

Appendix D

Aquatic Resource Delineation Report



Big Stone South to Alexandria Transmission Line

Aquatic Resource Delineation Report

Otter Tail Power Company &

Western Minnesota Municipal Power Agency, through its agent Missouri
River Energy Services

April 2024

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Contents

1.0	Introduction.....	1
1.1	Project background	1
1.2	Survey area	1
2.0	Methodology	5
2.1	Desktop analysis	5
2.2	Field delineation	9
3.0	Results.....	9
3.1	Wetlands.....	9
3.2	Other waters	11
4.0	Discussion	12
5.0	Conclusion.....	12
6.0	References	12

Tables

Table 1.	Land cover types in the BSSA Survey Area in Grant County, South Dakota.....	2
Table 2.	Summary of wetlands within the BSSA Survey Area located in Grant County, South Dakota.	11
Table 3.	Other waters within the BSSA Survey Area in Grant County, South Dakota.	12

Figures

Figure 1.	Location of BSSA Survey Area in Grant County, South Dakota.	3
Figure 2.	Land cover types in the BSSA Survey Area in Grant County, South Dakota.....	4
Figure 3.	NHD and NWI map of the BSSA Survey Area in Grant County, South Dakota.	6
Figure 4.	Hydric soils within the BSSA Survey Area in Grant County, South Dakota.	7
Figure 5.	Contour map of the BSSA Survey Area in Grant County, South Dakota.	8
Figure 6.	Locations of delineated aquatic resources in the BSSA Survey Area located in Grant County, South Dakota.	10

Appendices

Appendix A.	Antecedent Precipitation
Appendix B.	Photographs
Appendix C.	Delineated Wetlands Map Book

List of Acronyms and Abbreviations

APT	Antecedent Precipitation Tool
BSSA	Big Stone South to Alexandria Transmission Line
GIS	Geographic Information System
GNSS	Global Navigation Satellite System
kV	Kilovolt
LiDAR	Light Detection and Ranging
L RTP	Long Range Transmission Planning
MISO	Midcontinent Independent System Operator
MRES	Missouri River Energy Services
NHD	National Hydrography Dataset
NLCD	National Land Cover Dataset.
NRCS	Natural Resources Conservation Service
NWI	National Wetland Inventory
OHWM	Ordinary High-Water Mark
OTP	Otter Tail Power Company
USACE	US Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFWS	US Fish and Wildlife Service
USGS	US Geological Survey
WOUS	Waters of the United States

1.0 Introduction

1.1 Project background

Otter Tail Power Company (OTP) and Western Minnesota Municipal Power Agency (WMPMA) acting through its agent, Missouri River Energy Services (MRES), are partnering to develop, construct, and co-own a new 345-kilovolt (kV) transmission line. The Big Stone South to Alexandria (BSSA) transmission line will run between OTP's Big Stone South Substation in South Dakota and the Alexandria Substation owned by MRES near Alexandria, Minnesota. Big Stone South - Alexandria will be a 345-kV, high-voltage transmission line and will address thermal and voltage issues for western Minnesota and eastern North Dakota. This Project will improve electric reliability, increase resiliency to extreme weather events, reduce transmission congestion, and increase access to low-cost energy in the region.

BSSA is part of the Midcontinent Independent System Operator (MISO) Long Range Transmission Planning (LRTP) Tranche 1 portfolio of projects known as "Big Stone South – Alexandria – Cassie's Crossing (now referred to as Big Oaks)" (LRTP2). OTP is responsible for the Route Permit Application for the BSSA segment of LRTP2.

As part of this application process, OTP contracted HDR Engineering, Inc (HDR) to perform aquatic resource delineations in the portion of BSSA in Grant County, South Dakota (Project). The aquatic resource delineations were conducted on October 10-12, 2023.

1.2 Survey area

The Survey Area is in Grant County, South Dakota, approximately two miles east and one mile south of the town of Big Stone, South Dakota, and encompasses approximately 1,973.3 acres (Figure 1.). A larger Survey Area is being evaluated to enable routing flexibility.

The Survey Area primarily consists of cultivated crops (61.1%) followed by Hay/Pasture (10.8%), Emergent Herbaceous Wetlands (10.2%), Deciduous Forest (6.4%), and Developed, Open Space (5.0%). All other land cover types account for less than 2.0 percent of the Survey Area (Table 1, Figure 2) (U.S. Geological Survey [USGS] National Land Cover Dataset [NLCD] 2021).

Table 1. Land cover types in the BSSA Survey Area in Grant County, South Dakota.

Land Cover Type	Acres	Percentage
Cultivated Crops	1,206.1	61.1%
Hay/Pasture	214.1	10.8%
Emergent Herbaceous Wetlands	200.5	10.2%
Deciduous Forest	125.9	6.4%
Developed, Open Space	99.0	5.0%
Developed, Low Intensity	36.5	1.8%
Woody Wetlands	32.7	1.7%
Herbaceous	27.4	1.4%
Developed, Medium Intensity	16.0	0.8%
Open Water	7.4	0.4%
Barren Land	4.2	0.2%
Developed, High Intensity	2.4	0.1%
Mixed Forest	1.1	0.1%
TOTAL	1,973.3	100.0%



Figure 1. Location of BSSA Survey Area in Grant County, South Dakota.

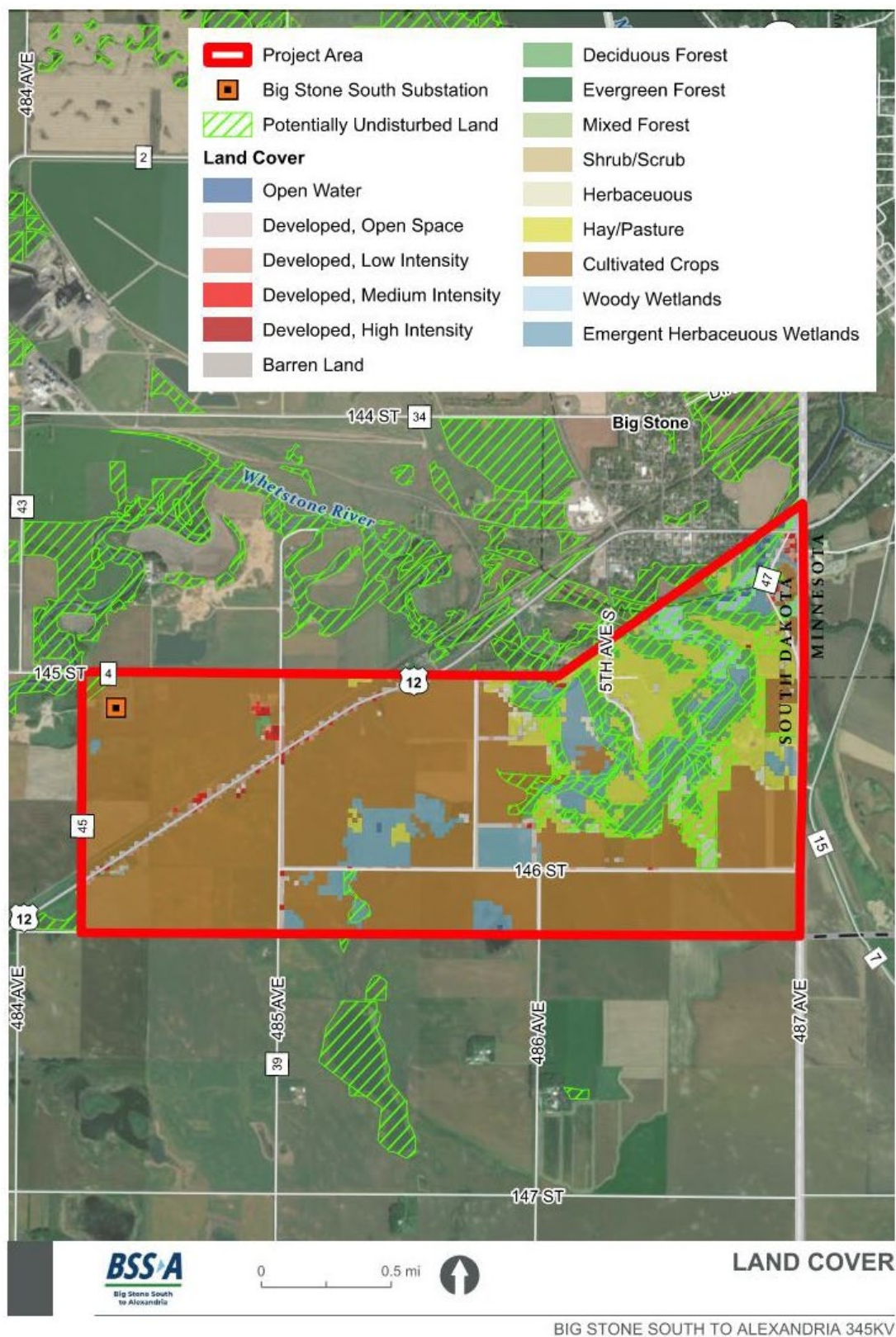


Figure 2. Land cover types in the BSSA Survey Area in Grant County, South Dakota.

2.0 Methodology

A desktop analysis was completed prior to the field delineation. The objective of this desktop effort was to: 1) help inform field delineation efforts, 2) map the extent of rivers, streams, and other waters which are not practically mapped in the field, and 3) provide wetland boundaries in areas where right of entry was not yet granted.

2.1 Desktop analysis

A desktop analysis was conducted prior to conducting the field delineation and included a review of several data sources. A time series of aerial imagery available on Google Earth was reviewed to compare to currently available imagery (Google Earth 2023).

Spatial data from National Hydrography Dataset (NHD) and The National Wetland Inventory – Version 2 (NWI) were used to inform location and boundaries of historic aquatic resources within the Survey Area (U.S. Fish and Wildlife Service [USFWS] 2023) (Figure 3).

Soils data from Web Soil Survey classifies soils by the percentage of components within the soil map unit which are identified as hydric. These five classifications are mapped as follows: Nonhydric soils containing <1 percent hydric soil components within the map unit, Predominantly Nonhydric (1%-25%), Partially Hydric (26%-50%), Predominantly Hydric (51%-95%), and Hydric soils containing (95%-100%) hydric soil components within the map unit. This data highlights areas with primarily hydric soil, indicating a potential aquatic resource for the field delineation (U.S. Department of Agriculture [USDA] Natural Resources Conservation Service [NRCS] Soil Survey Staff 2023) (Figure 4).

Elevation mapping with 10-foot and 2-foot contours produced from publicly available light detection and ranging (LiDAR) data aids in identifying areas with a geomorphic position indicating potential aquatic resources (Figure 5).

Additionally, the Antecedent Precipitation Tool (APT) interpolated data from nearby weather stations which was referenced to compare the 3-month average precipitation at the site to normal conditions at the time of the field delineation (U.S. Army Corps of Engineers [USACE] 2020a) (Appendix A).

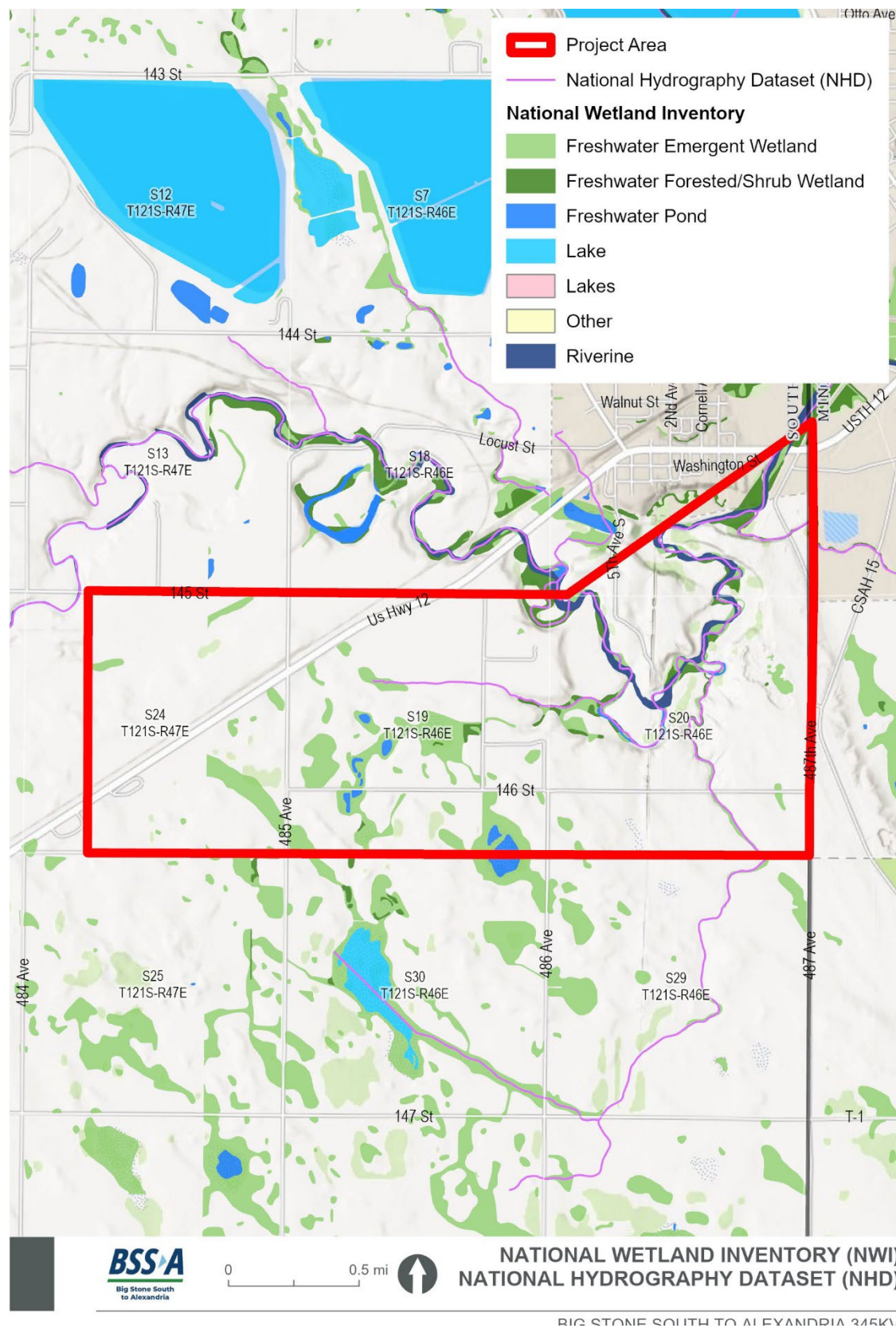


Figure 3. NWI/NHD map of the BSSA Survey Area in Grant County, South Dakota.

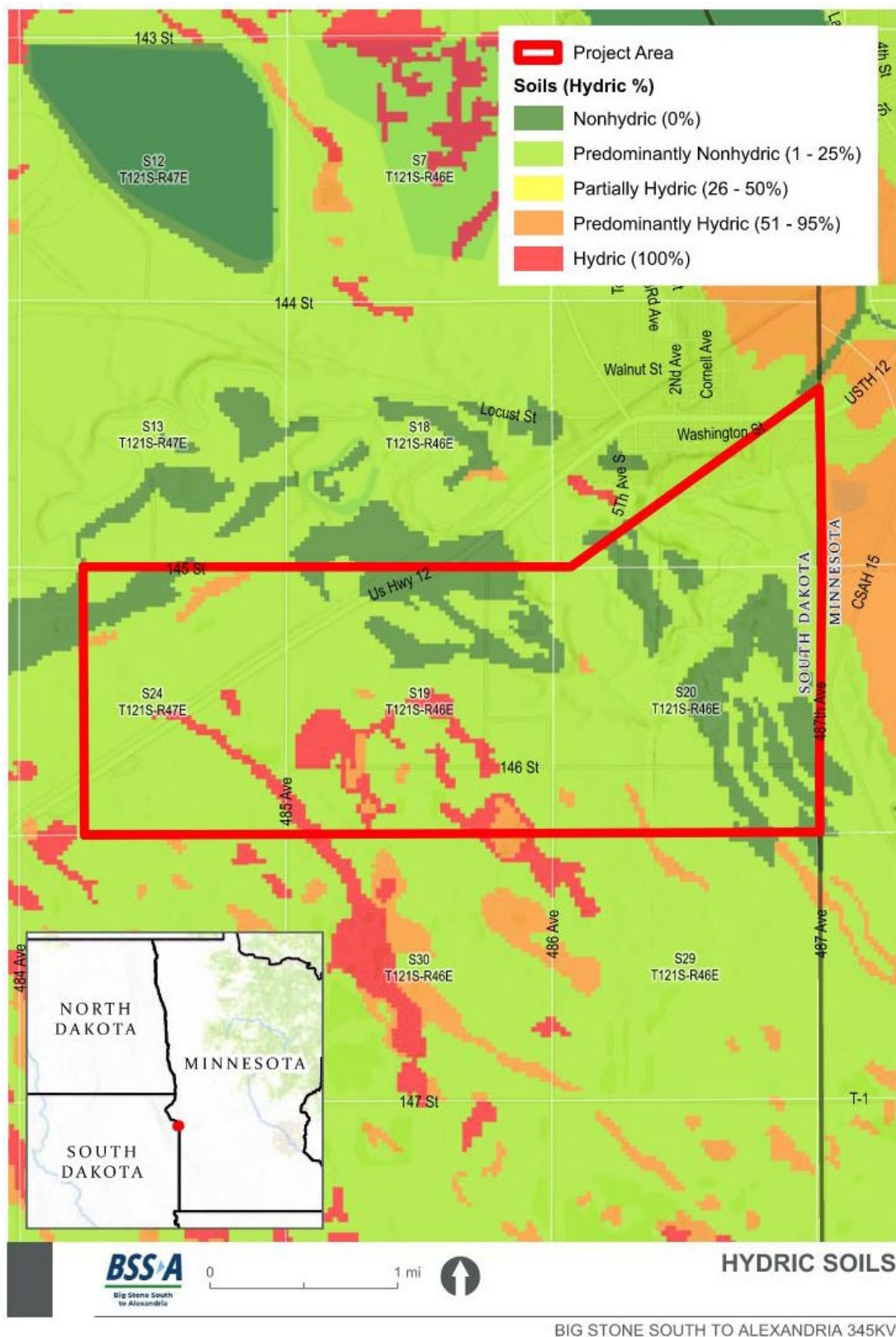


Figure 4. Hydric soils within the BSSA Survey Area in Grant County, South Dakota.

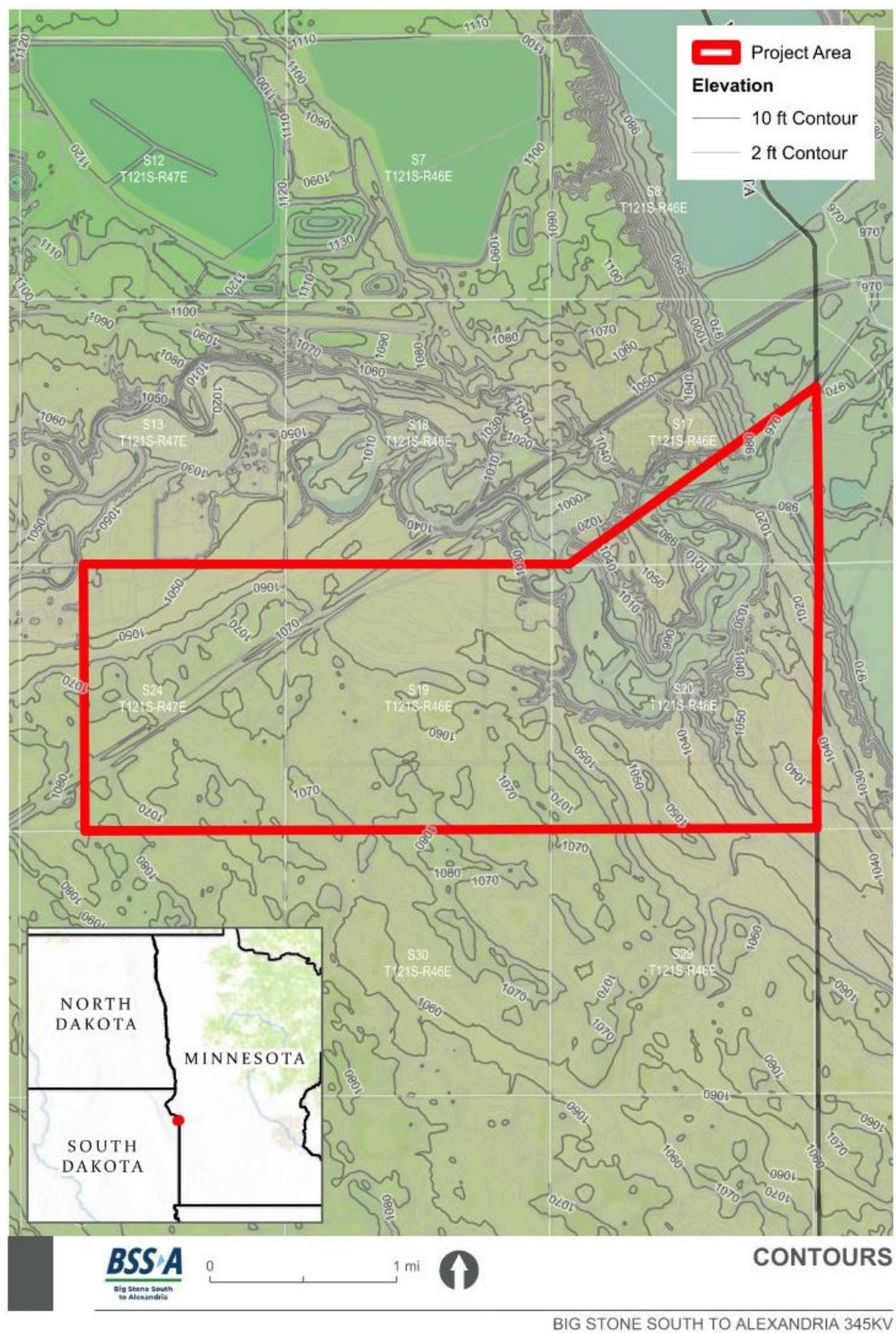


Figure 5. Contour map of the BSSA Survey Area in Grant County, South Dakota.

2.2 Field delineation

Field delineations and mapping were completed on October 10-12, 2023, by HDR Engineering, Inc. (HDR) for the Project. Wetlands (wetlands 1-11) were field delineated where access to conduct soil sampling had been granted. Field delineated wetland boundaries were defined in accordance with guidelines provided in the Corps of Engineers Wetlands Delineation Manual (Manual) (Environmental Laboratory 1987) and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual Midwest Region (Supplement) (USACE 2010). An area was considered a wetland if it met the three USACE-defined requisite criteria as provided in the Manual and Supplement (Environmental Laboratory 1987, USACE 2010): hydrophytic vegetation, hydric soils, and wetland hydrology (USACE 2020b, USDA/NRCS 2018). Suspected wetland areas were sampled to confirm the presence or absence of these wetland criteria. Guidance from the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Midwest Region (Version 2.0) (i.e., Supplement) (USACE 2010) helped assess whether atypical or problematic conditions were present, including climatic conditions. Where field sampling was not possible (wetland 12), soils were conservatively presumed to be hydric based on desktop analysis of the NWI and saturated signatures detectable using aerial imagery.

Sampling points were taken in potential aquatic resources identified during the desktop analysis to either confirm or refute the presence of wetland. Several isolated upland sampling points were taken in areas typically associated with an NWI feature and are referenced as “No Points.” In many of the “No Point” areas, soil data was not collected at the time of the on-site investigation because access had not been granted and/or the crop wasn’t harvested. However, these areas were clearly upland based on desktop analysis and what could be observed from the field – in some cases just a windshield survey (e.g., no stunting or stressed plants, lack of soil surface cracks, apparent tile drainage present).

Ordinary high-water marks (OHWM) were delineated based on guidance and indicators included in the USACE Regulatory Guidance Letter No. 05-05 (USACE 2005).

Wetland boundaries were collected using an EOS Arrow 100 global navigation satellite system (GNSS) with a sub-meter accuracy receiver for precise spatial data.

Photographs were taken to characterize the general landform, aquatic resources, and vegetative characteristics of the Survey Area.

3.0 Results

3.1 Wetlands

Twelve wetlands totaling 61.8 acres were identified and mapped (Figure 6, Table 2). There were 31 no-point features collected within the Survey Area (Figure 6.). Many wetlands were highly modified due to being within cultivated fields where tile drainage was prevalent.

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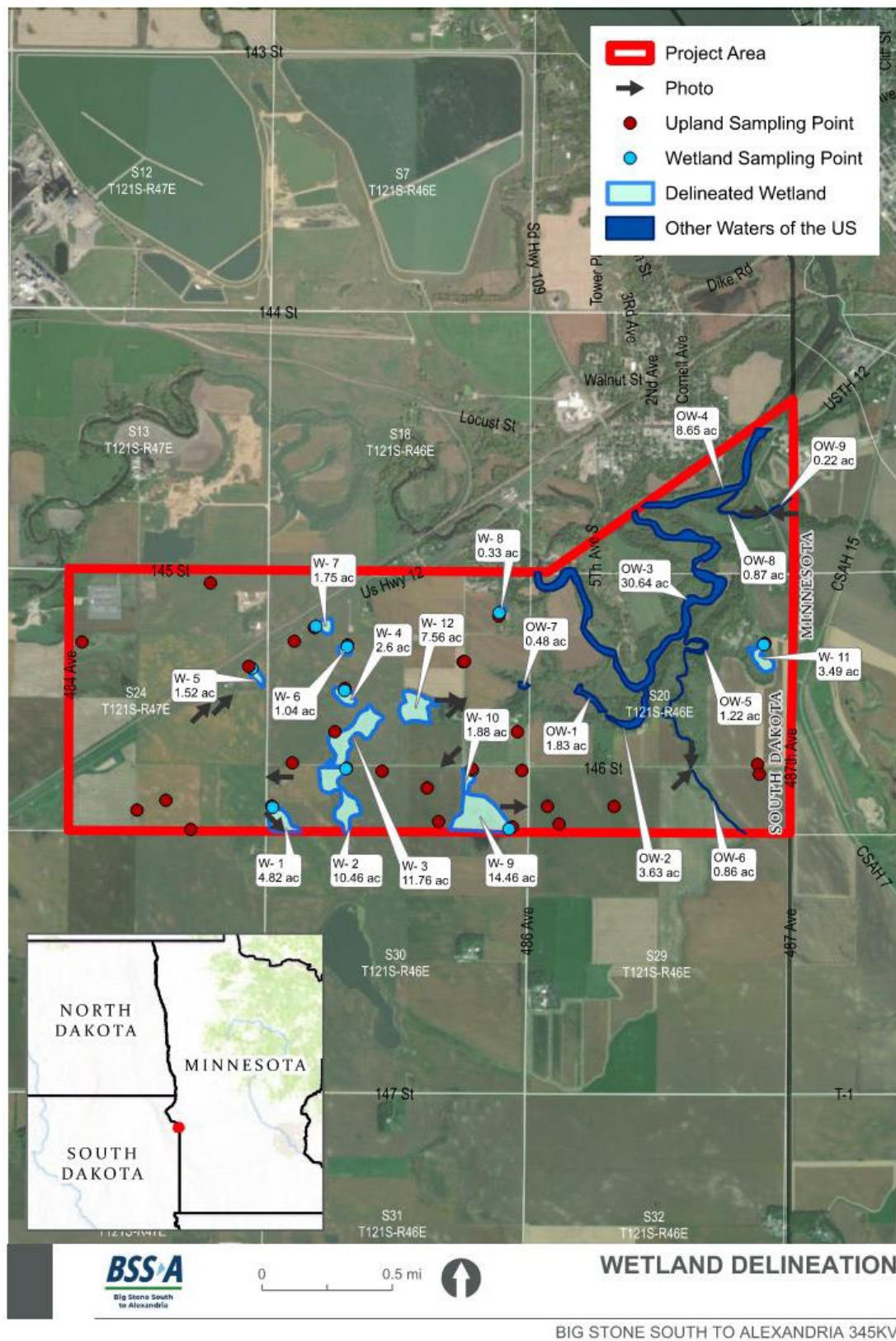


Figure 6. Locations of delineated aquatic resources in the BSSA Survey Area located in Grant County, South Dakota.

Table 2. Summary of wetlands within the BSSA Survey Area located in Grant County, South Dakota.

Aquatic Resource	Cowardin Classification*	Soil Map Unit Name	Delineation Type	Acres
Wetland 1	PEM1A	Vallers-Tonka Complex	Field Delineation	4.8
Wetland 2	PEM1A	Parnell Silty Clay Loam	Field Delineation	10.5
Wetland 3	PEM1C	Vallers-Tonka Complex	Field Delineation	11.8
Wetland 4	PEM1C	Parnell Silty Clay Loam	Field Delineation	2.6
Wetland 5	PEM1Af	Heimdal-Svea Loams, 2 to 6 percent slopes	Field Delineation	1.5
Wetland 6	PEM1Af	Divide Loam	Field Delineation	1.0
Wetland 7	PEM1Af	Heimdal-Svea Loams, 2 to 6 percent slopes	Field Delineation	1.8
Wetland 8	PEM1Cx	Renshaw Loam, 0 to 2 percent slopes	Field Delineation	0.3
Wetland 9	PEM1Af	Heimdal-Svea Loams, 0 to 2 percent slopes	Field Delineation	14.5
Wetland 10	PEM1Af	Vallers-Tonka Complex	Field Delineation	1.9
Wetland 11	PEM1Cx	Renshaw Loam, 2 to 6 percent slopes	Field Delineation	3.5
Wetland 12	PEM1C	Heimdal-Svea Loams, 0 to 2 percent slopes	Desktop Delineation	7.6
			Total	61.8

*Cowardin et al. (1979).

PEM1C = *Palustrine Emergent Persistent, temporarily flooded.*

PEM1A = *Palustrine Emergent Persistent, seasonally flooded.*

Special modifiers: "x" = *excavated*, "f" = *farmed*.

3.2 Other waters

Nine other waters totaling 48.4 acres were desktop delineated within the Survey Area. These other waters are all associated with the Whetstone River, its tributaries, and an oxbow (Figure 6, Table 3).

Table 3. Other waters within the BSSA Survey Area in Grant County, South Dakota.

Aquatic Resource	Cowardin Classification	Soil Map Unit Name	Delineation Type	Acres
Other Water 1	PUBF	LaDelle silt loam, channeled	Desktop Delineation	1.8
Other Water 2	PUBF	LaDelle silt loam, channeled	Desktop Delineation	3.6
Other Water 3	R2UBH	LaDelle silt loam, channeled	Desktop Delineation	30.6
Other Water 4	R5UBH	LaDelle silt loam, channeled	Desktop Delineation	8.7
Other Water 5	R2UBH	LaDelle silt loam, channeled	Desktop Delineation	1.2
Other Water 6	R4SBC	Sioux-Renshaw complex, 15 to 40 percent slopes	Field Delineation	0.9
Other Water 7	R4SBC	Estelline silty clay loam	Desktop Delineation	0.5
Other Water 8	PFO1A	Sisseton-Esmond complex, 12 to 40 percent slopes	Desktop Delineation	0.9
Other Water 9	PFO1A	Sisseton-Esmond complex, 12 to 40 percent slopes	Field Delineation	0.2
Total				48.4

*Cowardin et al. (1979).

PUBF = Palustrine Unconsolidated Bottom, semi-permanently flooded.

PFO = Palustrine Forested, temporarily flooded.

R2UBH = Riverine Lower Perennial, Unconsolidated Bottom, permanently flooded.

R5UBH = Riverine Unknown Perennial, Unconsolidated Bottom, permanently flooded.

R4SBC = Riverine Intermittent, Streambed, seasonally flooded.

4.0 Discussion

The aquatic resources within the Survey Area primarily consist of depressional “pothole” wetlands within or adjacent to cultivated crop fields and two other waters: the Whetstone River and its unnamed tributary to the south (Figure 4, Figure 6). Evidence of tile drainage throughout the Survey Area was observed during the field delineation and many of the wetlands identified within the NWI were confirmed to have been fully drained and converted to cultivated agriculture.

5.0 Conclusion

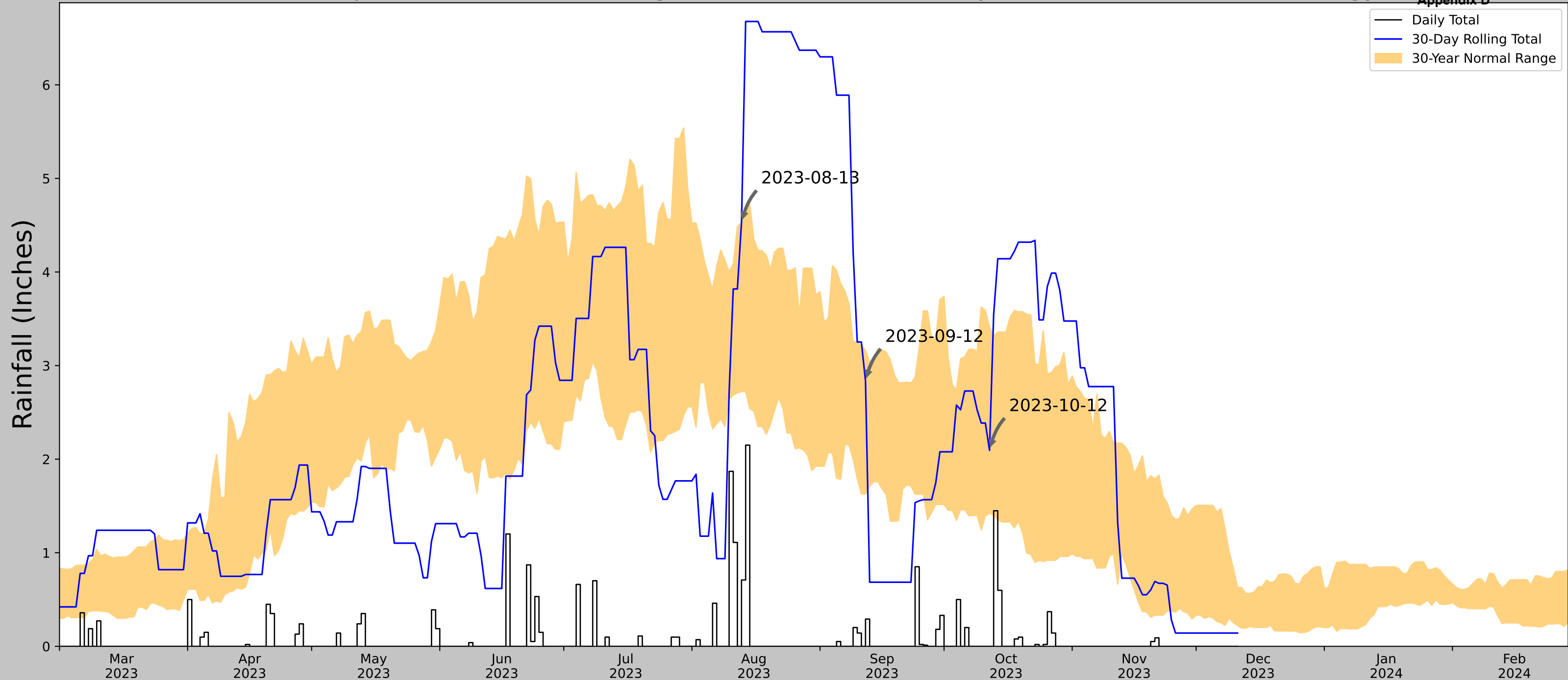
Twelve wetlands and nine other waters have been delineated within the Survey Area based on the desktop assessment and field delineation. The geographic information system (GIS) spatial files will be used to mitigate impacts to wetlands including avoidance and minimization strategies during the planning process.

6.0 References

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- U.S. Fish and Wildlife Service (USFWS). 2023. National Wetlands Inventory. Online URL: <http://www.fws.gov/wetlands/Data/Mapper.html>.
- U.S. Geological Survey (USGS) National Land Cover Dataset. 2021. Add full reference. First used on page 1.

Appendix A. Antecedent Precipitation

Antecedent Precipitation vs Normal Range based on NOAA's Daily Global Historical Climatology Network



Coordinates	45.2764678, -96.47838034
Observation Date	2023-10-12
Elevation (ft)	1054.66
Drought Index (PDSI)	Moderate wetness
WebWIMP H ₂ O Balance	Dry Season

30 Days Ending	30 th %ile (in)	70 th %ile (in)	Observed (in)	Wetness Condition	Condition Value	Month Weight	Product
2023-10-12	1.42126	3.412205	2.094488	Normal	2	3	6
2023-09-12	1.627953	3.161417	2.834646	Normal	2	2	4
2023-08-13	2.72126	4.531103	4.527559	Normal	2	1	2
Result							Normal Conditions - 12



Figures and tables made by the
Antecedent Precipitation Tool
Version 2.0

Developed by:
U.S. Army Corps of Engineers and
U.S. Army Engineer Research and
Development Center

Weather Station Name	Coordinates	Elevation (ft)	Distance (mi)	Elevation Δ	Weighted Δ	Days Normal	Days Antecedent
BIG STONE CITY 2 NW	45.2994, -96.5	1115.158	1.901	60.498	0.971	11235	90
BIG STONE CITY 5.0 WNW	45.3114, -96.5644	1142.06	3.238	26.902	1.544	10	0
ORTONVILLE 1N	45.3086, -96.4297	1099.081	3.475	16.077	1.62	65	0
MILBANK	45.2267, -96.6233	1142.06	7.822	26.902	3.73	7	0
MILBANK 4 NW	45.2836, -96.6689	1145.013	8.282	29.855	3.974	34	0
ARTICHOKE LAKE 1 E	45.3856, -96.1258	1098.097	19.124	17.061	8.932	1	0

Appendix B. Photographs

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Appendix C. Site Photographs



Photo 1. Upland sampling no-point No_001.



Photo 2. Upland sampling no-point No_002.



Photo 3. No Access; apparent no-point and evidence of tile drainage.



Photo 4. Upland sampling no-point No_003

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Appendix C. Site Photographs



Photo 5. Upland sampling no-point No_034.



Photo 7. Upland sampling point facing southeast adjacent to Wetland 1.



Photo 6. Wetland sampling point facing south in Wetland 1.



Photo 8. Upland sampling no-point No_022.

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Appendix C. Site Photographs



Photo 9. Upland sampling no-point No_004.



Photo 11. Wetland sampling point facing southeast in Wetland 2.



Photo 10. Upland sampling point facing northeast adjacent to Wetland 2.



Photo 12. Upland sampling no-point No_005.

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Appendix C. Site Photographs



Photo 13. Upland sampling no-point No_006.



Photo 14. Upland sampling no-point No_024.



Photo 15. Wetland sampling point facing southeast in Wetland 3.



Photo 16. Upland sampling point facing south adjacent to Wetland 3.

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Appendix C. Site Photographs



Photo 17. Upland sampling no-point No_007.



Photo 19. Downstream photo of OW-6.



Photo 18. Upstream photo of OW-6



Photo 20. Upland sampling no-point No_008.

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Appendix C. Site Photographs



Photo 21. Facing west, upstream on OW-8.

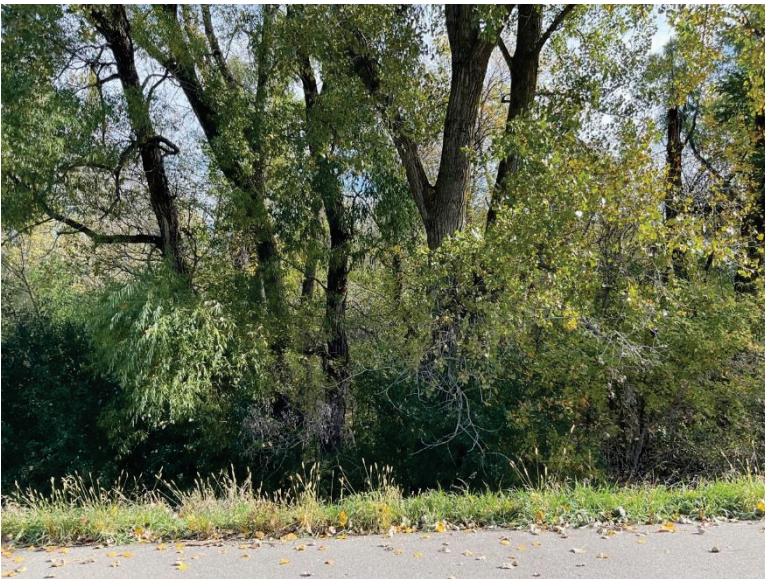


Photo 22. Facing east, downstream on OW-9.



Photo 23. Upland sampling no-point No_010.



Photo 24. Upland sampling no-point No_009.

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Appendix C. Site Photographs



Photo 25. Upland sampling point facing south adjacent to Wetland 5.



Photo 27. Upland sampling point facing south adjacent to Wetland 6.



Photo 26. Wetland sampling point facing south into Wetland 5.



Photo 28. Wetland sampling point facing southeast in Wetland 6.

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Appendix C. Site Photographs



Photo 29. Upland sampling point facing southwest adjacent to Wetland 7.



Photo 30. Wetland sampling point facing southwest in Wetland 7.



Photo 31. Upland sampling no-point No_011.



Photo 32. Upland sampling no-point No_012.

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Appendix C. Site Photographs



Photo 33. Upland sampling point facing southwest adjacent to Wetland 9.



Photo 34. Wetland sampling point facing southwest in Wetland 9.



Photo 35. Upland sampling no-point No_013.



Photo 36. Photo taken from road facing east toward no-point No_014.

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Appendix C. Site Photographs



Photo 37. Upland sampling no-point No_018.



Photo 39. Upland sampling facing southeast adjacent to Wetland 10.



Photo 38. Upland sampling no-point No_030.



Photo 40. Wetland sampling point facing southeast into Wetland 10.

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Appendix C. Site Photographs



Photo 41. Photo evidence of tile drainage located south of Wetland 10.

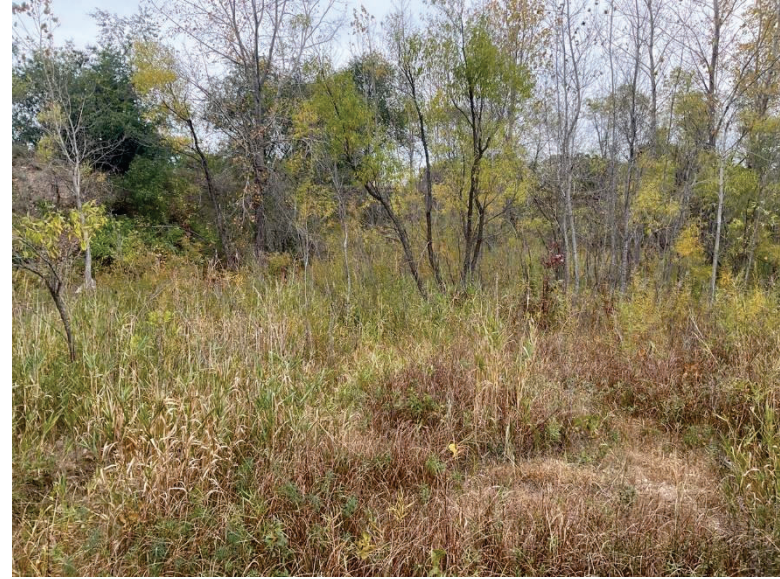


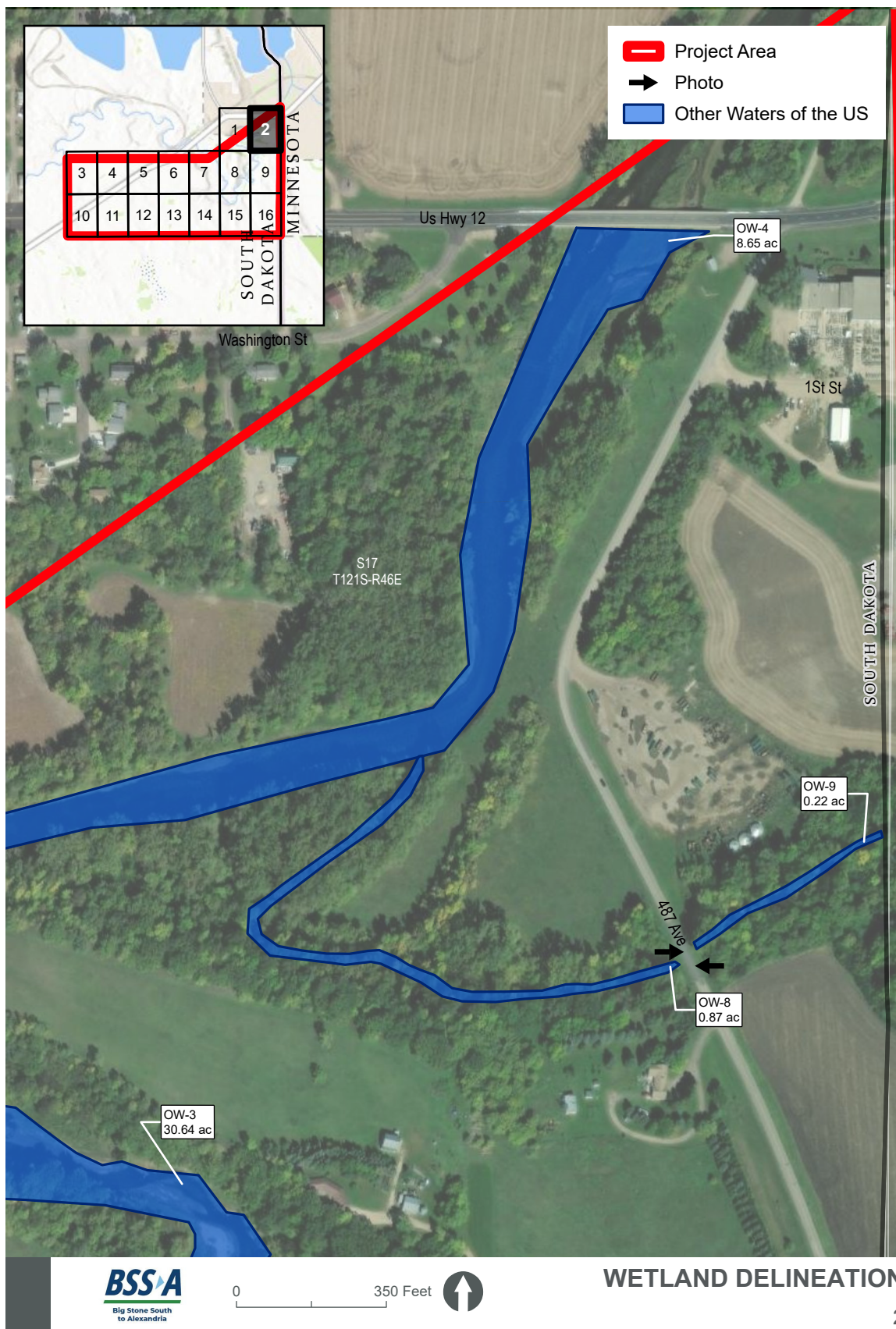
Photo 43. Wetland sampling point facing northwest into Wetland 11.



Photo 42. Upland sampling point facing northwest adjacent to Wetland 11.

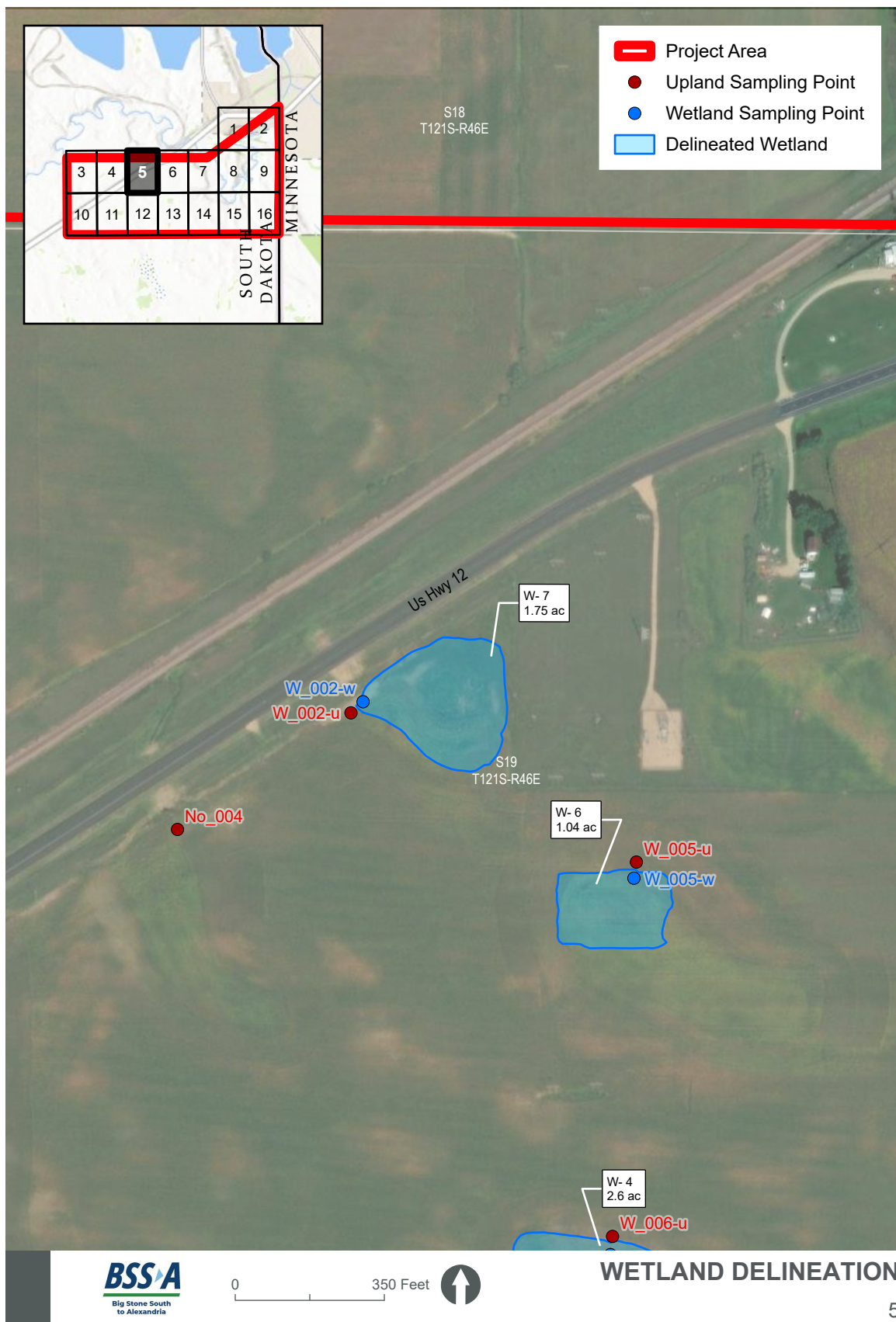
Appendix C. Delineated Wetlands Map Book













BIG STONE SOUTH TO ALEXANDRIA 345KV

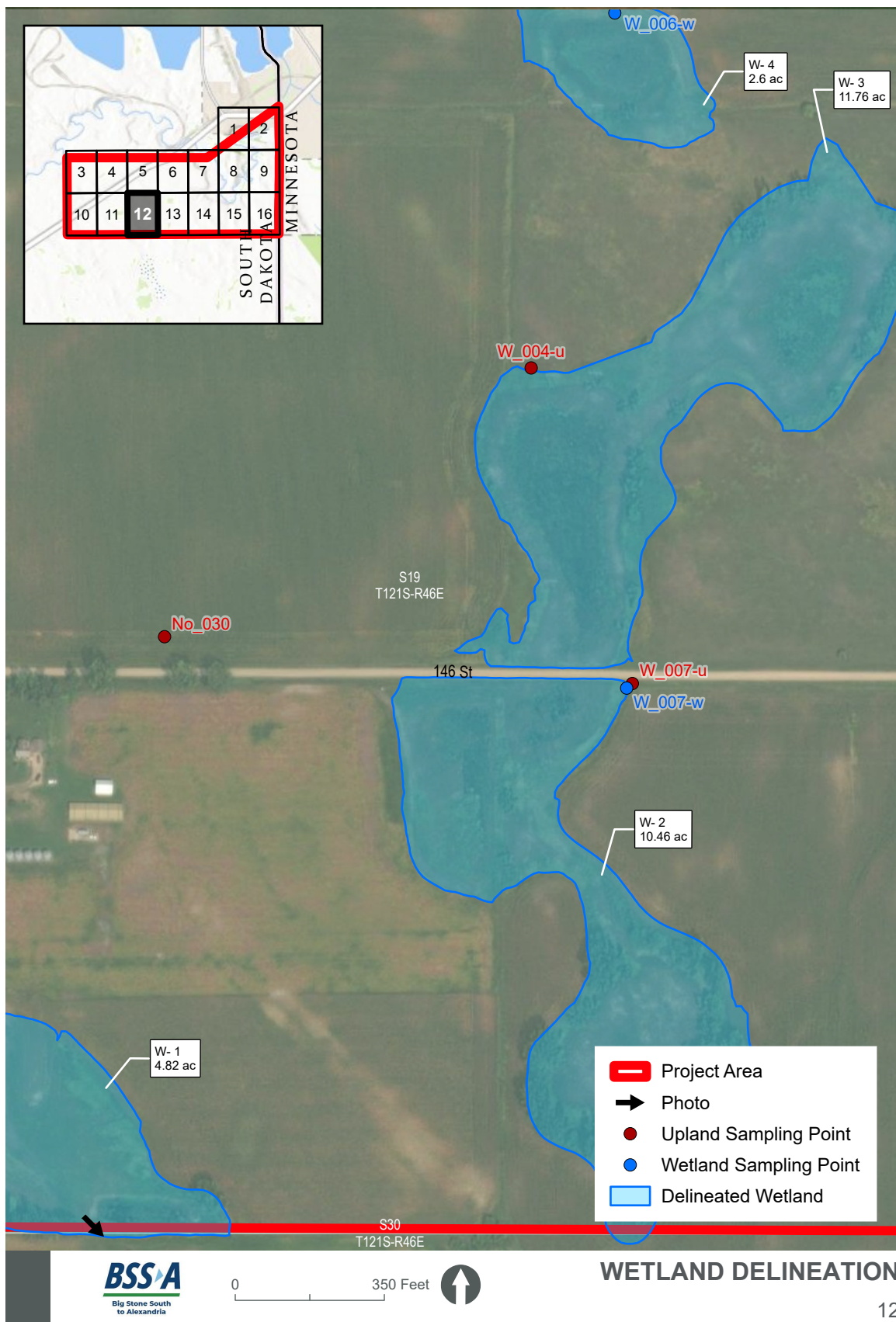


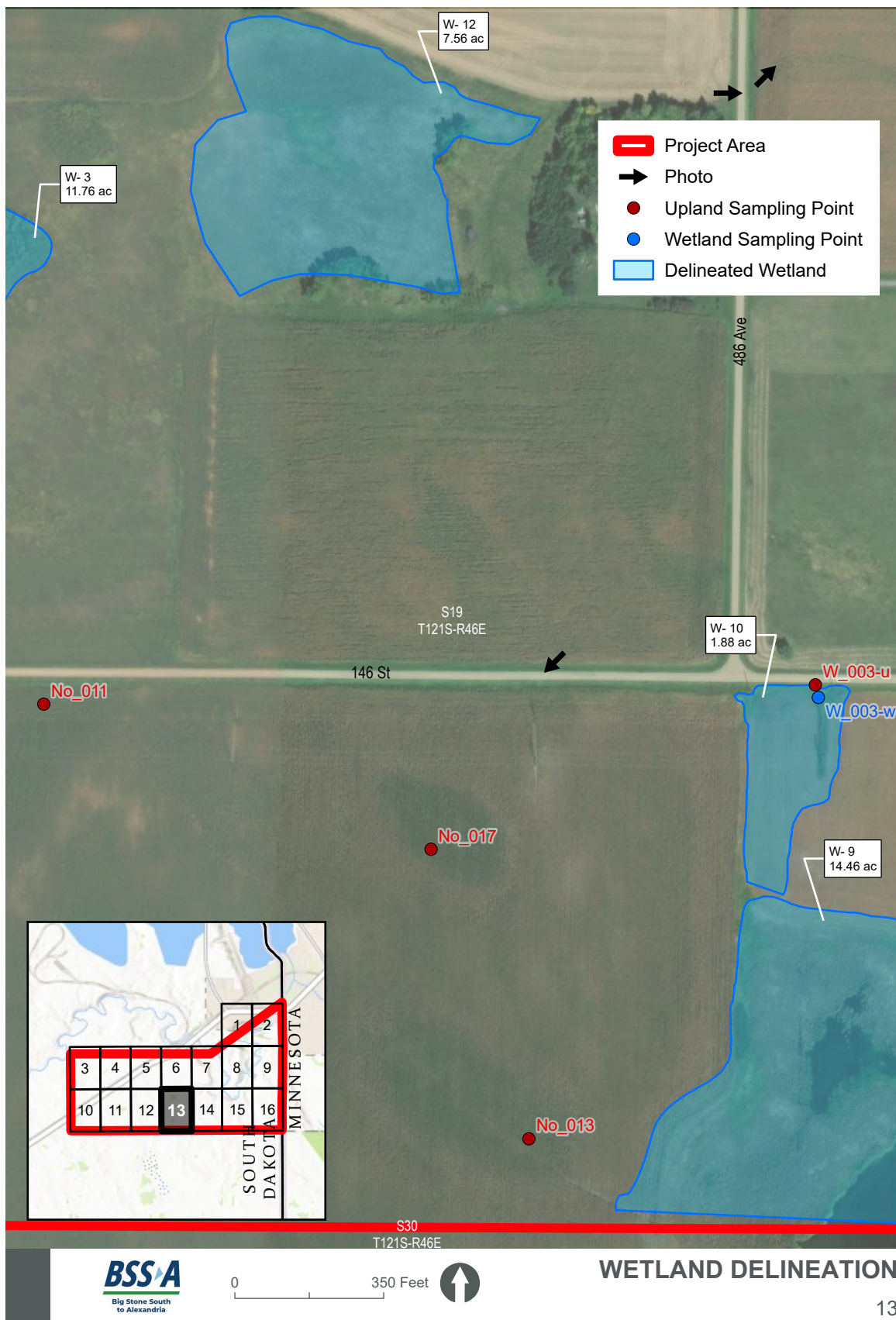








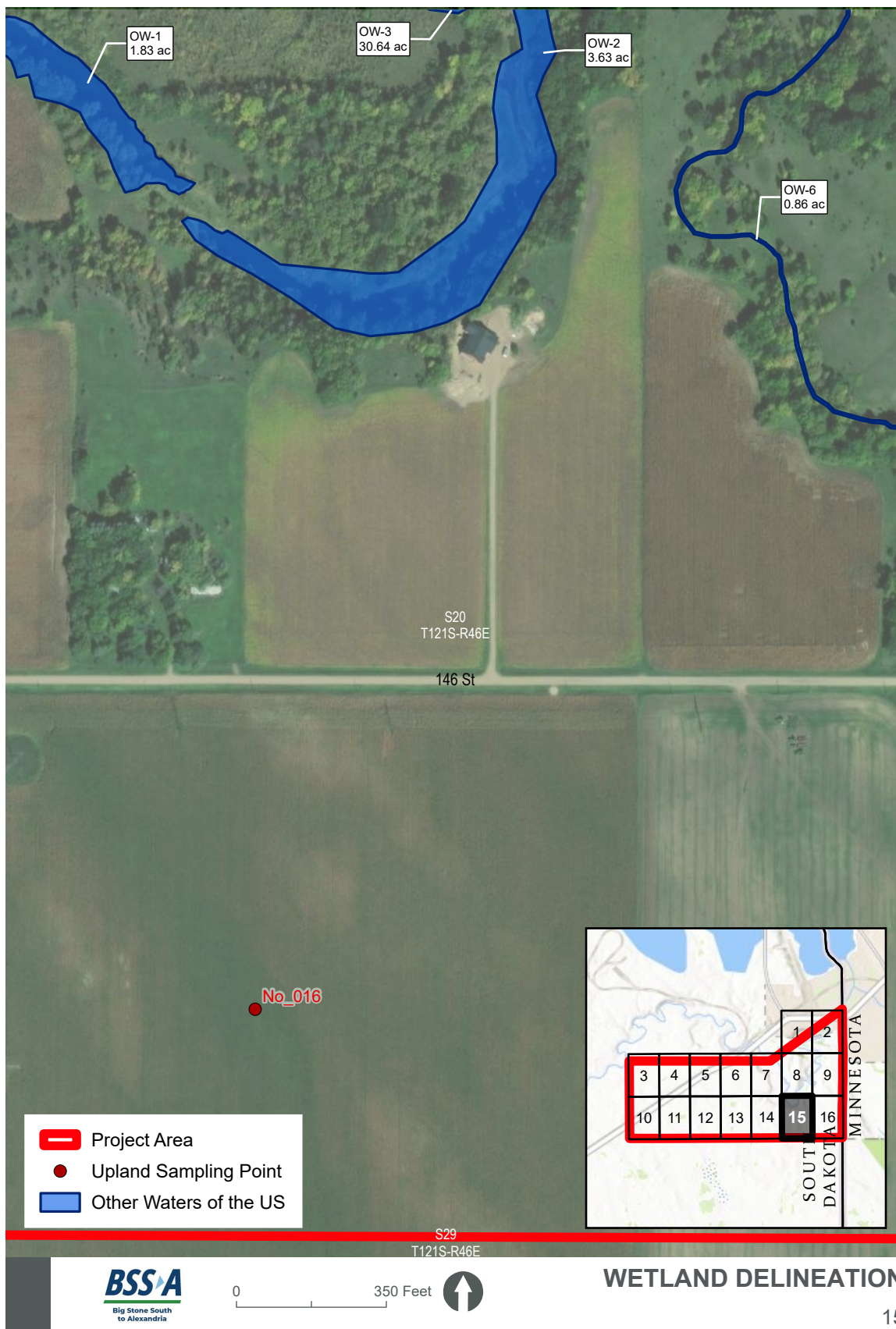




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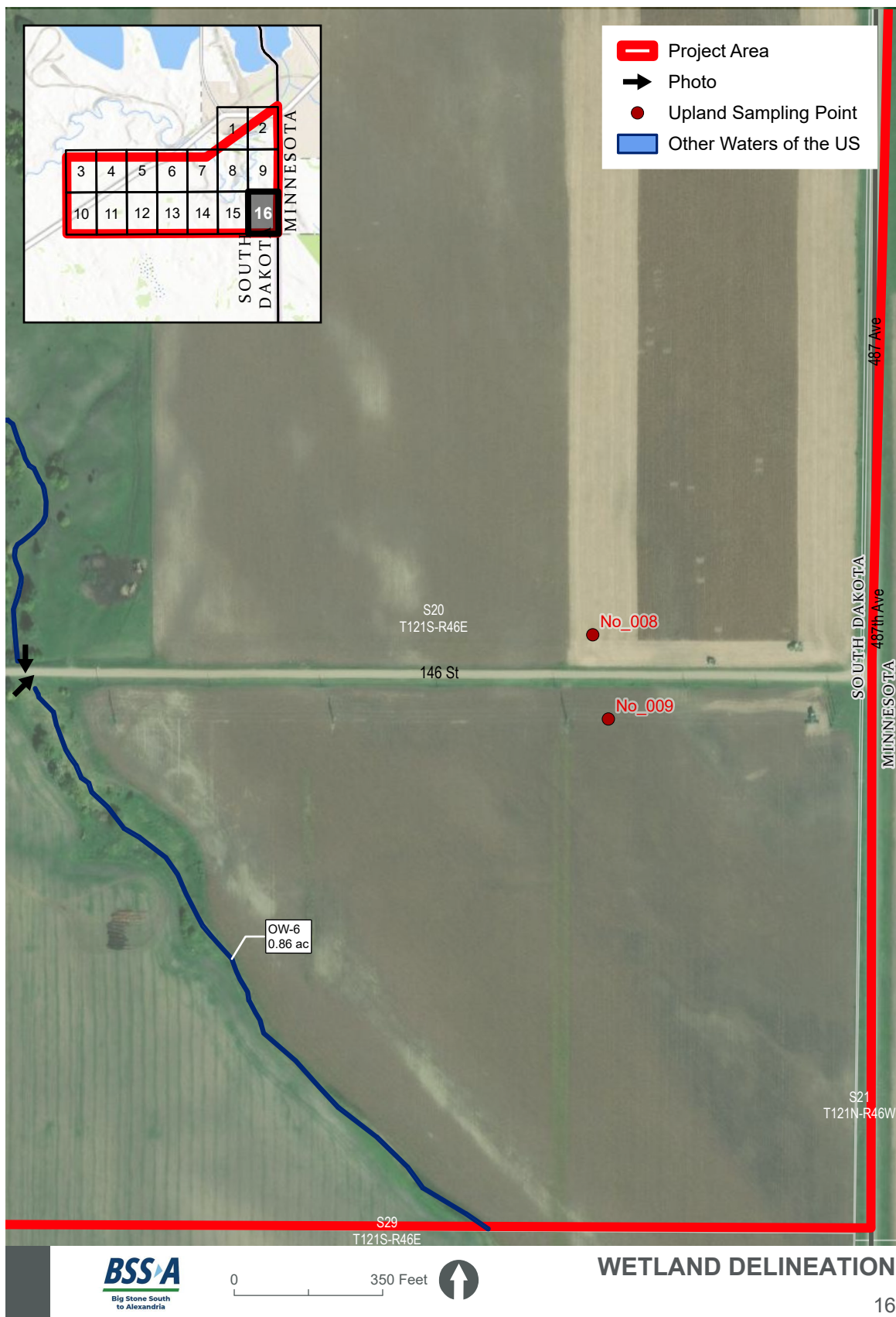
BIG STONE SOUTH TO ALEXANDRIA 345KV





15

BIG STONE SOUTH TO ALEXANDRIA 345KV



16

BIG STONE SOUTH TO ALEXANDRIA 345KV