

# APPENDIX D - 9

## Aquatic Resources Report



# AQUATIC RESOURCES REPORT

## Bylin Dam Rehabilitation, Walsh County

Prepared for:

**Walsh County Water Resource District**  
**Court House Building (1<sup>st</sup> Floor)**  
**600 Cooper Avenue**  
**Grafton, ND 58237**

I hereby certify that this report was prepared  
by me or under my direct supervision.

A handwritten signature in black ink that reads "Donna Jacob". The signature is written in a cursive style.

Donna Jacob, PhD, PWS  
Houston Engineering Inc.

Date: 2022-05-10

HEI project no. 7135-0037

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## Exhibits

- Exhibit D-9-1 – Project Location Map
- Exhibit D-9-2 – Aquatic Resources Maps
- Exhibit D-9-3 – USDA Soils Map
- Exhibit D-9-4 – LiDAR Maps
- Exhibit D-9-5 – Alternative 1 Impacts Maps
- Exhibit D-9-6 – Alternative 2 Impacts Maps

**Appendices**

Appendix D-9-A– Google Map Directions

Appendix D-9-B – Site Photographs

Appendix D-9-C – Plant List

Appendix D-9-D – Historical Aerial Photography

## 1 EXECUTIVE SUMMARY

Staff from Houston Engineering, Inc. (Houston Engineering) completed a field investigation of the survey area to identify and delineate aquatic resources for a project on behalf of the Natural Resource Conservation Service. The survey area is located in Vesta Township (T 157N, R 57W, S 31,32, 33), Norton Township (T 156N, R 57W, S 5,6), Latona Township (T156N, R58, S1), and Adams Township (T157, R58W, S 23, 25, 26, 36) near Adams, ND, in Walsh County, North Dakota. The delineation was conducted in accordance with the 1987 Corps of Engineers Wetland Delineation Manual (USACE 1987), and the Great Plains Regional Supplement (USACE 2010), and guidelines for other waters determinations (USACE 2020). Results of the field delineations indicate there are 37 wetland areas (total 35.35 acres) and 49 potential other waters (total 80.07 acres, 45,730.82 linear feet) located in the 950-acre survey area. Most of the aquatic resources within the survey area are potential other waters made up of intermittent or perennial streams, drainage features, and lacustrine fringe wetlands. Most of the wetlands are natural (58 %), but many have developed from construction of roads and the dam, and from the artificial hydrology of the reservoir (total 42 % artificial, 38 % are lacustrine fringe). There are three major bodies of water, the North Branch Forest River, Dougherty Dam reservoir, and the Bylin Dam reservoir, within the project.

For the Future Without Federal Investment (FWOFI) alternative (Alternative 1) there are anticipated to be 7.44 acres of permanent impacts to artificial wetlands and no permanent impacts to natural wetlands. There will also be 104.9 feet of permanent impacts to the river channel and elimination of the reservoir. Mitigation requirements, depending upon the decisions of the US Army Corps of Engineers 404 permitting, could result in purchase of replacement acres at a 1:1 ratio at a cost of \$446,400.

For the structural alternative (Alternative 1) there are anticipated to be no of permanent and 0.44 acres of temporary impacts to natural wetlands and 0.065 acres of permanent and 8.02 acres of temporary impacts to artificial wetlands . There will also be 43.0 acres of temporary impacts to the reservoir. Mitigation requirements, depending upon the decisions of the US Army Corps of Engineers 404 permitting, could result in purchase of replacement acres at a 1:1 ratio at a cost of \$4,200.

## 2 INTRODUCTION

The purpose of this report is to identify and describe aquatic resources to document boundary determinations for review by regulatory authorities and to aid engineers avoiding impacts to aquatic resources during the design process. The project consists of correcting dam performance, design, and safety standards while maintaining the current flood protection and recreational opportunities.

## 3 LOCATION

The project is located in Vesta Township (T 157N, R 57W, S 31,32, 33), Norton Township (T 156N, R 57W, S 5,6), Latona Township (T156N, R58, S1), and Adams Township (T157, R58W, S 23, 25, 26, 36) near Adams, ND, in Walsh County, North Dakota; general latitude: 48.370366, longitude: -98.035542; **Exhibit**

**D-9-1: Project Location Map).** The project extends from the dam upstream following the river and the river catchment area. Most of the catchment is pastureland and prairie with some portions extending into adjacent agricultural land. The project is two miles south of Adams, ND (driving directions: from USACE office in Bismarck, head east on I-94 going east.; follow I-94 E and ND-1 to 51<sup>st</sup> NE in Clara.; Continue on 51<sup>st</sup> St. NE until ND-35 to 121<sup>st</sup> Ave NE in Vesta)(**Appendix D-9-A : Google Map Directions**). The project area extends approximately four miles west of the Bylin Dam for a total survey area of 950 acres.

## 4 METHODS

The field aquatic resource delineation was conducted in accordance with the 1987 Corps of Engineers Wetlands Delineation Manual and the appropriate Regional Supplement: Great Plains (USACE 2010). Aquatic resource boundaries within the project boundary were determined by paired test holes observing the presence of hydric soil, vegetation, and hydrology, and were recorded on USACE Wetland Determination Data Forms. Wetland types followed “Cowardin” nomenclature in Federal Geographic Data Committee (2013). Determination of drainages and delineation of streams and rivers followed guidance from USACE (2020). The delineation report was written following the requirements of USACE (2019).

The following procedures were used to determine wetland ecosystems:

- Review of the available background resource information of this site as a part of the aquatic resource delineation activities. Aquatic resource maps were developed using aerial photography from 2019 in combination with the United States Fish and Wildlife Service National Wetlands Inventory (NWI) layer (USFWS 2019), United States Geological Survey (USGS) Topography Map; and Natural Resources Conservation Service Soil Survey (maps and soil unit characteristics USDA-NRCS 2010), and historical aerial photography from 2003, 2009, 2012, 2015, 2017, and 2019 (**Appendix D-9-D: Historical Aerial Photography**).
- Field survey of vegetation to determine the proportion of the dominant plant species classified as either obligate wetland, facultative wetland, or facultative plants; according to the National Wetland Plant List: 2020 wetland ratings (USACE 2018); or if other indicators of wetland vegetation were present. Nomenclature followed the PLANTS Database (USDA-NRCS 2020a).
- Field sampling of soil using a soil probe to identify soil morphology, redoximorphic features, and soil texture. We determined the hydric soil indicators according to Field Indicators of Hydric Soils in the United States; Guide for Identifying and Delineating Hydric Soils, Version 7.0 (USDA-NRCS 2016).
- Hydrology by observation of on-site primary and secondary indicators (USACE 2010). We also used aerial photography to assist hydrologic assessment. To describe the climatic conditions at the time of sampling, we accessed antecedent and recent rainfall data before going in the field (NDAWN 2010). To determine if the dry season water Table D-9-hydrology indicator applies, we obtained the typical water balance for the site at the date of sampling (Matsuura et al. 2003).

The following procedures were used to determine all potential other waters (OW):

- This guidance follows USACE (2020). All occurrences of blue lines on the USGS Topo Maps and stream and riverine data from the North Dakota GIS Database were identified prior to the field visit, as were areas of deepwater habitat (lakes). Historical aerial photographs and topographic data were used to identify potential drainage features. All lakes and larger drainage channels were described and mapped in the field. All potential drainage features were observed, or, where there were too many for feasible ground-truthing or inaccessible, several representative features were visually observed and then their characteristics were extrapolated to the remainder in the survey area.

The survey area is the portion of land defined as the Upstream Assessment Area. The survey area includes the reservoir and the upstream floodplain of the Forest River Valley. The survey area is approximately 950 acres, entirely within Walsh County. The area includes the dam, the reservoir, a zone downstream, and the floodplain upstream of the dam. For the downstream area, this extended approximately 1000 feet downstream and included land that may be affected if the dam is decommissioned. For the upstream extent, the area of potential effect was estimated by including land in an approximate flood zone using the elevation of the dam plus an additional ten feet.

Staff from Houston Engineering (Kaleb Haley) and a Registered Professional Soil Classifier (Mike Ulmer, Prairie Soil Consulting, LLC) performed fieldwork on July 17<sup>th</sup>, 2020. Donna Jacob and Mark D. Aanenson (both of Houston Engineering) performed fieldwork on September 22<sup>nd</sup> and 23<sup>rd</sup>, 2020. The wetland and other waters boundaries and sample locations were marked using a Trimble Geo 7X GPS unit for those representative plant communities present along the wetland boundaries. We also used additional, undocumented sample points throughout the delineation to verify vegetation, hydric soils, and hydrology. We recorded our observations using geolocated photographs and data forms. Once the correlation between hydrology, hydric soils, and hydrophytic vegetation was established for each wetland, the boundary of the wetland was determined by mapping the visible indicators (vegetation and hydrology) and verifying the presence of hydric soils when necessary. All wetlands were surveyed, but for many of the ephemeral drainages we used photos or visual observation only, and then interpreted these to be similar to field-verified sites.

A judgement was made regarding the natural or artificial state of the wetlands upon request of the NRCS. This judgement was based upon GIS and field observations. The lacustrine fringe was considered to be artificial based upon the presence of hydrology existing from the construction of the dams and filling of the reservoirs (artificial hydrologic condition). The artificial hydrology was assessed by using Lidar to map the elevation of the 2-year 24-hour flood event inundation. This flooding frequency was considered to be enough to sustain hydrophytic vegetation. Other wetlands were formed from the construction of the dam, access roads, or gravel pits.

The survey area was fully evaluated. The site was examined using remote tools (LiDAR, topographic maps, soil maps, NWI, and many years of aerial photography including wet years). The ground-truthing involved covering much of the site on foot, however, the terrain and dense vegetation restricted access and visibility in some areas. Upon guidance from the NRCS, extra attention was paid during the survey to

locating and recognizing fen communities. If soil units and/or slopes favorable to the formation of fens were identified (see fen description below), extra effort was made to survey those areas thoroughly. Over the whole site, extra attention was given to looking for organic soil layers in wetlands.

Fens are a relatively uncommon wetland type and are vulnerable to disturbance through small changes in their hydrology. Fens are predominantly groundwater-fed systems, so the soil is continually saturated. This condition supports the formation of peat soils by slowing the process of organic matter decomposition. Fens are indicated as having soils described as histosol (40 cm organic soil) or histic epipedon (20 cm or more of organic soil) (US Army Corps of Engineers 2010). Sloping fens form at the base of hills where groundwater discharges to the surface or on hillslopes where groundwater discharges from glacial moraines and bedrock aquifers. In North Dakota, fens would typically be classified by the HGM (hydrogeomorphic) classification as the “SLOPE” type (USDA-NRCS 2008). Slopes can be steep or gentle. If the groundwater discharge is sufficient, these slope wetlands can be found on landscapes that are nearly flat. Typically, water flows slowly over the fen surface during most or all of the summer, maintaining a constant soil saturation. Basin fens form from gradual filling of lakes or ponds with partially decomposed plant remains. These fens are flat and located near the margin of open water. The dominant species growing in fens are sedges, and there are other species depending upon the pH of the water and the availability of nutrients (cations) (MN DNR 2016, USFS 2021). Poor fens, with slightly acidic waters (pH of 4.5 to 5.5), include also evergreen shrubs and mosses (including *Sphagnum* spp.). Rich fens, being circumneutral (pH, 5.5-6.9), also support other wetland plants and mosses (including *Sphagnum* spp.). Calcareous fens, with alkaline waters (pH above 6.9) and a thicker peat layer, are known to foster mosses other than *Sphagnum* and a suite of distinctive and rare (declining) wetland plants (e.g., MN DNR 2016).

## 5 RESULTS

### 5.1 LANDSCAPE SETTING:

The survey area is located in the Northern Glaciated Plains Ecological Province, Drift Plains Subsection (USEPA 2020). This region consists of glacial features including gently rolling hills many of which are connected on the surface by natural streams and rivers or artificial drainage. This area includes a mix of vegetation types including forest, prairie, and wetland plant communities. Pre-settlement vegetation was dominated by tallgrass prairies and shortgrass prairie but now much of the area is farmland. The current local land use proximate to the project consists of hay production pastures and cultivated agriculture.

The total survey area was within the foreseeable impacts of the future dam rehabilitation. The circumstances were normal, but the vegetation (heavily grazed, mowed) and the hydrology (road and ditch construction) were significantly disturbed in some areas.

## 5.2 CLIMATIC CONDITIONS:

The weather conditions during both field visits were good. During the first field visit in July the climatic conditions in the area were normal due to precipitation totals in the three months before the survey (**Table D-9-1a**, WETS data, USDA-NRCS 2020b). The survey area received 0.54 inches of rain the seven days prior to the July 17th, 2020 fieldwork (NDAWN 2020). During the field visit in September, the climatic conditions in the area were drier than normal due to decreased precipitation in the three months before (**Table D-9-1b**, WETS data, USDA-NRCS 2020b). The survey area received no rain during the seven days prior to the September 22nd, 2020 fieldwork (NDAWN 2020).

**Table D-9-1a:** WETS data (May through July), historical precipitation data compared to recent precipitation data from a 48-year dataset (1971-2020) recorded at a nearby weather station (USDA-NRCS 2020b).

| Long-term rainfall records (1971-2019) |       |   |      |      |        |                   |                    |                           |                                      |
|--|-------|---|------|------|--------|-------------------|--------------------|---------------------------|--------------------------------------|
| WETS Station<br>Langdon, ND            | Month | <30%  | Mean | >30% | Actual | Condition         | Condition<br>Value | Month<br>Weight<br>Value  | Condition Value<br>X<br>Month Weight |
| 3rd Prior Month                        | April | 0.46  | 0.99 | 1.15 | 0.61   | Normal            | 2                  | 1                         | 2                                    |
| 2nd Prior Month                        | May   | 1.44  | 2.34 | 2.84 | 0.89   | Dry               | 1                  | 2                         | 2                                    |
| 1st Prior Month                        | June  | 2.37  | 3.33 | 3.94 | 3.96   | Wet               | 3                  | 3                         | 9                                    |
|  |       |   |      |      |        |                   |                    | Sum:                      | 13                                   |
| If sum is:                             |       |   |      |      |        | Condition Values: |                    | Conditions Onsite: Normal |                                      |
| 6 to 9                                 |       | then prior period has been drier than normal  |      |      |        | (1) Dry           |                    |                           |                                      |
| 10 to 14                               |       | then prior period has been normal             |      |      |        | (2) Normal        |                    |                           |                                      |
| 15 to 18                               |       | then prior period has been wetter than normal |      |      |        | (3) Wet           |                    |                           |                                      |

**Table D-9-1b:** WETS data (July through September), historical precipitation data compared to recent precipitation data from a 48-year dataset (1971-2020) recorded at a nearby weather station (USDA-NRCS 2020b).

| Long-term rainfall records (1971-2019) |           |   |      |      |        |                   |                    |                          |                                      |
|--|-----------|---|------|------|--------|-------------------|--------------------|--------------------------|--------------------------------------|
| WETS Station<br>Langdon, ND            | Month     | <30%  | Mean | >30% | Actual | Condition         | Condition<br>Value | Month<br>Weight<br>Value | Condition Value<br>X<br>Month Weight |
| 3rd Prior Month                        | July      | 2.04  | 3.19 | 3.84 | 4.06   | Wet               | 3                  | 1                        | 3                                    |
| 2nd Prior Month                        | August    | 1.57  | 2.73 | 3.31 | 0.96   | Dry               | 1                  | 2                        | 2                                    |
| 1st Prior Month                        | September | 1.13  | 1.68 | 2.01 | 0.50   | Dry               | 1                  | 3                        | 3                                    |
|  |           |   |      |      |        |                   |                    | Sum:                     | 8                                    |
| If sum is:                             |           |   |      |      |        | Condition Values: |                    | Conditions Onsite: Dry   |                                      |
| 6 to 9                                 |           | then prior period has been drier than normal  |      |      |        | (1) Dry           |                    |                          |                                      |
| 10 to 14                               |           | then prior period has been normal             |      |      |        | (2) Normal        |                    |                          |                                      |
| 15 to 18                               |           | then prior period has been wetter than normal |      |      |        | (3) Wet           |                    |                          |                                      |

## 5.3 OVERALL AQUATIC RESOURCE DESCRIPTIONS

Results of the field wetland delineation indicate there are 37 wetland areas (total 35.35 acres) and 49 potential other waters (total 80.07 acres, 45,730.82 linear feet) located in the 950-acre survey area (**Exhibit D-9-2: Aquatic Resources Maps**).

**Wetlands:** Some of the wetlands are listed in the NWI (**Table D-9-2**). Wetland types include natural swales (riverine wetlands), lacustrine fringe wetlands (with hydrology supplied by the presence of the

artificial reservoirs), and several basin or impoundment wetlands formed from the construction of the dam or other features (see **Appendix D-9-B: Site Photographs**). The potential other waters within the survey area include the reservoirs, the North Branch Forest River, and its tributaries. The North Branch Forest River is listed by the NWI as R5UBH (riverine, unknown perennial, unconsolidated bottom, permanently flooded) type. There are many tributaries that are classified by the NWI as a R4SBC (riverine, intermittent, streambed, seasonally flooded) type, but the majority of the potential other waters are ephemeral streams and drainages.

### 5.3.1 OVERALL VEGETATION DESCRIPTIONS

The wetland plant communities in the survey area are wet-mesic prairie and shallow marsh. Dominant species in the wetland areas within the project area (**Appendix D-9-C: Plant List**) represent herbaceous, shrub, and tree strata. The tree stratum is predominantly represented by *Acer negundo* (boxelder). The shrub species included *Amorpha canescens* (lead plant), *Artemisia absinthium* (absinthium), *Salix interior* (sandbar willow), *Shepherdia argentea* (silver buffaloberry), *Symphoricarpos albus* (snowberry), and *Symphoricarpos occidentalis* (buck brush). There are a variety of wetland herbs, the more frequent species include *Alopecurus pratensis* (meadow foxtail), *Bromus inermis* (smooth brome), *Carex atherodes* (slough sedge), *Eleocharis palustris* (common spikerush), *Hordeum jubatum* (foxtail barley), *Juncus arcticus* (arctic rush), *Panicum virgatum* (switchgrass), *Persicaria amphibia* (swamp smartweed), *Phalaris arundinacea* (reed canary grass), *Scirpus pallidus* (pale bulrush), *Spartina pectinata* (prairie cordgrass), and *Urtica dioica* (stinging nettle).

### 5.3.2 OVERALL SOIL DESCRIPTIONS

The NRCS Web Soil Survey identified areas of mapped hydric soils within the survey area. Please refer to **Exhibit D-9-3: USDA Soils Map**. The majority of the wetlands are included in map units that are predominately non-hydric (0 to 32%). Dominant soils within the project site areas are excessively drained and are formed in glacio-fluvial deposits (USDA-NRCS 2010). The survey area is composed of a variety of soil types with slopes ranging between zero and seventy-five percent. The dominant soils include Kloten-Walsh-Edgeley loam complex (hydric rating: 0 %) and Barnes-Svea loam complex (hydric rating: 4 %).

### 5.3.3 OVERALL HYDROLOGY DESCRIPTION

The survey area is located in the Walsh Rural Water District and the North Branch Forest River watershed. The North Branch Forest River watershed drains approximately 157 square miles of land, made up primarily of agricultural and pasture fields. The topography throughout the survey area consists of gently rolling hills and many of the wetlands receive runoff from agricultural fields. Other wetlands form a fringe along the edge of the reservoirs (**Exhibit D-9-4: LiDAR Maps**). There three major bodies of water within the survey area, the North Branch Forest River, Dougherty Dam reservoir, and Bylin Dam reservoir. The USGS topographic map was examined for indications of wetland conditions within the project corridor. No wetlands are indicated as marsh on the map within or near the survey

area. Historical aerial photography shows evidence of drainages, saturation, and wet signatures throughout the survey area (**Appendix D-9-D: Historical Aerial Photographs**).

## 5.4 INDIVIDUAL SITE DESCRIPTIONS

See **Table D-9-2** for wetland information and **Table D-9-3** for potential other waters information. Data recorded for each wetland are shown Wetland Determination Data Forms (data available upon request from ND NRCS). Potential other waters are also documented on data forms (data available upon request from ND NRCS).

### 5.4.1 WETLANDS

#### 5.4.1.1 RIVERINE/DRAINAGEWAY WETLANDS: 1a, 1b, 1c, 3, 4, 5, 7, 8, 10, 18, 22, 24, 37

These are natural wetlands formed in flow pathways, either of the mainstem North Branch Forest River or its tributaries. The NWI listings include none, PEMA, PEM1C, and R4SBC. Dominant species include *Alopecurus pratensis* (meadow foxtail- FACW), *Carex atherodes* (wheat sedge-OBL), *Carex lacustris* (lake sedge-OBL), *Juncus arcticus* (Baltic rush-FACW), *Persicaria amphibia* (water smartweed-OBL), *Phalaris arundinacea* (reed canary grass- FACW), *Scirpus pallidus* (pale bulrush- OBL), *Solidago canadensis* (Canada goldenrod – FACU), *Spartina pectinata* (prairie cordgrass -FACW), *Typha x glauca* (hybrid cattail -OBL), and *Urtica dioica* (stinging nettle- FAC). Soils include loams, clay-loams, and silty clay-loams with indicators including A11- Depleted Below Dark Surface, F3- Depleted Matrix, and F6- Redox Dark Surface. Hydrology indicators documented for these wetlands include A1- Surface Water, A2- High Water Table, A3- Saturation, B13-Aquatic Invertebrates, C9- Saturation Visible on Aerial Imagery, D2- Geomorphic Position, and D5- FAC Neutral Test. Wetland functions include wildlife habitat, water purification, carbon storage, water storage, and biofiltration of nutrients from runoff. Water sources are comprised of surface runoff from various drainages, surrounding fields, and grazed pastures.

#### 5.4.1.2 LACUSTRINE FRINGE WETLANDS: 9, 11, 12, 13, 14, 15, 16, 17, 19, 20, 21, 23, 25, 26, 27, 28, 30, 32, 33

These are wetlands formed along the shore of the reservoir, supported entirely or in part by the artificial hydrology of the lake. Some of these wetlands are a combination of drainageways (natural hydrologic conditions) and lacustrine fringe (9, 11, 12, 14, 15, 23, 28). The NWI listings include none, PEM1A, and PEM1C. Dominant species include *Alopecurus pratensis* (meadow foxtail- FACW), *Eleocharis palustris* (common spikerush-OBL), *Hordeum jubatum* (foxtail barley-FACW), *Phalaris arundinacea* (reed canary grass- FACW), *Poa pratensis* (Kentucky blue grass-FACU), *Scirpus pallidus* (pale bulrush- OBL), *Spartina pectinata* (prairie cordgrass -FACW), and *Typha x glauca* (hybrid cattail -OBL). Wetland functions include wildlife habitat, water purification, carbon storage, water storage, and biofiltration of nutrients from runoff. Water sources are comprised of surface runoff from various drainages, the reservoir, surrounding fields, and grazed pastures.

#### 5.4.1.3 DEPRESSIONAL WETLANDS: 2, 6, 29, 31, 34, 35, 36

Wetland 2 is an excavated pond and is classified by the NWI as PABFx. Field observations confirm this classification. The vegetation consists of *Typha x glauca* (hybrid cattail -OBL). The hydrology indicators documented for this wetland include A1 Surface Water, A2- High Water Table, A3- Saturation, C9- Saturation Visible on Aerial Imagery, D2- Geomorphic Position and D5- FAC Neutral Test. The soils of this wetland is clay loam and meets the following hydric soil indicator: A11- Depleted Below Dark Surface and F2-Depleted Matrix. Wetland functions include wildlife habitat, water purification, carbon storage, water storage, and biofiltration of nutrients from runoff. Water sources are comprised of surface runoff from the adjacent roadways, road ditch, and fields.

Wetland 6: This wetland appears to have formed from the construction of the road and placement of a culvert. It is classified by the NWI as PEM1C. The vegetation within this wetland includes *Phalaris arundinacea* (reed canary grass -FACW), *Typha x glauca* (hybrid cattail -OBL), and *Persicaria amphibia* (water smartweed-OBL). The hydrology indicators documented for this wetland include A2- High Water Table, A3- Saturation, C9- Saturation Visible on Aerial Imagery, D2- Geomorphic Position and D5- FAC Neutral Test, and B-13 Aquatic Invertebrates. The soils of these wetlands are dominated by loamy textured soils and meet the following hydric soil indicator: F6- Redox Dark Surface. Wetland functions include wildlife habitat, water purification, carbon storage, water storage, and biofiltration of nutrients from runoff. Water sources are comprised of surface runoff from OW-16 and surrounding fields.

Wetland 29 is a natural wetland not classified by the NWI. Field observations classify it as PEM1A. Wetland 29 is dominated by *Alopecurus pratensis* (meadow foxtail- FACW), *Phalaris arundinacea* (reed canary grass- FACW), *Persicaria amphibia* (water smartweed-OBL), *Spartina pectinata* (prairie cordgrass- FACW), *Scirpus pallidus* (pale bulrush- OBL), and *Panicum virgatum* (witchgrass-FAC). Hydrology indicators documented for this wetland include A2- High Water Table, A3- Saturation, C9- Saturation Visible on Aerial Imagery, D2- Geomorphic Position, D5- FAC Neutral Test. This wetland has clay loam textured soils with redoximorphic features in the upper part of the soil profile. The soils met the following hydric soil indicator: F6- Redox Dark Surface. Wetland functions include wildlife habitat, water purification, carbon storage, water storage, and biofiltration of nutrients from runoff. Water sources are comprised of surface runoff from the adjacent roadways, road ditch, and fields.

Wetland 31 appears to have developed as a result of the construction of the original road and is not classified by the NWI. Field observations classify this wetland as PEM1A. Wetland 32 is a fringe wetland that is hydrologically connected to the reservoir. The vegetation within this wetland consists of *Phalaris arundinacea* (reed canary grass- FACW) and *Urtica dioica* (stinging nettle- FAC). The clay loam soils met the following hydric soil indicators: A12- Thick Dark Surface and F6- Redox Dark Surface. Hydrology indicators documented for these wetlands include A3- Saturation, C9- Saturation Visible on Aerial Imagery, D2- Geomorphic Position, and D5- FAC Neutral Test. Wetland functions include wildlife habitat, water purification, carbon storage, water storage, and biofiltration of nutrients from runoff. Water sources are comprised of surface runoff from the adjacent roadways, road ditch, and fields.

Wetland 34 appears to be a drainageway that has been impounded by the toeslope of the dam and is not classified by the NWI. Field observations classify this wetland as PEM1A. Wetland 34 is dominated by *Phalaris arundinacea* (reed canary grass- FACW). . This wetland area has clay loam textured soils with redoximorphic features in the upper part of the soil profile. The soil met the following hydric soil indicator: F6- Redox Dark Surface. Hydrology indicators documented for this wetland include A2- High Water Table, A3- Saturation, C9- Saturation Visible on Aerial Imagery, D2- Geomorphic Position, D5- FAC Neutral Test. Wetland functions include carbon storage, water storage, and biofiltration of nutrients from runoff. Water sources are comprised of surface runoff from the fields.

Wetland 35 appears to have developed from the construction of the road and is not classified by the NWI. Field observations classify this wetland as PEM1A-mosaic (more than 50% wetland). Wetland 35 is dominated by *Alopecurus arundinaceus* (creeping meadow foxtail – FACW) and *Typha X glauca* (hybrid cattail - OBL). The soil met the following hydric soil indicator: F6 – Redox Dark Surface. Hydrology indicators documented for this wetland include D2- Geomorphic Position and D5- FAC Neutral Test. This wetland area has silty loam textured soils with redoximorphic features in the upper part of the soil profile. Wetland functions include water purification, carbon storage, and biofiltration of nutrients from runoff. Water sources are comprised of surface runoff from the adjacent roadway and fields.

Wetland 36 appears to have developed after the excavation of the auxiliary spillway and is not classified by the NWI. Field observations classify this wetland as PEM1A. Wetland 36 is dominated by *Alopecurus pratensis* (meadow foxtail- FACW). This wetland area has clay loam textured soils with redoximorphic features in the upper part of the soil profile. The soil met the following hydric soil indicator: F6- Redox Dark Surface. Hydrology indicators documented for this wetland include A2- High Water Table, A3- Saturation, C9- Saturation Visible on Aerial Imagery, D2- Geomorphic Position, D5- FAC Neutral Test, and D7-Frost-Heave Hummocks. Wetland functions include wildlife habitat, water purification, carbon storage, water storage, and biofiltration of nutrients from runoff. Water sources are comprised of surface runoff from the adjacent roadways, road ditch, and fields.

**Table D-9-2:** Delineated Wetlands and their characteristics (data limited to project boundary only).

| Wetland Number | NWI Listing | Field Observation | Natural or Artificial (* lacustrine fringe) | Wetland area (acres) | Latitude (center) | Longitude (center) |
|----------------|-------------|-------------------|---|----------------------|-------------------|--------------------|
| 1a             | PEM1A/PEM1C | PEM1A             | Natural                                     | 6.36                 | 48.400734         | -98.0834807        |
| 1b             | PEM1C       | PEM1C             | Natural                                     | 1.61                 | 48.3976685        | -98.0802181        |
| 1c             | PEM1C       | PEM1C             | Natural                                     | 2.29                 | 48.3963826        | -98.0767175        |
| 2              | PABFx       | PABFx             | Artificial                                  | 0.14                 | 48.3972016        | -98.0772232        |
| 3              | PEM1C       | PEM1C             | Natural                                     | 0.71                 | 48.3816115        | -98.0565263        |
| 4              | Not Listed  | PEM1A             | Natural                                     | 0.03                 | 48.380939         | -98.0575507        |
| 5              | Not Listed  | PEM1A             | Natural                                     | 0.03                 | 48.3797357        | -98.0572325        |
| 6              | PEM1C       | PEM1C             | Artificial                                  | 0.04                 | 48.3793884        | -98.0577024        |
| 7              | Not Listed  | PEM1A             | Natural                                     | 0.51                 | 48.3786403        | -98.0568705        |
| 8              | Not Listed  | PEM1A             | Natural                                     | 0.19                 | 48.3779556        | -98.0579961        |

Table D-9-2: continued

| Wetland Number                                  | NWI Listing              | Field Observation | Natural or Artificial (* lacustrine fringe) | Wetland area (acres) | Latitude (center) | Longitude (center) |
|---|--------------------------|-------------------|---|----------------------|-------------------|--------------------|
| 9   | PEM1C/R5UBH/R4SBC/L1UBGh | PEM1A/PEM1C/PABF  | Natural                                     | 1.65                 | 48.3764222        | -98.0525885        |
|   |                          |                   | Artificial*                                 | 4.49                 |                   |                    |
| 10  | PUBC                     | PUBC              | Natural                                     | 0.24                 | 48.3723986        | -98.0492442        |
| 11  | Not Listed               | PEM1A             | Natural                                     | 0.11                 | 48.3734605        | -98.0480253        |
|   |                          |                   | Artificial*                                 | 0.22                 |                   |                    |
| 12  | Not Listed               | PEM1A             | Natural                                     | 0.44                 | 48.3738031        | -98.0456742        |
|   |                          |                   | Artificial*                                 | 0.1                  |                   |                    |
| 13  | Not Listed               | PEM1A             | Artificial*                                 | 0.22                 | 48.3722268        | -98.0443914        |
| 14  | PEM1A/R4SBC/R5UBH        | PEM1A/PABF        | Natural                                     | 1.0                  | 48.3762501        | -98.0432191        |
|   |                          |                   | Artificial*                                 | 0.44                 |                   |                    |
| 15  | Not Listed               | PEM1A             | Natural                                     | 0.19                 | 48.3731878        | -98.0389072        |
|   |                          |                   | Artificial*                                 | 0.16                 |                   |                    |
| 16  | Not Listed               | PEM1A             | Artificial*                                 | 0.06                 | 48.3722009        | -98.0408668        |
| 17  | R5UBH/L1UBGh             | PABF              | Artificial*                                 | 0.49                 | 48.369243         | -98.0398226        |
| 18  | R4SBC                    | PEM1C             | Natural                                     | 0.10                 | 48.3724145        | -98.0396535        |
| 19  | Not Listed               | PEM1A             | Artificial*                                 | 0.02                 | 48.3720246        | -98.0388999        |
| 20  | Not Listed               | PEM1A             | Artificial*                                 | 0.02                 | 48.3718535        | -98.0382356        |
| 21  | Not Listed               | PEM1A             | Artificial*                                 | 0.06                 | 48.3715074        | -98.0373945        |
| 22  | PEM1C                    | PEM1C             | Natural                                     | 0.25                 | 48.370648         | -98.0366951        |
| 23  | Not Listed               | PEM1A             | Natural                                     | 1.08                 | 48.371518         | -98.0370827        |
|   |                          |                   | Artificial*                                 | 2.6                  |                   |                    |
| 24  | PEM1A/R4SBC              | PEM1A             | Natural                                     | 1.80                 | 48.3670833        | -98.0281666        |
| 25  | L1UBGh                   | PABF              | Artificial*                                 | 1.11                 | 48.3702113        | -98.0217943        |
| 26  | Not Listed               | PEM1A             | Artificial*                                 | 2.30                 | 48.3688131        | -98.0174002        |
| 27  | L1UBGh                   | PABF              | Artificial*                                 | 0.05                 | 48.3651371        | -98.0157956        |
| 28  | Not Listed               | PEM1A             | Natural                                     | 0.17                 | 48.3675591        | -98.0181864        |
|   |                          |                   | Artificial*                                 | 0.71                 |                   |                    |
| 29  | Not Listed               | PEM1A             | Natural                                     | 0.53                 | 48.364591         | -98.015821         |
| 30  | Not Listed               | PEM1A             | Artificial*                                 | 0.19                 | 48.3683651        | -98.0137199        |
| 31  | Not Listed               | PEM1A             | Artificial                                  | 0.12                 | 48.3689533        | -98.0118318        |
| 32  | Not Listed               | PEM1A             | Artificial*                                 | 0.02                 | 48.3679715        | -98.0116826        |
| 33  | Not Listed               | PEM1A             | Artificial*                                 | 0.02                 | 48.3672342        | -98.0112445        |
| 34  | Not Listed               | PEM1A             | Artificial                                  | 0.06                 | 48.3665777        | -98.0120906        |
| 35  | Not Listed               | PEM1A             | Artificial                                  | 0.02                 | 48.3659128        | -98.0104267        |
| 36  | Not Listed               | PEM1A             | Artificial                                  | 0.85                 | 48.3658075        | -98.0102238        |
| 37  | Not Listed               | PEM1A             | Natural                                     | 1.07                 | 48.3726093        | -98.0101871        |
| Total acres of wetlands within project boundary |                          |                   |   | <b>34.87</b>         |                   |                    |
| Total acres natural wetland                     |                          |                   |   | 20.36                |                   |                    |
| Total acres artificial wetland                  |                          |                   |   | 14.51                |                   |                    |
| Total acres artificial lacustrine fringe        |                          |                   |   | 13.28                |                   |                    |

## 5.4.2 POTENTIAL OTHER WATERS

Table D-9-3 shows the potential other waters in the survey area.

### OW 1 (Bylin Dam and Dougherty Dam Reservoirs)

The Bylin Dam Reservoir is an artificial lake that was created with the construction of the Bylin Dam. An original structure, Dougherty Dam, is part of the Bylin reservoir when the water is high. The Bylin reservoir part is approximately 59.62 acres, and the Dougherty reservoir is approximately 20.57 acres. Both are classified as L1UBHh by the NWI. Field observations confirm this classification.

### OW-2 (North Branch Forest River) and 4-10, 15-18, 22, 28, 49 (Tributaries)

The North Branch Forest River flows southeast through the survey area and drains into the Bylin Dam reservoir. The mainstem is classified by the NWI as R2UBF while the majority of the potential tributaries are classified as R4SBC/PEM1C. Field observations confirm these classifications. The North Branch Forest River converges with the Forest River approximately 14.5 miles southeast of Bylin Dam near Fordville, North Dakota and is a tributary to the Red River of the North. The dominant vegetation within the low-flow channel includes *Spartina pectinata* (prairie cordgrass), *Schoenoplectus tabernaemontani* (soft-stem bulrush), *Phalaris arundinacea* (reed canary grass), and *Symphyotrichum ericoides* (heath aster). The dominant vegetation along the active floodplain boundary includes *Phalaris arundinacea* (reed canary grass), *Bromus inermis* (smooth brome), *Poa pratensis* (Kentucky blue grass), *Solidago canadensis* (Canada goldenrod), *Cirsium arvense* (Canada thistle), *Sonchus arvensis* (perennial sow thistle), and *Euphorbia esula* (leafy spurge). The width of the channel is approximately five feet near the reservoir and becomes narrower further upstream (1-3 feet wide). The river has a slightly meandering course in some places and flows through wetland areas in other places. The river flows into the reservoir pool and continues its course downstream upon exiting the reservoir at the outlet point.

### OW 3, 11-14, 19-21, 23-27, 29-48 (Drainage features)

These are potential OW-drainages observed within the project area. These drainage features are indicated on the map because of their relatively low position on the landscape, which creates the potential for concentrated flows toward the Bylin Dam Reservoir. No indicators of ordinary high-water marks were observed during the field visits and no active floodplains were observed/associated with these features. These are likely ephemeral features which lack sufficient wetland indicators, and the presence of flow is a response to precipitation and/or flood events. The dominant vegetation within the low-flow channel include *Spartina pectinata* (prairie cordgrass), *Phalaris arundinacea* (reed canary grass), *Symphyotrichum ericoides* (heath aster), and many *Carex spp.* (sedges). The dominant vegetation along the active floodplain boundary includes *Bromus inermis* (smooth brome), *Poa pratensis* (Kentucky bluegrass), *Solidago canadensis* (Canada goldenrod), *Cirsium arvense* (Canada thistle), *Sonchus arvensis* (perennial sow thistle), *Artemisia campestris* (field sagewort), and *Euphorbia esula* (leafy spurge). The width of the channel is approximately 1-2' wide with many of the drainages being concave within the landscape.

**Table D-9-3:** Potential other waters and their characteristics (data limited to project boundary only).

| Resource ID | NWI Listing | Field Observation | OW length (linear feet) | OW Area (acres)                | Latitude (center) | Longitude (center) |
|-------------|-------------|-------------------|-------------------------|--------------------------------|-------------------|--------------------|
| 1           | L1UBGh      | L1UBGh            | -                       | Bylin 59.62<br>Dougherty 20.57 | 48.37418937       | -98.0500918        |
| 2           | PEM1C/R4SBC | PEM1C/R4SBC       | 11947.98                | -                              | 48.3861541        | -98.06380865       |
| 3           | Not Listed  | R4SBC             | 506.50                  | -                              | 48.39593139       | -98.07651883       |
| 4           | R4SBC       | R4SBC             | 1650.72                 | -                              | 48.39039582       | -98.06958883       |
| 5           | Not Listed  | PEM1A/C           | 435.38                  | -                              | 48.38997816       | -98.06944293       |
| 6           | R4SBC       | R4SBC             | 1828.93                 | -                              | 48.39034452       | -98.06329951       |
| 7           | R4SBC       | R4SBC             | 767.54                  | -                              | 48.38908278       | -98.06272857       |
| 8           | Not Listed  | PEM1A/C           | 515.39                  | -                              | 48.38871426       | -98.06743087       |
| 9           | Not Listed  | PEM1A/C           | 1032.65                 | -                              | 48.3868835        | -98.06607107       |
| 10          | Not Listed  | PEM1A/C           | 282.39                  | -                              | 48.3866013        | -98.06579086       |
| 11          | Not Listed  | N/A               | 671.1                   | -                              | 48.38399025       | -98.06368157       |
| 12          | Not Listed  | N/A               | 696.48                  | -                              | 48.38383288       | -98.06371023       |
| 13          | Not Listed  | N/A               | 369.64                  | -                              | 48.38397449       | -98.06155893       |
| 14          | Not Listed  | N/A               | 363.25                  | -                              | 48.38389648       | -98.06154558       |
| 15          | Not Listed  | PEM1A/C           | 421.76                  | -                              | 48.38232767       | -98.06227018       |
| 16          | R4SBC       | R4SBC             | 2567.4                  | -                              | 48.37962046       | -98.06016367       |
| 17          | Not Listed  | PEM1A/C           | 49.24                   | -                              | 48.38078816       | -98.0578232        |
| 18          | Not Listed  | PEM1A/C           | 136.39                  | -                              | 48.38029261       | -98.05727238       |
| 19          | Not Listed  | PEM1A/C           | 934.98                  | -                              | 48.3789427        | -98.05755968       |
| 20          | Not Listed  | PEM1A/C           | 310.55                  | -                              | 48.37809283       | -98.05739628       |
| 21          | Not Listed  | PEM1A/C           | 831.64                  | -                              | 48.3736473        | -98.05602823       |
| 22          | R4SBC       | R4SBC             | 1353.34                 | -                              | 48.37164199       | -98.05640022       |
| 23          | Not Listed  | PEM1A/C           | 1134.72                 | -                              | 48.37072001       | -98.05059669       |
| 24          | Not Listed  | PEM1A/C           | 617.64                  | -                              | 48.37770645       | -98.04561115       |
| 25          | Not Listed  | PEM1A/C           | 510.66                  | -                              | 48.37417847       | -98.04681527       |
| 26          | Not Listed  | PEM1A/C           | 512.57                  | -                              | 48.37154661       | -98.04639572       |
| 27          | Not Listed  | PEM1A/C           | 611.88                  | -                              | 48.37075955       | -98.04555402       |
| 28          | R4SBC/R5UBH | R4SBC             | 2320.39                 | -                              | 48.37020278       | -98.04169564       |
| 29          | Not Listed  | PEM1A/C           | 185.03                  | -                              | 48.37430567       | -98.04117799       |
| 30          | Not Listed  | PEM1A/C           | 211.57                  | -                              | 48.37386654       | -98.0392182        |
| 31          | Not Listed  | R4SBC             | 252.32                  | -                              | 48.37369782       | -98.03826661       |
| 32          | Not Listed  | PEM1A/C           | 245.84                  | -                              | 48.37295228       | -98.0360694        |
| 33          | Not Listed  | R4SBC             | 688.36                  | -                              | 48.36983638       | -98.0373087        |
| 34          | Not Listed  | R4SBC             | 906.48                  | -                              | 48.36959294       | -98.03425613       |

Table D-9-3: continued

| Resource ID                           | NWI Listing | Field Observation | OW length (linear feet) | OW Area (acres) | Latitude (center) | Longitude (center) |
|---------------------------------------|-------------|-------------------|-------------------------|-----------------|-------------------|--------------------|
| 35                                    | Not Listed  | PEM1/SS1F         | 327.95                  | -               | 48.37015783       | -98.03169083       |
| 36                                    | Not Listed  | PEM1/SS1F         | 356.07                  | -               | 48.37121148       | -98.02807968       |
| 37                                    | Not Listed  | PEM1/SS1F         | 449.34                  | -               | 48.37025415       | -98.02536485       |
| 38                                    | Not Listed  | PEM1/SS1F         | 186.24                  | -               | 48.36972286       | -98.02342729       |
| 39                                    | Not Listed  | PEM1A/C           | 450.94                  | -               | 48.36589121       | -98.02788796       |
| 40                                    | Not Listed  | PEM1A/C           | 950.14                  | -               | 48.36646638       | -98.02651285       |
| 41                                    | Not Listed  | R4SBC             | 389.82                  | -               | 48.36675589       | -98.02517995       |
| 42                                    | Not Listed  | PEM1/SS1F         | 416.85                  | -               | 48.37026949       | -98.02040891       |
| 43                                    | Not Listed  | PEM1/SS1F         | 440.6                   | -               | 48.37130434       | -98.02119588       |
| 44                                    | Not Listed  | PEM1/SS1F         | 1030.69                 | -               | 48.37281562       | -98.02217214       |
| 45                                    | Not Listed  | PEM1/SS1F         | 2262.27                 | -               | 48.37327558       | -98.02482634       |
| 46                                    | Not Listed  | PEM1A/C           | 433.68                  | -               | 48.36706007       | -98.01859512       |
| 47                                    | Not Listed  | R4SBC             | 310.7                   | -               | 48.36526212       | -98.01743754       |
| 48                                    | Not Listed  | PEM1A/C           | 1403.3                  | -               | 48.37002179       | -98.01546874       |
| 49                                    | Not Listed  | PEM1/SS1F         | 451.52                  | -               | 48.37084064       | -98.00841955       |
| <b>Totals within project boundary</b> |             |                   | <b>45,730.82</b>        | <b>80.19</b>    |                   |                    |

## 5.5 COMMERCE

There are no evident commerce activities associated with these wetlands. There are no irrigation features associated with these wetlands. The dam reservoir offers boating and fishing activities that are open to the public. A public boat access is located at the eastern side of the reservoir.

## 5.6 IMPACTS TO AQUATIC RESOURCES

The two proposed project alternatives include impacts to aquatic resources. The sections below briefly describe the alternatives, the potential impacts, and avoidance measures that were incorporated into the alternative designs, an estimate of the mitigation requirements, and proposed mitigation methods. All aquatic resources are assumed to be under the jurisdiction of the USACE for the purposes of this estimate and it is assumed both natural and artificial wetlands may require mitigation. These estimates are provisional upon USACE determination once a 404-permit application has been submitted.

### 5.6.1 ALTERNATIVE NO. 1 –FUTURE WITHOUT FEDERAL INVESTMENT (FWOFI)

Alternative No. 1 would involve a breach of the existing dam and removal of the outlet works associated with the dam. Riprap and sheet and sheet piling would be used to minimize sediment transport downstream. The road over Bylin Dam would be realigned to its original location (prior to the construction of Bylin Dam, 122<sup>nd</sup> Ave NE) west of the dam embankment, and a 90-inch diameter culvert would be installed to pass flows through the road crossing with the North Branch Forest River.

Impacts to aquatic resources include elimination of the Bylin reservoir and subsequent loss of lacustrine fringe wetlands, fill into wetlands where the roadbed would be constructed, and excavation into the current plunge pool and a stretch of the downstream channel. Impacts are shown on **Exhibit D-9-5** and in **Table D-9-4**).

**Table D-9-4:** Impacts to aquatic resources with Alternative 1.

| Resource ID | Resource Description | Feature Condition      | Impact Type and Description            | Impact (acres unless noted) | Proposed Mitigation  |
|-------------|----------------------|------------------------|--|-----------------------------|--|
| Wetland 23  | Lacustrine fringe    | Artificial (hydrology) | Permanent, water source eliminated     | 2.58                        | Mitigation credit purchase or redevelopment of floodplain wetlands |
|             | Riverine wetland     | Natural                | No impact                              | n/a                         | n/a  |
| Wetland 25  | Lacustrine fringe    | Artificial (hydrology) | Permanent, water source eliminated     | 1.1                         | Mitigation credit purchase or redevelopment of floodplain wetlands |
|             | Riverine wetland     | Natural                | No impact                              | n/a                         | n/a  |
| Wetland 26  | Lacustrine fringe    | Artificial (hydrology) | Permanent, water source eliminated     | 2.3                         | Mitigation credit purchase or redevelopment of floodplain wetlands |
|             |                      |                        | Permanent, fill with road construction | n/a                         | n/a, wetland already eliminated by reservoir removal               |
|             | Riverine wetland     | Natural                | No impact                              | n/a                         | n/a  |
| Wetland 27  | Lacustrine fringe    | Artificial (hydrology) | Permanent, water source eliminated     | 0.49                        | Mitigation credit purchase or redevelopment of floodplain wetlands |
| Wetland 28  | Lacustrine fringe    | Artificial (hydrology) | Permanent, water source eliminated     | 0.71                        | Mitigation credit purchase or redevelopment of floodplain wetlands |
|             | Riverine wetland     | Natural                | No impact                              | n/a                         | n/a  |
| Wetland 30  | Lacustrine fringe    | Artificial (hydrology) | Permanent, water source eliminated     | 0.19                        | Mitigation credit purchase or redevelopment of floodplain wetlands |
|             |                      |                        | Permanent, fill with road construction | n/a                         | n/a, wetland already eliminated by reservoir removal               |

**Table D-9-4:** continued.

| Resource ID | Resource Description         | Feature Condition  | Impact Type and Description            | Impact (acres unless noted) | Proposed Mitigation  |
|-------------|------------------------------|--|--|-----------------------------|--|
| Wetland 31  | Impoundment                  | Artificial (drainageway obstructed by road construction) | Permanent, fill with road construction | 0.026                       | Mitigation credit purchase   |
| Wetland 32  | Lacustrine fringe            | Artificial (hydrology)                                   | Permanent, water source eliminated     | 0.02                        | Mitigation credit purchase or redevelopment of floodplain wetlands |
|             |                              |  | Permanent, fill with road construction | n/a                         | n/a, wetland already eliminated by reservoir removal               |
| Wetland 33  | Lacustrine fringe            | Artificial (hydrology)                                   | Permanent, water source eliminated     | 0.018                       | Mitigation credit purchase or redevelopment of floodplain wetlands |
|             |                              |  | Permanent, fill with road construction | n/a                         | n/a, wetland already eliminated by reservoir removal               |
| OW-1        | Bylin Reservoir – open water | Artificial (hydrology)                                   | Permanent, open water areas eliminated | 59.62                       | n/a  |
| OW-2        | Stream                       | Natural  | Excavation                             | 104.9                       | n/a  |

### 5.6.2 ALTERNATIVE NO. 2 – STRUCTURAL REHABILITATION TO HIGH-HAZARD DESIGNATION (STRUCTURAL REHABILITATION)

The structural rehabilitation involves raising the dam embankment, modifying the existing auxiliary spillway profile, armoring the auxiliary spillway with ACB, implementing a new principal spillway structure, modifying the downstream embankment of the dam, and adjusting the plunge pool and channel location.

Impacts to aquatic resources include permanent excavation, permanent fill, temporary equipment parking, temporary inundation of wetlands, temporary drawdown of the reservoir (approximately September to June), and fill in the downstream channel. Impacts are shown on **Exhibit D-9-6** and in **Table D-9-5**).

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**Table D-9-5:** Impacts to aquatic resources with Alternative 2.

| Resource ID | Resource Description<br>(lacustrine fringe,<br>basin, stream, other) | Feature<br>Condition<br>(artificial,<br>natural) | Impact Type and<br>description      | Impact<br>(acres<br>unless<br>noted) | Proposed<br>Mitigation                     |
|-------------|--|--|-------------------------------------|--------------------------------------|--|
| Wetland 1   | Riverine wetland   | Natural  | Temporary,<br>inundation            | 0.0012                               | n/a  |
| Wetland 3   | Riverine wetland   | Natural  | Temporary,<br>inundation            | 0.086                                | n/a  |
| Wetland 8   | Riverine wetland   | Natural  | Temporary,<br>inundation            | 0.02                                 | n/a  |
| Wetland 9   | Riverine wetland   | Natural  | Temporary,<br>inundation            | 0.044                                | n/a  |
| Wetland 12  | Riverine wetland   | Natural  | Temporary,<br>inundation            | 0.049                                | n/a  |
| Wetland 14  | Riverine wetland   | Natural  | Temporary,<br>inundation            | 0.038                                | n/a  |
| Wetland 18  | Riverine wetland   | Natural  | Temporary,<br>inundation            | 0.061                                | n/a  |
| Wetland 23  | Riverine wetland   | Natural  | Temporary,<br>inundation            | 0.028                                | n/a  |
|             | Lacustrine fringe  | Artificial<br>(hydrology)                        | Temporary,<br>reservoir<br>drawdown | 2.6                                  | n/a  |
| Wetland 24  | Riverine wetland   | Natural  | Temporary,<br>inundation            | 0.11                                 | n/a  |
| Wetland 25  | Lacustrine fringe  | Artificial<br>(hydrology)                        | Temporary,<br>reservoir<br>drawdown | 1.1                                  | n/a  |
| Wetland 26  | Lacustrine fringe  | Artificial<br>(hydrology)                        | Permanent,<br>excavation            | 0.057                                | Mitigation<br>credit<br>purchase or<br>n/a |
|             |  |  | Temporary,<br>reservoir<br>drawdown | 2.3                                  | n/a  |
| Wetland 27  | Lacustrine fringe  | Artificial<br>(hydrology)                        | Temporary,<br>reservoir<br>drawdown | 0.049                                | n/a  |
| Wetland 28  | Lacustrine fringe  | Artificial<br>(hydrology)                        | Temporary,<br>reservoir<br>drawdown | 0.71                                 | n/a  |
| Wetland 30  | Lacustrine fringe  | Artificial<br>(hydrology)                        | Temporary,<br>reservoir<br>drawdown | 0.19                                 | n/a  |

Table D-9-5: continued.

| Resource ID | Resource Description<br>(lacustrine fringe,<br>basin, stream, other) | Feature<br>Condition<br>(artificial,<br>natural)             | Impact Type and<br>description                                | Impact<br>(acres<br>unless<br>noted) | Proposed<br>Mitigation                  |
|-------------|--|--|---|--------------------------------------|---|
| Wetland 32  | Lacustrine fringe  | Artificial<br>(hydrology)                                    | Temporary,<br>reservoir<br>drawdown                           | 0.2                                  | n/a                                     |
| Wetland 33  | Lacustrine fringe  | Artificial<br>(hydrology)                                    | Temporary,<br>reservoir<br>drawdown                           | 0.018                                | n/a                                     |
| Wetland 34  | Impoundment  | Artificial<br>(drainageway<br>obstructed by<br>dam toeslope) | Permanent, fill   | 0.0079                               | Mitigation<br>credit<br>purchase        |
| Wetland 36  | Basin wetland  | Artificial (formed<br>from spillway<br>construction)         | Temporary,<br>equipment<br>staging (fill)                     | 0.85                                 | n/a                                     |
| OW-1        | Bylin Reservoir – open<br>water                                      | Artificial (formed<br>from dam<br>construction)              | Temporary,<br>coffer dams and<br>drawdown for<br>construction | 43                                   | n/a                                     |
| OW-2        | Channel  | Natural  | Channel course<br>adjustment –<br>permanent fill              | 251.53 feet                          | n/a,<br>replaced<br>with new<br>channel |

## 5.7 IMPACTS SUMMARY

Tables D-9-6 and D-9-7 show the summarized impacts and potential mitigation acres.

Table D-9-6: Summary of impacts to aquatic resources with Alternative 1-Future Without Federal Investment.

| Impact Duration                | Wetland / OW Type | Impact Type | Impact Quantity                         | Mitigation Credit Purchase if USACE 404 decision and if 1:1 ratio |
|--------------------------------|-------------------|-------------|---|---|
| Permanent                      | Natural           | Excavation  | 104.90 feet stream                      | n/a   |
|                                | Artificial        | Fill        | 0.03 acres wetlands                     | 0.03 credits  |
|                                |                   | Drawdown    | 59.62 acres lake<br>7.41 acres wetlands | n/a<br>7.41 credits   |
| Total Wetland Impact           |                   |             | 7.44                                    | -   |
| Total Permanent Wetland Impact |                   |             | 7.44                                    | Up to 7.44 credits  |

**Table D-9-7:** Summary of impacts to aquatic resources with Alternative 2 – Structural Alternative.

| Impact Duration                | Wetland / OW Type | Impact Type | Impact Quantity                       | Mitigation Credit Purchase if USACE 404 decision and if 1:1 ratio |
|--------------------------------|-------------------|-------------|---------------------------------------|---|
| Permanent                      | Natural           | Fill        | 251.53 river feet                     | n/a   |
|                                | Artificial        | Fill        | 0.008 wetland acres                   | 0.008 credits   |
|                                |                   | Excavation  | 0.057 wetland acres                   | 0.057 credits   |
| Temporary                      | Natural           | Inundation  | 0.44 wetland acres                    | n/a   |
|                                | Artificial        | Fill        | 0.85 wetland acres                    | n/a   |
|                                |                   | Drawdown    | 7.17 wetland acres<br>43.0 lake acres | n/a   |
| Total Wetland Impact           |                   |             | 8.52 acres                            | -   |
| Total Permanent Wetland Impact |                   |             | 0.065 acres                           | Up to 0.07 credits  |

## 5.8 AVOIDANCE, MINIMIZATION, AND MITIGATION MEASURES

Avoidance measures incorporated into the designs included keeping the Alternative 2 drawdown to a minimum depth difference and duration, minimizing the size of equipment staging areas, repairing damage in wetlands due to equipment, and minimizing the downstream channel construction extent; and replacing the road in Alternative 1 on the smallest footprint possible while meeting safety standards.

Mitigation methods may consist of purchasing credits in the Red River Basin Service Area from Ducks Unlimited (\$60,000 per credit as of April 15, 2022). For Alternative 1, if the USACE determines jurisdiction on all wetlands and determines all impacts (on natural and artificial wetlands) require a 1:1 replacement ratio, this could amount to \$446,400. For Alternative 2, the mitigation credits could amount to \$4,200.

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## 7 DELINEATOR CREDENTIALS

**Name: Mike Ulmer, Soil Scientist, Prairie Soil Consulting, LLC**

Education: North Dakota State School of Science, Wahpeton ND – AS Civil Engineering Technology, North Dakota State University, Fargo, ND – BS and MS Soil Science

Professional Memberships: Professional Soil Classifiers Association of North Dakota, Soil Science Society of America, Soil and Water Conservation Society, North Dakota Geological Society, North Dakota Academy of Science

National Association of Soil Conservation Districts, Phi Kappa Phi Honor Society

Training: SOIL Wetland identification (1978, 1995), SOIL Wetland training (1999), SOIL Reg. IV (1991), SOIL Hydric Soils (1995), SOIL Advanced Hydric Soils (2005)

**Name: Mark D. Aanenson, Senior Environmental Scientist**

Education: Minnesota State University Moorhead – BS Biology

Professional Membership: MN Wetland Professionals Association

Certifications/Licenses: Minnesota Wetland Professional Certification (no. 1001)

Training: More than 30 years of experience in wetland delineation, permitting, and other wetland-related work. Board of Water and Soil Resources – Jurisdictional Delineation of Wetlands in Minnesota; Advanced Delineation Practicum; Hydrologic Monitoring; Minnesota Routine Assessment Method; Wetland Plant Identification; University of Minnesota St. Paul – Soils 5555 – Wetland Soils, Dr. Jay Bell; NRCS – Engineering Properties of Soils; Minnesota DNR Native Plant Community Field Guide Training; Minnesota DNR Native Plant Community Field Plant Identification, Sedges of Minnesota Laboratory and Field Identification, 25+ years of fieldwork experience in the Northern Plains, UMN Approved Self-study course: Grasses of the Northern Plains

**Name: Dr. Donna Jacob, Senior Scientist**

Education: Beloit College – BS Environmental Biology, University College Dublin – MSc Botany, University College Dublin – PhD Botany (wetland biogeochemistry)

Professional Membership: Society of Wetland Scientists, American Association for the Advancement of Science, Research Associate Professor Affiliate at North Dakota State University, elected to Minnesota School Board Association

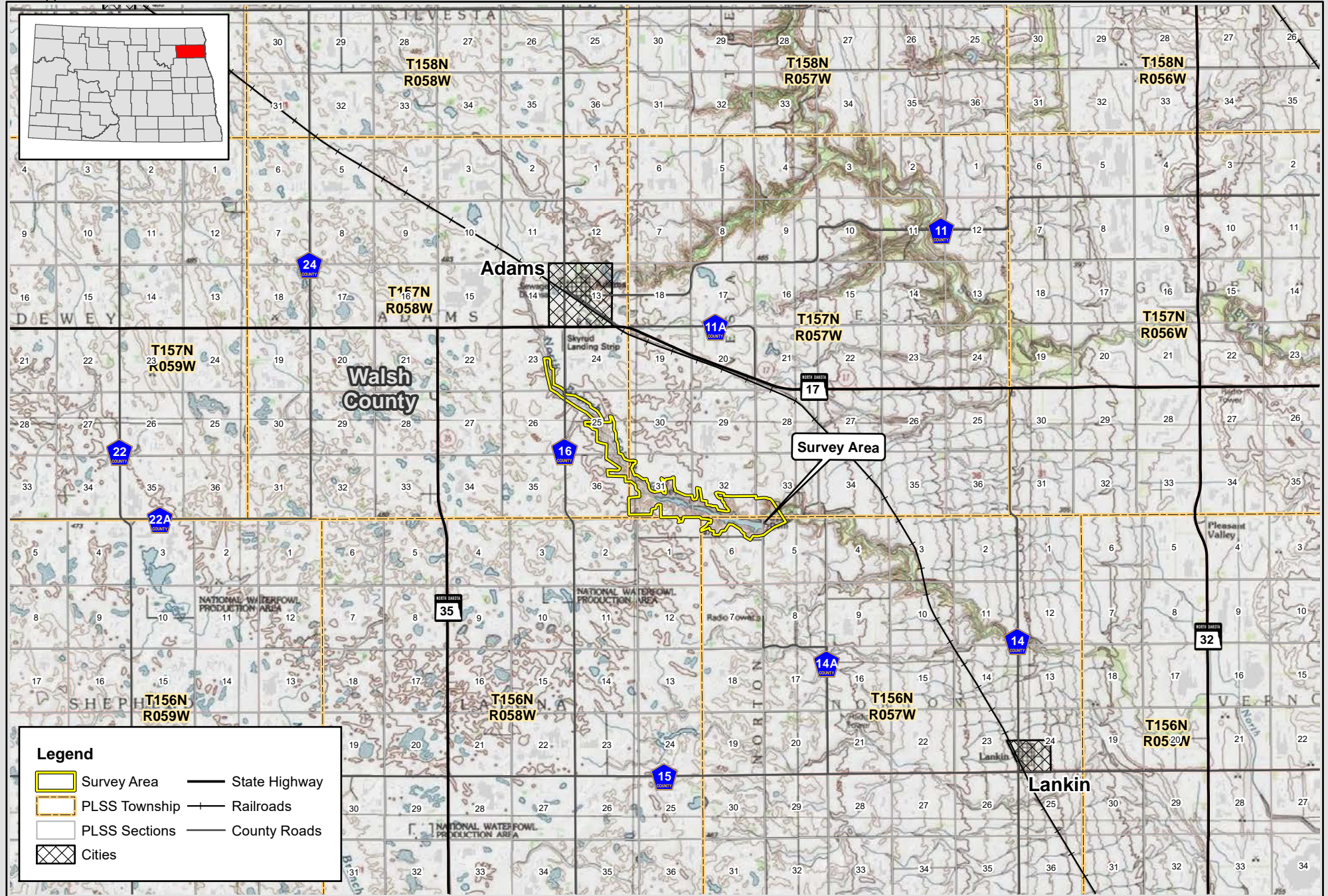
Certifications/Licenses: Professional Wetland Scientist (no. 2672), Minnesota Wetland Professional Certification (no. 1267)

Training: More than 25 years of experience including applied science and basic research in ecology and wetlands (most recently Research Associate Professor, North Dakota State University, 30+ peer-review publications); vegetation and biological inventories; wetland bank application preparation, preparing applications for 404 permitting; wetland delineations and fieldwork in the Northern Plains, MO, CO, NE, WI and other regions (Europe, Central Asia); Minnesota Wetland Professional Wetland Delineator Course, Minnesota DNR Native Plant Community Field Guide Training; Minnesota DNR Native Plant Community Field Plant Identification, Sedges of Minnesota Laboratory and Field Identification, UMN Approved Self-study course: Grasses of the Northern Plains

## REPORT AUTHORS

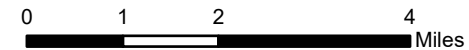
Kaleb Haley, Benjamin Hengel, and Donna Jacob wrote the report. Jake Larson completed the GIS work and maps. Jacob, Aanenson, Haley, and Mike Ulmer (Prairie Soil Consulting, LLC) performed the fieldwork.

# Exhibits

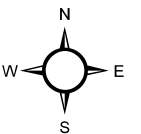


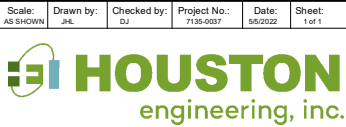
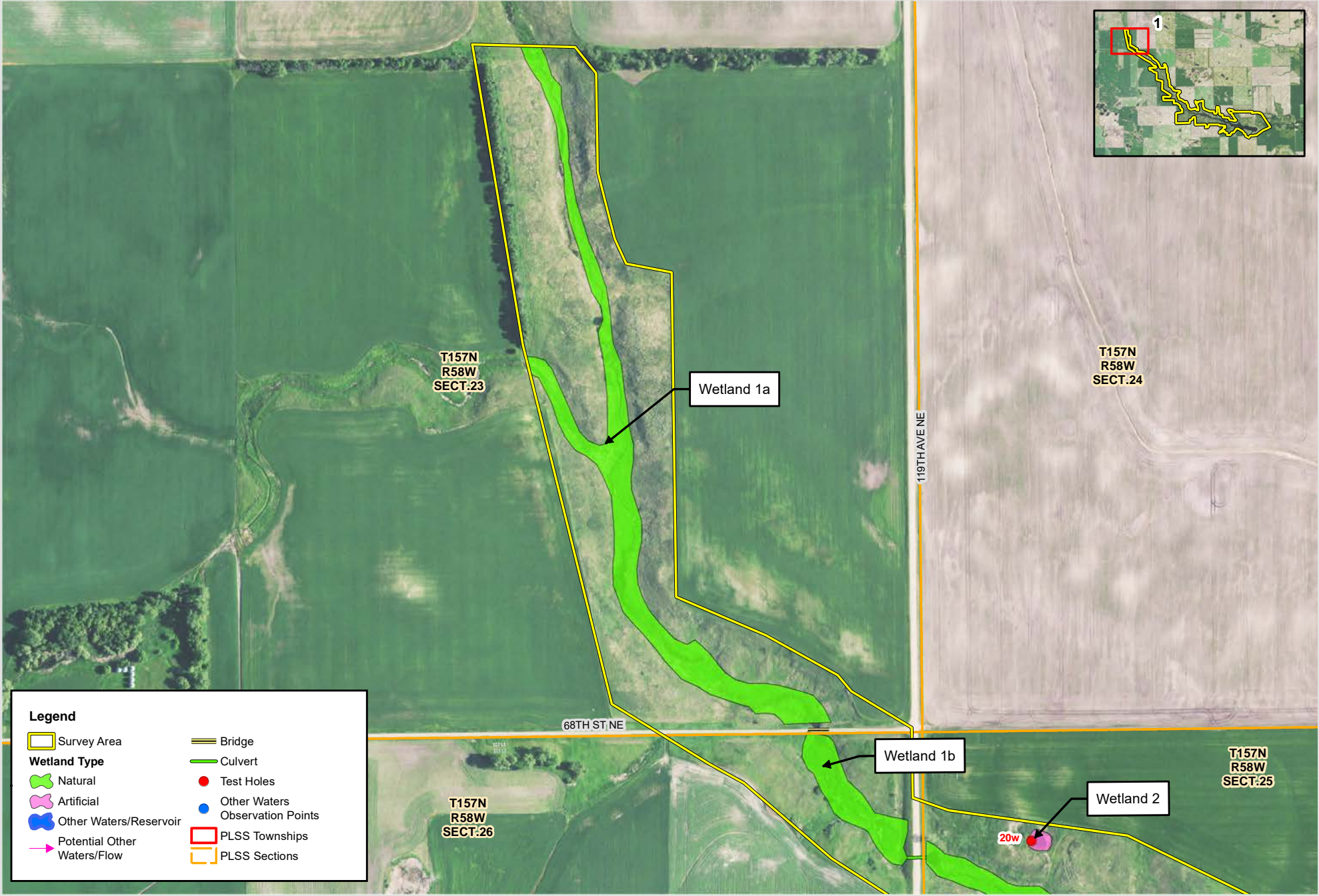
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North Branch Forest River Dam No. 1 (Bylin Dam)  
 Aquatic Resources Delineation Report  
 Natural Resource Conservation Service (NRCS)



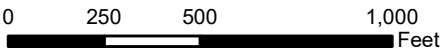
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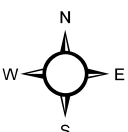


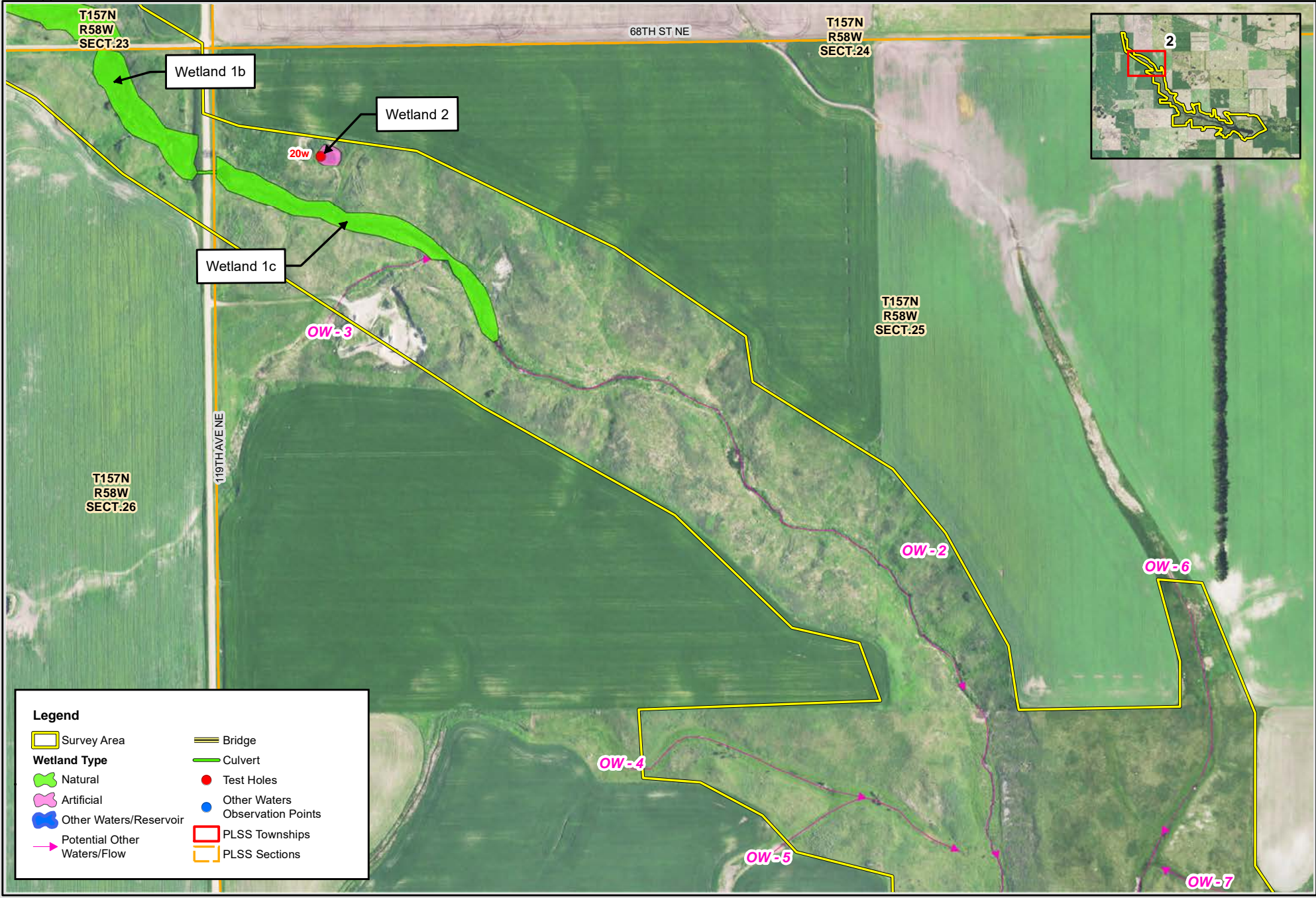
**Exhibit D-9-2 Aquatic Resources Map**

North Branch Forest River Dam No. 1 (Bylin Dam)  
Natural Resource Conservation Service (NRCS)

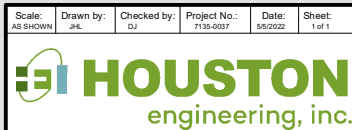
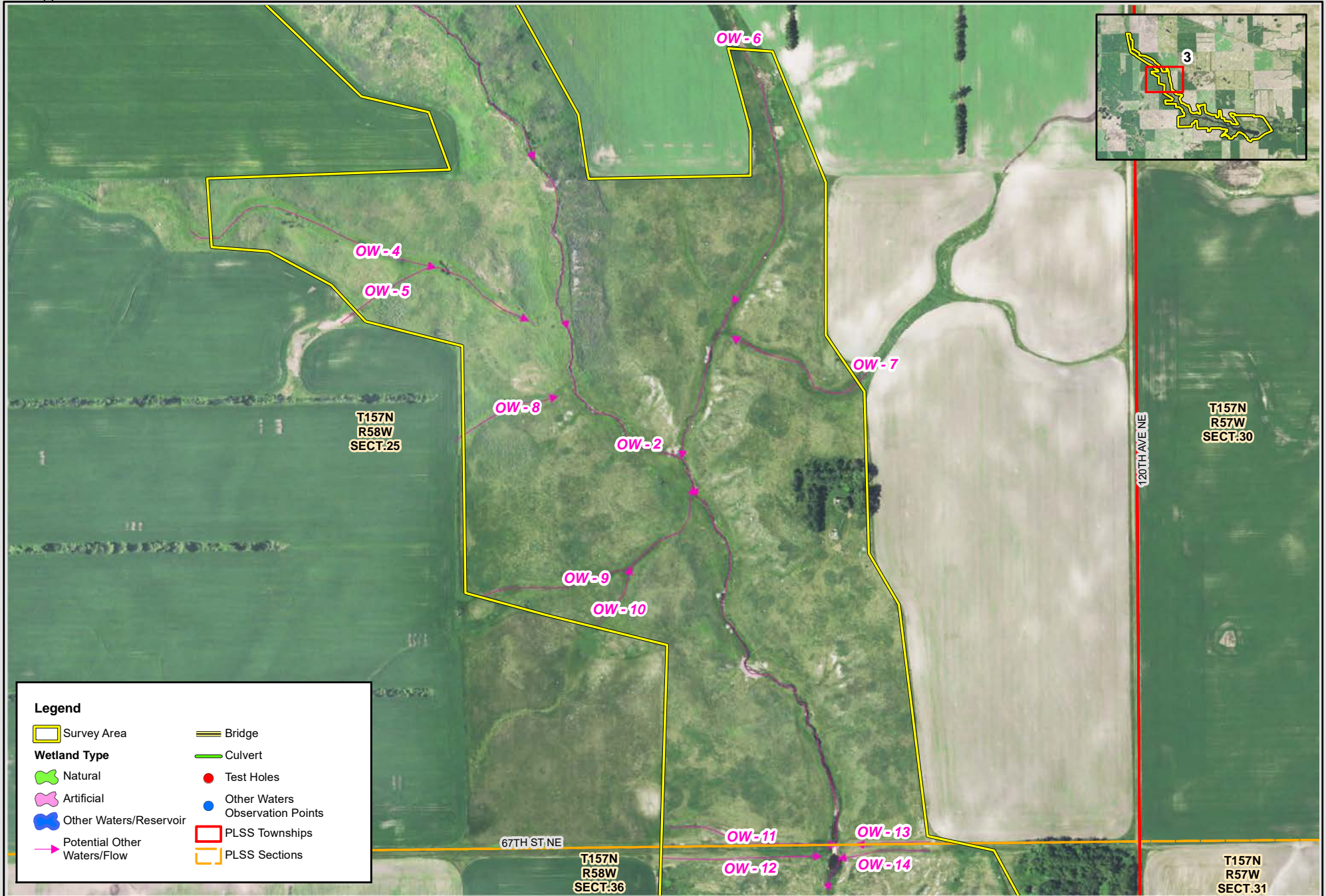


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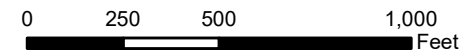


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| <b>HOUSTON engineering, inc.</b>  |  |                      |                       |                               |                       |                      |
| <b>Exhibit D-9-2 Aquatic Resources Map</b>  |  |                      |                       |                               |                       |                      |
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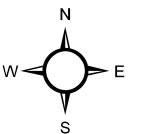


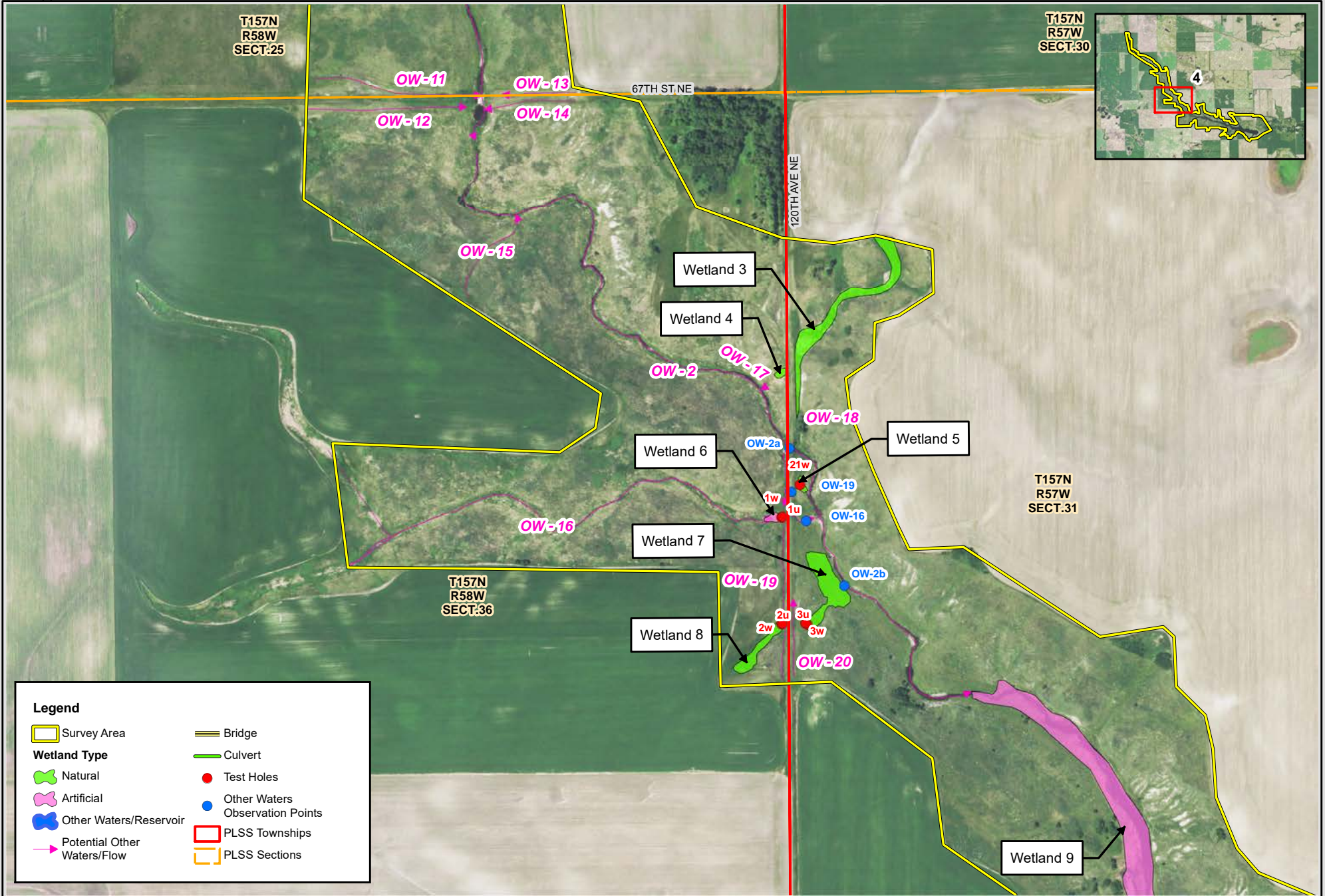
**Exhibit D-9-2 Aquatic Resources Map**

North Branch Forest River Dam No. 1 (Bylin Dam)  
Natural Resource Conservation Service (NRCS)



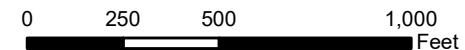
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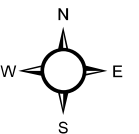


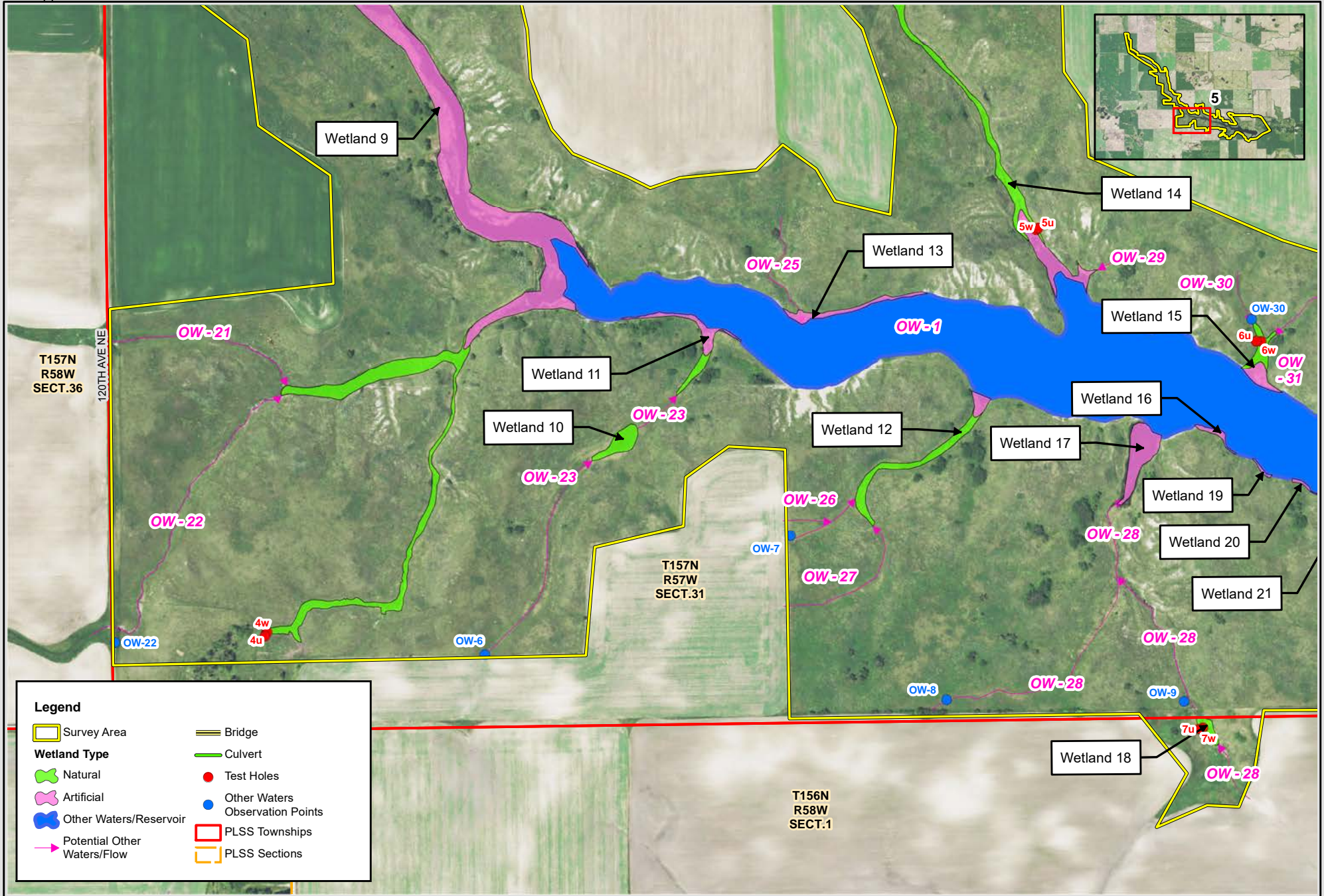
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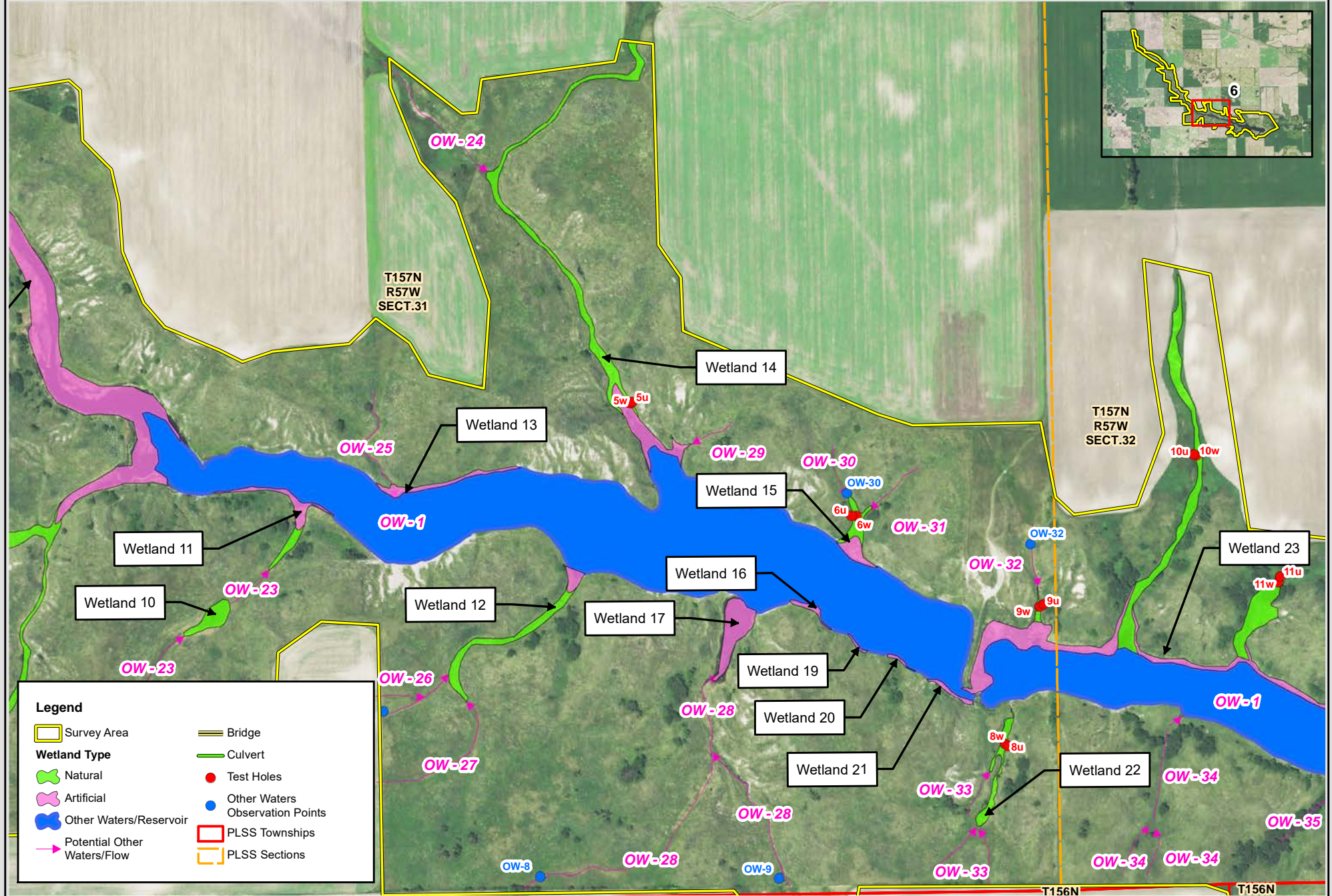
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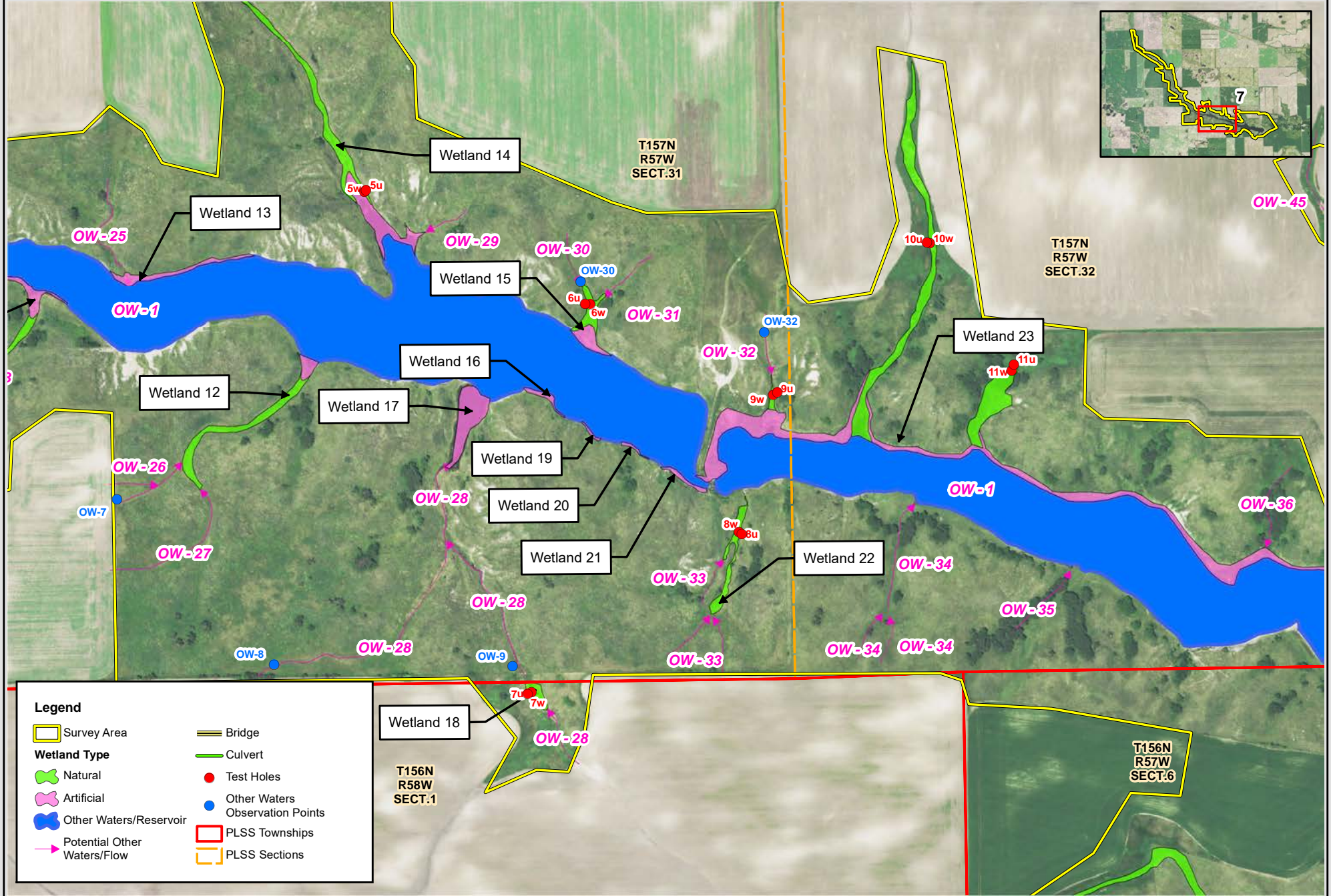
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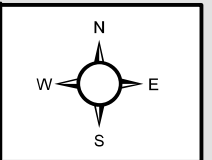
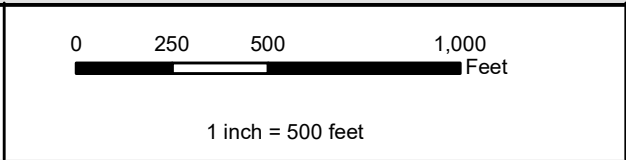


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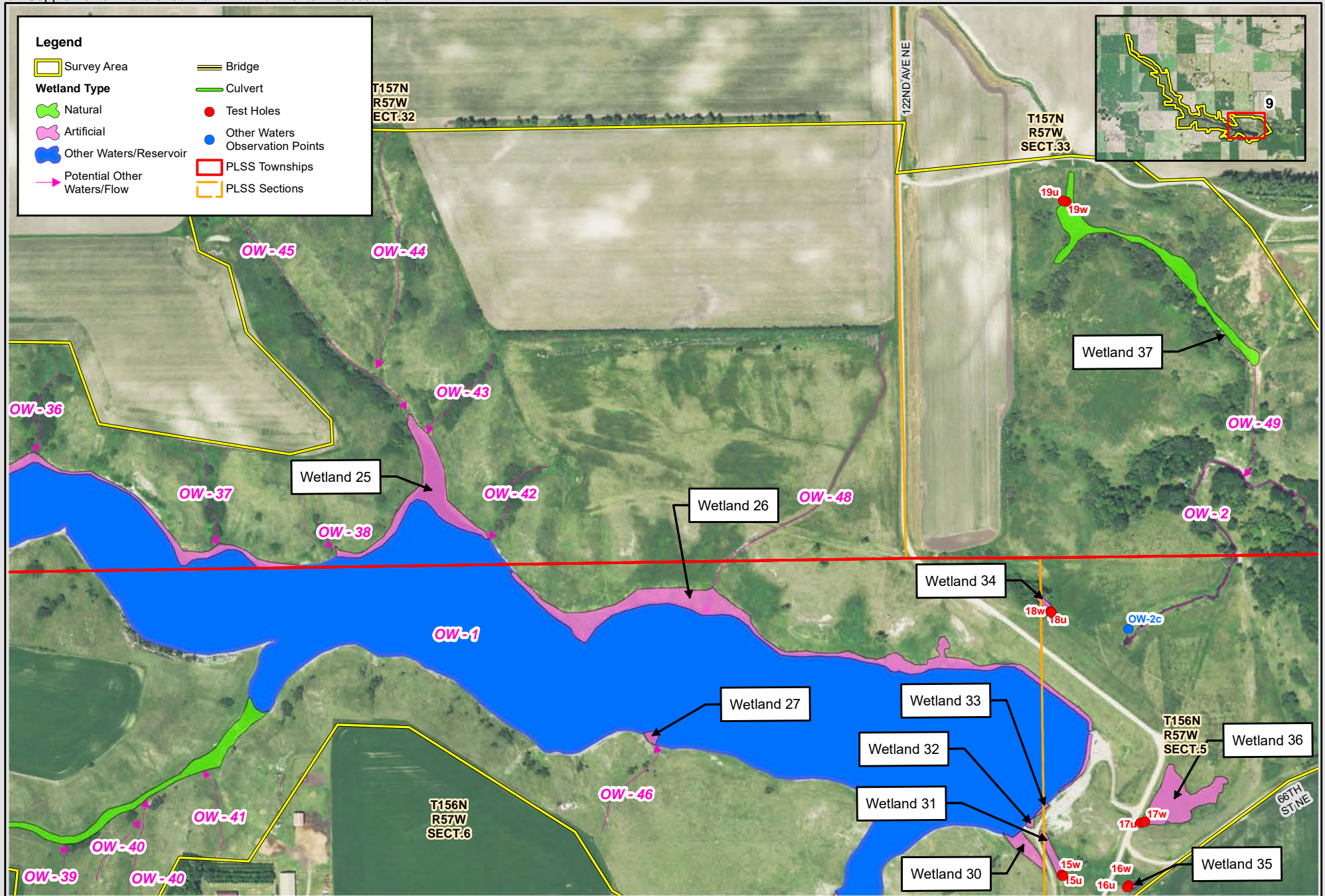
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**Exhibit D-9-2 Aquatic Resources Map**

North Branch Forest River Dam No. 1 (Bylin Dam)  
 Natural Resource Conservation Service (NRCS)





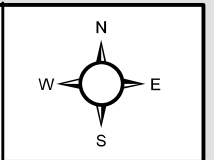
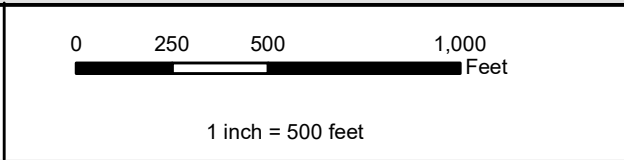


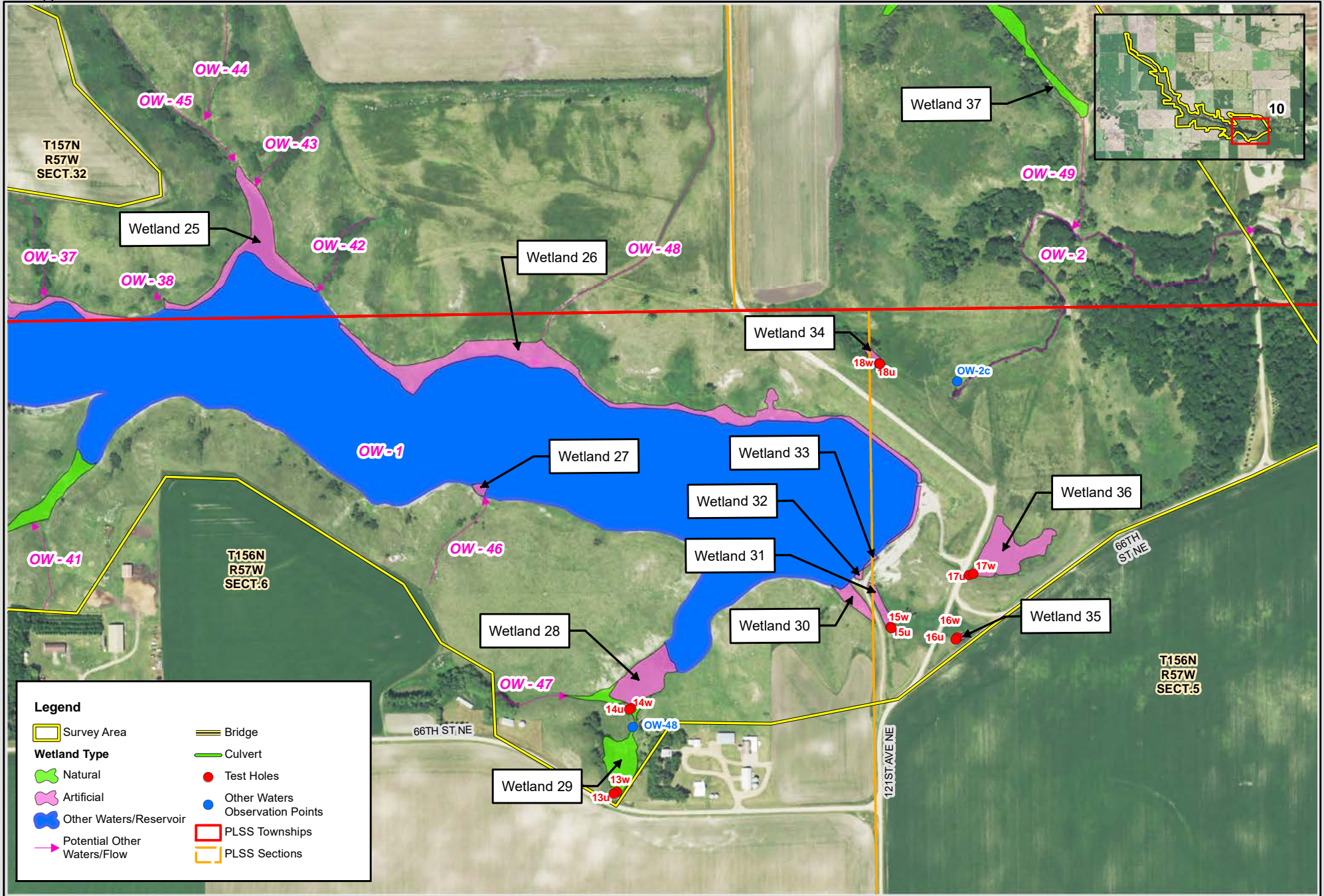
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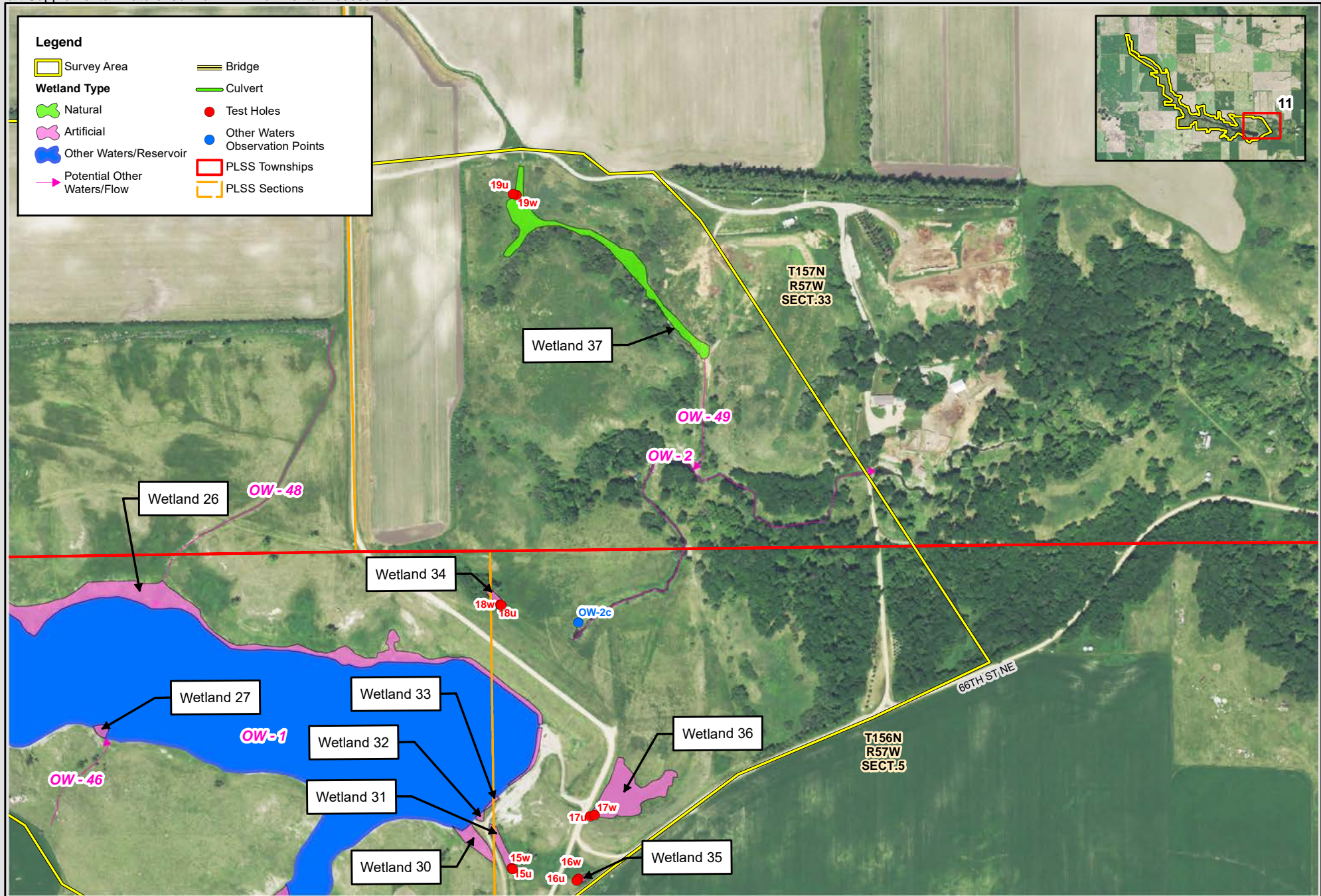
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North Branch Forest River Dam No. 1 (Bylin Dam)  
Natural Resource Conservation Service (NRCS)





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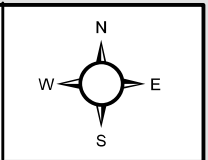
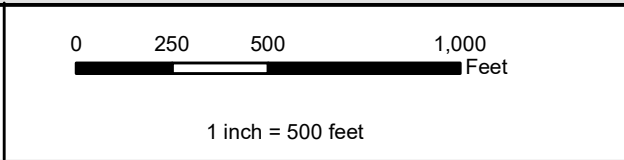


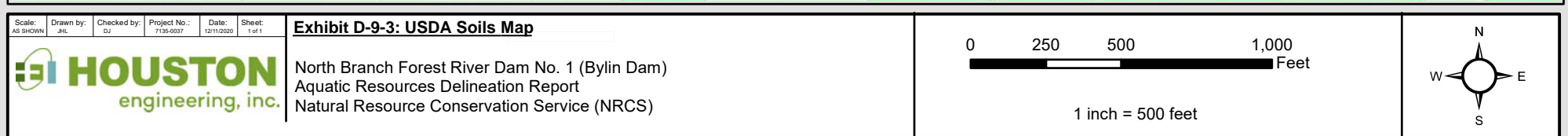
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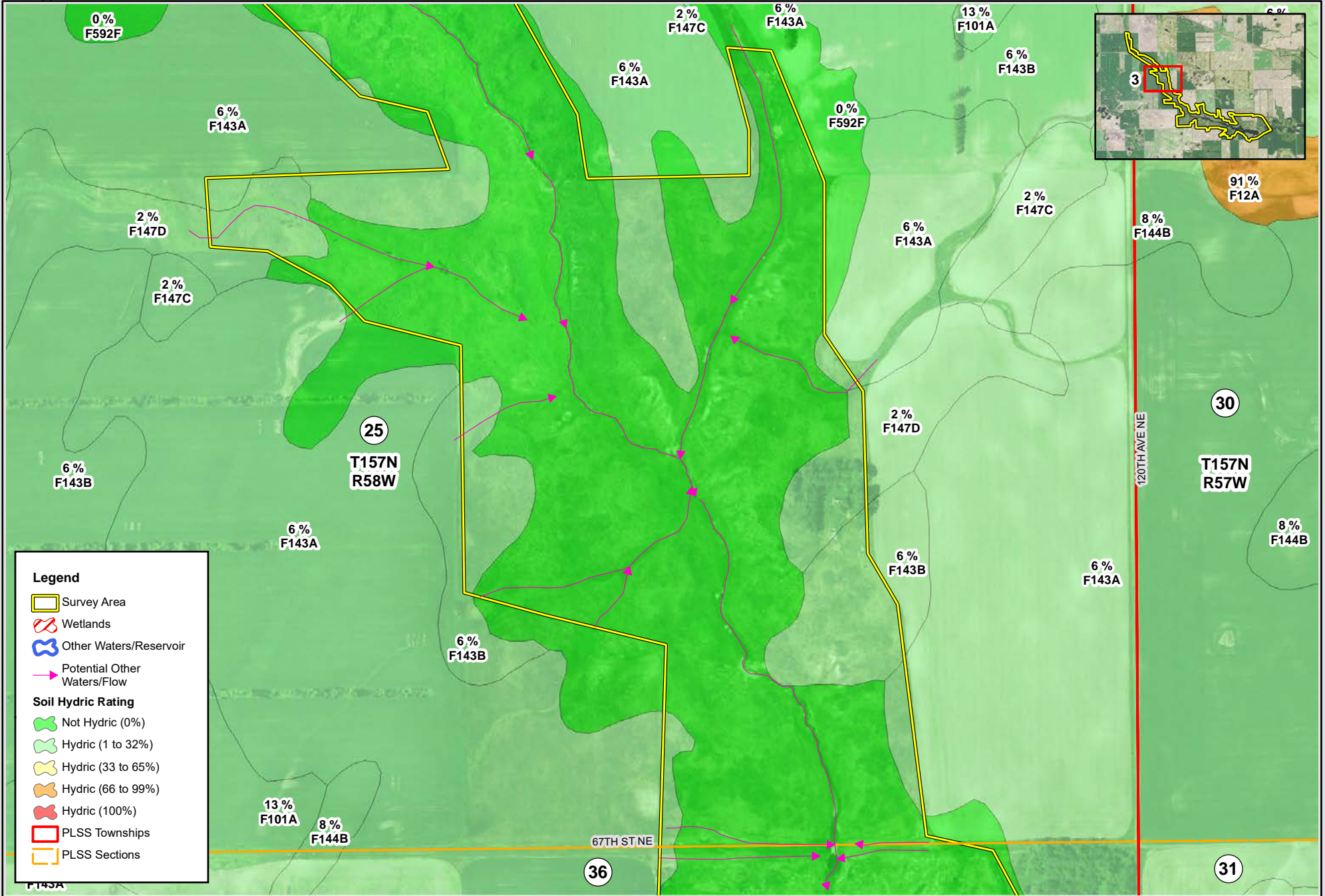
**Exhibit D-9-2 Aquatic Resources Map**

North Branch Forest River Dam No. 1 (Bylin Dam)  
Natural Resource Conservation Service (NRCS)



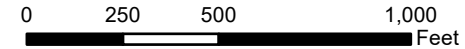




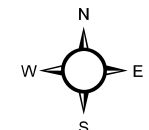


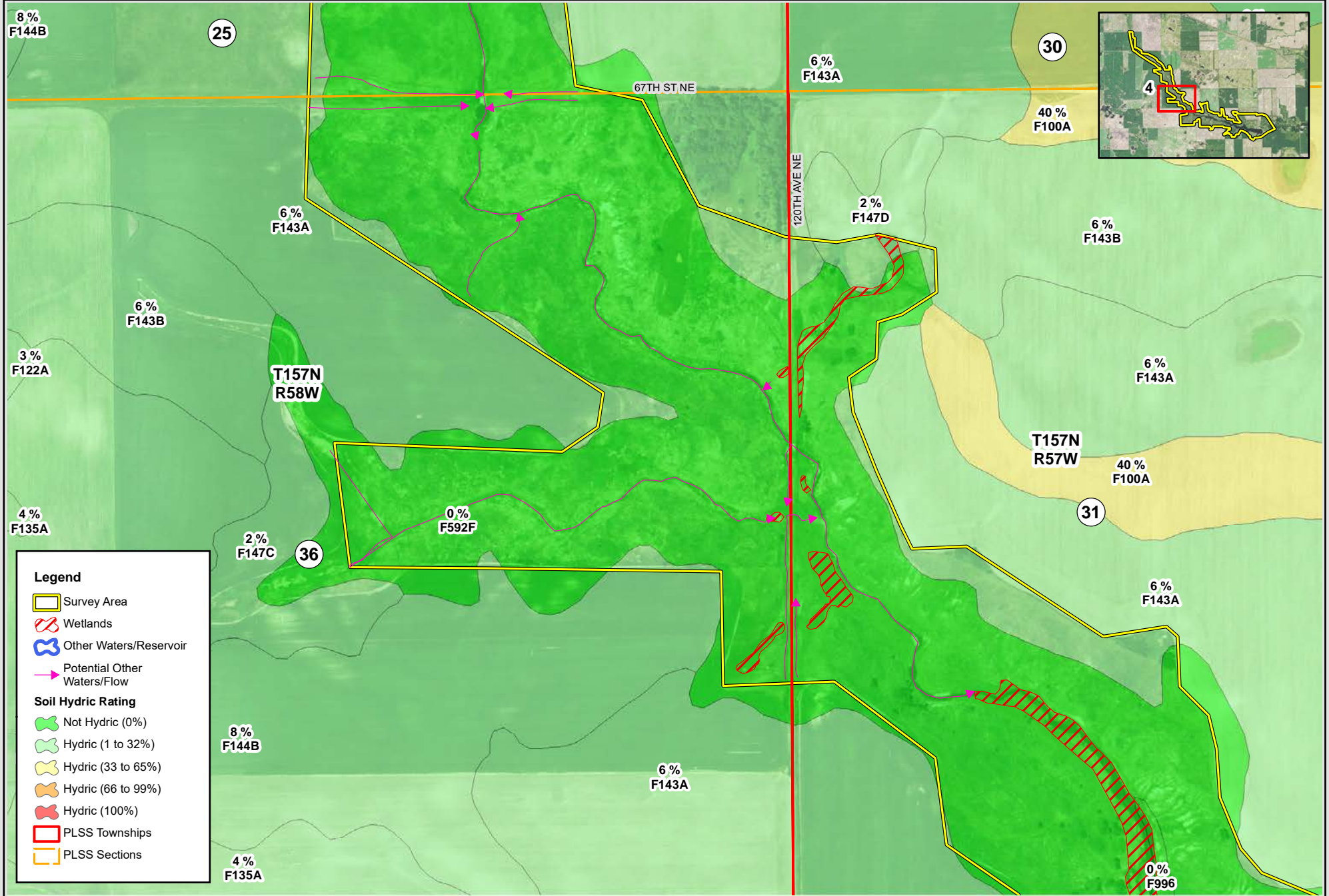
**Exhibit D-9-3: USDA Soils Map**

North Branch Forest River Dam No. 1 (Bylin Dam)  
 Aquatic Resources Delineation Report  
 Natural Resource Conservation Service (NRCS)



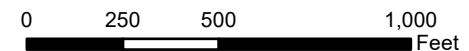
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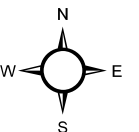


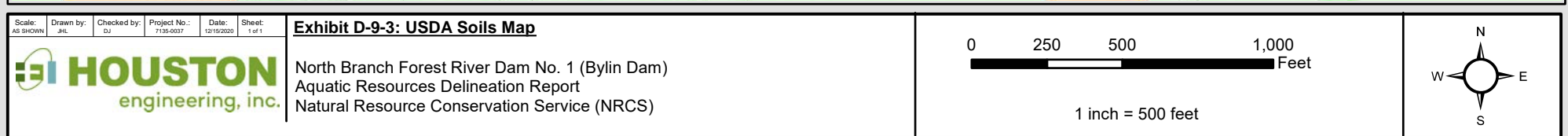
**Exhibit D-9-3: USDA Soils Map**

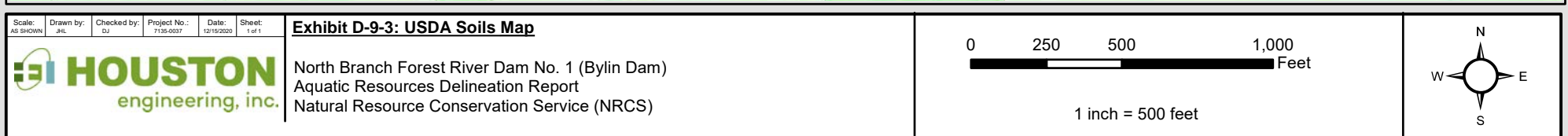
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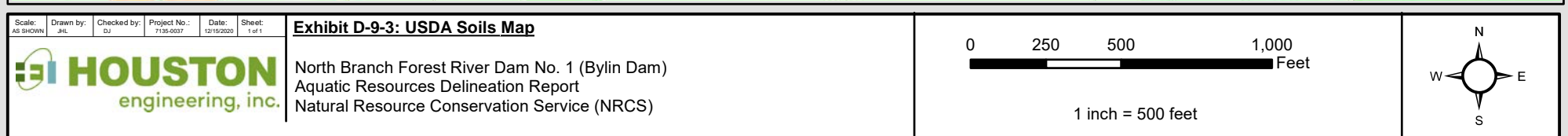


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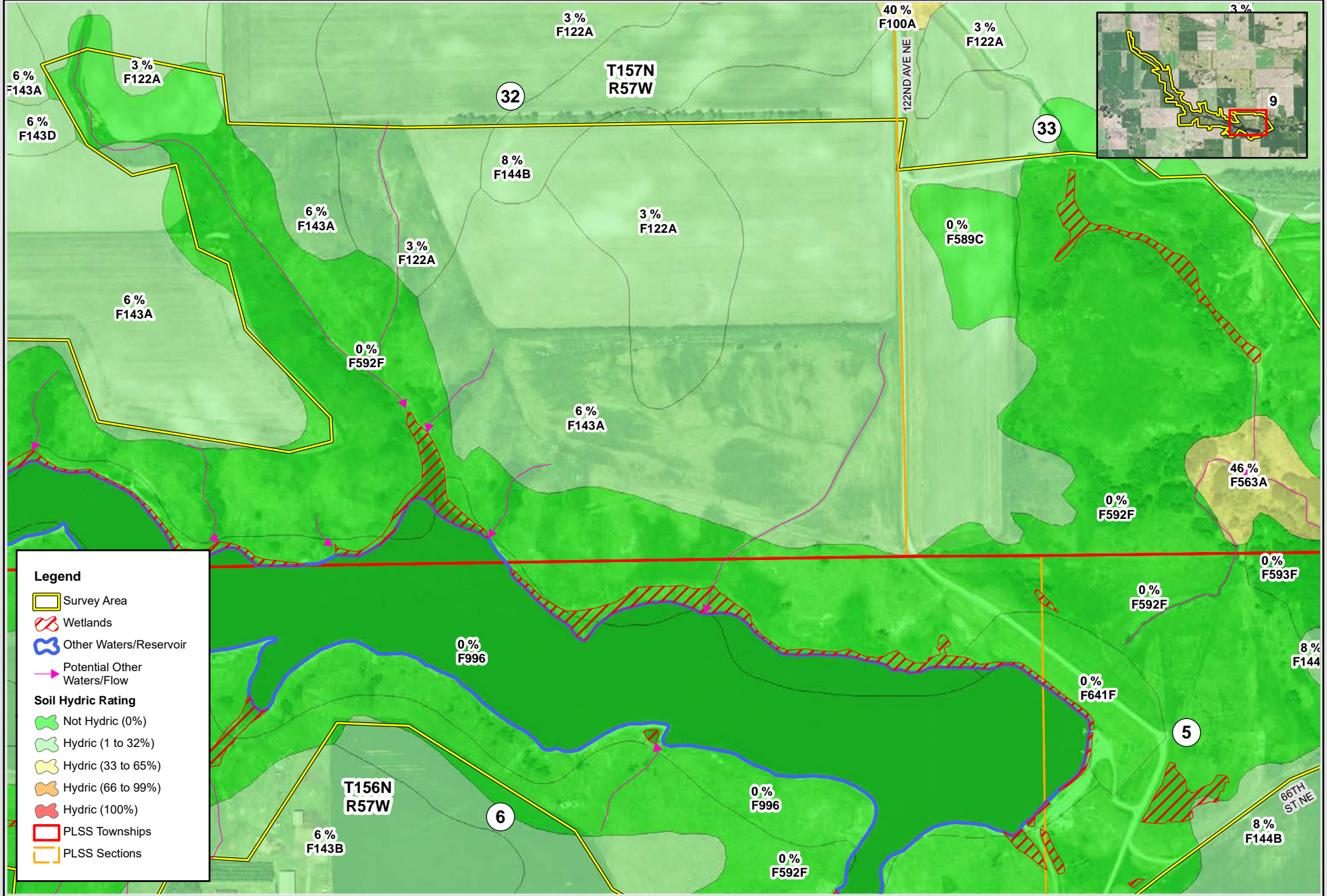


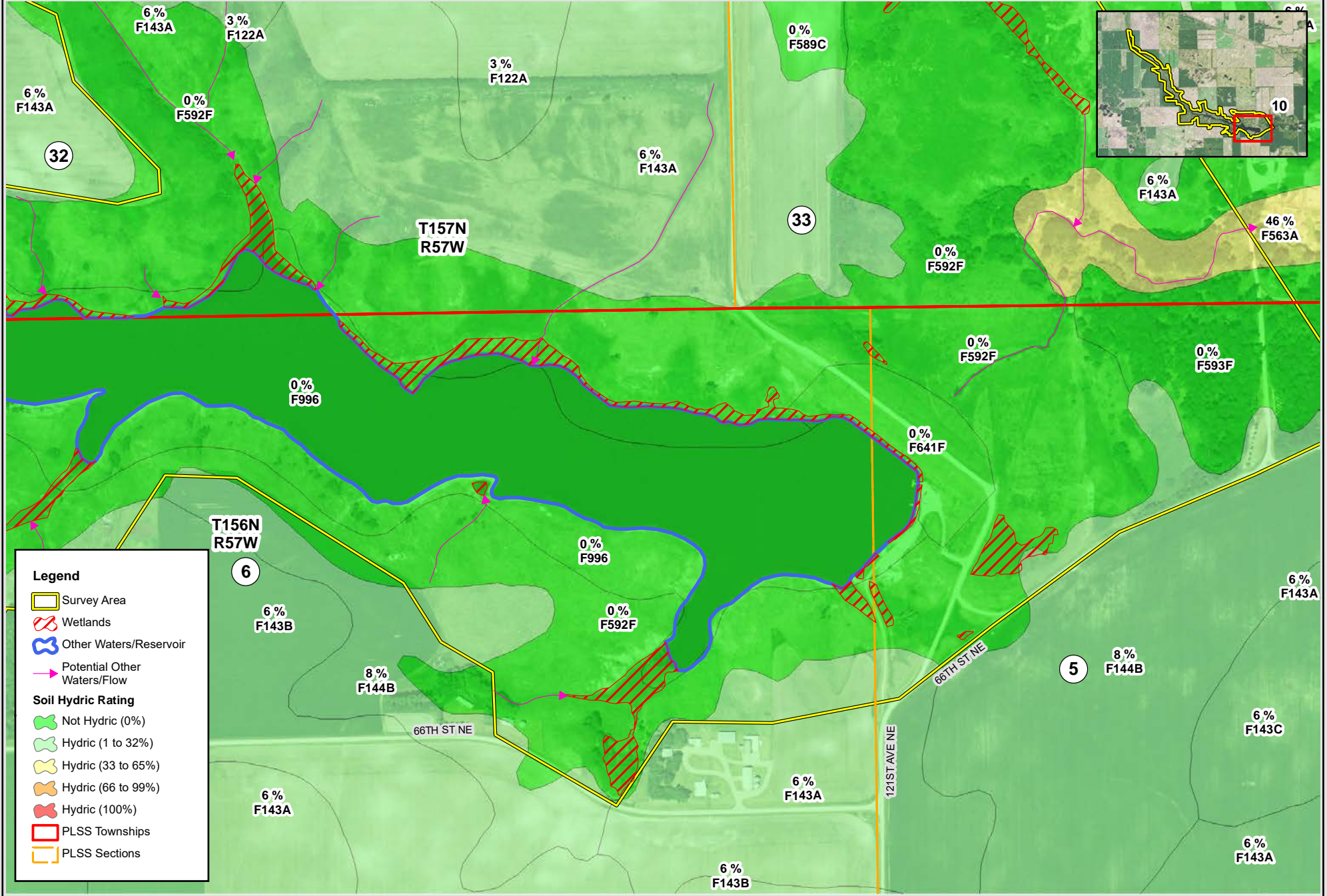


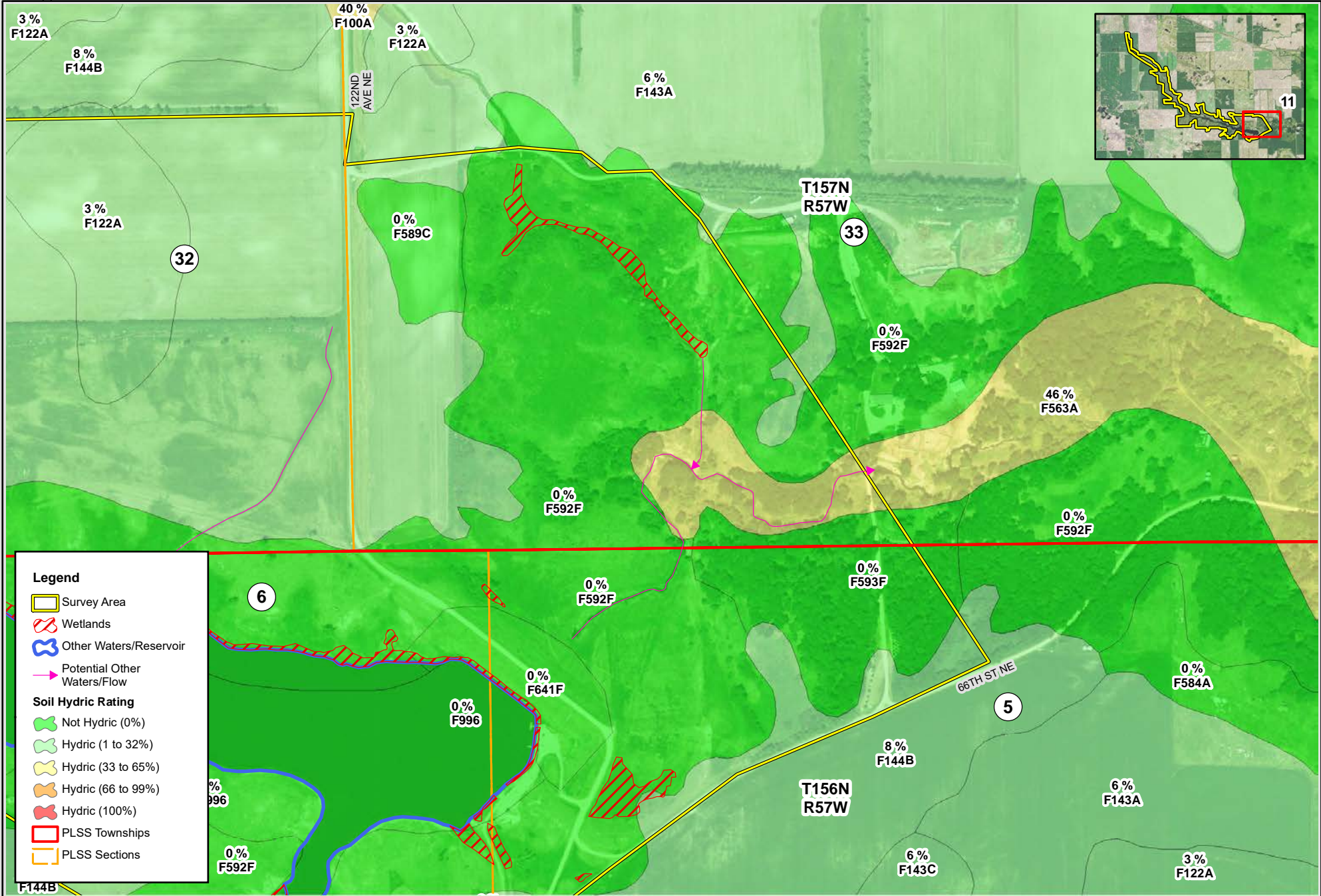






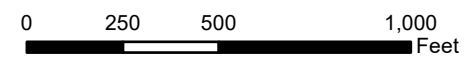




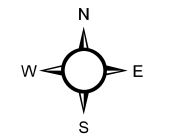


**Exhibit D-9-3: USDA Soils Map**

North Branch Forest River Dam No. 1 (Bylin Dam)  
Aquatic Resources Delineation Report  
Natural Resource Conservation Service (NRCS)

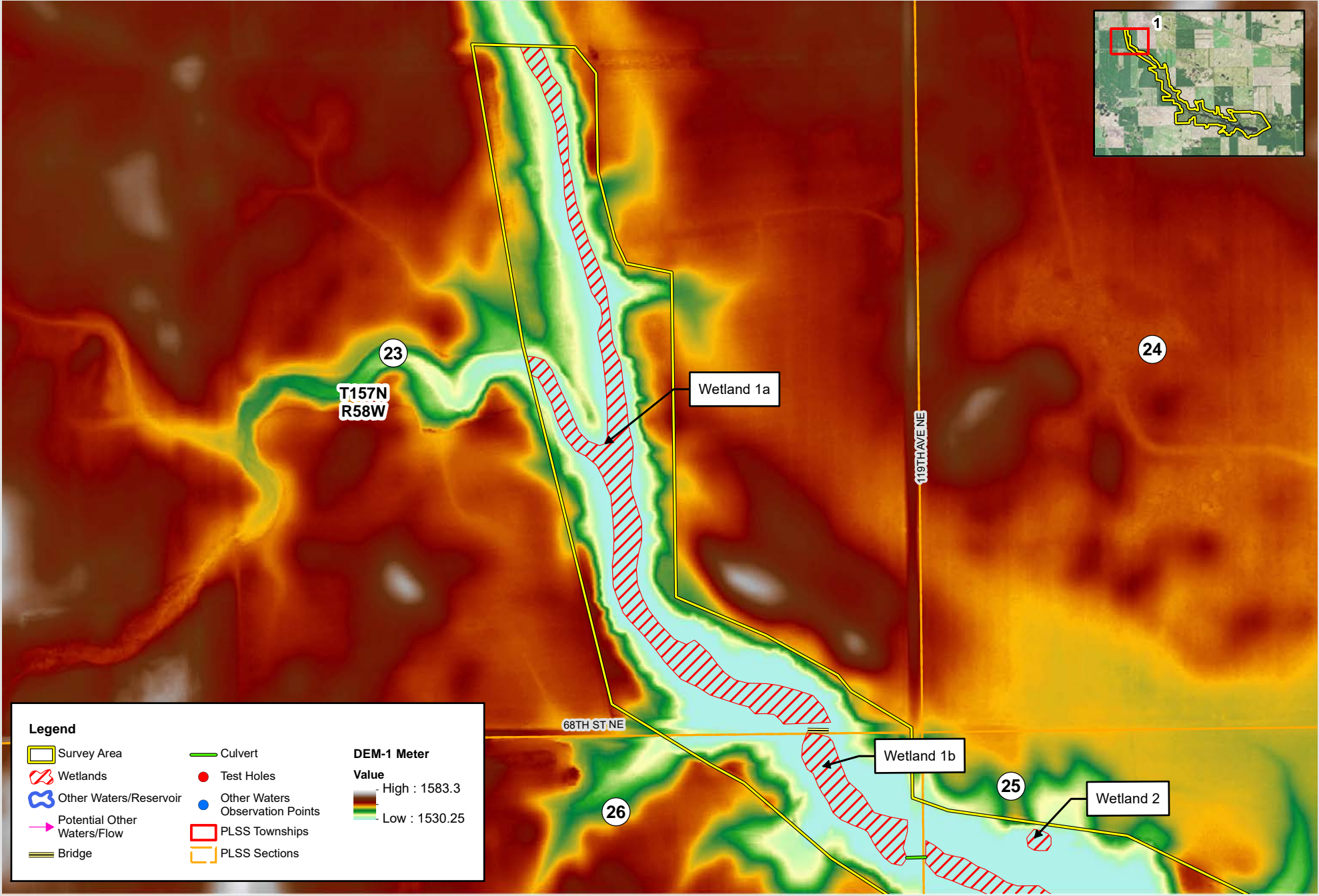


1 inch = 500 feet



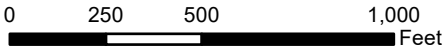
## Hydric Rating by Map Unit

| Map unit symbol                    | Map unit name  | Rating | Acres in AOI | Percent of AOI |
|------------------------------------|--|--------|--------------|----------------|
| F122A                              | Svea-Cresbard loams, 0 to 3 percent slopes   | 3      | 19.0         | 2.0%           |
| F143A                              | Barnes-Svea loams, 0 to 3 percent slopes   | 6      | 108.9        | 11.4%          |
| F143B                              | Barnes-Svea loams, 3 to 6 percent slopes   | 6      | 58.6         | 6.1%           |
| F143C                              | Barnes-Buse-Langhei loams, 6 to 9 percent slopes                                   | 6      | 0.4          | 0.0%           |
| F143D                              | Barnes-Buse-Langhei loams, 9 to 15 percent slopes                                  | 6      | 0.0          | 0.0%           |
| F144B                              | Barnes-Buse loams, 3 to 6 percent slopes   | 8      | 24.6         | 2.6%           |
| F147C                              | Buse-Barnes-Darnen loams, 3 to 9 percent slopes                                    | 2      | 0.7          | 0.1%           |
| F147D                              | Buse-Barnes-Darnen loams, 6 to 15 percent slopes                                   | 2      | 6.5          | 0.7%           |
| F148F                              | Buse-Barnes-La Prairie, occasionally flooded loams, 6 to 35 percent slopes         | 3      | 0.5          | 0.0%           |
| F563A                              | Fluvaquents, channeled-Fairdale complex, 0 to 2 percent slopes, frequently flooded | 46     | 6.1          | 0.6%           |
| F589C                              | Edgeley-Kloten loams, 6 to 9 percent slopes  | 0      | 4.0          | 0.4%           |
| F592F                              | Kloten-Walsh-Edgeley loams, 6 to 35 percent slopes                                 | 0      | 621.6        | 65.2%          |
| F641F                              | Udarents loamy, earthen dam, 1 to 75 percent slopes                                | 0      | 5.5          | 0.6%           |
| F680C                              | Barnes-Sioux complex, 3 to 9 percent slopes  | 0      | 0.5          | 0.1%           |
| F680D                              | Barnes-Sioux complex, 6 to 15 percent slopes                                       | 0      | 0.9          | 0.1%           |
| F996                               | Water  | 0      | 96.4         | 10.1%          |
| <b>Totals for Area of Interest</b> |  |        | <b>954.0</b> | <b>100.0%</b>  |

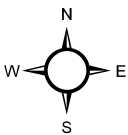


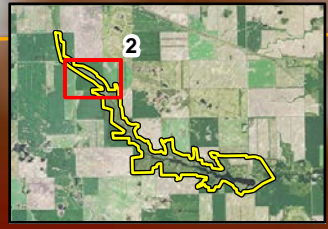
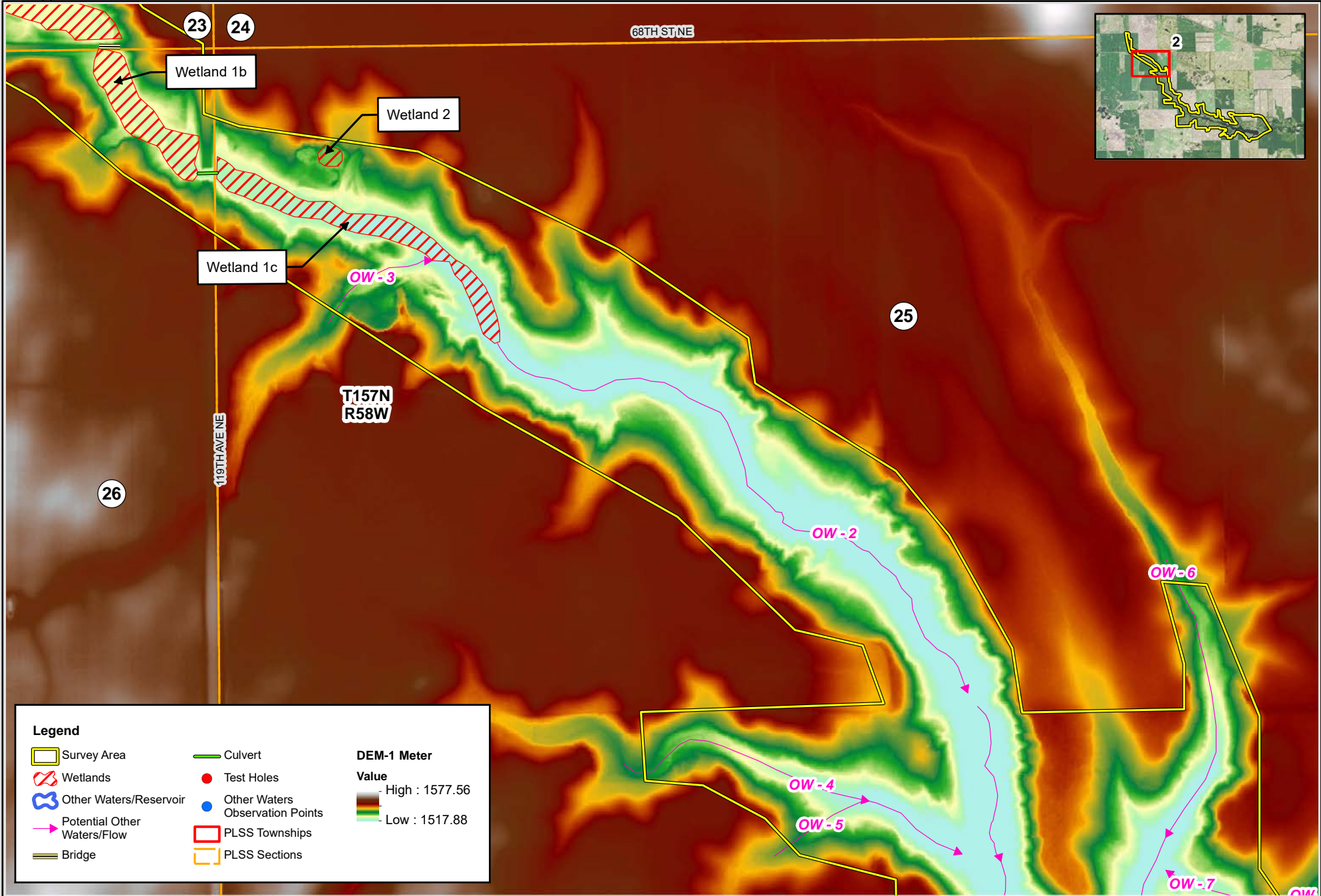
**Exhibit D-9-4: Lidar Map**

North Branch Forest River Dam No. 1 (Bylin Dam)  
Aquatic Resources Delineation Report  
Natural Resource Conservation Service (NRCS)



1 inch = 500 feet





Scale: AS SHOWN  
 Drawn by: JHL  
 Checked by: DJ  
 Project No.: 7135-0037  
 Date: 12/10/2020  
 Sheet: 1 of 1

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**Exhibit D-9-4: Lidar Map**

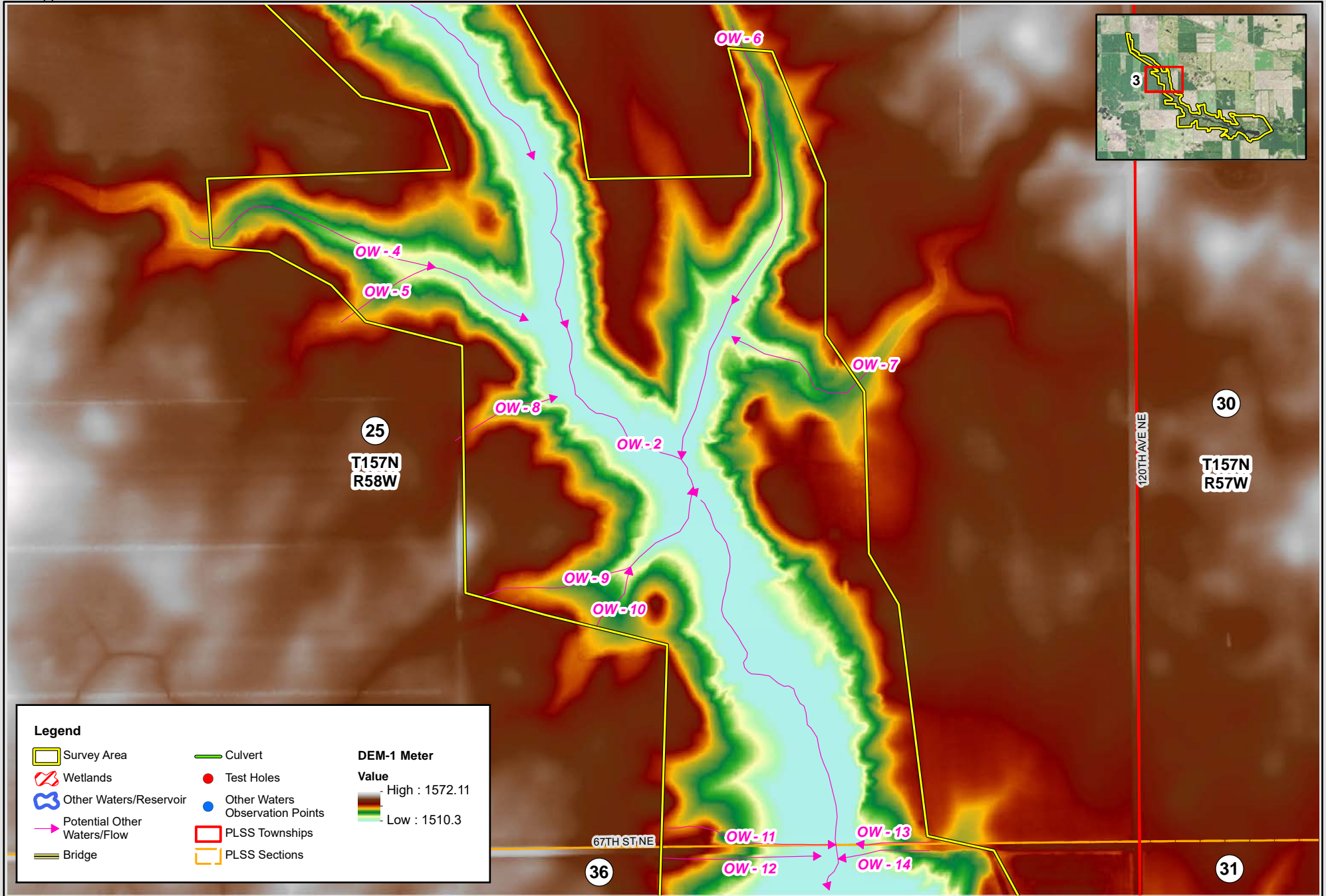
North Branch Forest River Dam No. 1 (Bylin Dam)  
 Aquatic Resources Delineation Report  
 Natural Resource Conservation Service (NRCS)

0 250 500 1,000 Feet

1 inch = 500 feet

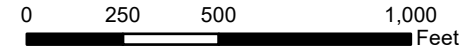
N  
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 S

Document Path: \\houston\heli\BUN7100\7135\7135\_0037\GIS\Working\Bylin\_JHL.mxd

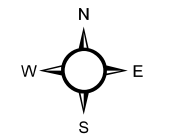


**Exhibit D-9-4: Lidar Map**

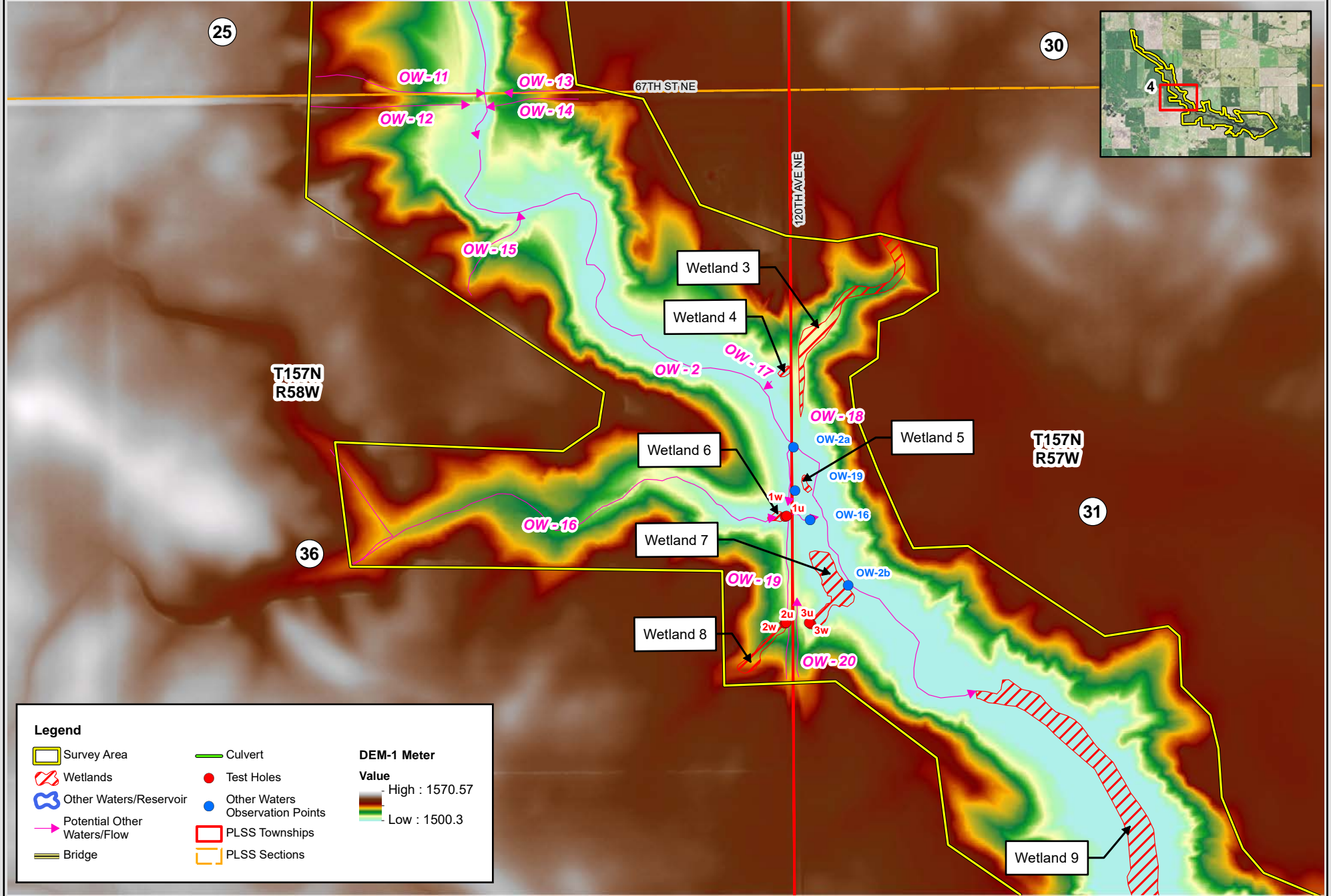
North Branch Forest River Dam No. 1 (Bylin Dam)  
 Aquatic Resources Delineation Report  
 Natural Resource Conservation Service (NRCS)



1 inch = 500 feet

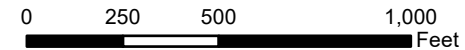


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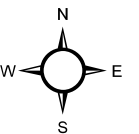


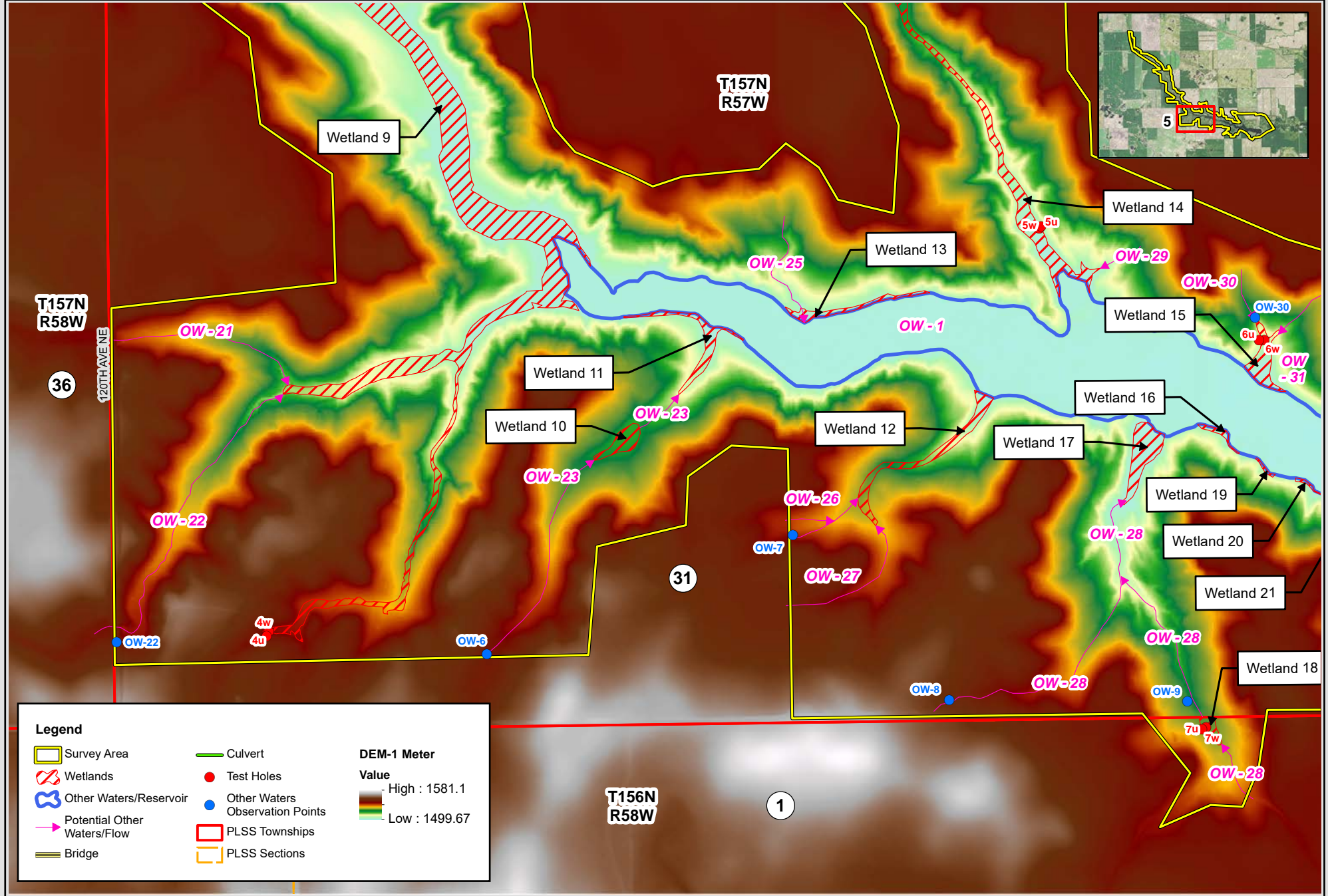
**Exhibit D-9-4: Lidar Map**

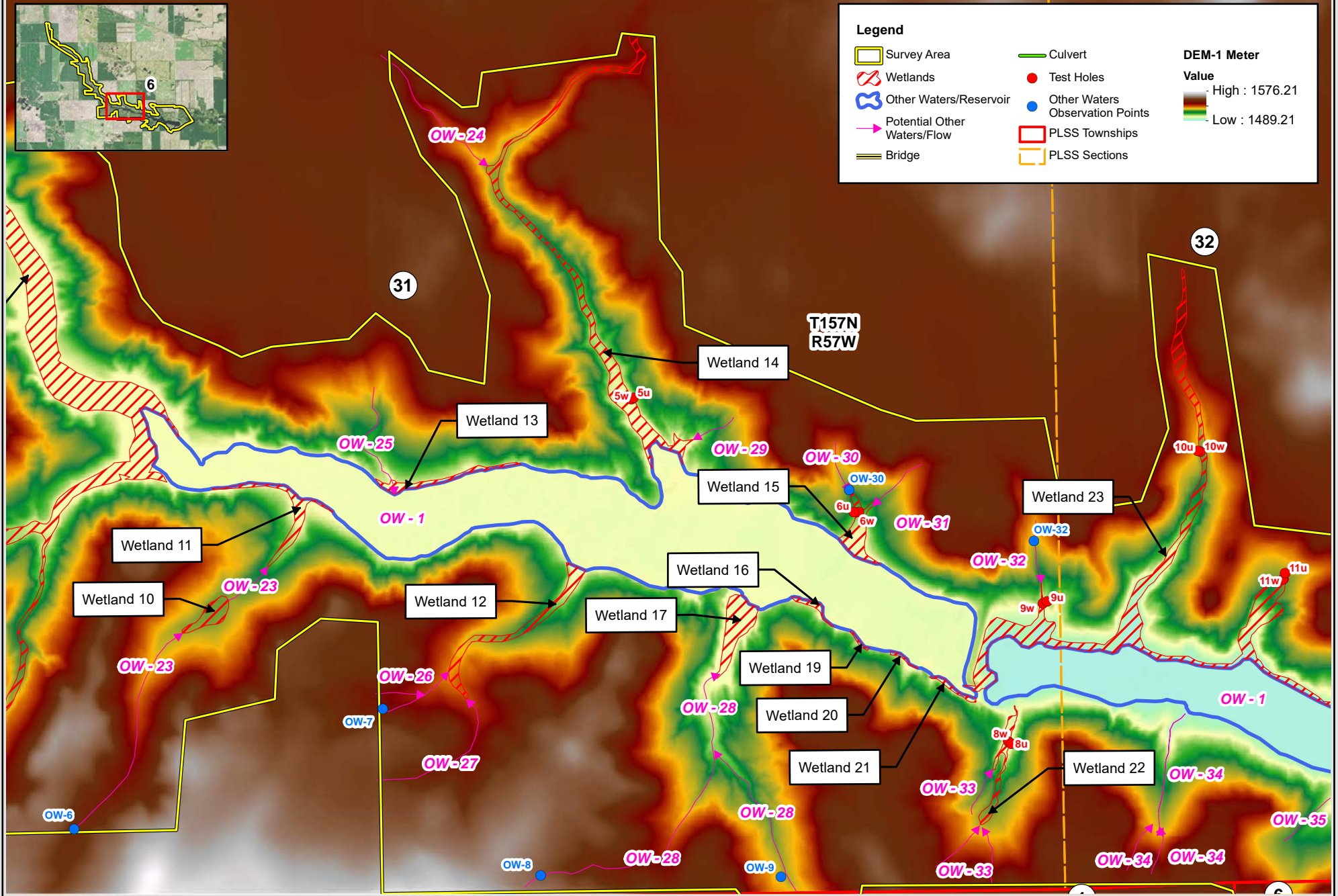
North Branch Forest River Dam No. 1 (Bylin Dam)  
 Aquatic Resources Delineation Report  
 Natural Resource Conservation Service (NRCS)



1 inch = 500 feet





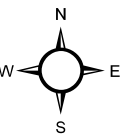


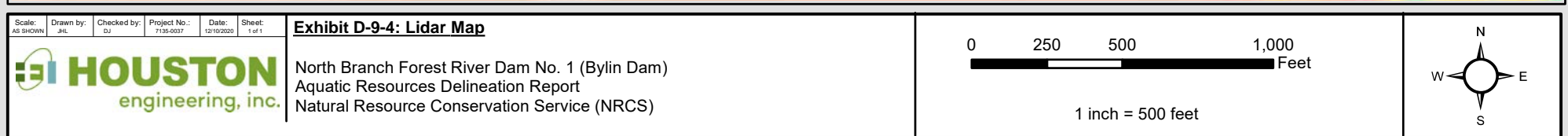
**Exhibit D-9-4: Lidar Map**

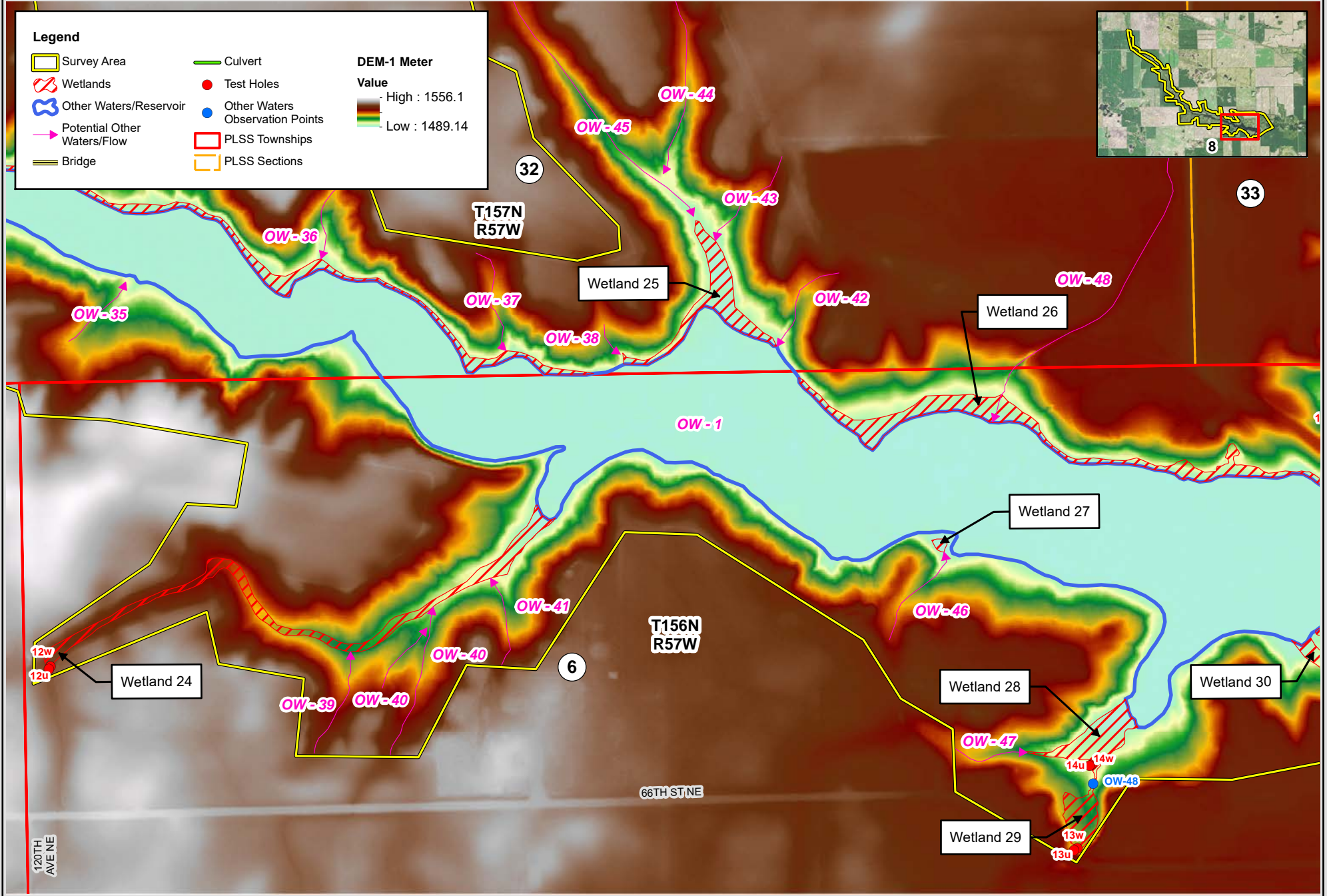
North Branch Forest River Dam No. 1 (Bylin Dam)  
Aquatic Resources Delineation Report  
Natural Resource Conservation Service (NRCS)

0 250 500 1,000  
Feet

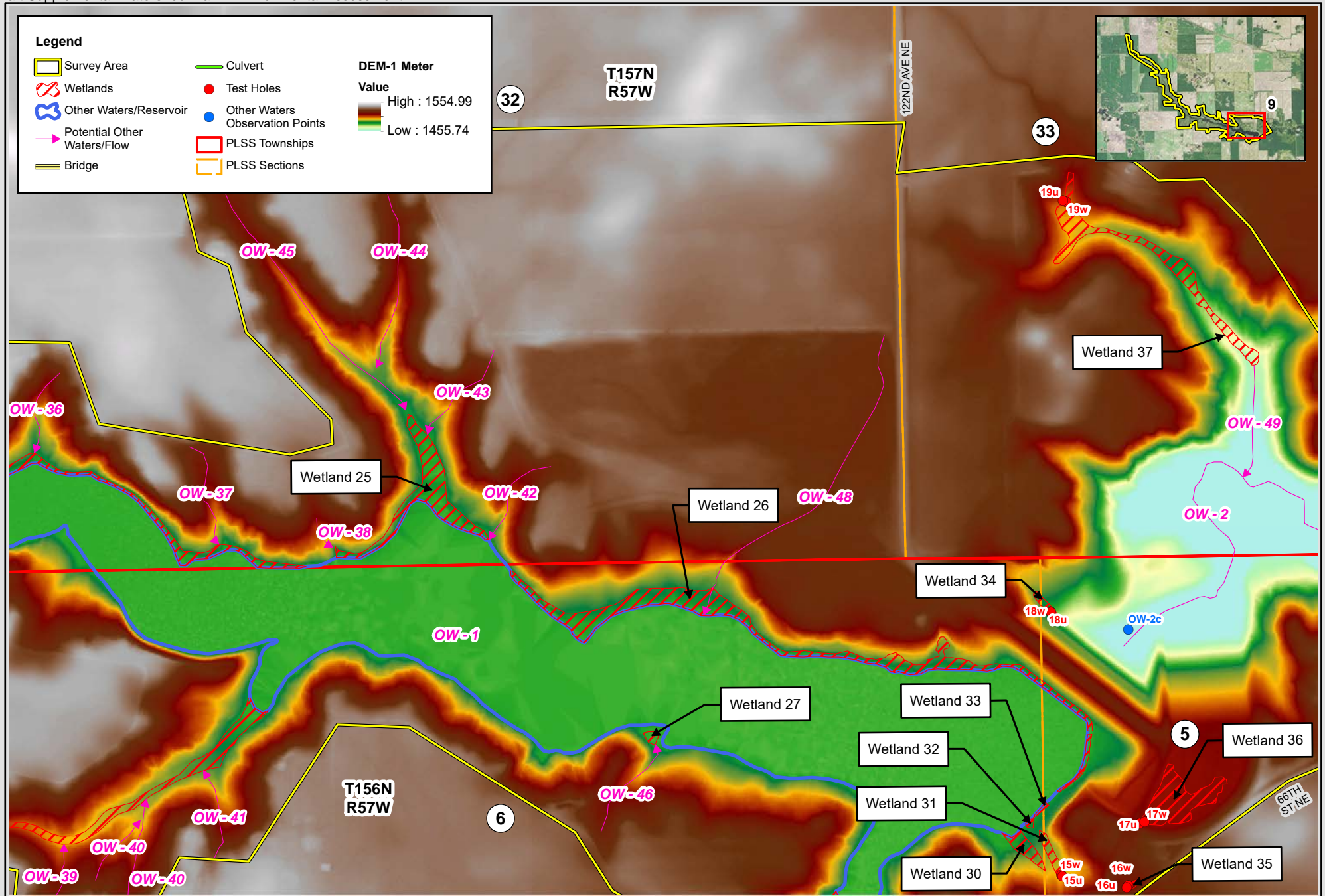
1 inch = 500 feet





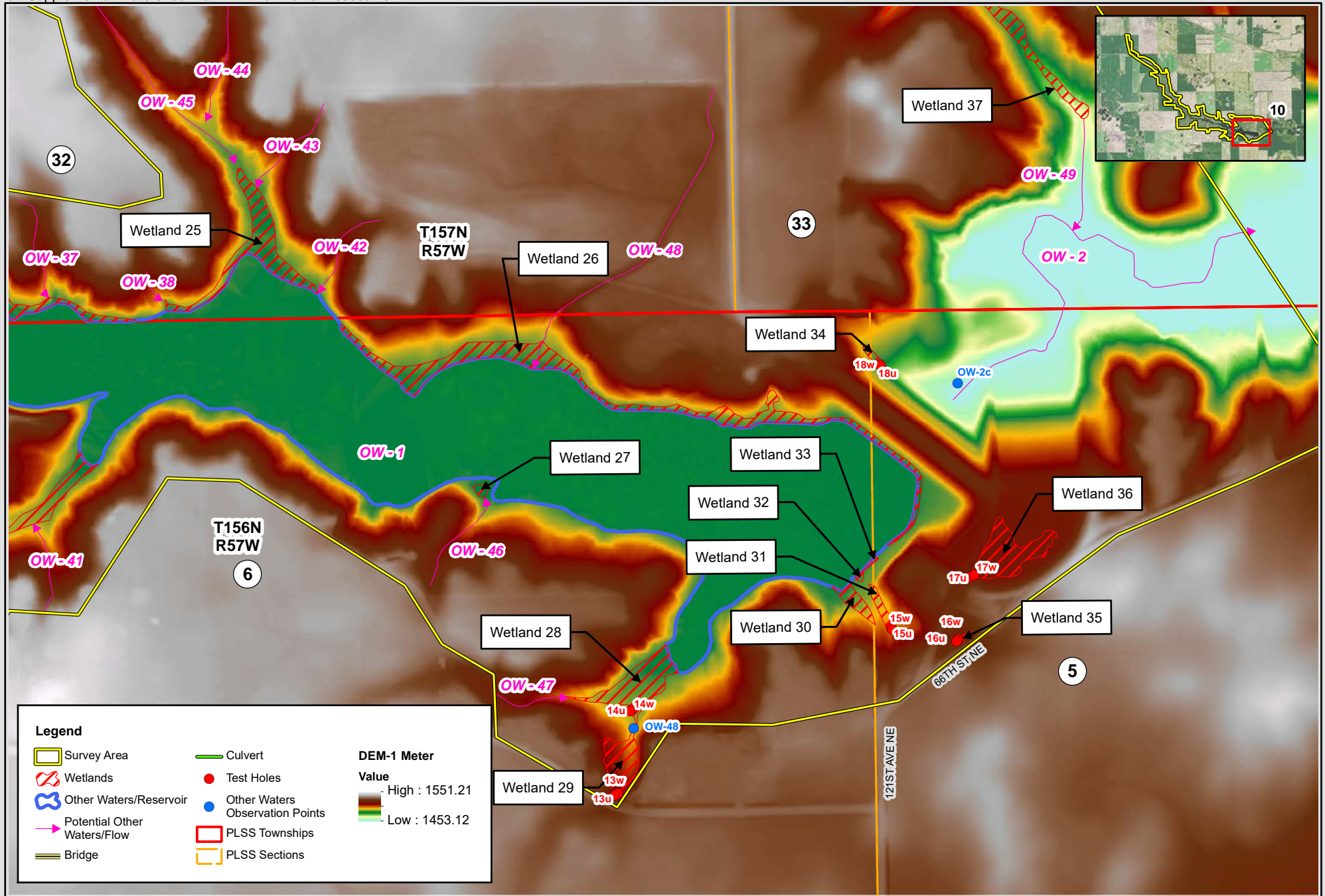


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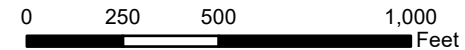
**Exhibit D-9-4: Lidar Map**

North Branch Forest River Dam No. 1 (Bylin Dam)  
Aquatic Resources Delineation Report  
Natural Resource Conservation Service (NRCS)

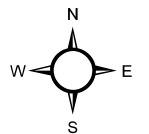


**Exhibit D-9-4: Lidar Map**

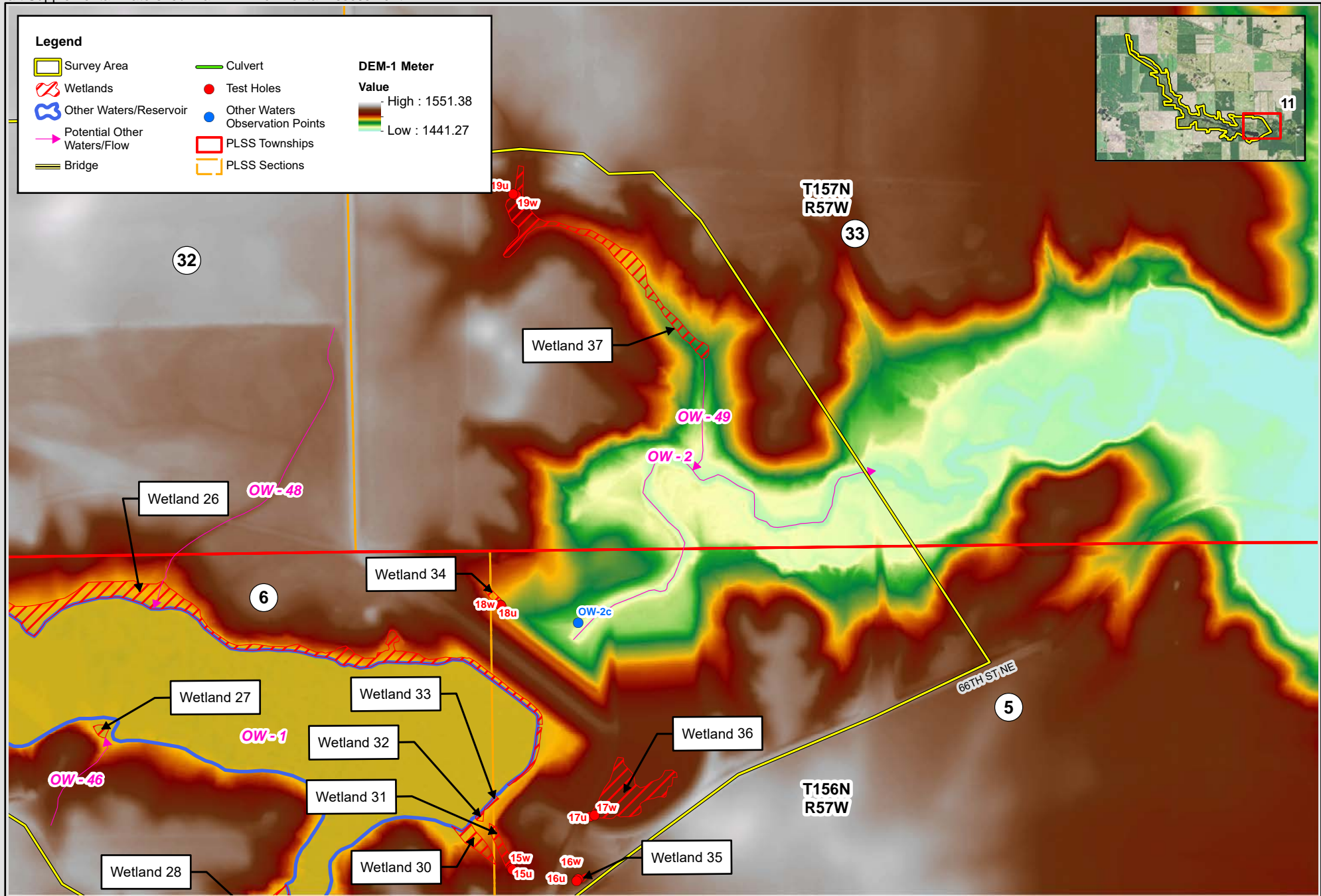
North Branch Forest River Dam No. 1 (Bylin Dam)  
 Aquatic Resources Delineation Report  
 Natural Resource Conservation Service (NRCS)



1 inch = 500 feet



Document Path: \\houston\heli\BUN7100\7135\7135\_0037\GIS\WorkingBylin\_jHL.mxd

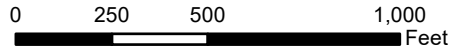


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| Scale:<br>AS SHOWN | Drawn by:<br>JHL | Checked by:<br>DU | Project No.:<br>7135-0037 | Date:<br>12/10/2020 | Sheet:<br>1 of 1 |
|--------------------|------------------|-------------------|---------------------------|---------------------|------------------|

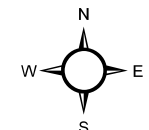
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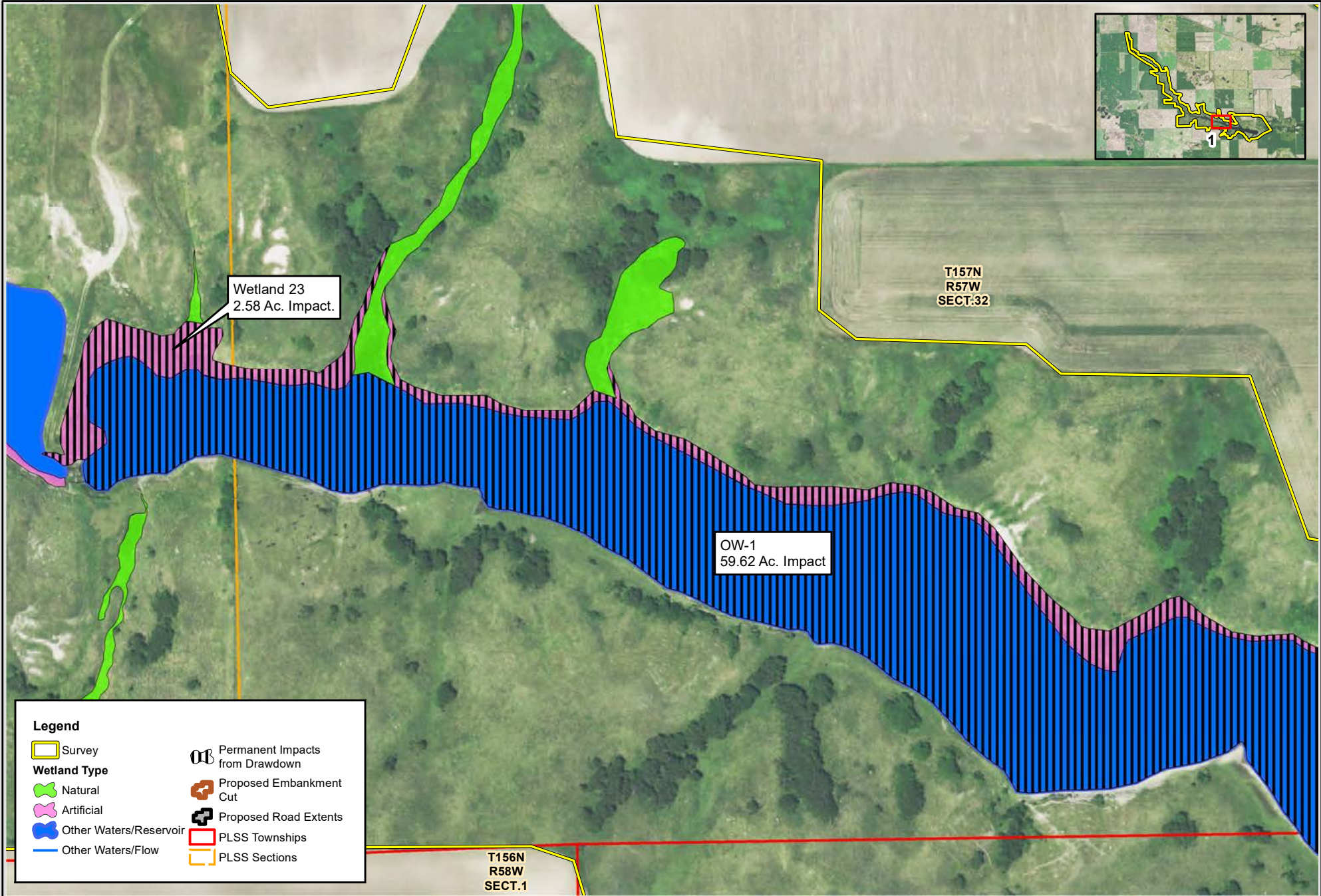
**Exhibit D-9-4: Lidar Map**

North Branch Forest River Dam No. 1 (Bylin Dam)  
Aquatic Resources Delineation Report  
Natural Resource Conservation Service (NRCS)



1 inch = 500 feet





Scale: AS SHOWN  
Drawn by: JHL  
Checked by: DJ  
Project No.: 7135-0031  
Date: 09/2022  
Sheet: 1 of 1

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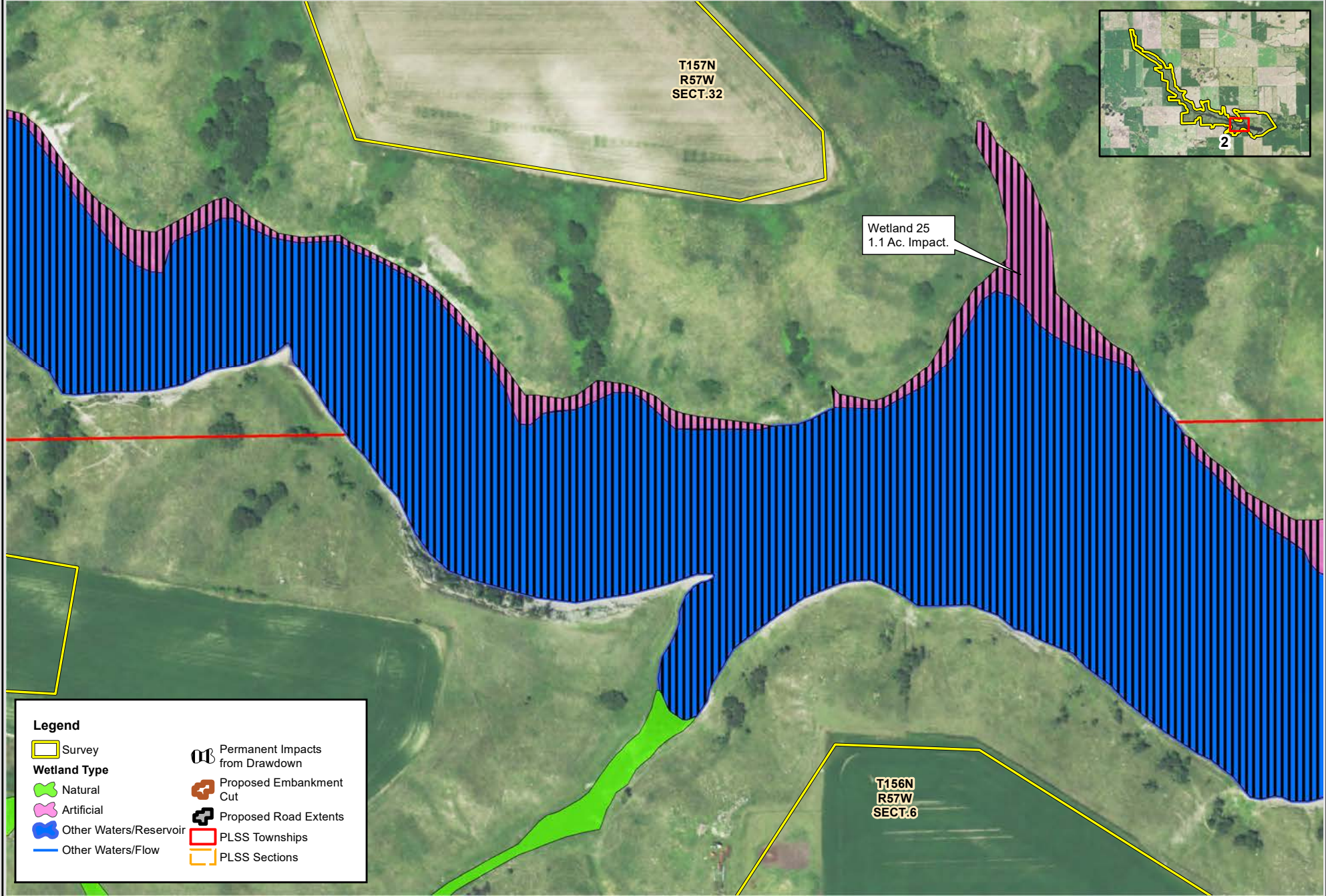
**Exhibit D-9-5 – Alternative 1 Impacts Map**

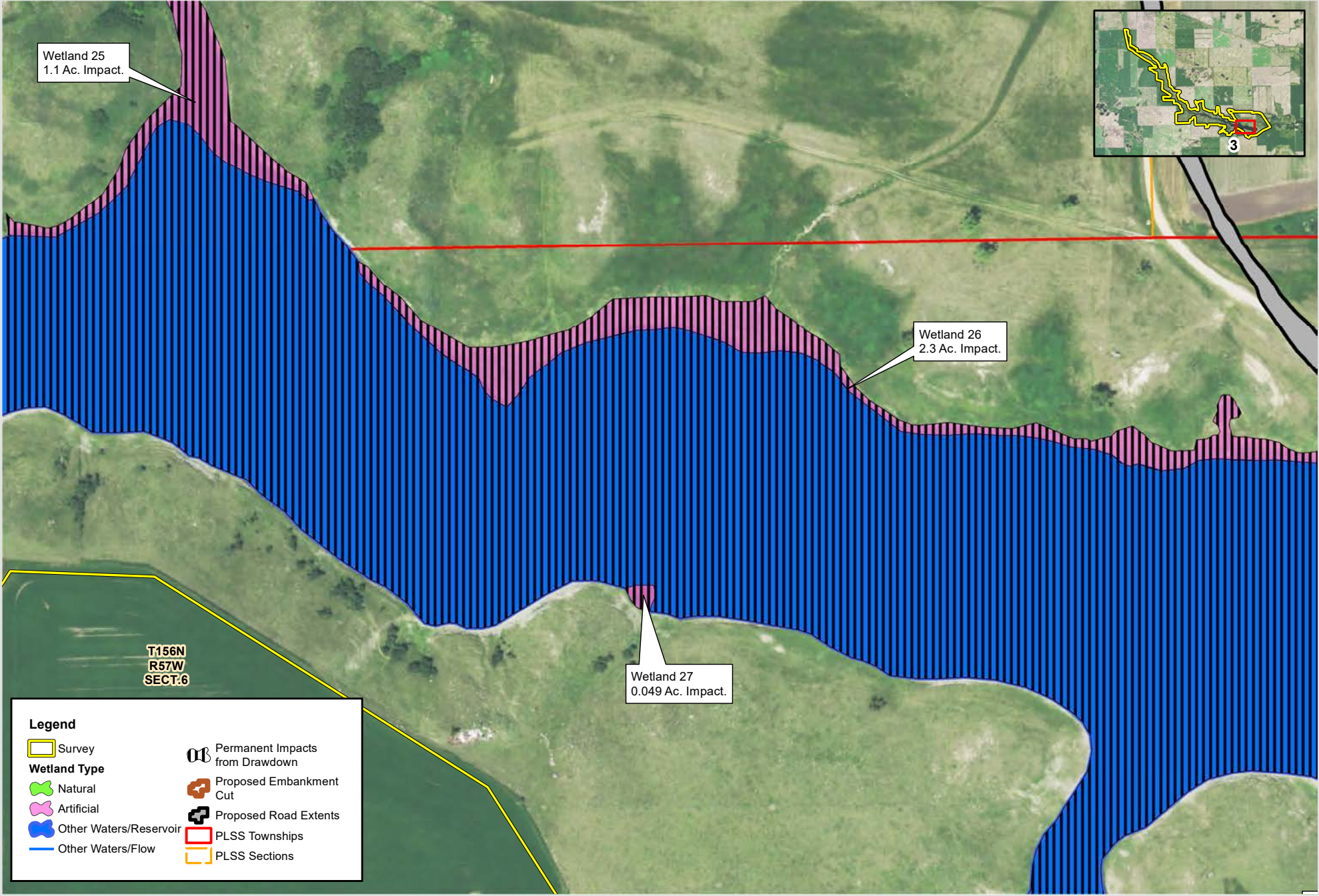
North Branch Forest River Dam No. 1 (Bylin Dam)  
Natural Resource Conservation Service (NRCS)

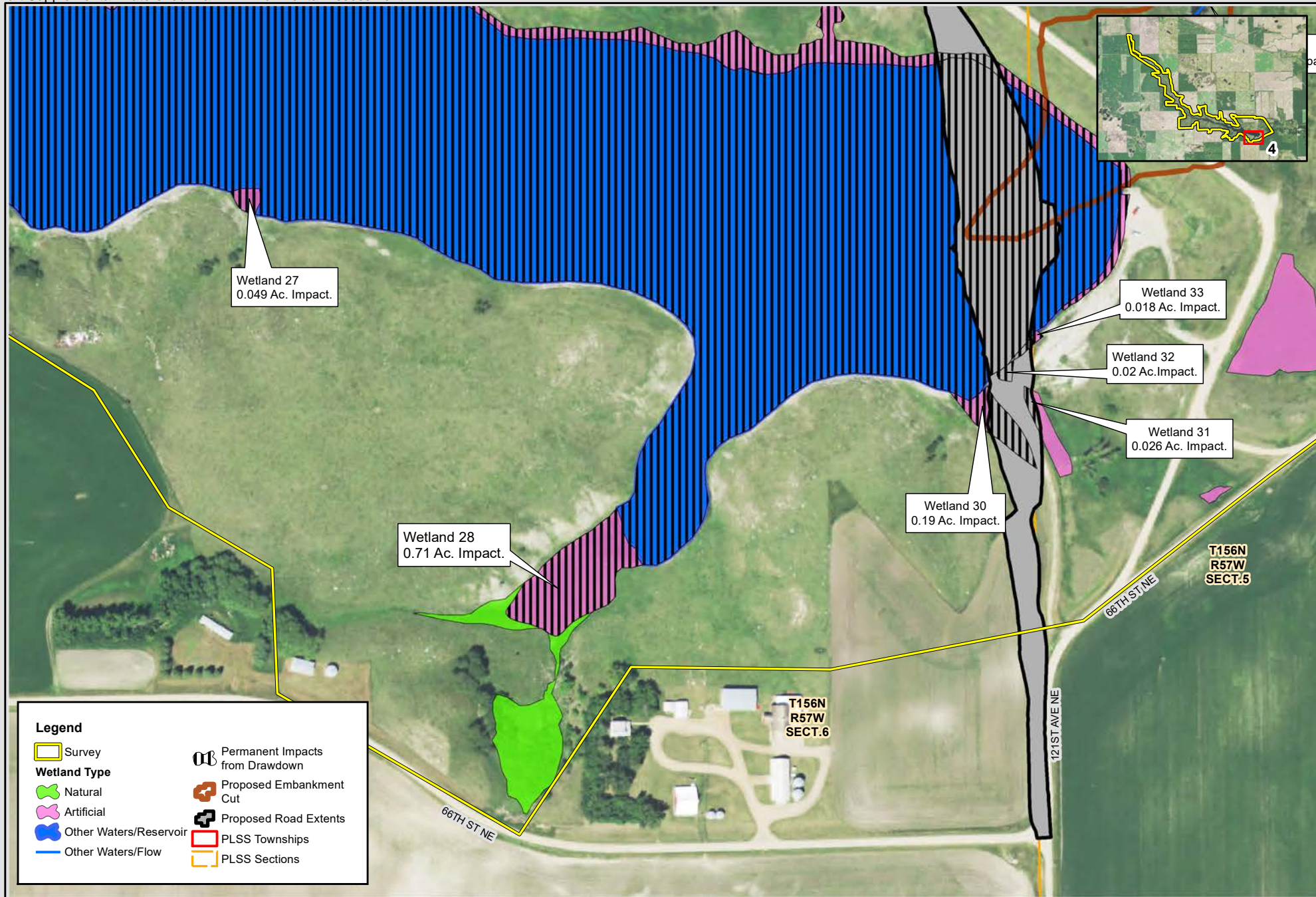
0 125 250 500 Feet

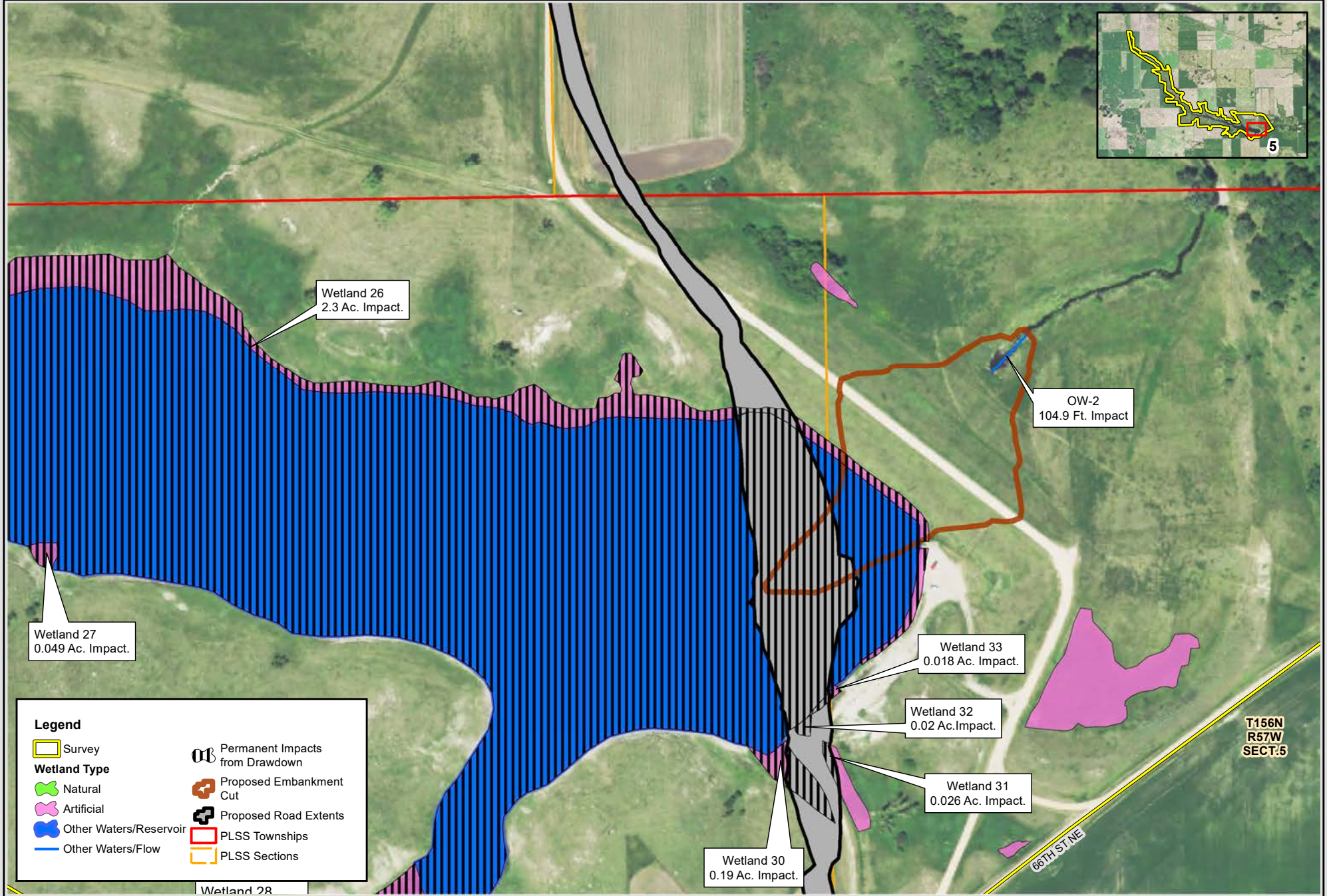
1 inch = 250 feet

N  
W E  
S







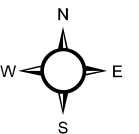


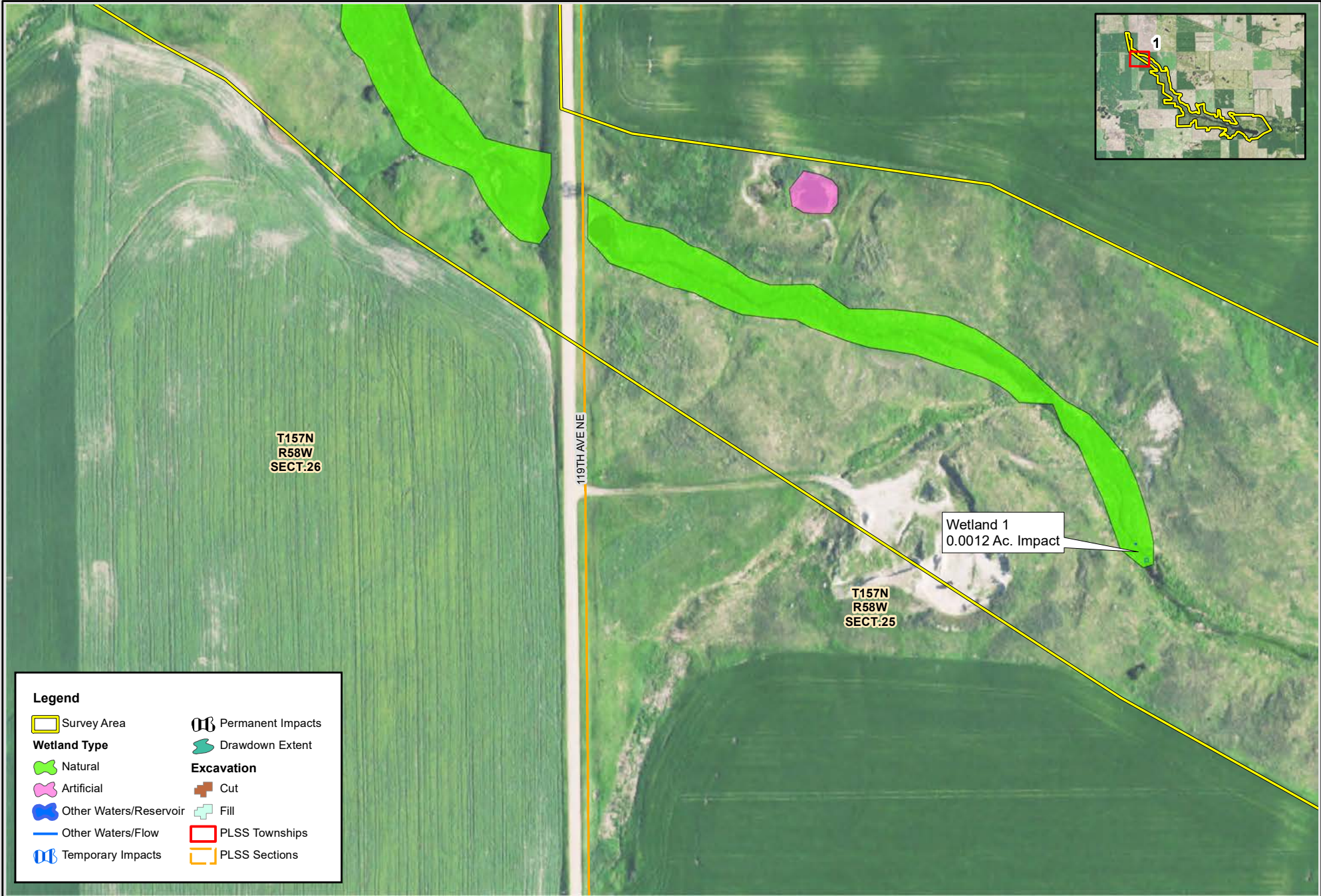
**Exhibit D-9-5 – Alternative 1 Impacts Map**

North Branch Forest River Dam No. 1 (Bylin Dam)  
Natural Resource Conservation Service (NRCS)

0 125 250 500  
Feet

1 inch = 250 feet



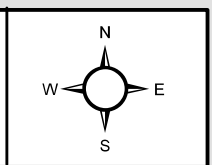
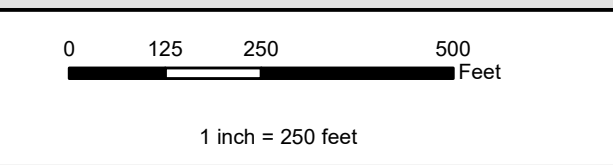


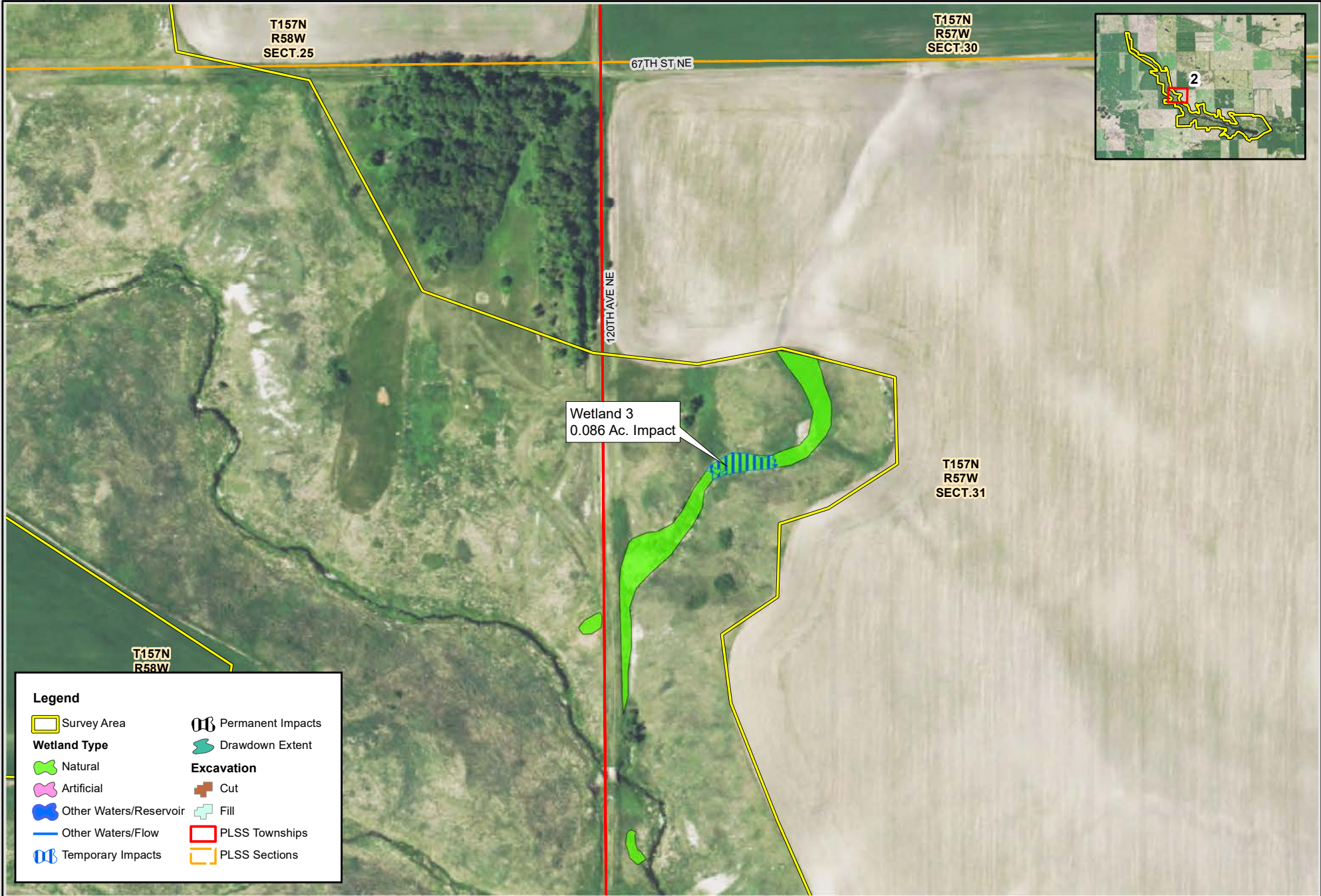
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Drawn by: JHL  
Checked by: DJ  
Project No.: 7135-0037  
Date: 09/2022  
Sheet: 1 of 1

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engineering, inc.

**Exhibit D-9-6 – Alternative 2 Impacts Map**

North Branch Forest River Dam No. 1 (Bylin Dam)  
Natural Resource Conservation Service (NRCS)



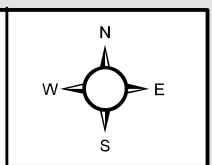
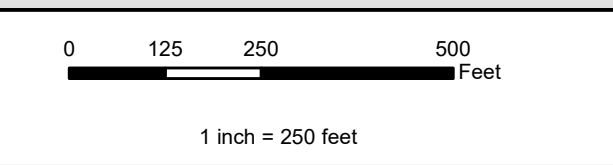


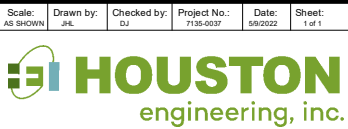
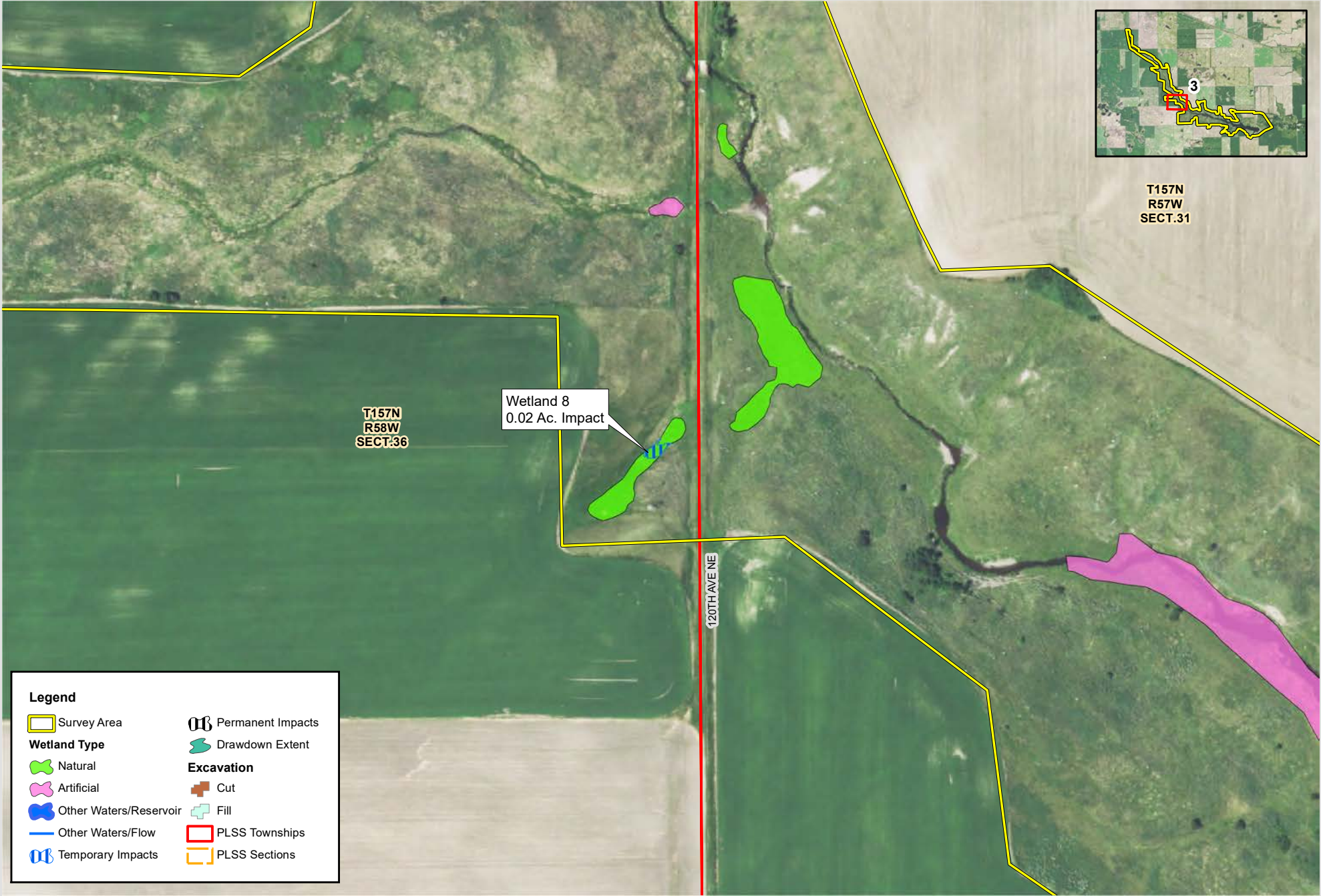
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Checked by: DJ  
Project No.: 7135-0031  
Date: 09/2022  
Sheet: 1 of 1

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**Exhibit D-9-6 – Alternative 2 Impacts Map**

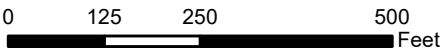
North Branch Forest River Dam No. 1 (Bylin Dam)  
Natural Resource Conservation Service (NRCS)



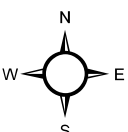


**Exhibit D-9-6 – Alternative 2 Impacts Map**

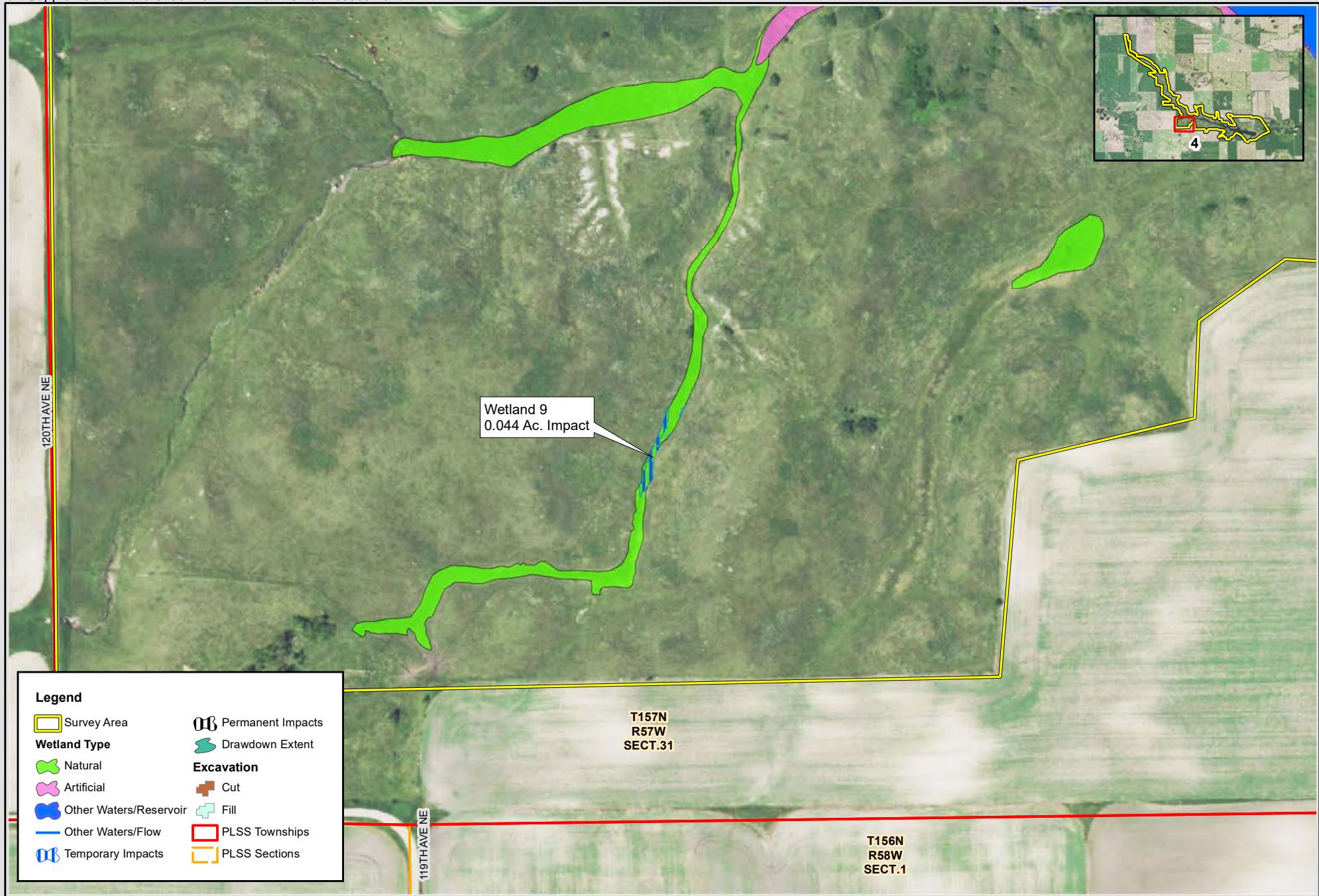
North Branch Forest River Dam No. 1 (Bylin Dam)  
Natural Resource Conservation Service (NRCS)



1 inch = 250 feet



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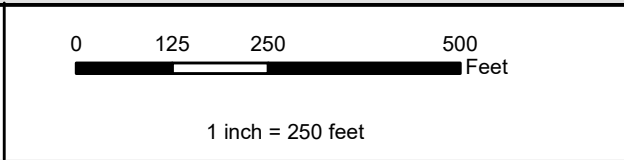


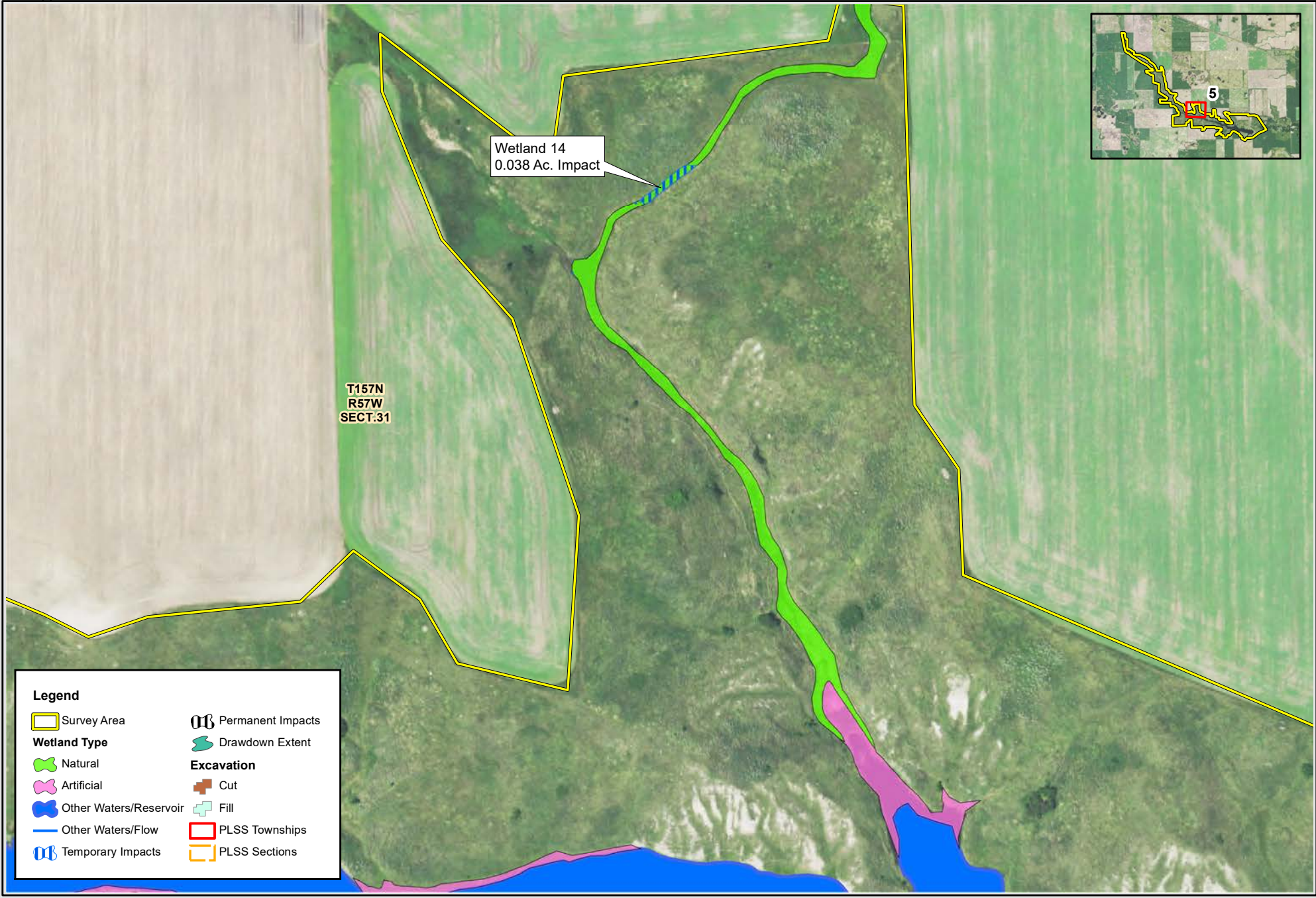
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Checked by: DJ  
Project No.: 7135-0037  
Date: 09/2022  
Sheet: 1 of 1

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**Exhibit D-9-6 – Alternative 2 Impacts Map**

North Branch Forest River Dam No. 1 (Bylin Dam)  
Natural Resource Conservation Service (NRCS)





**Legend**

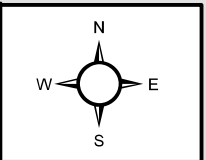
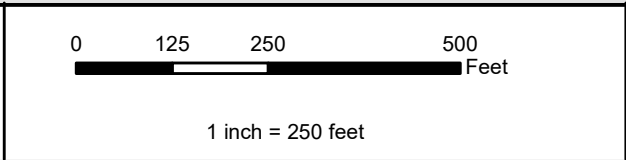
|                        |                   |
|------------------------|-------------------|
| Survey Area            | Permanent Impacts |
| <b>Wetland Type</b>    | Drawdown Extent   |
| Natural                | <b>Excavation</b> |
| Artificial             | Cut               |
| Other Waters/Reservoir | Fill              |
| Other Waters/Flow      | PLSS Townships    |
| Temporary Impacts      | PLSS Sections     |

Scale: AS SHOWN  
Drawn by: JHL  
Checked by: DJ  
Project No.: 7135-0037  
Date: 09/2022  
Sheet: 1 of 1

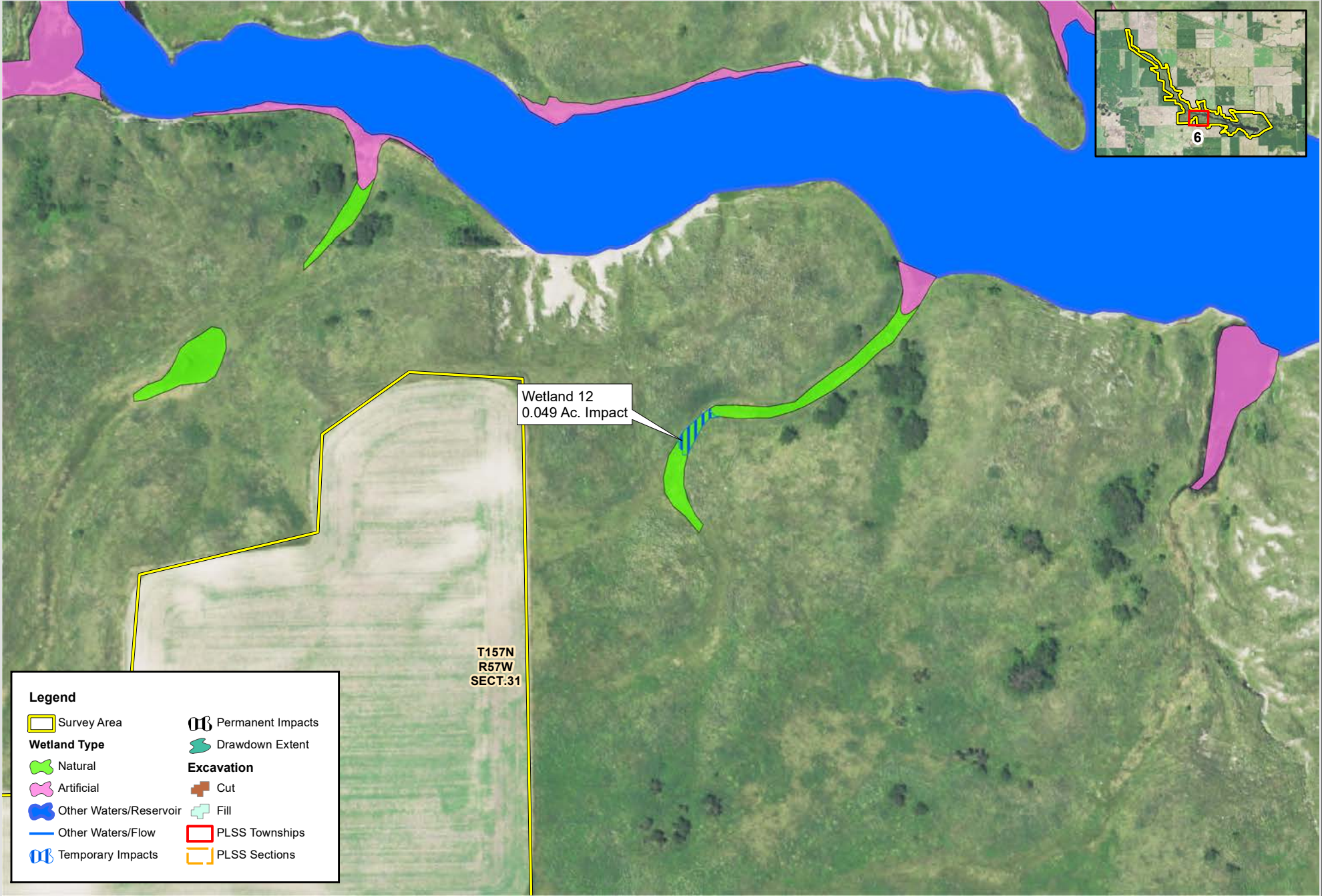
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**Exhibit D-9-6 – Alternative 2 Impacts Map**

North Branch Forest River Dam No. 1 (Bylin Dam)  
Natural Resource Conservation Service (NRCS)



Document Path: H:\UBN\7100\7135\7135\_0037\GIS\WorkingBylin\_JHL.mxd

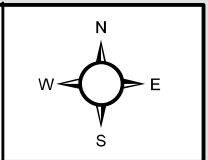
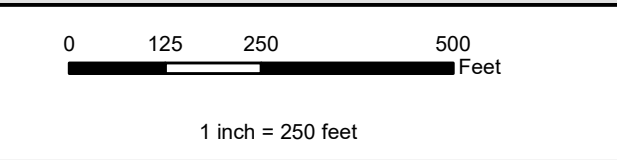


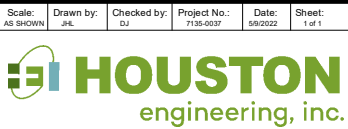
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Checked by: DJ  
Project No.: 7135-0037  
Date: 09/2022  
Sheet: 1 of 1

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**Exhibit D-9-6 – Alternative 2 Impacts Map**

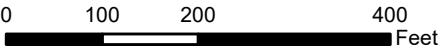
North Branch Forest River Dam No. 1 (Bylin Dam)  
Natural Resource Conservation Service (NRCS)



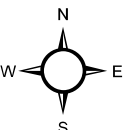


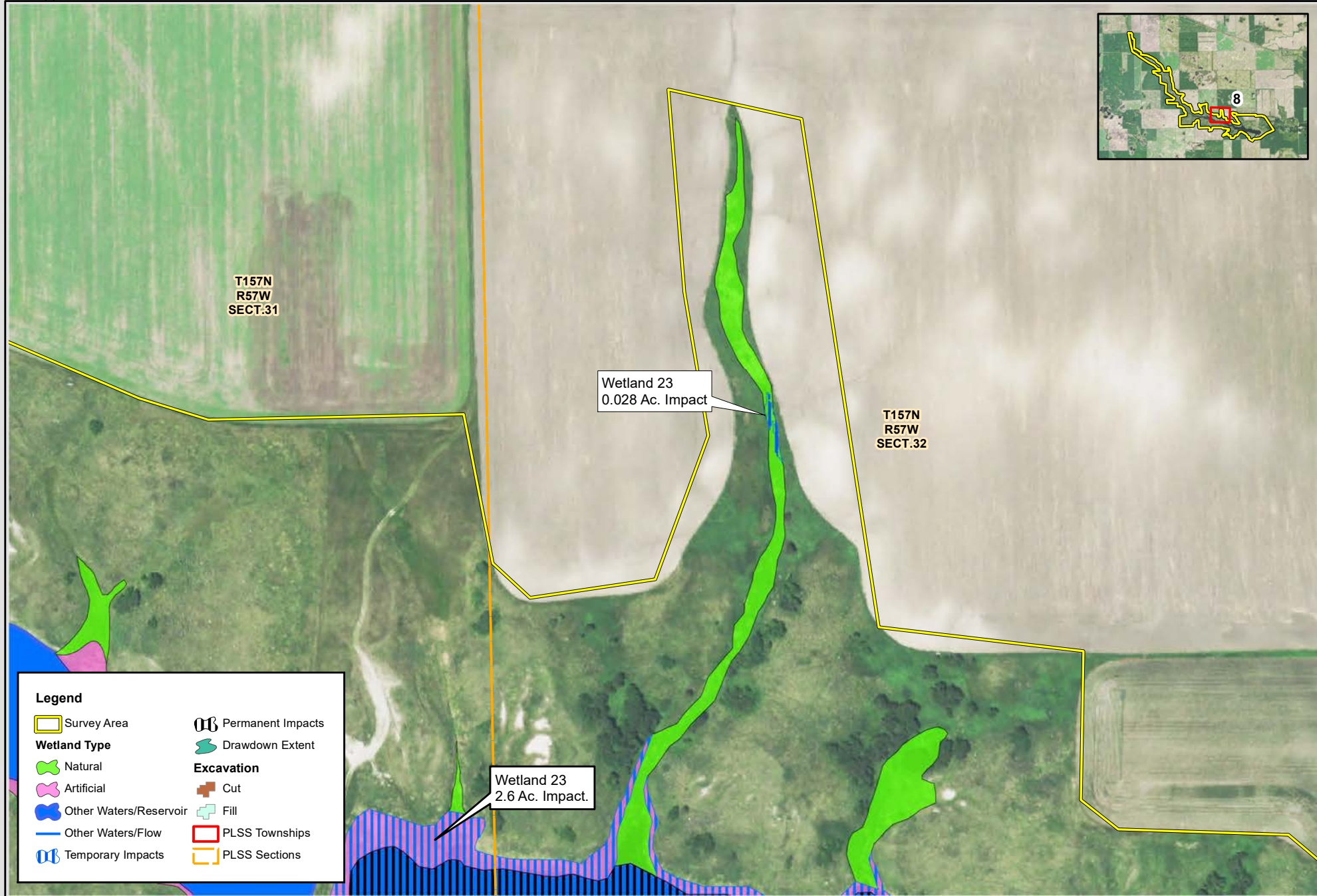
**Exhibit D-9-6 – Alternative 2 Impacts Map**

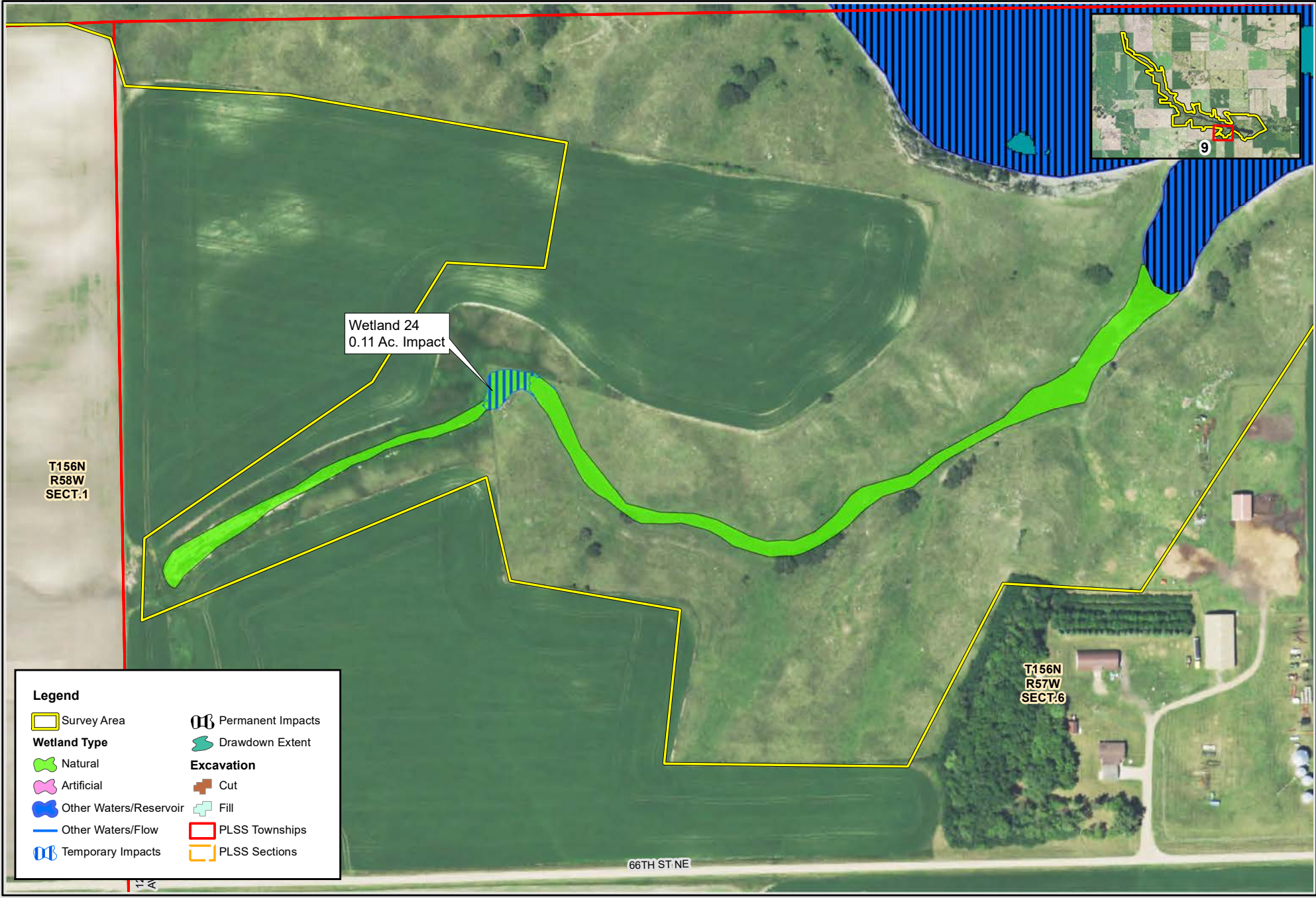
North Branch Forest River Dam No. 1 (Bylin Dam)  
Natural Resource Conservation Service (NRCS)



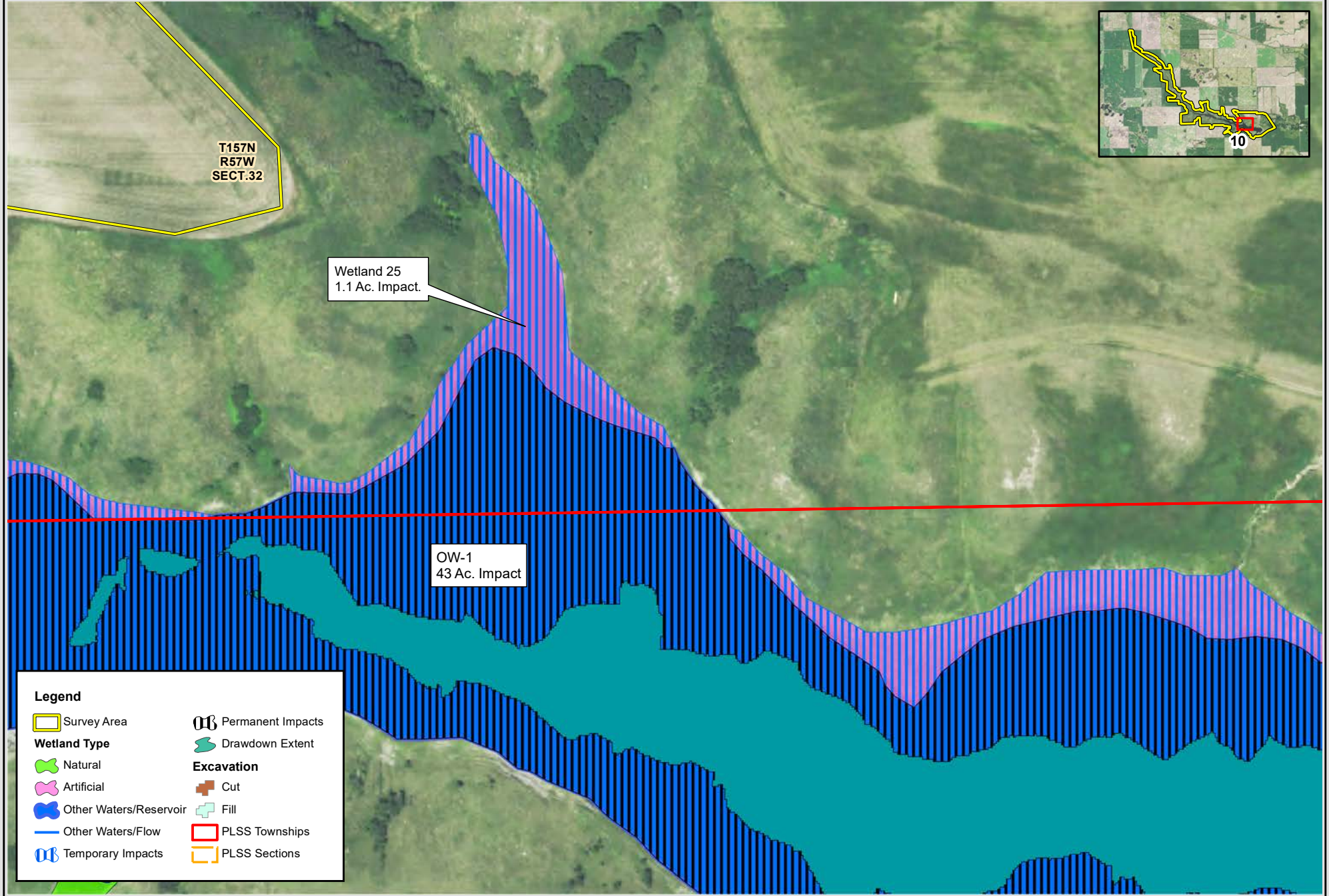
1 inch = 200 feet







|                    |                  |                   |                           |                  |                  |   |  |  |
|--------------------|------------------|-------------------|---------------------------|------------------|------------------|---|--|--|
| Scale:<br>AS SHOWN | Drawn by:<br>JHL | Checked by:<br>DU | Project No.:<br>7135-0031 | Date:<br>09/2022 | Sheet:<br>1 of 1 | <b>Exhibit D-9-6 – Alternative 2 Impacts Map</b><br>North Branch Forest River Dam No. 1 (Bylin Dam)<br>Natural Resource Conservation Service (NRCS) | 0 125 250 500<br>Feet<br>1 inch = 250 feet |  |
|--------------------|------------------|-------------------|---------------------------|------------------|------------------|---|--|--|

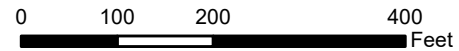


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Project No.: 7135-0037  
Date: 09/2022  
Sheet: 1 of 1

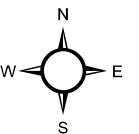
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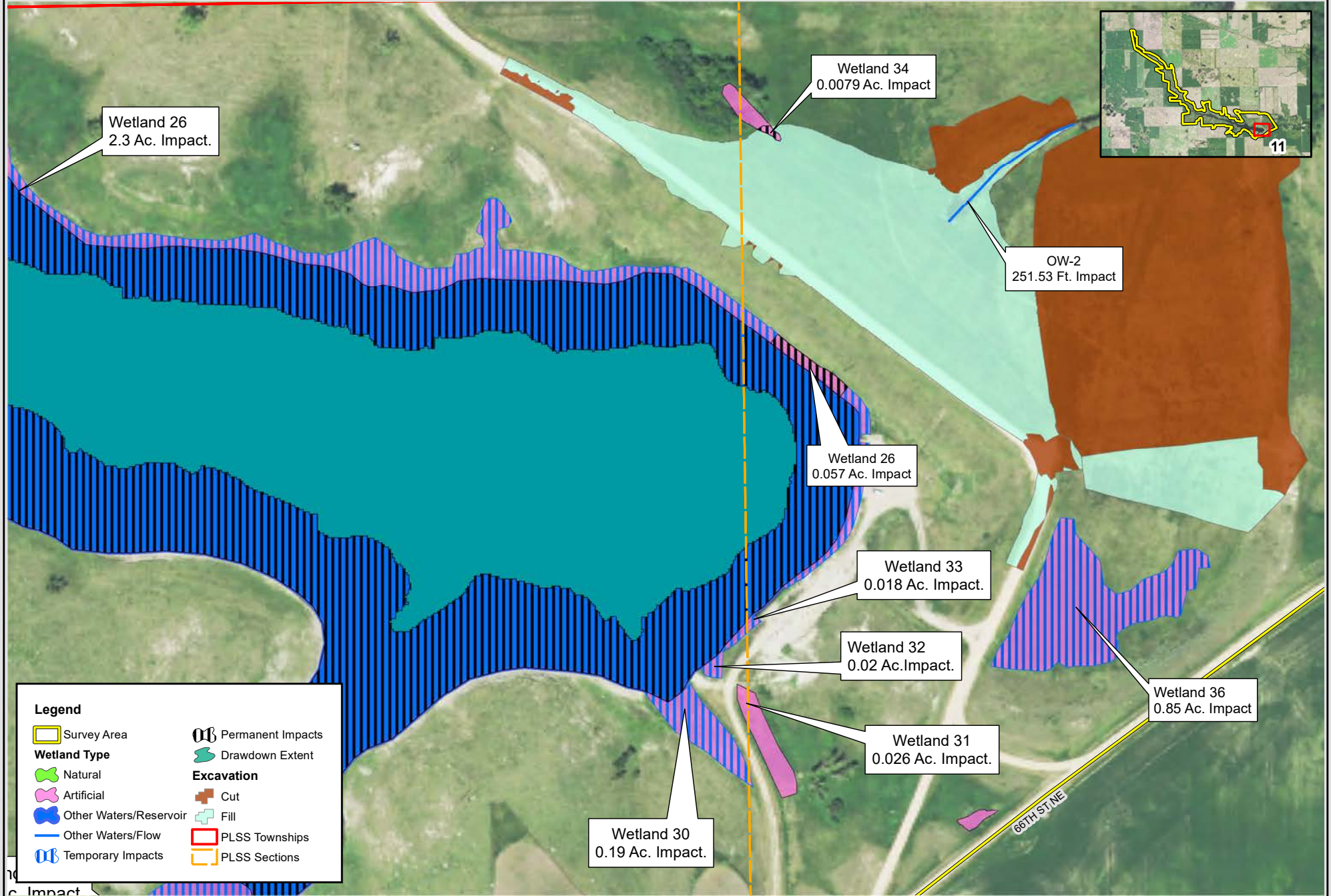
**Exhibit D-9-6 – Alternative 2 Impacts Map**

North Branch Forest River Dam No. 1 (Bylin Dam)  
Natural Resource Conservation Service (NRCS)



1 inch = 200 feet

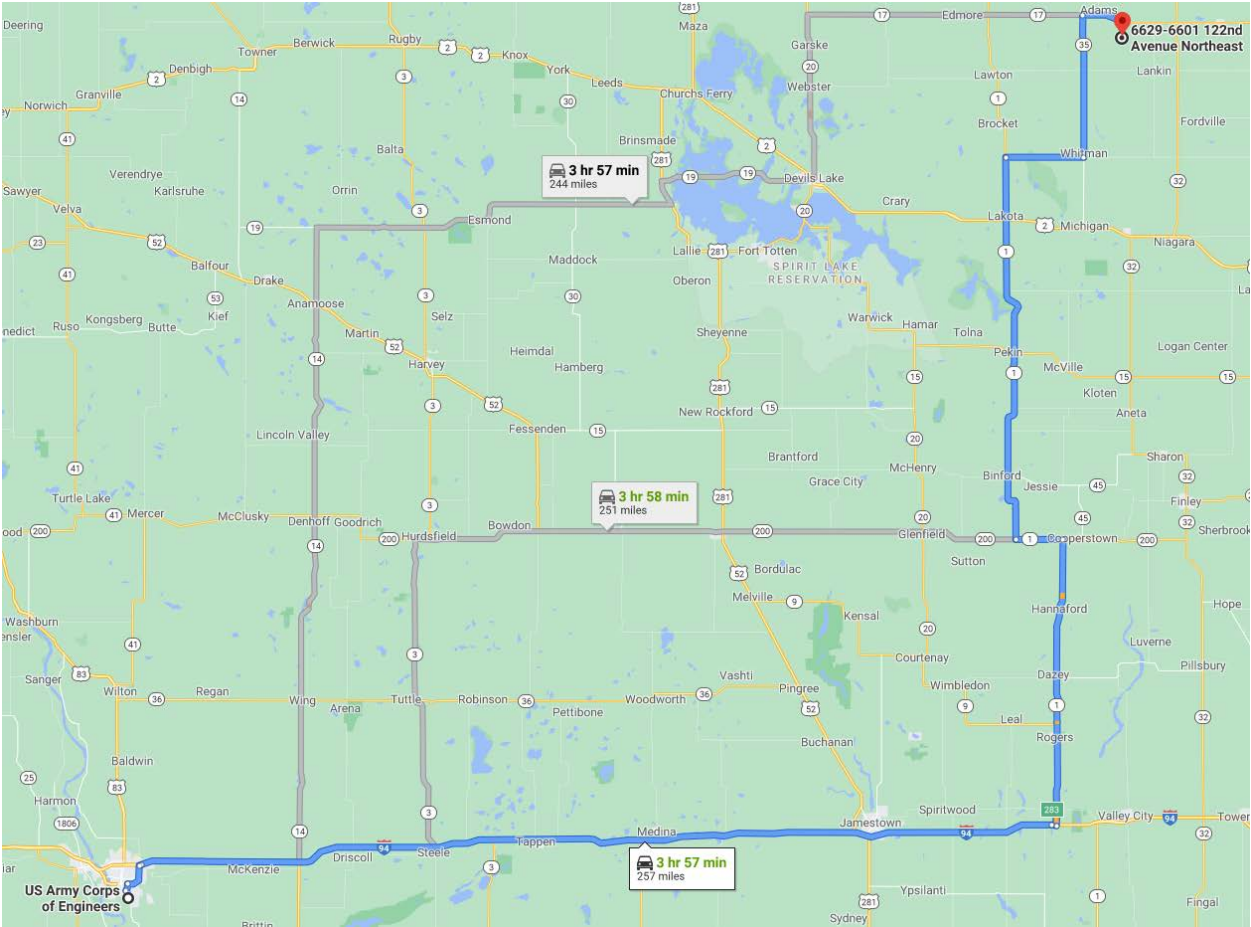




# APPENDIX D-9-A

## Google Maps Directions

From US Army Corps of Engineers to Bylin Dam- 257 Miles, 3 hrs and 27min



US Army Corps of Engineers

3319 University Dr, Bismarck, ND 58504

- ▼

Get on I-94 E/US-83 S from E Bismarck Expy

10 min (5.8 mi)

↑

Head north on ND-1804 N/Airport Expy/University Dr toward Sisseton St

1.0 mi

↱

Turn right onto Airport Rd

0.9 mi

↱

Turn right onto E Bismarck Expy

3.6 mi

⤴

Turn right to merge onto I-94 E/US-83 S toward Fargo

0.3 mi
- ▼

Follow I-94 E and ND-1 N to 51st St NE in Clara

3 hr 11 min (216 mi)

⤴

Merge onto I-94 E/US-83 S

i


Continue to follow I-94 E


121 mi


|   |  |
|---|--|
|   | 121 mi                                 |
| ➤ | Take exit 283 for ND-1 N toward Rogers |
|   | 0.6 mi                                 |
| ➤ | Turn left onto ND-1 N                  |
|   | 37.4 mi                                |
| ➤ | Turn left onto ND-1 N/ND-200 W         |
|   | 6.1 mi                                 |
| ➤ | Turn right onto ND-1 N                 |
|   | 51.4 mi                                |
| ▼ | Take ND-35 N to ND-17 E in Adams       |
|   | 27 min (28.0 mi)                       |
| ➤ | Turn right onto 51st St NE             |
|   | 10.0 mi                                |
| ➤ | Turn left onto ND-35 N                 |
|   | 18.1 mi                                |
| ➤ | Turn right onto ND-17 E                |
|   | 5 min (5.1 mi)                         |
| ➤ | Turn right onto 122nd Ave NE           |
|   | 4 min (2.1 mi)                         |


# APPENDIX D-9-B


## Selected Site Photographs


| Wetland #6- INFORMATION SUMMARY   |                                  |  |
|---|----------------------------------|--|
|  | <b>Location</b>                  | Lat: 48.37938842<br>Long: -98.05770244   |
|   | <b>Dominant Vegetation</b>       | <i>Typha X glauca</i> ,<br><i>Persicaria amphibia</i>  |
|   | <b>Soils</b>                     | Loam   |
|   | <b>Hydrology</b>                 | High Water Table,<br>Saturation, Aquatic<br>Invertebrates,<br>Saturation Visible<br>on Aerial Imagery,<br>Geomorphic<br>Position, and FAC-<br>Neutral Test |
|   | <b>Rationale for Delineation</b> | This area met all<br>wetland delineation<br>criteria   |


| Wetland #7- INFORMATION SUMMARY  |                                  |  |
|--|----------------------------------|--|
|  | <b>Location</b>                  | Lat: 48.378244,<br>Long: -98.057174  |
|  | <b>Dominant Vegetation</b>       | <i>Spartina pectinata</i> ,<br><i>Juncus articus</i> , and<br><i>Scirpus pallidus</i>  |
|  | <b>Soils</b>                     | Loam   |
|  | <b>Hydrology</b>                 | High Water Table,<br>Saturation, Aquatic<br>Invertebrates,<br>Saturation Visible<br>on Aerial Imagery,<br>Geomorphic<br>Position, and FAC-<br>Neutral Test |
|  | <b>Rationale for Delineation</b> | This area met all<br>wetland delineation<br>criteria   |


| Wetland #8- INFORMATION SUMMARY   |                                  |  |
|---|----------------------------------|--|
|  | <b>Location</b>                  | Lat: 48.378245,<br>Long: -98.057593                  |
|   | <b>Dominant Vegetation</b>       | <i>Phalaris arundinacea</i> and <i>Urtica dioica</i> |
|   | <b>Soils</b>                     | Loam   |
|   | <b>Hydrology</b>                 | Depleted Below<br>Dark Surface,<br>Depleted Matrix   |
|   | <b>Rationale for Delineation</b> | This area met all wetland delineation criteria       |


| Wetland #9- INFORMATION SUMMARY  |                                  |  |
|--|----------------------------------|--|
|  | <b>Location</b>                  | Lat: 48.370411,<br>Long: -98.054978  |
|  | <b>Dominant Vegetation</b>       | <i>Scirpus pallidus</i> ,<br><i>Eleocharis palustris</i> ,<br><i>Poa pratensis</i> ,<br><i>Hordeum jubatum</i> |
|  | <b>Soils</b>                     | Clay Loam  |
|  | <b>Hydrology</b>                 | Saturation visible<br>on aerial imagery,<br>Geomorphic<br>Position, and FAC-<br>Neutral Test                   |
|  | <b>Rationale for Delineation</b> | This area met all wetland delineation criteria   |


| Wetland #14- INFORMATION SUMMARY  |                                  |  |
|---|----------------------------------|--|
|  <p>34.5° N: T<br/>Lat: 48.374644° N Lon: 98.042493° W</p> | <b>Location</b>                  | Lat: 48.374637,<br>Long: -98.042491                  |
|   | <b>Dominant Vegetation</b>       | <i>Spartina pectinata</i>                            |
|   | <b>Soils</b>                     | Clay Loam and Loam                                   |
|   | <b>Hydrology</b>                 | FAC-Neutral Test<br>and Geomorphic<br>Position       |
|   | <b>Rationale for Delineation</b> | This area met all<br>wetland delineation<br>criteria |


| Wetland #15- INFORMATION SUMMARY  |                                  |   |
|---|----------------------------------|---|
|  <p>149.3° N: T<br/>Lat: 48.373422° N Lon: 98.038887° W</p> | <b>Location</b>                  | Lat: 48.373402,<br>Long: -98.038884                             |
|   | <b>Dominant Vegetation</b>       | <i>Spartina pectinata</i>                                       |
|   | <b>Soils</b>                     | Silty Loam and Clay<br>sand                                     |
|   | <b>Hydrology</b>                 | Saturation,<br>Geomorphic<br>Position, and FAC-<br>Neutral Test |
|   | <b>Rationale for Delineation</b> | This area met all<br>wetland delineation<br>criteria            |


| Wetland #18- INFORMATION SUMMARY  |                                  |  |
|---|----------------------------------|--|
|  <p>98.0° N: T<br/>Lat: 48.369256° N Lon: 98.039916° W</p> | <b>Location</b>                  | Lat: 48.37241453<br>Long: -98.0396535                |
|   | <b>Dominant Vegetation</b>       | <i>Typha X glauca</i> and<br><i>Carex lacustris</i>  |
|   | <b>Soils</b>                     | Loam and Silty Loam                                  |
|   | <b>Hydrology</b>                 | Geomorphic<br>Position and FAC-<br>Neutral Test      |
|   | <b>Rationale for Delineation</b> | This area met all<br>wetland delineation<br>criteria |


| Wetland #22- INFORMATION SUMMARY  |                                  |  |
|---|----------------------------------|--|
|  <p>349.4° N: T<br/>Lat: 48.370828° N Lon: 98.036484° W</p> | <b>Location</b>                  | Lat: 48.37064801<br>Long: -98.03669514               |
|   | <b>Dominant Vegetation</b>       | <i>Carex atherodes</i>                               |
|   | <b>Soils</b>                     | Clay Loam  |
|   | <b>Hydrology</b>                 | Geomorphic<br>Position and FAC-<br>Neutral Test      |
|   | <b>Rationale for Delineation</b> | This area met all<br>wetland delineation<br>criteria |


| Wetland #23- INFORMATION SUMMARY  |                           |  |
|---|---------------------------|--|
|  | Location                  | Lat: 48.37213494<br>Long: -98.03598026         |
|   | Dominant Vegetation       | <i>Phalaris arundinacea</i>                    |
|   | Soils                     | Loam   |
|   | Hydrology                 | Geomorphic Position and FAC-Neutral Test       |
|   | Rationale for Delineation | This area met all wetland delineation criteria |


| Wetland #23- INFORMATION SUMMARY   |                           |  |
|--|---------------------------|--|
|  | Location                  | Lat: 48.37347474<br>Long: -98.03399531                   |
|  | Dominant Vegetation       | <i>Phalaris arundinacea</i>                              |
|  | Soils                     | Loam   |
|  | Hydrology                 | Surface Water, Geomorphic Position, and FAC-Neutral Test |
|  | Rationale for Delineation | This area met all wetland delineation criteria           |


| Wetland #23- INFORMATION SUMMARY  |                                  |  |
|---|----------------------------------|--|
|  | <b>Location</b>                  | Lat: 48.372635,<br>Long: -98.032131                                |
|   | <b>Dominant Vegetation</b>       | <i>Phalaris arundinacea</i>  |
|   | <b>Soils</b>                     | Loam   |
|   | <b>Hydrology</b>                 | Surface Water,<br>Geomorphic<br>Position, and FAC-<br>Neutral Test |
|   | <b>Rationale for Delineation</b> | This area met all<br>wetland delineation<br>criteria               |


| Wetland #24- INFORMATION SUMMARY   |                                  |   |
|--|----------------------------------|---|
|  | <b>Location</b>                  | Lat: 48.366373,<br>Long: -98.032521   |
|  | <b>Dominant Vegetation</b>       | <i>Typha X. glauca</i>  |
|  | <b>Soils</b>                     | Clay Loam   |
|  | <b>Hydrology</b>                 | High Water Table,<br>Saturation,<br>Saturation Visible<br>on Aerial Imagery,<br>and FAC-Neutral<br>Test |
|  | <b>Rationale for Delineation</b> | This area met all<br>wetland delineation<br>criteria  |


| Wetland #30- INFORMATION SUMMARY  |                                  |  |
|---|----------------------------------|--|
|  | <b>Location</b>                  | Lat: 48.366023,<br>Long: -98.011597  |
|   | <b>Dominant Vegetation</b>       | <i>Phalaris arundinacea</i> and <i>Urtica dioica</i>                                     |
|   | <b>Soils</b>                     | Clay Loam  |
|   | <b>Hydrology</b>                 | High Water Table, Saturation, Saturation Visible on Aerial Imagery, and FAC-Neutral Test |
|   | <b>Rationale for Delineation</b> | This area met all wetland delineation criteria   |


| Wetland #33- INFORMATION SUMMARY   |                                  |  |
|--|----------------------------------|--|
|  | <b>Location</b>                  | Lat: 48.175054,<br>Long: -97.758172  |
|  | <b>Dominant Vegetation</b>       | <i>Salix interior</i> , <i>Acer negundo</i> , <i>Alopecurus pratensis</i> , and <i>Solidago canadensis</i> |
|  | <b>Soils</b>                     | Sandy Loam and Sandy Clay Loam   |
|  | <b>Hydrology</b>                 | Saturation Visible on Aerial Imagery, and Geomorphic Position  |
|  | <b>Rationale for Delineation</b> | This area met all wetland delineation criteria   |


| Wetland #34- INFORMATION SUMMARY  |                                  |   |
|---|----------------------------------|---|
|  | <b>Location</b>                  | Lat: 48.36591277<br>Long: -98.01042665  |
|   | <b>Dominant Vegetation</b>       | <i>Phalaris arundinacea</i>   |
|   | <b>Soils</b>                     | Clay Loam   |
|   | <b>Hydrology</b>                 | High Water Table, Saturation, Saturation Visible on Aerial Imagery, Geomorphic Position, and FAC-Neutral Test |
|   | <b>Rationale for Delineation</b> | This area met all wetland delineation criteria  |


| Wetland #36- INFORMATION SUMMARY   |                                  |   |
|--|----------------------------------|---|
|  | <b>Location</b>                  | Lat: 48.181611,<br>Long: -97.756883   |
|  | <b>Dominant Vegetation</b>       | <i>Alopecurus pratensis</i>   |
|  | <b>Soils</b>                     | Clay Loam   |
|  | <b>Hydrology</b>                 | High Water Table, Saturation, Saturation Visible on Aerial Imagery, Geomorphic Position, FAC-Neutral Test, and Frost Heave Hummocks |
|  | <b>Rationale for Delineation</b> | This area met all wetland delineation criteria  |


| Other Water #2a - INFORMATION SUMMARY  |                                  |   |
|--|----------------------------------|---|
|  <p>133.5° N: T<br/>Lat: 48.380135° N Lon: 98.057446° W</p> | <b>Location</b>                  | Lat: 48.380135, Long: -98.057446                              |
|  | <b>Dominant Vegetation</b>       | <i>Spartina pectinata</i> and <i>Symphyotrichum ericoides</i> |
|  | <b>Soils</b>                     | Clay Loam   |
|  | <b>Hydrology</b>                 | Natural drainage that has hydrology most years                |
|  | <b>Rationale for Delineation</b> | Potential other water indicators are present                  |


| Other Water #2b - INFORMATION SUMMARY   |                                  |  |
|---|----------------------------------|--|
|  <p>162.6° N: T<br/>Lat: 48.378664° N Lon: 98.056586° W</p> | <b>Location</b>                  | Lat: 48.378664, Long: -98.056586               |
|   | <b>Dominant Vegetation</b>       | <i>Phalaris arundinacea</i>                    |
|   | <b>Soils</b>                     | Clay Loam                                      |
|   | <b>Hydrology</b>                 | Natural drainage that has hydrology most years |
|   | <b>Rationale for Delineation</b> | Potential other water indicators are present   |


| Other Water #2c - INFORMATION SUMMARY  |                                  |  |
|--|----------------------------------|--|
|  <p>125.4° N: T<br/>Lat: 48.368650° N Lon: 98.010467° W</p> | <b>Location</b>                  | Lat: 48.368650, Long: -98.010467                                       |
|  | <b>Dominant Vegetation</b>       | <i>Schoenoplectus tabernaemontani</i> and <i>Phalaris arundinacea</i>  |
|  | <b>Soils</b>                     | Clay Loam  |
|  | <b>Hydrology</b>                 | Natural drainage that has hydrology most years; incised stream channel |
|  | <b>Rationale for Delineation</b> | Potential other water indicators are present                           |


| Other Water #13 - INFORMATION SUMMARY   |                                  |   |
|---|----------------------------------|---|
|  <p>15:33 PM 8/19/20<br/>97.7° N: T<br/>Lat: 48.365793° N Lon: 98.015382° W</p> | <b>Location</b>                  | Lat: 48.365781, Long: -98.015382  |
|   | <b>Dominant Vegetation</b>       | <i>Typha X glauca</i> , <i>Spartina pectinate</i> , <i>Salix interior</i> , and <i>Sagittaria latifolia</i> |
|   | <b>Soils</b>                     | Clay Loam   |
|   | <b>Hydrology</b>                 | Dam reservoir pool with hydrology year round  |
|   | <b>Rationale for Delineation</b> | Potential other water indicators are present  |


| Other Water #14 - INFORMATION SUMMARY   |                                  |   |
|---|----------------------------------|---|
|  | <b>Location</b>                  | Lat: 48.398373,<br>Long: -98.080766                               |
|   | <b>Dominant Vegetation</b>       | <i>Typha X glauca</i>   |
|   | <b>Soils</b>                     | Clay Loam   |
|   | <b>Hydrology</b>                 | Natural depressional<br>drainage that has<br>hydrology year round |
|   | <b>Rationale for Delineation</b> | Potential other<br>water indicators are<br>present                |

| Other Water #16 - INFORMATION SUMMARY  |                                  |   |
|--|----------------------------------|---|
|  | <b>Location</b>                  | Lat: 48.379365,<br>Long: -98.057203   |
|  | <b>Dominant Vegetation</b>       | -   |
|  | <b>Soils</b>                     | Clay Loam   |
|  | <b>Hydrology</b>                 | Natural drainage<br>that has hydrology<br>most years; incised<br>stream channel |
|  | <b>Rationale for Delineation</b> | Potential other<br>water indicators are<br>present                              |

| Other Water #22 - INFORMATION SUMMARY   |                                  |  |
|---|----------------------------------|--|
|  | <b>Location</b>                  | Lat: 48.370324,<br>Long: -98.057455                  |
|   | <b>Dominant Vegetation</b>       | -  |
|   | <b>Soils</b>                     | Clay Loam  |
|   | <b>Hydrology</b>                 | Natural drainage<br>that has hydrology<br>most years |
|   | <b>Rationale for Delineation</b> | Potential other<br>water indicators are<br>present   |

| Other Water #30 - INFORMATION SUMMARY  |                                  |   |
|--|----------------------------------|---|
|  | <b>Location</b>                  | Lat: 48.373619,<br>Long: -98.038981   |
|  | <b>Dominant Vegetation</b>       | <i>Typha X glauca</i> and<br><i>Spartina pectinata</i>                      |
|  | <b>Soils</b>                     | Clay Loam   |
|  | <b>Hydrology</b>                 | Natural drainage<br>that has hydrology<br>for part of the<br>growing season |
|  | <b>Rationale for Delineation</b> | Potential other<br>water indicators are<br>present                          |

| Other Water #32 - INFORMATION SUMMARY   |                                  |  |
|---|----------------------------------|--|
|  | <b>Location</b>                  | Lat: 48.373079,<br>Long: -98.036102  |
|   | <b>Dominant Vegetation</b>       | <i>Spartina Pectinata</i> ,<br><i>Poa pratensis</i> , and<br><i>Sonchus arvensis</i> |
|   | <b>Soils</b>                     | Clay Loam  |
|   | <b>Hydrology</b>                 | Depressional<br>drainage that has<br>hydrology for part of<br>the growing season     |
|   | <b>Rationale for Delineation</b> | Potential other<br>water indicators are<br>present                                   |

| Other Water #48 - INFORMATION SUMMARY  |                                  |  |
|--|----------------------------------|--|
|  | <b>Location</b>                  | Lat: 48.364994,<br>Long: -98.015794                  |
|  | <b>Dominant Vegetation</b>       | <i>Phalaris<br/>arundinacea</i>                      |
|  | <b>Soils</b>                     | Clay Loam  |
|  | <b>Hydrology</b>                 | Natural drainage that<br>has hydrology most<br>years |
|  | <b>Rationale for Delineation</b> | Potential other<br>water indicators are<br>present   |



# APPENDIX D-9-C

## Plant List

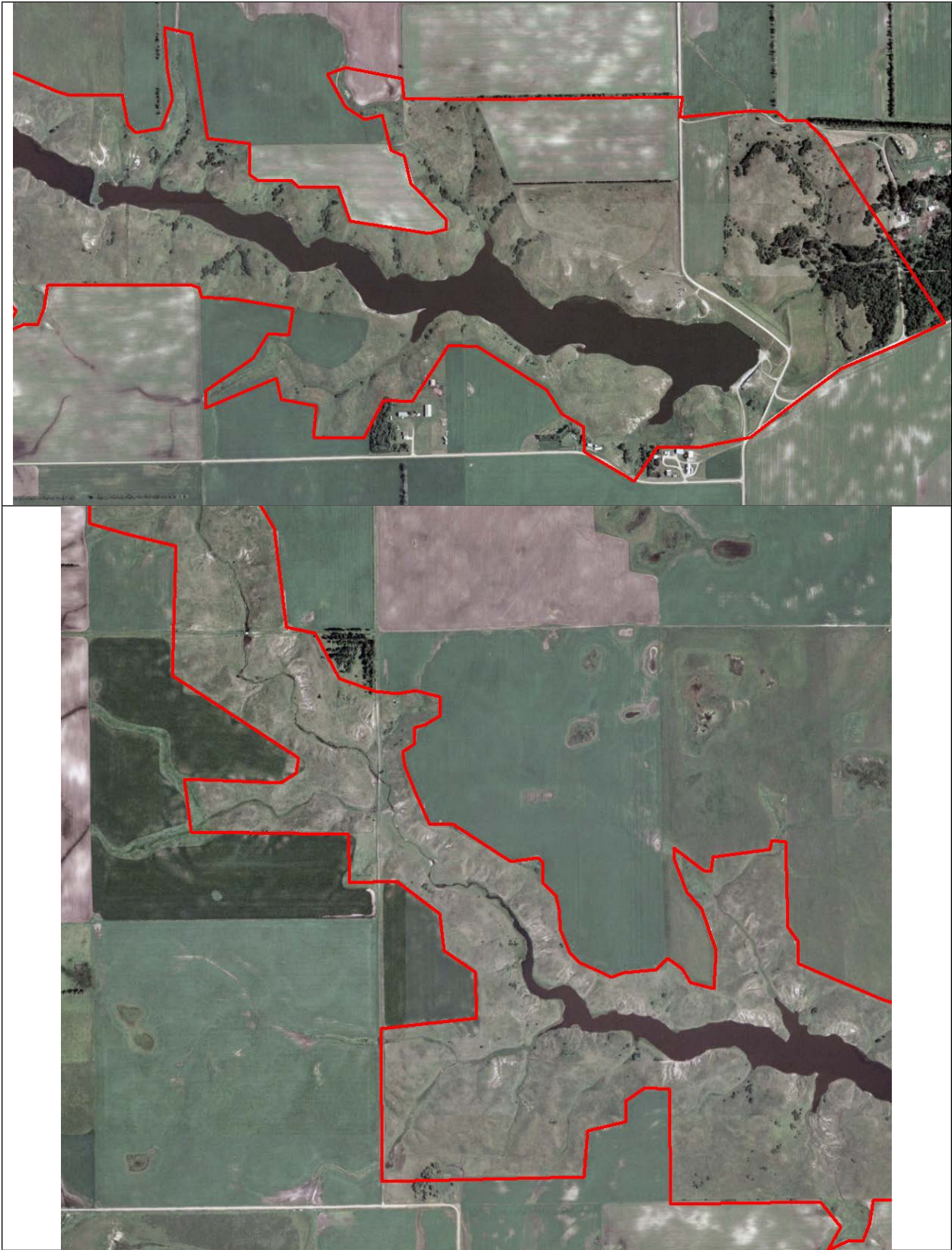
## Appendix D-9-C: Plant List (species names from Lichvar et al. 2016; noxious weed lists from ND Department of Agriculture 2020).

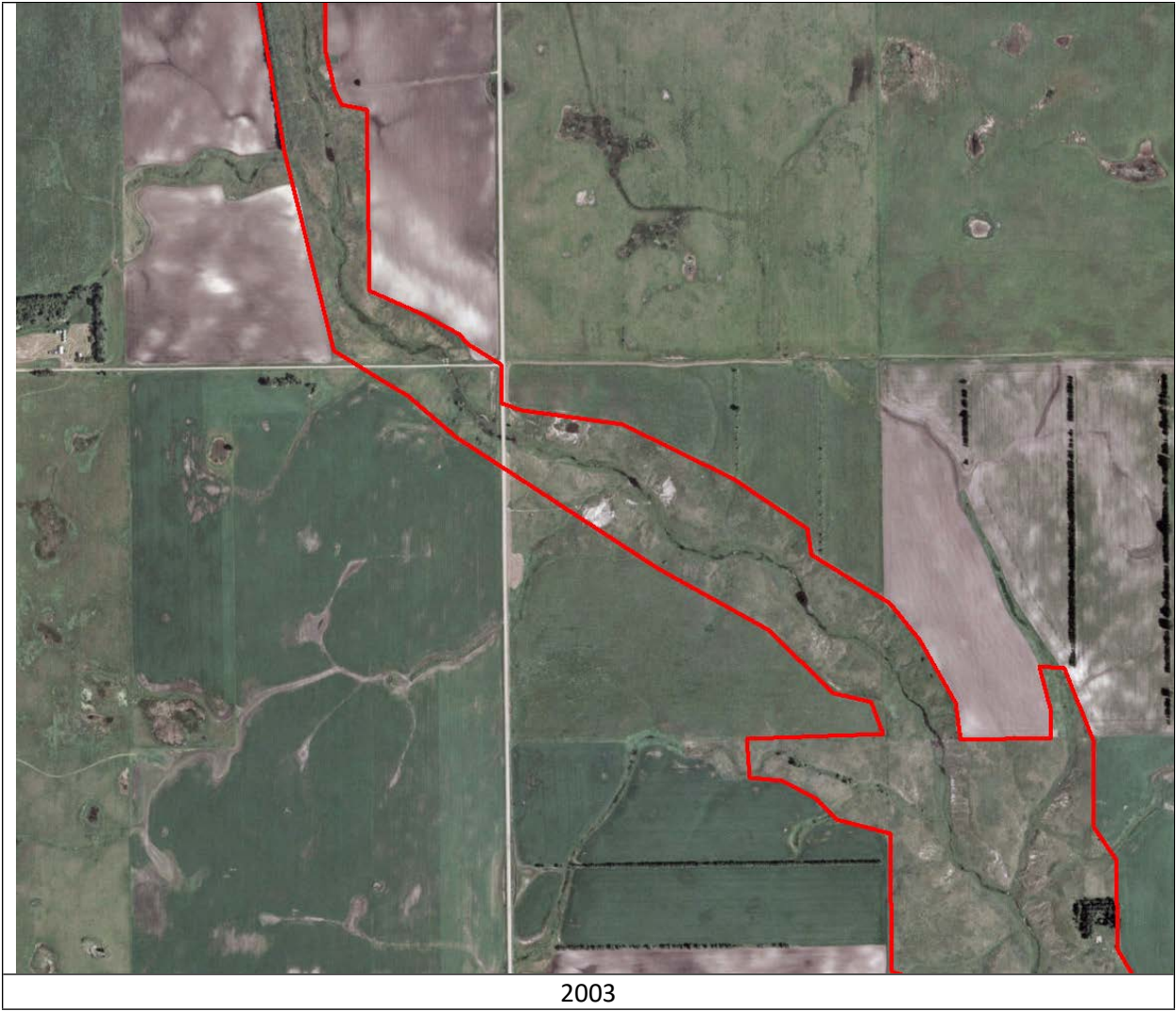
| Genus/Species                   | Common Name              | Indicator Status Great Plains region | Dominant Wetland plants | Dominant Upland Plants | Stratum    | Native status/noxious weeds |
|---------------------------------|--------------------------|--------------------------------------|-------------------------|------------------------|------------|-----------------------------|
| <i>Acer negundo</i>             | boxelder                 | FAC                                  | x                       |                        | tree       | native                      |
| <i>Achillea millefolium</i>     | common yarrow            | FACU                                 |                         |                        | herb       | native                      |
| <i>Alopecurus pratensis</i>     | meadow foxtail           | FACW                                 | x                       |                        | herb       | exotic                      |
| <i>Amorpha canescens</i>        | lead plant               | not listed                           |                         |                        | shrub      | native                      |
| <i>Artemisia absinthium</i>     | absinth wormwood         | not listed                           |                         |                        | herb       | Invasive/noxious            |
| <i>Artemisia biennis</i>        | biennial wormwood        | FACU                                 |                         |                        | shrub      | invasive                    |
| <i>Bromus inermis</i>           | smooth brome             | UPL                                  | x                       | x                      | herb       | invasive                    |
| <i>Calamagrostis canadensis</i> | Canada bluejoint         | FACW                                 |                         |                        | herb       | native                      |
| <i>Carex atherodes</i>          | slough sedge             | OBL                                  | x                       |                        | herb       | native                      |
| <i>Cirsium arvense</i>          | Canada thistle           | FACU                                 |                         | x                      | herb       | Invasive/noxious            |
| <i>Eleocharis palustris</i>     | common spikerush         | OBL                                  | x                       |                        | herb       | native                      |
| <i>Elymus repens</i>            | quackgrass               | FACU                                 |                         | x                      | herb       | invasive                    |
| <i>Euphorbia esula</i>          | leafy spurge             | not listed                           |                         | x                      | herb       | Invasive/noxious            |
| <i>Glycyrrhiza lepidota</i>     | wild licorice            | FACU                                 |                         |                        | herb       | native                      |
| <i>Grindelia squarrosa</i>      | gumweed                  | UPL                                  |                         |                        | herb       | native                      |
| <i>Hordeum jubatum</i>          | foxtail barley           | FACW                                 | x                       |                        | herb       | native                      |
| <i>Juncus arcticus</i>          | arctic rush              | FACW                                 | x                       |                        | herb       | native                      |
| <i>Lycopus americanus</i>       | American water horehound | OBL                                  |                         |                        | herb       | native                      |
| <i>Medicago lupulina</i>        | black medick             | FACU                                 |                         |                        | herb       | invasive                    |
| <i>Panicum virgatum</i>         | switchgrass              | FAC                                  | x                       |                        | herb       | native                      |
| <i>Persicaria amphibia</i>      | swamp smartweed          | OBL                                  | x                       |                        | herb       | native                      |
| <i>Phalaris arundinacea</i>     | reed canary grass        | FACW                                 | x                       |                        | herb       | native                      |
| <i>Poa palustris</i>            | fowl bluegrass           | FACW                                 |                         |                        | herb       | native                      |
| <i>Poa pratensis</i>            | Kentucky blue grass      | FACU                                 |                         | x                      | herb       | exotic                      |
| <i>Potentilla anserina</i>      | silver cinquefoil        | FACW                                 |                         |                        | herb       | native                      |
| <i>Salix interior</i>           | sandbar willow           | FACW                                 | x                       |                        | Tree/shrub | native                      |
| <i>Scirpus atrovirens</i>       | green bulrush            | OBL                                  |                         |                        | herb       | native                      |
| <i>Scirpus pallidus</i>         | pale bulrush             | OBL                                  | x                       |                        | herb       | native                      |
| <i>Shepherdia argentea</i>      | silver buffaloberry      | UPL                                  |                         | x                      | shrub      | native                      |
| <i>Sium suave</i>               | water parsnip            | OBL                                  |                         |                        | herb       | native                      |

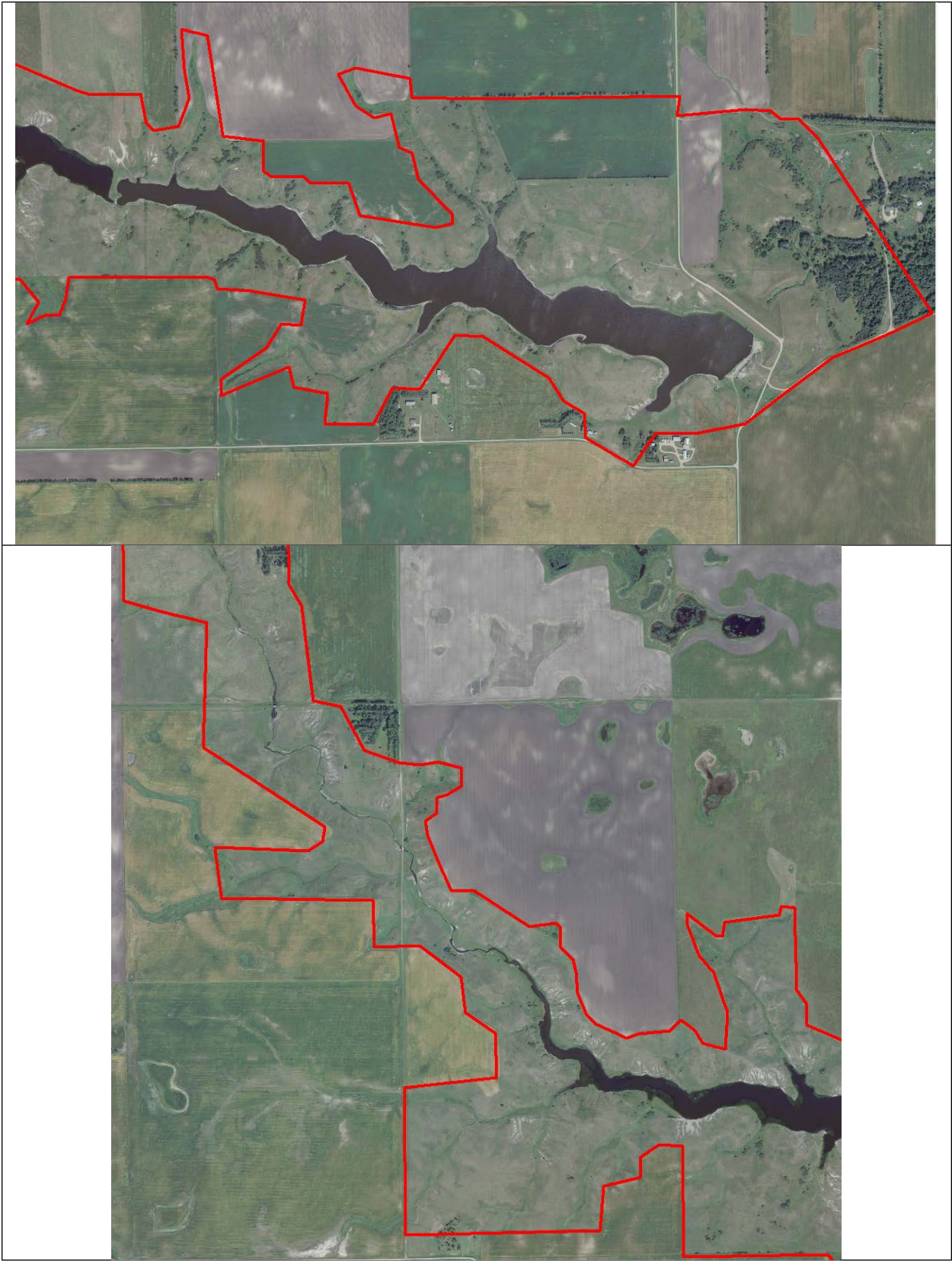
|                                    |                       |      |   |   |       |                     |
|------------------------------------|-----------------------|------|---|---|-------|---------------------|
| <i>Solidago canadensis</i>         | Canada goldenrod      | FACU |   |   | herb  | native              |
| <i>Sonchus arvensis</i>            | perennial sow thistle | FAC  |   |   | herb  | exotic              |
| <i>Spartina pectinata</i>          | prairie cordgrass     | FACW | x |   | herb  | native              |
| <i>Symphoricarpos albus</i>        | snowberry             | UPL  |   | x | shrub | native              |
| <i>Symphoricarpos occidentalis</i> | buck brush            | UPL  |   | x | shrub | native              |
| <i>Symphyotrichum ericoides</i>    | heath aster           | FACU |   |   | herb  | native              |
| <i>Symphyotrichum lanceolatum</i>  | panicked aster        | FACW |   |   | herb  | native              |
| <i>Symphyotrichum laeve</i>        | smooth blue aster     | FACU |   |   | herb  | native              |
| <i>Taraxacum officinale</i>        | common dandelion      | FACU |   | x | herb  | introduced/invasive |
| <i>Trifolium repens</i>            | white clover          | FACU |   | x | herb  | exotic              |
| <i>Typha X glauca</i>              | hybrid cattail        | OBL  | x |   | herb  | native              |
| <i>Urtica dioica</i>               | stinging nettle       | FAC  | x |   | herb  | native              |

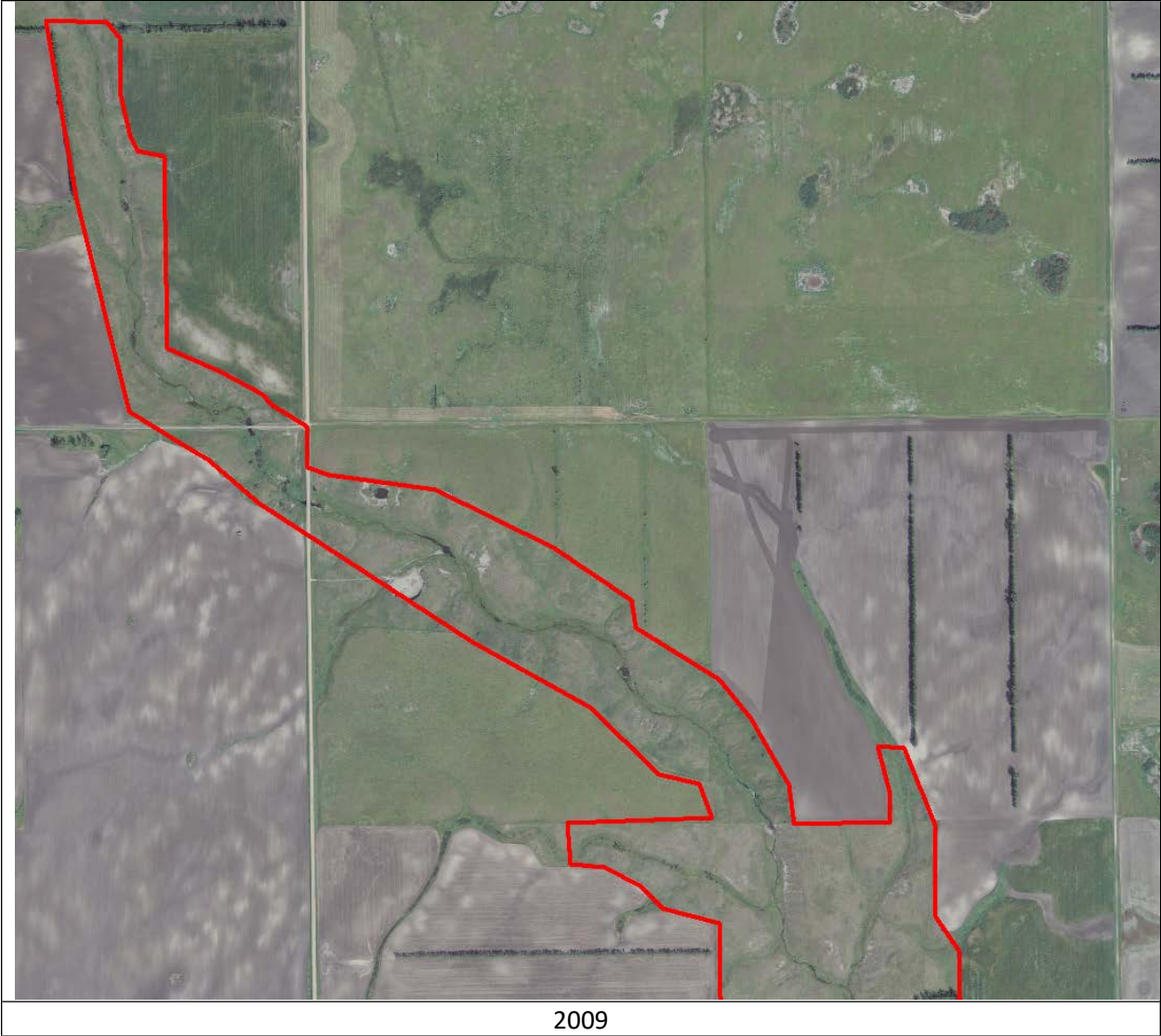
# APPENDIX D-9-D

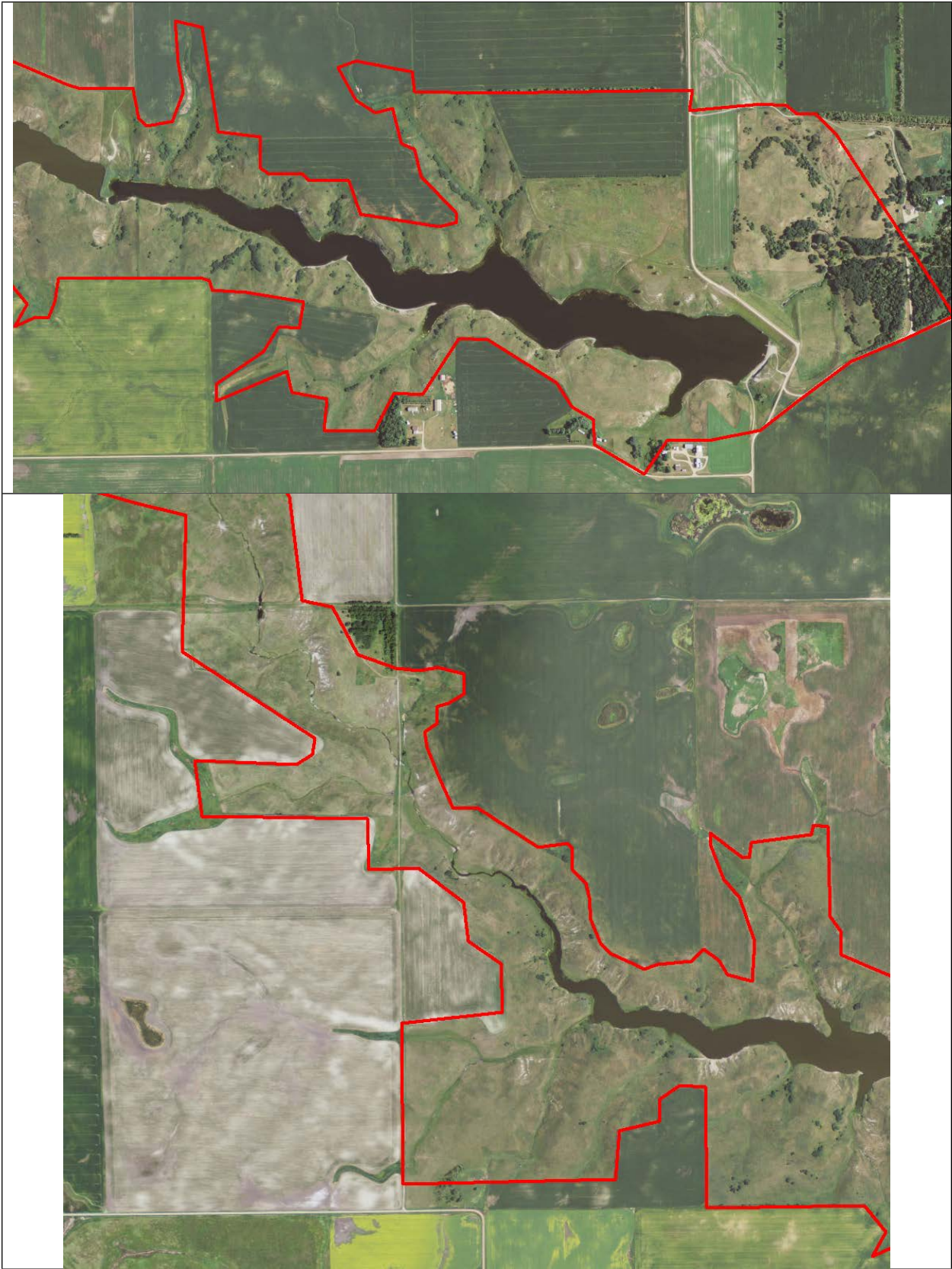
## Historical Aerial Photographs

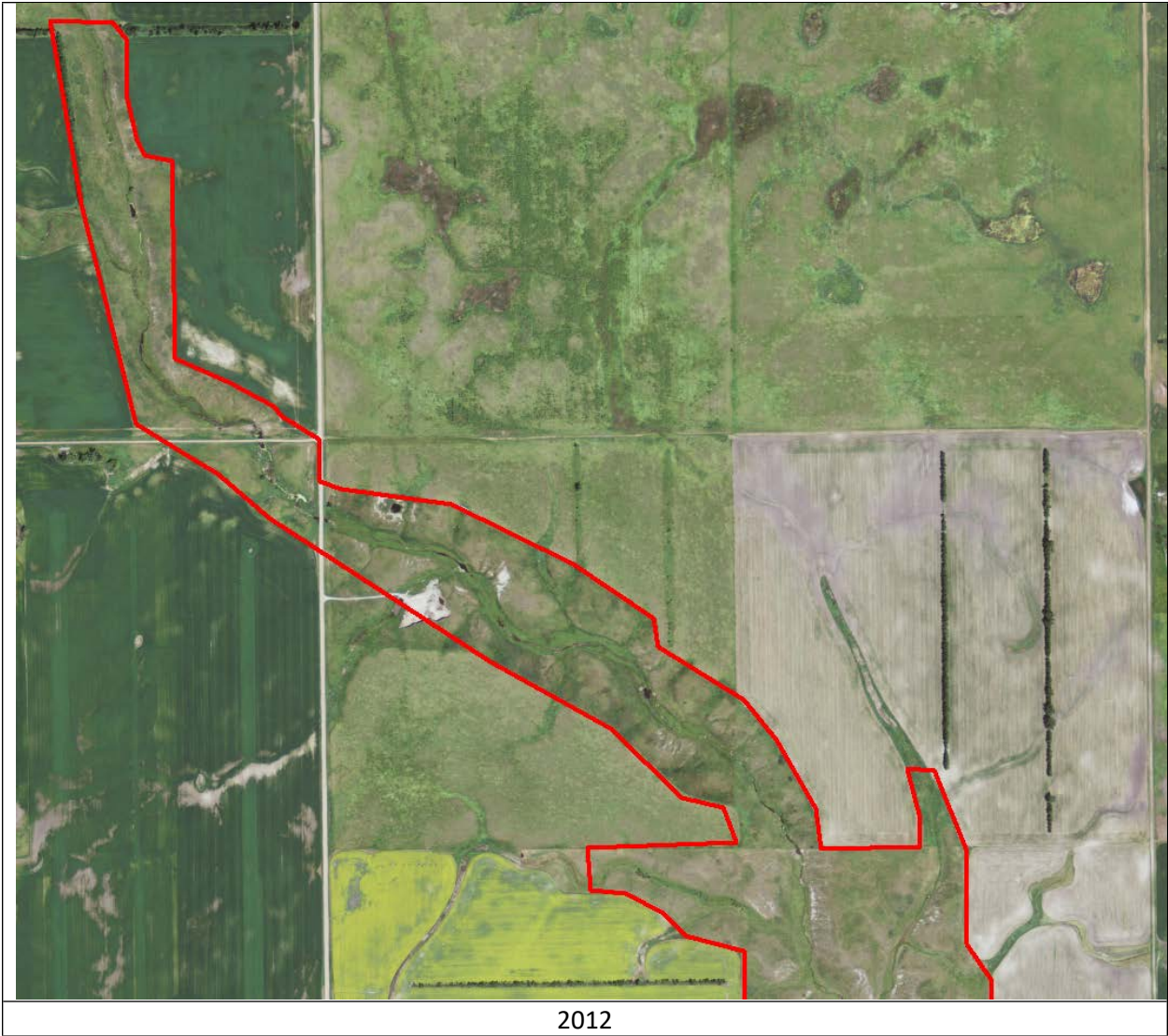


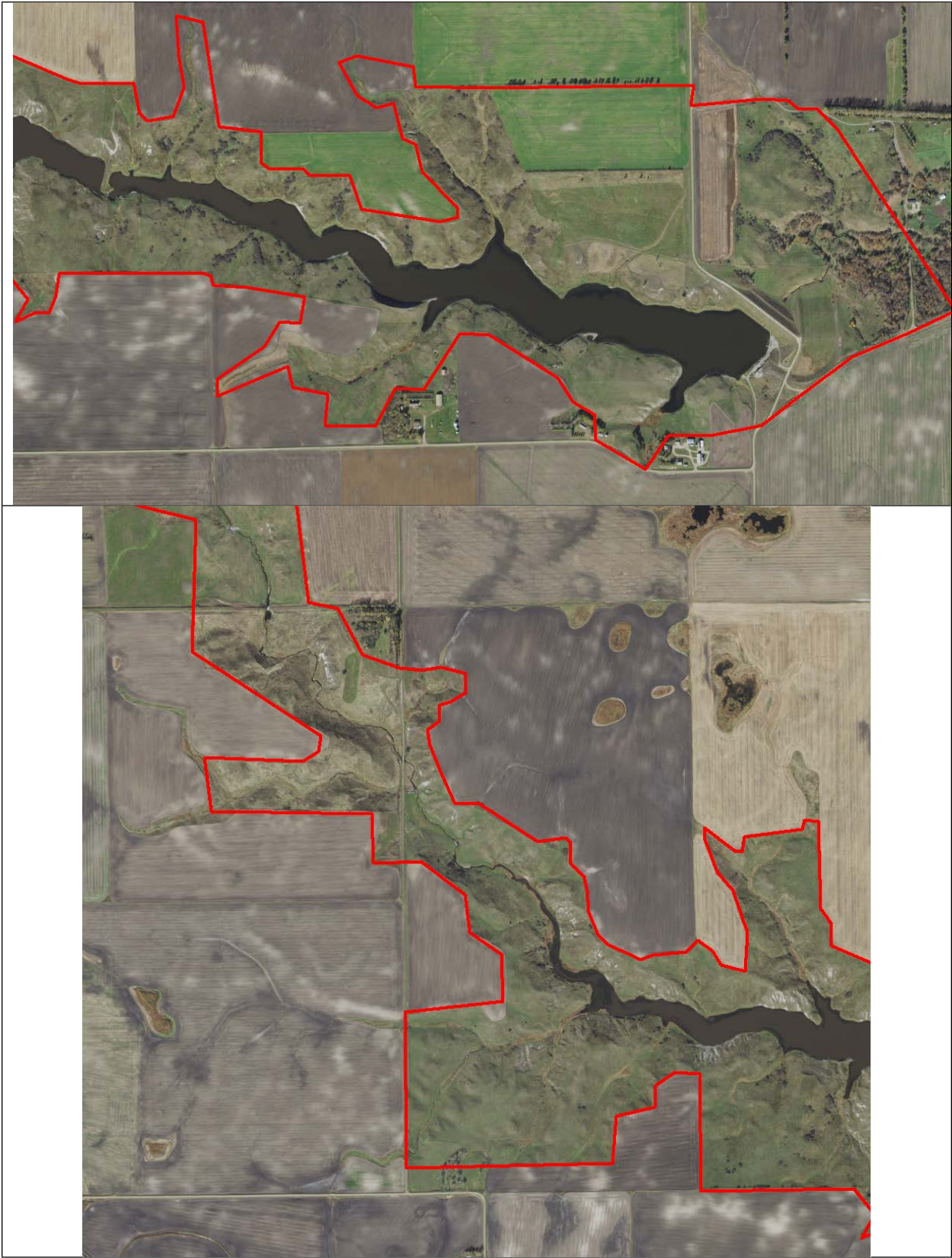


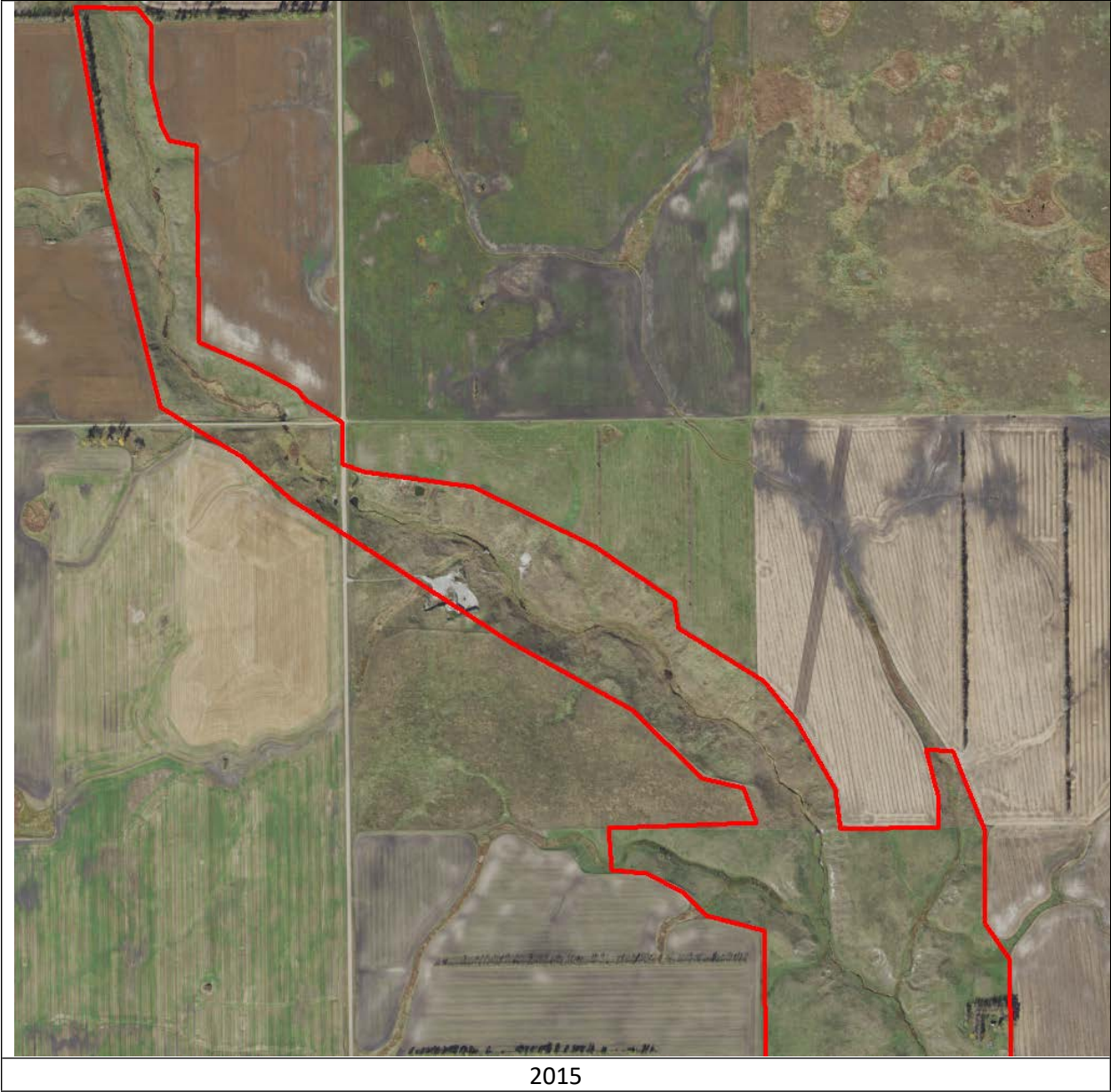
















2017

