 5 inches: silty clay
Bw - 5 to 11 inches: silty clay

Bk - 11 to 22 inches: silty clay
BCk - 22 to 30 inches: silty clay
Cr - 30 to 40 inches: bedrock

Properties and qualities

Slope: 15 to 40 percent
Depth to restrictive feature: 25 to 33 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 30 percent
Gypsum, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 2.0
Available water storage in profile: Low (about 3.9 inches)

Interpretive groups

Land capability classification (irrigated): 7e
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: Thin Upland (R063AY012SD)
Forage suitability group: Clayey Subsoil (G063BY210SD)
Hydric soil rating: No

Minor Components

Promise

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Footslope, backslope
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Clayey (R063AY011SD)
Hydric soil rating: No

Boro

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Summit, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: Clayey (R063AY011SD)
Hydric soil rating: No

Bullcreek

Percent of map unit: 3 percent
Landform: Drainageways
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear

Across-slope shape: Concave
Ecological site: Dense Clay (R063AY018SD)
Hydric soil rating: No

Schamber

Percent of map unit: 2 percent
Landform: Hills
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: Very Shallow (R063AY016SD)
Hydric soil rating: No

PrB—Promise clay, 3 to 6 percent slopes

Map Unit Setting

National map unit symbol: 2rmj7
Elevation: 1,250 to 2,760 feet
Mean annual precipitation: 16 to 21 inches
Mean annual air temperature: 43 to 50 degrees F
Frost-free period: 100 to 150 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Promise and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Promise

Setting

Landform: Plains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Clayey alluvium

Typical profile

Ap - 0 to 8 inches: clay
Bss - 8 to 16 inches: clay
Bkss - 16 to 36 inches: clay
Cy - 36 to 47 inches: clay
C - 47 to 79 inches: clay

Properties and qualities

Slope: 3 to 6 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained

Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 8 percent
Gypsum, maximum in profile: 10 percent
Salinity, maximum in profile: Very slightly saline to moderately saline (2.0 to 8.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 9.0
Available water storage in profile: Low (about 4.1 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: D
Ecological site: Clayey (R063AY011SD)
Forage suitability group: Clayey Subsoil (G063AY210SD)
Hydric soil rating: No

Minor Components

Opal

Percent of map unit: 5 percent
Landform: Plains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex, linear
Ecological site: Clayey (R063AY011SD)
Hydric soil rating: No

Bullcreek

Percent of map unit: 4 percent
Landform: Plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: Dense Clay (R063AY018SD)
Hydric soil rating: No

Capa

Percent of map unit: 3 percent
Landform: Swales
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: Thin Claypan (R063AY015SD)
Hydric soil rating: No

Kolls

Percent of map unit: 3 percent
Landform: Closed depressions
Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: Closed Depression (R063AY019SD)
Hydric soil rating: Yes

W—Water

Map Unit Setting

National map unit symbol: cxqg
Elevation: 1,310 to 1,640 feet
Mean annual precipitation: 17 to 25 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 135 to 160 days
Farmland classification: Not prime farmland

Map Unit Composition

Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Water

Interpretive groups

Land capability classification (irrigated): None specified
Ecological site: Non-site (R063BY999SD)
Hydric soil rating: Unranked

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Appendix D – WETS Climate and Precipitation Data

WETS Table

WETS Station: ACADEMY 2NE, SD								
Requested years: 1971 - 2000								
Month	Avg Max Temp	Avg Min Temp	Avg Mean Temp	Avg Precip	30% chance precip less than	30% chance precip more than	Avg number days precip 0.10 or more	Avg Snowfall
Jan	30.3	7.7	19.0	0.49	0.20	0.60	2	6.6
Feb	36.8	13.9	25.4	0.63	0.25	0.71	2	6.7
Mar	47.4	23.1	35.3	1.52	0.72	1.85	4	8.8
Apr	60.4	34.1	47.3	2.68	1.83	3.20	6	4.5
May	71.8	45.7	58.8	3.78	2.37	4.56	7	0.0
Jun	81.7	55.4	68.5	3.34	2.29	3.97	6	0.0
Jul	88.0	60.5	74.3	2.96	1.96	3.55	6	0.0
Aug	86.9	58.4	72.6	2.17	1.30	2.63	4	0.0
Sep	77.8	48.2	63.0	2.24	1.06	2.74	4	0.3
Oct	63.9	36.2	50.0	1.82	0.80	2.22	4	1.7
Nov	44.5	22.7	33.6	0.99	0.45	1.21	3	8.2
Dec	33.7	11.8	22.8	0.39	0.21	0.48	2	6.7
Annual:					19.50	25.76		
Average	60.3	34.8	47.5	-	-	-	-	-
Total	-	-	-	23.01			47	43.5

GROWING SEASON DATES			
Years with missing data:	24 deg = 0	28 deg = 0	32 deg = 0
Years with no occurrence:	24 deg = 0	28 deg = 0	32 deg = 0
Data years used:	24 deg = 30	28 deg = 30	32 deg = 30
Probability	24 F or higher	28 F or higher	32 F or higher
50 percent *	4/12 to 10/18: 189 days	4/24 to 10/9: 168 days	5/3 to 9/28: 148 days
70 percent *	4/8 to 10/23: 198 days	4/20 to 10/14: 177 days	4/29 to 10/3: 157 days
* Percent chance of the growing season occurring between the Beginning and Ending dates.			

STATS TABLE - total precipitation (inches)													
Yr	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annl
1898							3.84	3.00	0.31	1.06	0.25	0.13	8.59
1899	0.48	0.15	2.06	1.12	3.25	2.71	2.40	2.42	0.14	0.71	0.57	0.16	16.17
1900	0.01	0.07	1.32	2.73	1.68	0.95	8.40	4.36	0.46	2.01	0.16	0.18	22.33
1901	0.08	0.24	0.72	2.08	1.83	7.25	1.92	4.67	5.25	2.70	0.09	1.00	27.83
1902	0.41	0.48	M1.79	2.37	2.50	2.50	M1.89	5.34	M0.70	0.60	0.78	2.53	21.89
1903	0.08	0.75	1.23	1.59	2.71	2.72	5.08	2.88	1.61	0.33	0.59	0.85	20.42
1904	M0.28	0.42	0.36	2.66	0.90	4.31	2.27	M2.48	M0.25	2.25	M0.08	0.35	16.61
1905	0.57	0.35	1.48	1.19	5.24	7.38	2.81	0.92	1.90	2.31	0.63	0.02	24.80
1906	M0.99	0.70	3.00	6.04	4.75	5.06	1.37	4.41	2.	3.	0.43	0.86	33.

									92	06			59
1907	1.10	0.60	M0.35	1.33	2.91	2.66	5.77	2.04	2.15	M1.26	0.06	0.71	20.94
1908	0.21	1.06	0.69	2.63	M6.06	6.60	2.84	1.62	1.17	1.37	0.76	1.02	26.03
1909	0.43	0.94	0.24	0.88	5.32	1.57	2.20	4.60	M0.66	1.12	1.62	1.80	21.38
1910	1.10	0.18	M0.46	1.39	M1.76	M4.19	2.88	1.34	2.00	0.36	0.15	0.86	16.67
1911	0.15	0.80	0.23	3.41	2.35	2.49	3.61	2.67	2.81	4.11	0.34	0.60	23.57
1912	0.11	0.07	0.86	4.17	3.72	0.32	6.26	3.35	1.03	0.50	T	0.28	20.67
1913	0.11	0.43	1.91	2.64	2.57	3.75	3.92	1.83	1.53	0.47	0.42	0.23	19.81
1914	0.23	1.14	1.19	M3.64	2.34	5.79	M1.54	2.81	3.10	3.25	0.02	0.81	25.86
1915	0.47	2.79	M2.18	3.25	M4.22	5.57	5.89	0.66	1.85	1.33	0.16	0.62	28.99
1916	0.64	0.15	0.60	2.03	4.01	3.78	2.09	2.97	1.21	0.68	0.30	0.67	19.13
1917	1.00	0.43	2.26	3.19	5.60	2.55	2.87	0.87	1.95	0.21	0.26	0.93	22.12
1918	1.29	0.70	1.20	2.68	3.87	3.55	2.87	2.59	0.22	0.56	0.84	2.11	22.48
1919	0.15	1.45	0.66	3.54	2.35	5.35	1.68	1.08	1.22	2.49	3.07	0.35	23.39
1920	0.20	1.00	1.23	4.58	3.20	5.53	1.49	1.96	0.55	2.27	1.79	0.15	23.95
1921	0.05	T	1.48	1.00	3.18	1.56	2.22	6.19	3.22	0.86	0.29	0.20	20.25
1922	0.45	1.05	0.20	1.13	1.77	4.35	3.95	2.72	0.00	1.43	1.80	0.80	19.65
1923	0.35	0.00	0.40	1.64	2.73	5.76	1.95	4.67	1.94	0.68	0.28	0.40	20.80
1924	0.10	1.07	0.63	0.63	0.91	6.86	0.35	4.02	3.60	0.82	0.40	1.50	20.89
1925	0.00	T	0.42	1.17	0.52	4.75	3.68	3.00	1.30	0.80	0.44	0.30	16.38
1926	M0.68	0.29	0.00	0.00	2.43	1.88	1.60	1.97	5.41	1.70	0.13	0.10	16.19
1927	0.05	0.20	2.65	6.68	4.99	0.99	1.68	1.76	0.34	0.47	0.31	1.07	21.19
1928	0.00	0.65	1.15	0.21	1.84	3.50	0.88	2.50	0.51	1.92	1.36	0.00	14.52
1929	M0.00	0.90	1.27	2.22	3.00	3.38	3.47	0.28	2.39	3.95	1.00	T	21.86
1930	0.30	0.40	0.35	2.69	2.02	4.85	1.03	4.00	1.12	2.29	1.70	0.00	20.75
1931	0.20	0.23	1.62	0.69	2.17	4.92	1.31	0.83	1.46	1.51	0.72	0.53	16.19
1932	0.53	0.60	M1.00		3.10	6.20	M1.02	2.95	1.56	1.04	0.00	0.21	18.21
1933	T	0.22	0.88	1.75	2.87	M1.34	4.59	4.06	0.72	0.00	T	0.51	16.94
1934	0.20	0.10	1.20	0.25	0.62	3.46	1.63	1.69	1.50	1.00	0.32	T	11.97
1935	0.20	1.40	0.98	5.79	3.87	2.63	0.85	0.83	0.81	M0.08	0.83	1.05	19.32
1936	0.52	0.73	0.78	1.47	2.03	2.27	0.80	0.55	1.50	1.05	0.60	0.61	12.91
1937	0.90	0.10	1.82	1.23	2.90	3.99	1.10	2.25	0.85	1.00	0.10	0.42	16.66
1938	0.40	1.15	2.85	6.96	4.99	2.05	2.12	1.09	1.58	T	0.11	0.10	23.40
1939	1.30	0.35	0.35	1.82	3.77	3.20	5.23	0.86	1.15	1.18	T	0.00	19.21
1940	0.08	0.72	2.10	1.52	0.14	3.27	0.58	3.47	0.	0.	1.23	0.67	15.

									77	65			20
1941	0.52	0.38	0.48	4.69	1.77	3.95	1.74	2.91	2.31	4.32	0.10	0.58	23.75
1942	T	1.11	2.34	3.74	9.06	6.07	1.57	2.21	2.21	0.31	MT	0.58	29.20
1943	0.48	0.35	0.71	1.63	2.36	M3.35	1.29	1.84	0.52	1.56	0.10	T	14.19
1944	2.00	0.68	0.70	3.86	4.44	8.06	2.58	6.85	0.83	1.35	2.39	MT	33.74
1945	0.48	0.51	0.50	1.97	2.85	3.98	1.15	3.35	1.50	0.46	0.17	0.15	17.07
1946	0.25	0.39	3.53	1.02	3.74	3.47	2.02	2.63	5.22	5.51	M1.00	0.37	29.15
1947	0.46	0.13	0.40	2.96	1.70	7.42	1.78	0.56	1.25	1.38	1.90	0.08	20.02
1948	0.27	0.35	M0.52	2.55	1.87	5.82	2.61	1.05	1.08	1.17	0.71	0.45	18.45
1949	1.66	T	2.21	1.73	2.70	1.26	3.55	3.11	2.82	2.75	0.42	1.50	23.71
1950	0.32	1.00	2.53	1.10	2.80	1.68	8.42	3.91	2.35	1.22	MT	MT	25.33
1951	0.20	1.08	0.81	3.03	5.24	4.41	3.23	3.09	2.93	1.83	0.74	1.91	28.50
1952	1.22	1.09	1.15	0.85	2.25	M2.39	1.46	3.64	T	0.00	0.82	0.08	14.95
1953	M0.00	M1.41	M0.09	4.01	2.11	6.54	1.27	4.75	0.10	0.17	0.52	1.05	22.02
1954	T	0.51	0.84	1.46	M1.93	7.27	2.27	4.39	1.80	1.05	0.55	T	22.07
1955	T	1.30	0.11	1.78	1.71	3.21	1.34	1.19	1.13	0.31	0.03	M0.15	12.26
1956	0.05	0.02	1.71	1.89	0.94	1.24	3.35	M2.44	0.74	1.56	1.74	0.40	16.08
1957	0.50	0.50	1.42	2.42	5.92	4.17	3.16	1.17	2.24	2.38	2.93	T	26.81
1958	0.23	1.06	0.70	3.68	1.98	2.75	3.38	0.75	0.46	T	0.85	0.12	15.96
1959	0.42	0.81	1.26	1.13	5.66	2.75	1.57	2.03	2.75	2.00	1.47	0.69	22.54
1960	0.90	0.88	1.19	3.27	5.04	2.53	0.56	3.97	1.79	0.43	1.11	0.20	21.87
1961	0.41	0.48	0.78	0.80	3.47	2.73	3.20	1.95	1.87	1.14	0.40	0.27	17.50
1962	0.36	2.64	3.99	1.34	8.06	6.27	M4.27		1.40	0.47	0.10	0.01	28.91
1963	1.40	0.16	0.72	2.44		M1.79	6.88	0.52	4.16	0.32	0.75	0.20	19.34
1964	0.22	0.08	2.13	3.29	2.49	5.44	4.21	0.92	1.54	0.00	T	1.12	21.44
1965	0.18	0.32	0.80	1.58	2.65	7.52	3.02	0.69	4.15	0.52	0.40	0.67	22.50
1966	0.27	0.34	1.48	2.35	0.99	2.30	2.39	5.79	1.71	1.08	0.19	0.33	19.22
1967	0.76	0.30	0.17	1.08	1.52	7.70	0.22	2.26	1.34	0.77	T	0.35	16.47
1968	0.28	0.10	0.62	6.51	2.92	4.33	0.55	0.91	1.79	2.31	0.81	1.68	22.81
1969	0.57	1.07	0.08	0.79	4.33	1.39	3.16	2.60	3.26	1.93	0.13	0.39	19.70
1970	0.36	0.15	1.72	4.23	2.57	3.60	0.50	0.89	1.43	2.19	1.48	0.81	19.93
1971	0.05	1.09	0.65	4.41	3.06	2.84	2.09	1.35	1.31	3.91	1.22	0.49	22.47
1972	0.12	0.14	0.24	3.35	7.91	5.07	3.27	1.45	0.39	1.66	1.78	0.38	25.76
1973	0.88	0.70	3.97	1.15	4.16	1.48	2.23	0.83	4.83	1.71	1.73	0.38	24.05
1974	0.07	0.47	1.20	3.34	3.62	4.28	M1.14	0.88	0.	0.	0.22	0.10	16.

									59	47			38
1975	0.86	0.18	2.19	1.38	0.79	5.39	1.01	0.53	1.28	1.01	0.80	0.10	15.52
1976	0.67	0.24	0.29	1.46	2.33	0.91	1.64	0.96	2.38	0.45	0.02	0.15	11.50
1977	0.23	2.91	4.20	3.59	4.59	1.91	4.52	4.06	4.34	3.10	1.23	M0.40	35.08
1978	0.30	1.60	0.22	4.28	5.04	2.13	3.12	0.64	0.67	0.53	0.14	0.26	18.93
1979	1.12	0.01	1.73	2.31	2.74	2.12	5.54	2.31	0.40	2.60	1.51	T	22.39
1980	0.21	0.21	0.58	0.95	2.46	2.95	0.82	3.99	1.12	3.10	0.05	0.42	16.86
1981	0.20	0.05	2.25	1.13	2.92	3.45	6.19	1.66	0.42	1.16	1.43	0.72	21.58
1982	1.16	T	1.35	1.30	9.55	3.85	4.90	2.15	3.42	5.56	1.21	0.91	35.36
1983	0.05	T	2.73	1.83	3.04	6.00	3.01	0.49	0.72	1.28	1.92	0.97	22.04
1984	0.09	1.50	1.72	5.88	3.30	4.50	2.86	3.92	0.68	3.25	0.18	0.24	28.12
1985	0.97	T	1.47	M2.76	2.28	2.65	2.81	5.38	4.91	0.93	2.00	0.44	26.60
1986	0.49	0.12	1.71	4.10	2.82	4.05	2.06	2.18	3.85	0.95	0.51	M0.05	22.89
1987	0.26	1.72	5.01	1.22	1.17	3.61	4.21	2.50	1.68	0.62	1.18	0.87	24.05
1988	1.77	0.41	0.89	2.59	7.16	0.72	1.70	1.79	5.09	0.36	0.89	0.51	23.88
1989	0.03	0.61	0.84	1.33	0.98	1.82	2.48	1.23	1.47	0.24	0.65	1.11	12.79
1990	0.06	0.30	1.37	2.79	5.40	2.64	3.55	3.50	0.38	1.34	0.44	0.35	22.12
1991	0.21	1.06	M1.14	3.00	4.12	3.11	0.88	2.02	0.82	1.97	1.43	0.03	19.79
1992	0.79	0.68	1.18	1.06	0.61	1.91	6.41	3.10	2.11	0.05	0.89	0.21	19.00
1993	0.23	0.98	1.13	2.90	3.39	6.18	4.32	1.08	2.01	0.61	1.58	0.34	24.75
1994	0.53	0.56	0.11	3.17	1.49	4.59	4.46	2.12	2.18	1.77	0.64	0.47	22.09
1995	0.30	0.44	3.64	5.14	6.30	1.52	1.36	3.98	4.27	3.78	0.95	0.32	32.00
1996	1.13	0.18	0.99	1.64	7.06	2.59	1.58	0.59	7.45	2.73	1.12	0.58	27.64
1997	0.51	1.03	0.24	3.32	2.95	2.67	3.11	1.93	2.32	2.47	0.18	0.12	20.85
1998	0.42	0.30	M1.49	2.71	2.80	5.79	3.27	4.42	3.83	5.29	1.62	0.16	32.10
1999	0.31	0.60	0.63	4.93	5.83	6.95	3.31	3.28	2.12	0.17	0.14	0.20	28.47
2000	0.66	0.88	0.36	1.36	3.43	2.39	0.98	0.84	0.27	1.48	2.13	0.54	15.32
2001	2.33	M1.13	0.27	6.34	3.07	1.28	4.36	0.04	4.31	0.17	1.79	0.11	25.20
2002	0.37	0.03	1.29	1.65	2.54	1.36	1.08	3.14	1.37	2.22	0.08	0.17	15.30
2003	M0.52	M0.59	0.50	2.81	3.32	3.45	1.94	3.48	0.58	0.89	0.78	0.17	19.03
2004	0.30	0.28	2.80	0.87	4.50	5.69	2.18	1.07	4.19	2.06	0.38	0.13	24.45
2005	0.43	0.60	1.02	2.51	4.16	8.79	0.99	1.54	2.39	0.68	2.29	0.75	26.15
2006	0.46	0.27	1.88	2.57	1.27	2.76	1.89	3.43	4.05	0.25	0.57	1.65	21.05
2007	M0.22	0.93	2.55	3.88	6.07	4.41	0.64	4.31	1.54	5.57	0.01	M0.74	30.87
2008	0.30	0.51	0.70	2.43	2.69	6.75	2.35	3.25	1.	4.	0.90	0.64	25.

									32	09			93
2009	0.68	0.69	1.52	1.23	0.87	2.69	0.00	5.01	0.89	4.20	T	0.68	18.46
2010	0.76	0.49	1.05	2.81	3.57	5.79	5.15	1.56	2.57	0.76	M0.15	0.15	24.81
2011	0.75	0.85	0.33	2.40	4.16	9.95	2.89	2.58	0.49	1.74	0.10	0.18	26.42
2012	0.35	1.81	1.13	4.03	3.37	1.64	0.67	1.25	0.11	M0.28	0.19	0.63	15.46
2013	0.18	0.85	0.61	2.13	5.42	4.08	4.85	3.00	1.38	3.07	0.26	0.35	26.18
2014	0.12	0.11	0.37	1.68	2.07	2.75	0.08	7.10	0.94	0.50	0.27	0.99	16.98
2015	0.15	0.19	0.12	0.72	4.91	2.21	6.02	4.97	2.98	1.06	1.99	0.89	26.21
2016	0.27	0.29	1.15	5.83	3.12	1.08	1.10	4.73	4.83	1.02	0.97	1.08	25.47
2017	0.70	0.20	0.18	3.15	1.70	1.16	0.22	4.38	5.11	0.79	0.23	0.30	18.12
2018	0.21	0.60	M0.43										1.24

Notes: Data missing in any month have an "M" flag. A "T" indicates a trace of precipitation.

Data missing for all days in a month or year is blank.

Creation date: 2016-07-22

Appendix E – Fort Randall Dam Average Pool Levels

FTRA Reservoir

22-Aug-17

AVERAGE DAILY MIDNIGHT ELEVATION (ft msl)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN MIN	ANN AVE	ANN MAX
1967						1361.6	1363.7	1360.5	1351.9	1340.1	1328.1	1328.1			
1968	1333.1	1345.8	1353.9	1353.6	1354.4	1354.0	1353.2	1352.2	1349.2	1342.8	1328.9	1322.7	1322.7	1345.3	1354.4
1969	1337.8	1344.3	1347.4	1359.1	1359.4	1356.4	1357.4	1354.5	1350.2	1339.1	1323.8	1320.7	1320.7	1345.8	1359.4
1970	1335.4	1347.0	1357.3	1360.8	1360.7	1355.7	1355.7	1354.0	1350.2	1341.2	1327.4	1327.1	1327.1	1347.7	1360.8
1971	1339.0	1347.8	1353.2	1354.8	1357.7	1360.9	1361.1	1361.1	1358.3	1352.4	1342.1	1339.6	1339.0	1352.3	1361.1
1972	1345.0	1351.6	1358.0	1361.3	1363.9	1363.4	1362.2	1360.4	1357.3	1352.2	1342.8	1343.8	1342.8	1355.2	1363.9
1973	1347.4	1351.5	1358.1	1358.5	1356.1	1356.4	1355.1	1354.2	1351.9	1351.8	1342.7	1340.5	1340.5	1352.0	1358.5
1974	1346.4	1350.9	1355.0	1354.1	1354.8	1353.5	1354.9	1352.9	1352.0	1347.9	1341.7	1341.4	1341.4	1350.5	1355.0
1975	1344.7	1350.6	1357.1	1359.3	1361.4	1362.0	1361.4	1356.5	1351.2	1346.3	1342.0	1340.5	1340.5	1352.8	1362.0
1976	1345.6	1351.1	1356.7	1355.6	1355.1	1354.2	1354.7	1355.3	1354.7	1351.5	1343.4	1339.7	1339.7	1351.5	1356.7
1977	1344.9	1350.1	1356.4	1359.0	1358.6	1355.1	1353.3	1352.3	1351.6	1347.8	1341.4	1345.8	1341.4	1351.4	1359.0
1978	1348.2	1350.4	1355.6	1361.6	1360.2	1358.5	1358.5	1357.3	1355.6	1351.8	1345.4	1341.6	1341.6	1353.7	1361.6
1979	1347.4	1350.8	1356.8	1358.8	1357.3	1357.0	1356.9	1355.8	1354.6	1349.4	1342.4	1339.0	1339.0	1352.2	1358.8
1980	1341.5	1350.4	1356.4	1355.2	1353.5	1355.5	1354.0	1355.7	1354.1	1348.1	1340.0	1339.7	1339.7	1350.3	1356.4
1981	1345.0	1350.6	1355.4	1357.1	1358.1	1357.1	1355.8	1354.8	1353.6	1343.4	1337.0	1339.0	1337.0	1350.6	1358.1
1982	1345.8	1348.8	1356.2	1355.9	1356.7	1356.3	1356.6	1355.4	1356.7	1353.8	1344.3	1338.5	1338.5	1352.1	1356.7
1983	1346.3	1351.2	1355.9	1356.8	1356.6	1356.5	1357.5	1355.6	1354.7	1349.0	1342.6	1341.4	1341.4	1352.0	1357.5
1984	1347.0	1351.5	1355.1	1361.1	1360.9	1361.4	1360.5	1356.2	1355.2	1350.9	1341.5	1339.8	1339.8	1353.4	1361.4
1985	1346.4	1349.5	1353.9	1353.9	1355.9	1354.9	1355.2	1355.7	1355.5	1349.2	1341.2	1340.3	1340.3	1351.0	1355.9
1986	1345.4	1349.5	1355.3	1357.2	1360.9	1360.2	1355.7	1356.0	1357.2	1353.3	1343.6	1339.1	1339.1	1352.8	1360.9
1987	1343.6	1350.4	1356.9	1359.8	1358.3	1357.5	1356.1	1354.7	1353.6	1349.4	1340.5	1340.1	1340.1	1351.7	1359.8
1988	1344.7	1349.6	1354.6	1355.4	1356.0	1355.5	1355.3	1354.5	1352.2	1345.4	1338.4	1340.5	1338.4	1350.2	1356.0
1989	1346.2	1350.6	1356.4	1355.3	1355.8	1355.0	1355.0	1354.4	1351.6	1341.3	1338.9	1340.0	1338.9	1350.0	1356.4
1990	1345.0	1348.2	1352.6	1353.3	1355.8	1356.4	1354.6	1354.3	1350.5	1341.6	1338.2	1339.7	1338.2	1349.2	1356.4
1991	1344.6	1350.4	1354.6	1353.7	1355.4	1357.6	1354.9	1355.0	1355.7	1344.5	1339.2	1341.2	1339.2	1350.6	1357.6
1992	1344.6	1350.5	1355.0	1355.1	1354.8	1354.3	1355.7	1354.9	1349.9	1339.5	1337.8	1339.7	1337.8	1349.3	1355.7
1993	1345.6	1350.2	1355.5	1356.9	1357.1	1357.0	1359.5	1359.7	1354.8	1348.3	1339.9	1340.6	1339.9	1352.1	1359.7
1994	1344.2	1349.6	1355.2	1354.5	1355.0	1355.7	1355.3	1355.2	1354.7	1349.2	1340.6	1342.0	1340.6	1350.9	1355.7
1995	1347.8	1350.5	1354.1	1358.4	1366.0	1365.8	1361.3	1358.9	1353.5	1348.5	1341.1	1342.5	1341.1	1354.0	1366.0
1996	1346.4	1353.1	1355.3	1355.2	1356.9	1360.1	1359.5	1356.6	1352.8	1349.7	1340.2	1342.9	1340.2	1352.4	1360.1
1997	1348.5	1352.0	1356.5	1368.7	1370.5	1370.1	1368.0	1368.0	1362.0	1352.5	1342.8	1340.4	1340.4	1358.3	1370.5
1998	1347.9	1352.2	1354.3	1356.1	1355.2	1356.8	1356.5	1355.4	1353.7	1351.4	1343.2	1339.2	1339.2	1351.8	1356.8
1999	1346.5	1351.0	1352.7	1357.0	1360.6	1359.0	1360.6	1357.0	1353.7	1349.4	1343.1	1339.8	1339.8	1352.5	1360.6
2000	1339.4	1351.7	1354.5	1355.1	1356.5	1354.9	1354.9	1355.1	1354.3	1341.4	1334.7	1338.7	1334.7	1349.3	1356.5
2001	1343.7	1348.6	1355.2	1361.8	1363.1	1358.3	1356.1	1355.3	1354.2	1348.7	1340.4	1342.6	1340.4	1352.3	1363.1
2002	1346.0	1347.8	1349.7	1352.2	1349.8	1352.8	1354.7	1355.2	1353.2	1342.9	1337.1	1340.9	1337.1	1348.5	1355.2
2003	1343.5	1347.9	1352.7	1354.2	1353.1	1352.1	1353.9	1353.8	1353.6	1349.2	1340.3	1342.1	1340.3	1349.7	1354.2
2004	1343.8	1346.0	1354.2	1354.3	1355.0	1355.7	1354.2	1353.5	1349.1	1341.1	1338.4	1340.1	1338.4	1348.8	1355.7
2005	1342.6	1349.2	1353.1	1356.2	1355.8	1356.3	1355.0	1353.2	1348.4	1342.2	1340.1	1339.3	1339.3	1349.3	1356.3
2006	1345.7	1347.7	1353.0	1356.9	1356.8	1355.1	1354.4	1353.3	1348.7	1339.3	1338.0	1339.2	1338.0	1349.0	1356.9
2007	1344.8	1349.5	1355.7	1358.5	1359.3	1356.4	1354.7	1355.3	1350.0	1342.1	1340.8	1342.2	1340.8	1350.8	1359.3
2008	1343.2	1347.8	1354.6	1355.7	1357.6	1360.7	1356.4	1354.5	1347.5	1339.0	1341.1	1339.3	1339.0	1349.8	1360.7
2009	1344.3	1350.2	1354.8	1356.7	1357.1	1355.0	1355.7	1354.9	1355.1	1351.2	1341.5	1337.8	1337.8	1351.2	1357.1
2010	1343.6	1348.1	1356.1	1361.2	1360.3	1364.8	1364.2	1359.7	1353.1	1349.3	1339.6	1339.0	1339.0	1353.2	1364.8
2011	1343.2	1348.5	1353.9	1358.6	1356.7	1365.5	1372.7	1365.1	1356.5	1348.9	1339.2	1338.6	1338.6	1353.9	1372.7
2012	1341.4	1349.0	1352.3	1353.6	1355.5	1354.0	1354.3	1354.5	1354.1	1349.9	1340.6	1340.3	1340.3	1350.0	1355.5
2013	1342.6	1348.8	1352.8	1354.8	1355.8	1356.7	1355.1	1355.6	1353.8	1350.9	1340.5	1338.8	1338.8	1350.5	1356.7
2014	1341.6	1346.8	1351.0	1352.6	1355.2	1356.2	1356.5	1356.3	1354.3	1348.4	1341.6	1340.7	1340.7	1350.1	1356.5
2015	1341.7	1347.9	1352.3	1354.5	1355.7	1359.1	1359.3	1357.3	1355.6	1349.0	1341.0	1339.8	1339.8	1351.1	1359.3
2016	1341.3	1349.2	1352.8	1355.5	1360.2	1357.1	1355.3	1355.5	1354.8	1349.4	1340.8	1338.0	1338.0	1350.8	1360.2
2017	1343.1	1349.8	1353.6	1355.8	1356.7	1355.0	1355.7								
MIN	1333.1	1344.3	1347.4	1352.2	1349.8	1352.1	1353.2	1352.2	1347.5	1339.0	1323.8	1320.7	1320.7	1345.3	1354.2
AVG	1344.1	1349.5	1354.6	1356.8	1357.6	1357.6	1357.3	1356.1	1353.4	1347.1	1339.6	1339.1	1338.5	1351.1	1359.0
MAX	1348.5	1353.1	1358.1	1368.7	1370.5	1370.1	1372.7	1368.0	1362.0	1353.8	1345.4	1345.8	1342.8	1358.3	1372.7
STDEV	3.1	1.8	2.1	3.1	3.5	3.6	3.9	3.0	2.8	4.4	4.3	4.6	4.2	2.2	3.8

Statistics for Years 1967-2016