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Mitigation Plan – Amendment 2

November 19, 2021

Sullivan Wetland Bank

Tyrone Township,
Le Sueur County, Minnesota

Submitted by:

Bolton & Menk, Inc.
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Wetland Mitigation Proposal

Mitigation Plan (Full Application)



BWSR

Submit this document to the [Corps of Engineers](#) and Wetland Conservation Act (WCA) [Local Government Unit](#) (LGU).

PROJECT NAME Sullivan Wetland Bank	Project Type <input checked="" type="checkbox"/> Wetland Bank <input type="checkbox"/> In Lieu Fee Site <input type="checkbox"/> Project Specific (PRM)
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SPONSOR INFORMATION

Agent Information

Sponsor's Full Name Todd Sullivan			Authorized Agent's Name and Title (if applicable) Dan Donayre & Eva Douma		
Company Bolton & Menk, Inc.			Company Bolton & Menk, Inc.		
Street Address 33244 245th Ave			Street Address 1960 Premier Drive		
City Le Center	State MN	Zip Code 56057	City Mankato	State MN	Zip Code 56001
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E-mail Address <i>Click to enter text.</i>			E-mail Address dan.donayre@bolton-menk.com & eva.douma@bolton-menk.com		
Sponsor's Relationship to Property <input checked="" type="checkbox"/> Fee Title Owner <input type="checkbox"/> Contract for Deed <input type="checkbox"/> Contract or agreement with fee owner <input type="checkbox"/> Other: (describe)					

STATEMENT OF AUTHORIZATION (required if agent is authorized to represent, and sign for, sponsor)

I hereby authorize, **Bolton & Menk, Inc.** to act on my behalf as my agent in the processing of this document and to furnish, upon request, supplemental information in support of this document.

Signature of Sponsor

1/5/2021
 Date

PROJECT LOCATION (Include a Site Location Map)

County Le Sueur		Est. Easement Size (acres) 39	<u>Watershed Name/No. or HUC 8</u> 33 - Minnesota River - Shakopee		<u>Bank Service Area</u> BSA 9
Latitude: °N	Longitude: °W	Section No. 24	Township No. 112	Range No. 25	

- ☐ Check this box if you are only requesting review under WCA.
- ☐ Check this box if this is a Minnesota *Agricultural* Wetland Bank proposal.

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SECTIONS

Do not leave any of the following sections or subsections blank. If a section does not apply to your project, then enter "not applicable" for that section and explain why.

1. Regulatory Review Status and Project History

Identify and discuss the extent of review and comments received on this pending wetland banking project to date. Reference and include review letters and findings related to previous scrutiny of the proposed project by local, state, and federal review entities.

The Mitigation Plan and Draft MBI were submitted on January 26, 2021. BWSR comments were received on May 25, 2021, Corps and IRT comments were received on April 27, 2021. The BWSR and IRT comments have been addressed as follows:

BWSR Comments:

1. The Mitigation Plan form being used for the Sullivan Bank includes all the information required by the current Mitigation Plan form on the BWSR website.
2. The ownership of easement 03.019.0400 has been updated to match the ownership of the adjoining easements.
3. The document has been updated so that exhibit numbers correspond with the correct exhibit.
4. Exhibit P2 show six of the last 10 years being cultivated in both restoration areas.
5. The buffer of reduced credit has been increased to 50-feet.
6. Credit table updated with final credit allocation based on agency comments.
7. Buffer credits have been distributed into shrub-carr credits.
8. The performance standards have been updated accordingly.
9. Although it is impractical to identify native vs non-native cattail species, it can be done. During vegetative management, all cattails will be treated as non-native. But if they cannot be controlled than determining their native status will be important on future management.
10. The performance standards have been updated accordingly.
11. The performance standards have been updated accordingly.
12. The performance standards have been updated accordingly.
13. The herbaceous stratum of the shrub-carr community relative cover has been updated.
14. The subscript for the performance standards has been updated.
15. Vegetation plan has been updated for a fall 2021 seeding.
16. The vegetation management plan has been updated to include shrub-carr species.
17. The vegetation maintenance plan has been updated to show that the deep marsh plugs will be planted at the same time as the seeding of the entire site.
18. The sponsor will be using a combination of glyphosate and mowing to control reed canary grass. The sponsor's consultant has been using this method and it has been very successful.
19. Aerial estimates of plant communities will be included in each annual report. The plant community survey is conducted the third year and as part of the final delineation.
20. The monitoring plan has been updated to reflect shrub-carr monitoring.
21. It was not intended for the well data to be used as part of the final delineation. The narrative has been updated.
22. By capturing the ground elevation at each well, the software can correlate the water table elevation. This firm water table elevation throughout the growing season is graphed and correlated throughout the wetland. The concept is that the water table should be consistent through each mapped soil type, hence basing well placement on soil type at the shallow marsh/fresh (wet) meadow boundary. No wells are placed in the deep marsh because of access issues and the ability to determine water levels across the open pool using the elevations. Staff gauges are not recommended because of the difficulty in collecting sufficient and accurate data. The use of this methodology has been used for several years by the sponsor's consultant to great success.

23. The monitoring plan has been updated.
24. The Phase I Archaeological Survey removed.

BWSR Engineering Comments:

1. The embankment has been modified accordingly – Sheet C3.02.
2. The outlet has been modified accordingly – Sheet C3.04.
3.
 - a. The tile locations have been modified to reflect the 1991 imagery. These tiles will be located and recorded during construction. The actual location will be recoded on the as-built survey.
 - b. A tile block was added and elongated where that existing tile is shown to better match this assumption. A note was added about confirming existence outside the conservation easement and to contact engineer for relocation plan if it does exist on C2.02. We took a look at the imagery and didn't see anything that definitively showed its existence, so to design a whole tile daylight for something that might not even be there didn't seem like a good idea.
 - c. A single outlet for these tiles is ideal, but our assumptions of tile depths, based of tile probing, do not allow for the appropriate fall to be able to daylight these tiles together. During construction and once we have a full understanding of the depth of the tiles, the suggested re-route will be explored with the hopes that it will work.

Corps Comments:

1. All corrections to DMBI have been made in the FMBI.
2. See engineering comments above.
3. All exhibit numbering has been corrected within the text.
4. It was not intended for the well data to be used as part of the final delineation. The narrative has been updated.
5. Credit Allocation
 - a. Exhibit P2 includes six photos from the past ten years showing cultivation of both restoration areas.
 - b. Credit allocation table and text has been updated to reflect the use of CFC credit action.
 - c. Credit allocation figure updated for no credit over the exiting ditch. Narrative in section 9.1 updated.
 - d. Credit allocation figure updated to reflect embankment as a no credit area.
 - e. Upland credits have been portioned out into shrub-carr credits.
6. Buffer
 - a. Buffer increased to 50-feet.
 - b. The buffer narrative has been expanded in section 6.
7. Vegetation
 - a. The shrub planting will not take place until the end of the second growing season, section 8.
 - b. The short-term maintenance schedule has been updated to include shrub-carr maintenance, section 8.
 - c. The adaptive management plan in section 8 has been expanded accordingly.
 - d. The short-term maintenance schedule in section 8 has been updated accordingly.
 - e. The performance standards in section 6 have been updated.
8. Monitoring Plan
 - a. The monitoring plan narrative has been updated to reflect that the emergent wetland and associated upland will be monitored for five years. The shrub-carr will be monitored for seven years as well but monitoring of the shrub-carr will begin in the third growing season. Therefore, two separate credit release tables are being proposed. One for emergent and one for sub-carr as they will be monitored on different timelines. The sub-carr and emergent credits release tables propose the release of apportioned upland credits in conjunction with their wetland type.
 - b. By capturing the ground elevation at each well, the software can correlate the water table elevation. This firm water table elevation throughout the growing season is graphed and

correlated throughout the wetland. The concept is that the water table should be consistent through each mapped soil type, hence basing well placement on soil type at the shallow marsh/fresh (wet) meadow boundary.

- c. No wells are placed in the deep marsh because of access issues and the ability to determine water levels across the open pool using the elevations. Staff gauges are not recommended because of the difficulty in collecting sufficient and accurate data. The use of this methodology has been used for several years by the sponsor's consultant to great success.

9. Performance Standards (PS)

- a. Performance Standard table in section 6 updated accordingly.
- b. Performance Standard table in section 6 updated accordingly.
- c. Performance Standard table in section 6 updated accordingly.
- d. Performance Standard table in section 6 updated accordingly.
- e. Performance Standard table in section 6 updated accordingly.
- f. Performance Standard table subscript in section 6 updated accordingly.

10. Long Term Management

- a. The long-term management narrative in section 8 has been expanded accordingly.

11. District Guidance Documents were utilized.

EPA Comments:

- Document has been updated to be consistent with CFC crediting.
- The existing ditch holds water year-round, with a low flow regime. There will be no negative effects on the restoration through lateral effect. Crediting has been updated to reflect the ditch will not receive credit.
- The buffer has been expanded to 50 feet.
- Crediting has been updated to reflect the embankment will not receive credit.
- Exhibit N-2b has been removed and replaced with Exhibit P2 which includes six aerial photos from the last 10 years which show the restoration areas cultivated.
- A long-term management fund has not been set up because the Mitigation Plan includes requirements for long-term maintenance by the sponsor. By signing the MBI, the sponsor agrees to conducting the long-term maintenance in perpetuity. Further, the conservation easement being used will be under state control. No funding mechanism such as an escrow can be held against a state conservation easement.
- The performance standards have been updated.
- Buffer credits have been distributed through all wetland plant communities and the credit tables have been updated. Shrub planting has been delayed to the end of the second growing season.
- The sponsor is planning on using an experienced vegetation management contractor.
- The monitoring plan has been updated to include shrub-carr management. The monitoring well locations have been modified, see comments from BWSR and Corps regarding placement.
- The adaptive management plan has been updated.

2. Project Sponsor - Landowner

Identify who will be the official project proposer that is ultimately responsible for completing the project and owning the result wetland credits. Discuss any agreements between the sponsor and landowner (if different) or other legal circumstances related to project ownership.

The Sponsor, Todd Sullivan, is the fee title owner. The Sponsor is aware that areas within the conservation easement must stay in a natural state for perpetuity and that access to state and federal inspectors must be provided. The Sponsor is planning to retain ownership of the property and be responsible for the long-term management of the restoration. This includes annual inspection of structures, spot spraying and/or spot mowing invasive species.

3. Proposed Easement Description

Discuss the proposed easement boundary (a required figure) in terms of its location (e.g. coincides with property line, follows road or ditch right-of-way boundary, etc.) and the reasons for including or excluding certain areas (e.g. excludes field road to allow access to adjacent property, etc.).

The majority of the conservation easement is the eastern half of the combined Sullivan Property. The north end of the conservation easement follows the St. Thomas Road ROW from east to west, beginning at the intersection of St. Thomas Road and 251st Avenue and ending at the Phillip Hansen Property. At this point, the easement turns 90-degrees to the southeast corner of the Phillip Hansen Property. The easement then turns 90-degrees to the west and just slightly follows the property line before it turns 90-degrees to the south, following south until the DNR Property line. The conservation easement then continues along the entire south and east edges of the Sullivan Property.

One location will provide access to the easement. An existing farm access at the intersection of St. Thomas Road and 251st Avenue will be removed and an access to the easement will be constructed along St. Thomas Road, immediately before the easement boundary turns 90-degrees south at the Phillip Hansen property boundary (Exhibit B).

4. Historical Conditions

Provide an assessment of historical site conditions from pre-settlement to current condition. Utilize historical air photos, soils information, and other available information sources to estimate historical conditions based on available evidence. Discuss the extent of restoration proposed and describe any constraints that prevent full restoration (such as access to other lands, need to maintain drainage from other properties, etc.). If the project is a wetland creation, discuss historic watershed conditions, changes over time, and how the project will replace or enhance important wetland functions. Attach and reference supporting documents as necessary.

This restoration lies within the Eastern Broadleaf Forest ecological province. According to the MnDNR website, the pre-settlement vegetation was primarily eastern deciduous forest, dominated by a maple-basswood forest (elm, basswood, sugar maple, red oak, and white oak) landscape. The Minnesota Early Settlement Vegetation, as compiled by Marschner (Exhibit E), echoes the pre-settlement description described by the MnDNR, showing the conservation easement dominated by big woods (hardwoods) and surrounded by swaths of wet prairie and open water. The earliest normal climatic imagery found is from 1937 (Exhibit N), which shows a majority of the easement area in crop rotation, with wetland signatures visible in the southeast corner. The next available normal climatic imagery is from 1951 and wetland signatures are visible in the northern portion of the easement area as well. Both areas of wetland signatures appear to be extensions of the St. Thomas State Wildlife Management Area to the east.

The restoration lies within the northern portion of minor watershed HUC No. 33036 (Exhibit C). This watershed was once dominated by wetland basins that have been drained and placed in agricultural production. Excluding open water portions of lakes, ponds and rivers, the Lower Minnesota River Watershed has approximately 124,812 acres of wetlands, which is equivalent to 10.61% of the watershed area. Wetlands with herbaceous emergent vegetation are the most common wetland class in this watershed comprising 8.37% of the total wetland area. Shallow open water habitat wetlands are the second most common (1.12%) wetland class. Forested and scrub-shrub wetlands each make up less than 1% of the wetland area in the Lower Minnesota Watershed. Ninety percent of historic wetlands in the watershed have been removed from the landscape to improve agricultural productivity. Of what remains, 80% of wetlands in the watershed are in poor to fair condition. Using LiDAR, soils data, and historical imagery an estimated 226 acres of wetland have been drained in this minor watershed (Exhibit O1). Many of these wetlands would be classified as either shallow marsh, deep marsh, or open water. According to the original public land survey, a deep marsh was present in the northeast corner of the proposed conservation easement ensuring wetland hydrology was present prior to agricultural activities (Exhibit O2).

The fields have been in agricultural crop rotation for over 80 years. Throughout these years the fields have been extensively tiled.

LiDAR (Exhibit G) and soils data (Exhibit F) indicate that hydric soils lie at the bottom of landscape positions in the area, mostly consisting of clay loams and depressional complexes. This indicates that prior to agricultural drainage, the low-lying areas were most likely wetland, surrounded by upland prairie. Judging by the elevations associated with the depressional complexes, historic aerial photographs, and the existing adjacent St. Thomas State Wildlife Management Area, the Wetland 1 area in the northeast corner likely supported a deep marsh habitat up to 2.5-feet deep and was surrounded by shallow marsh and fresh (wet) meadow habitats. The Wetland 2 area, located in southeast corner of the proposed easement, appears to have been a scrub shrub wetland based on the 1937 aerial photograph. This area likely supported a shrub marsh habitat up to 6-inches of inundation and was surrounded by mesic prairie. The historic wetland boundaries were determined by overlaying hydric soils data and elevation data on the 1937 and 1951 historic aerial photographs (Exhibit N). The historic wetland boundary of Wetland 1 looks to extend along the 996-foot contour rising to the southeast along a swale to an elevation of 999-feet.

5. Existing Conditions

Provide a description of existing physical conditions of the bank site and surrounding area including current land use, vegetation, roads, structures, wells, utility lines, hydrology, etc. For hydrology describe water flow sources and flow directions and identify tiles, ditches and any other drainage components on or near the site. Also include a discussion of existing wetlands on the site including reference to any wetland delineations or determinations previously conducted and approved. Include and reference figures to supplement the narrative.

The restoration site lies directly adjacent to the St. Thomas State Wildlife Management Area, which is mainly comprised of a restored oak savanna, wetland complex with forest upland and forest wetland components, along with an agricultural food plot. The north boundary of the conservation easement abuts the ROW of St. Thomas Road (CR 28), a paved two-lane roadway. There is a homestead located along the northwest edge of the site as well that will be excluded from the conservation easement. Access to the site will be from the north, along St. Thomas Road (Exhibit B). The access is also located near the proposed northern embankment site, which will ensure the access to the easement remains dry.

The majority of the surrounding land is the St. Thomas State Wildlife Management Area, owned and operated by the MnDNR and the St. Thomas Sportsman Association. There is an adjacent homestead located along the northwest portion of the easement, and farmed agricultural land is located across St. Thomas Road to the north of the easement.

The agricultural fields are extensively tiled (Exhibit H) having been farmed for over 80 years. An agricultural ditch system also runs along the northern and northeastern edges of the site and flows north off-site.

The site is in agricultural production, corn and soybeans row cropping. The majority of the site was planted with soybeans in 2020. The site was delineated in 2019, which was the first year that Mr. Sullivan had not planted crops in the northeast and southeast sections of site because of heavy rains. The surrounding land use/land cover consists of shrubland, woodland, wetlands, and row crop agriculture. The western portion of the property was not included in the conservation easement due to that area containing no historic wetlands (Exhibit N). That area will continue to be farmed.

The adjacent St. Thomas State Wildlife Management Area consists of approximately 130 acres of wetland area. The vegetation within this wetland complex is dominated by reed canary grass and hybrid cattails. This factor was taken into consideration when designing the invasive species monitoring plan for the site.

The proposed easement consists of low depressional areas and ridges. The location of the easement boundary takes into consideration the natural drainage present and the historic connection to the adjacent St. Thomas State Wildlife Management Area to the east. This ensures that the proposed site is capturing as much overland flow as possible.

The original drainage connection between the proposed easement and the adjacent St. Thomas State Wildlife Management Area has been disconnected due to agricultural ditching between the properties intended to allow agricultural production on the Sullivan property.

The proposed easement site and adjacent farmland has been extensively tiled. Tile lines drain Wetland 1 across CSAH 28 and on to the north, eventually flowing to a lift station that pumps water into an existing wetland that drains into the Forest Prairie Creek (which eventually drains into the Minnesota River). Two tile lines drain Wetland 2 into the restored St. Thomas State Wildlife Management Area to the east.

Wetland hydrology has been removed almost entirely throughout the extent of the Sullivan Bank site through the use of tiling and ditch systems. Restoring hydrology to the site is the key component of this restoration, which will act as the catalyst for a successful vegetation restoration.

The Le Sueur County Soil survey (Exhibit F) has hydric and non-hydric soils mapped throughout the site. The areas mapped as non-hydric are elevated and are not proposed to be restored as wetland. The majority of hydric soils consist of clay loam and depressional complexes with hydric classifications between 90-100%. Scattered throughout the site are small pockets of loamy soil units that are not considered hydric. The wetland delineation that was conducted on July 31, 2019 supports the mapped soils. The delineation found a combination of loamy and clay soils that met the hydric soil indicators for depleted below dark surface, thick dark surface, and redox dark surface.

One seasonally flooded wetland basin (5.00 ac) and two fresh (wet) meadow wetland basins (2.95 ac) were identified in the 2019 wetland delineation (Exhibit J). All three of the wetlands were located within a farmed agricultural field and have been greatly degraded due to cropping and tile lines. Crops have altered the natural hydrophytic vegetation associated with the historic wetland basins that used to be present. The seasonally flooded basin was not cropped in 2019 and nearly void of any hydrophytic vegetation. In addition, drown out has caused the lack of any vegetation in wet years. The two fresh (wet) meadow basins have been cropped in recent years, but were not cropped in 2019, and contained some hydrophytic vegetation, along with many species found in disturbed areas. In addition, tile lines have drawn down the natural hydrology that also used to be associated with all three of the historic wetlands. The seasonally flooded basin is proposed to be restored to shallow and deep marsh hydrology, with a fringed fresh (wet) meadow wetland. The two fresh (wet) meadow basins, that presumably coincide off-site, are proposed to be restored to a shrub-carr wetland. All three of the wetland basin restorations will complete the previous restoration of the adjacent St. Thomas State Wildlife Management Area wetland complex.

A NOD was issued by the LGU on August 30th, 2019 and the Corps letter of approval was received on June 17, 2020 for the delineation.

6. Project Goals, Expected Outcomes and Crediting

Identify overall project goals and discuss the anticipated project outcomes in terms of hydrology, vegetation, and wetland functions. Identify credit areas on a Credit Area Map and complete the following Wetland Bank Credit Allocation and Proposed Credit Release Tables. Discuss the rationale for the credit release and any possible modifications to credit releases related to project conditions (such as reduced crediting for partial outcome conditions).

Goals & Outcomes

This project will restore hydrology and native vegetation to 4.9-acres of fresh (wet) meadow, 1.9-acres of shallow marsh, 4.7-acres of deep marsh, 8.0-acres of shrub-carr, and 19.5-acres of mesic prairie. These wetlands have been effectively drained through the use of drain tile, while vegetation has been significantly altered by agricultural practices. By using a fixed outlet set at the normal water level (NWL) elevation of 994.5, wetland hydrology will be returned and maintained. With a 372-acre watershed feeding the site and the presence of depressional soils, hydrology can be preserved by the outlet control structure. All areas above the designed NWL will be seeded with native seed mixes, while areas below the NWL up to 3 feet will be seeded with a marsh seed mix.

This restoration will restore 4.9-acres of fresh (wet) meadow, 1.9-acres of shallow marsh, and 4.7-acres of deep marsh, and 8.0-acres of shrub-carr in Bank Service Area (BSA) 9. At this time there is only one other wetland bank found in Le Sueur County. This bank will fill a need for wetland credits in Le Sueur County. BSA 9 serves the southwest metro and growing communities such as Jordan, Shakopee, Waconia, and Carver. With the increasing population pressures in these areas, the need for wetland credits will continue.

The minor watershed (Exhibit C), approximately 4,896-acres, drains to the west feeding the Minnesota River. Using LiDAR and soils data, it has been estimated that 709-acres of wetland existed within the minor watershed prior to agricultural production (Exhibit O1). The need to restore shallow marsh and deep marsh habitat is apparent when reviewing the Minnesota Public Land Survey (Exhibit O2). The presence of deep marsh and open water throughout the minor watershed was well documented. The areas being proposed for restoration have signs that indicate the areas were once flooded basins that were an extension of the adjacent St. Thomas State Wildlife Management Area to the east (Exhibit N). The ability to store and treat water on this landscape after rain events will therefore be restored.

Through an extensive tile and ditch network documented throughout the minor watershed, it has been estimated that only 483-acres of wetland still exist (excluding Type 1 wetlands) within the minor watershed. It will also restore important ecological habitat for migrating birds, amphibians and reptiles.

On the west side, the wetland areas will be protected with a buffer consisting of a native mesic prairie. The buffer encompasses the steep slopes adjacent to the wetland. This will protect low lying wetland areas from erosional issues and sedimentation along these steep slopes.

Crediting

Credit allocation was determined using the Wetland Mitigation Credit Potential for Restorations in Cultivated fields in Minnesota guidance presented jointly by BWSR and Corps at the April 4, 2019, bank training. The Sullivan Wetland Bank qualifies for 100 percent credit potential as both basins being proposed for restoration have been cultivated for at least 6 of the past 10 years (Exhibit P2). Although there is crop stress or drown outs, the areas were cultivated prior to the crop damage as there are no signs that the landowner farmed around these areas.

The fields have been in agricultural crop rotation for over 80 years. Throughout these years the field has been tiled outletting to a private tile system in the field to the north. In turn, wetland hydrology has been removed almost entirely throughout the extent of the Sullivan Bank site. Therefore, meeting the requirements of wetland re-establishment, which involves a more significant lift in hydrology functions and acreage than rehabilitation. Re-establishing hydrology to the site is the key component of this restoration, which will act as the catalyst for a successful vegetation restoration.

The historic wetland boundaries were estimated by overlaying hydric soils data and elevation data on the 1951 historic aerial photograph (Exhibit N). The historic wetland boundary looks to extend along the 999-foot contour throughout the northern portion of site. The southern portion of the conservation easement that is to be Wetland 2 lies approximately 1-foot above the lowest basins to the north. It is evident through aerial imagery that wetland hydrology is present based on cropping history showing saturation and drown out conditions.

According to the Wetland Conservation Act and Section 404 of the Clean Water Act, in wetlands greater than 2-acres a buffer must be established with a minimum width of 25 feet and an average width of 50 feet. The majority of the proposed wetland boundary borders mesic prairie, which is to function as natural buffer and is greater than 50-feet. However, there are locations along the east side of the easement where the proposed easement lies against existing wetland and where an existing ditch is found and will remain. The requirement was achieved by incorporating a 50-foot buffer through restored wetlands including the ditch at these locations. Being that the ditch is included, which will not be modified, no credit is being proposed.

Because the shrub-carr plant community will have a different monitoring period (7 years vs 5 years) and will not begin in earnest until the seedlings are planted after the second growing season, there are separate credit allocation and performance standards tables for that plant community.

Credit Allocation Table

Credit Action¹	Wetland Type (Plant Community)	Acres² (x.x acres)	% Credit	Credit Amount (x.xxxx)
Rehabilitation - CFC	Type 2 - Fresh (wet) Meadow	4.0	100%	4.0000
Rehabilitation - CFC	Type 3 - Shallow Marsh	1.7	100%	1.7000
Rehabilitation - CFC	Type 4 - Deep Marsh	4.7	100%	4.7000
Rehabilitation - CFC	Type 6 – Shrub-Carr	5.6	100%	5.6000
Rehabilitation - CFC	Type 2 – Fresh (wet) Meadow	0.7	25%	0.1750
Rehabilitation - CFC	Type 3 – Shallow Marsh	0.1	25%	0.0250
Rehabilitation - CFC	Type 6 – Shrub-Carr	2.4	25%	0.6000
Subp. 2 - Buffer	Type 2 – Fresh (wet) Meadow	4.6550	25%	1.1638
	Type 3 – Shallow Marsh	1.7860	25%	0.4464
	Type 4 – Deep Marsh	4.6550	25%	1.1638
	Type 6 – Shrub Carr	7.9040	25%	1.9760
No Credit - Embankment	Type 2 – Fresh (wet) Meadow	0.1	0%	0
No Credit - Embankment	Type 3 – Shallow Marsh	0.1	0%	0
No Credit – Embankment	Mesic Prairie	0.5	0%	0
No Credit – Existing Ditch	Type 2 – Fresh (wet) Meadow	0.0	0%	0
TOTAL EASEMENT SIZE:		39.0000	TOTAL:	21.5500

¹As identified by [MN Rules Chapter 8420.0526](#) and [St. Paul District Policy for Wetland Compensatory Mitigation in Minnesota](#).

- | | |
|---|--|
| <ul style="list-style-type: none"> ▪ Subp. 2: <i>Buffer</i> ▪ Subp. 3: <i>Restoration of Completely Drained or Filled</i> ▪ Subp. 4: <i>Restoration of Partially Drained or Filled</i> ▪ Subp. 5: <i>Vegetative Restoration of Farmed Wetlands</i> ▪ Subp. 6: <i>Protection of Wetlands Previously Restored via Conservation Easements</i> ▪ Subp. 7: <i>Wetland Creations</i> ▪ Subp. 8: <i>Restoration and Protection of Exceptional Natural Resource Value</i> ▪ Subp. 9: <i>Preservation of Wetlands</i> ▪ No Credit: <i>Portions of easement area not receiving credit</i> | <p>Buffer</p> <p>Restoration via Reestablishment</p> <p>Restoration via Rehabilitation</p> <p>Enhancement</p> <p>Extended Restoration</p> <p>Establishment</p> <p>Restoration or Enhancement</p> <p>Preservation</p> <p>No Credit</p> |
|---|--|

²Acres within the bank easement corresponding to the identified credit action and wetland type (round to nearest tenth-acre). The sum total of these acres must equal the bank easement area. WCA/CWA Credit Release Summary

³Buffer credits will be distributed among wetland credits based on credit area. See WCA/CWA Credit Release Schedule Table.

Emergent Wetland & Upland Performance Standards				
Initial Release	Execution of MBI, completion of CE monumenting, approval of as-built plan and seeding, recording of conservation easement and delivery of the title insurance policy accepted by the State of Minnesota.			15%
Hydrology Standard	Fresh (wet) Meadow	<u>Depth of Water Table:</u> Within 12 inches of the surface for 28 days or two periods of 14 or more consecutive days during the growing season under normal and wetter than normal conditions. <u>Inundation:</u> Shall not occur except: (1) at the start of the growing season (due to snowmelt/precipitation); and (2) following the 10-year, 24-hour (or greater) precipitation events. Depth of inundation during the growing season shall be 6 inches or less with a duration of less than 14 consecutive days. An exception can be made for sites with hummocky microtopography—hollows between hummocks can have standing water depths up to 6 inches for extended duration.	2 nd year ²	20%
	Shallow Marsh	<u>Inundation:</u> Up to 6 inches for a period of 28 consecutive days during the growing season under normal or wetter than normal hydrological conditions. Inundation allowable up to 18 inches following 2-year, 24-hour or greater storm event provided the inundation does not occur for more than 28 consecutive days.		
	Deep Marsh	<u>Inundation:</u> 6 to 48 inches in depth throughout the growing season, with the exception of drought conditions, per U.S. Drought Monitor		
Vegetation Standard Interim 1³ (NNI – native, non-invasive species, I – non-native/invasive species)	Fresh (wet) Meadow	<u>Relative Cover by NNI vs I:</u> 50% or more cover of NNI; Less than 50% I <u>Relative Cover by Hydrophytes:</u> 50% or more cover <u>Species Richness:</u> 5 or more NNI <u>Absolute Cover Unvegetated:</u> Less than 5% (2,178 ft ²)/acre	2 years ³	20%
	Shallow Marsh	<u>Relative Cover by NNI vs I:</u> 50% or more cover of NNI; Less than 50% I, including non-native cattail ¹ <u>Relative Cover by Hydrophytes:</u> 50% or more cover <u>Species Richness:</u> 3 or more NNI <u>Absolute Cover of Open Water (acreage):</u> 30% or less		
	Deep Marsh	<u>Relative Cover by NNI vs I:</u> 50% or more cover of NNI; Less than 50% I, including non-native cattail ¹ <u>Relative Cover by Hydrophytes:</u> 10% or more cover <u>Species Richness:</u> 1 or more species NNI <u>Absolute Cover of Open Water (acreage):</u> Less than 50%		
	Upland Buffer	<u>Relative Cover by NNI vs I:</u> 50% or more cover of NNI, Less than 50% I <u>Species Richness:</u> 5 or more NNI <u>Absolute Cover Unvegetated:</u> Less than 5% (2,178 ft ²)/acre		
Vegetation Standard Interim 2 (NNI – native, non-invasive species, I – non-native/invasive species)	Fresh (wet) Meadow	<u>Relative Cover by NNI vs I:</u> 70% or more cover of NNI; Less than 30% I <u>Relative Cover by Hydrophytes:</u> 65% or more cover <u>Species Richness:</u> 10 or more NNI <u>Absolute Cover Unvegetated:</u> Less than 2% (871 ft ²)/acre	1 year	20%
	Shallow Marsh	<u>Relative Cover by NNI vs I:</u> 60% or more cover of NNI; Less than 40% I, including non-native cattail ¹ <u>Relative Cover by Hydrophytes:</u> 70% or more cover <u>Species Richness:</u> 5 or more NNI <u>Absolute Cover of Open Water (acreage):</u> 20% or less		
	Deep Marsh	<u>Relative Cover by NNI vs I:</u> 60% or more cover of NNI; Less than 40% I, including non-native cattail ¹ <u>Relative Cover by Hydrophytes:</u> More than 50% cover <u>Species Richness:</u> 3 or more species NNI <u>Absolute Cover of Open Water (acreage):</u> 40% or less		
	Upland Buffer	<u>Relative Cover by NNI vs I:</u> 70% or more cover of NNI; Less than 30% I <u>Species Richness:</u> 10 or more NNI <u>Absolute Cover Unvegetated:</u> Less than 2% (871 ft ²)/acre		
Final Vegetation Standard (NNI – native, non-invasive species, I – non-native/invasive species)	Fresh (wet) Meadow	<u>Relative Cover by NNI vs I:</u> 80% or more cover of NNI; Less than 20% I <u>Relative Cover by Hydrophytes:</u> 75% or more cover <u>Species Richness:</u> 15 or more NNI <u>Absolute Cover Unvegetated:</u> Less than 1% (436 ft ²)/acre	1 year ⁴	25%
	Shallow Marsh	<u>Relative Cover by NNI vs I:</u> 70% or more cover of NNI; Less than 30% I, including non-native cattail ¹ <u>Relative Cover by Hydrophytes:</u> 80% or more cover <u>Species Richness:</u> 7 or more NNI <u>Absolute Cover of Open Water (acreage):</u> 10% or less		
	Deep Marsh	<u>Relative Cover by NNI vs I:</u> 70% or more cover of NNI; Less than 30% I, including non-native cattail ¹ <u>Relative Cover by Hydrophytes:</u> 95% or more cover <u>Species Richness:</u> 6 or more species NNI <u>Absolute Cover of Open Water (acreage):</u> 30% or less		
	Upland Buffer	<u>Relative Cover by NNI vs I:</u> 80% or greater cover of NNI, Less than 20% I <u>Species Richness:</u> 15 or more NNI <u>Absolute Cover Unvegetated:</u> Less than 1% (436 ft ²)/acre		

¹Non-native cattail refers to *Typha angustifolia* and *Typha x glauca*.

²PS shall be met for a minimum of 2 years; years do not need to be consecutive.

³Hydrology PS must be met prior to release of vegetation PS; years must be consecutive.

⁴All interim vegetation standards must be met for one full year prior to the final credit release.

Shrub-Carr Performance Standards				
Initial Release	Planting of shrubs.			15%
Shrub-Carr Hydrology Standard	Shrub-Carr	<u>Depth of Water Table:</u> Within 12 inches of the surface for 28 days or two periods of 14 or more consecutive days during the growing season under normal and wetter than normal conditions. <u>Inundation:</u> Shall not occur except: (1) at the start of the growing season (due to snowmelt/precipitation); and (2) following the 10-year, 24-hour (or greater) precipitation events. Depth of inundation during the growing season shall be 6 inches or less with a duration of less than 14 consecutive days. An exception can be made for sites with hummocky microtopography—hollows between hummocks can have standing water depths up to 6 inches for extended duration.	2 years ¹	20%
Shrub-Carr Interim 1	Shrub-Carr	<u>Live Stems/Acre:</u> 300 or more NNI shrub seedlings per acre <u>Relative Cover by NNI vs I Herbaceous Strata:</u> 50% or greater cover of NNI, Less than 50% I <u>Relative Cover by Hydrophytes:</u> 65% or more cover <u>Herbaceous Species Richness:</u> 3 or more NNI <u>Absolute Cover Unvegetated:</u> Less than 5% (2,178 ft ²)/acre	3 years ²	20%
Shrub-Carr Interim 2	Shrub-Carr	<u>Live Stems/Acre:</u> 300 or more NNI shrub seedlings per acre <u>Relative Cover by NNI vs I Herbaceous Strata:</u> 65% or greater cover of NNI, Less than 35% I <u>Relative Cover by Hydrophytes:</u> 75% or more cover <u>Shrub Species Richness:</u> 4 or more NNI <u>Herbaceous Species Richness:</u> 5 or more NNI <u>Absolute Cover Unvegetated:</u> Less than 2% (871 ft ²)/acre	1 year ³	20%
Final Shrub-Carr Standard	Shrub-Carr	<u>Live Stems/Acre:</u> 300 or more NNI shrub seedlings per acre <u>Relative Cover by NNI vs I Herbaceous Strata:</u> 80% or greater cover of NNI, Less than 20% <u>Relative Cover by Hydrophytes:</u> 85% or more cover <u>Shrub Species Richness:</u> 6 or more NNI <u>Herbaceous Species Richness:</u> 7 or more NNI <u>Absolute Cover Unvegetated:</u> Less than 1% (436 ft ²)/acre	1 year ³	25%

¹PS shall be met for a minimum of 2 years; years do not need to be consecutive.

²Interim Hydrology PS must be met prior to release of vegetation PS.

³All previous interim vegetation standards must be met before current interim standard is released.

WCA/CWA Emergent Wetland Credit Release Schedule								
<i>*Credit releases shall occur as the specific performance standard is met.</i>								
Performance Standard	Percent of Release	Wetland Release			Upland Release			Total Credits
		Fresh (wet) Meadow	Shallow Marsh	Deep Marsh	Fresh (wet) Meadow	Shallow Marsh	Deep Marsh	
Initial Release	15%	0.6263	0.2588	0.7050	0.1746	0.0669	0.1746	2.0062
Hydrology	20%	0.8350	0.3450	0.9400	0.2327	0.0893	0.2327	2.6747
Veg Interim 1	20%	0.8350	0.3450	0.9400	0.2327	0.0893	0.2327	2.6747
Veg Interim 2	20%	0.8350	0.3450	0.9400	0.2327	0.0893	0.2327	2.6747
Final Veg	25%	1.0437	0.4312	1.1750	0.2911	0.1116	0.2911	3.3437
Total:	100%	4.1750	1.7250	4.7000	1.1638	0.4464	1.1638	13.3740

WCA/CWA Shrub-Carr Credit Release Schedule				
<i>*Credit releases shall occur as the specific performance standard is met.</i>				
Performance Standard	Percent of Release	Wetland Release	Upland Release	Total Credits
Initial Release	15%	0.9300	0.2964	1.2264
Shrub-Carr Hydrology	20%	1.2400	0.3952	1.6352
Shrub-Carr Interim 1	20%	1.2400	0.3952	1.6352
Shrub-Carr Interim 2	20%	1.2400	0.3952	1.6352
Shrub-Carr Final	25%	1.5500	0.4940	2.0440
Total:	100%	6.2000	1.9760	8.1760

7. Ecological Suitability and Sustainability

Specifically address the compatibility of the project with surrounding land uses, habitat types, and ecological communities. Discuss the long-term sustainability of the project in terms of hydrology and vegetation. Specifically address the ability of the project to continue to provide important wetland functions in the context of reasonably foreseeable land use and landscape changes.

The areas being proposed for restoration have signs that indicate these areas once maintained wetland hydrology and were an extension of the adjacent St. Thomas State Wildlife Management Area to the east (Exhibit N). The Le Sueur County soil survey has hydric soils mapped in the area, including depressional complex soils at the lowest elevations. According to the original public land survey, a large deep marsh was present in the northeast corner of the proposed conservation easement ensuring wetland hydrology was present prior to agricultural activities (Exhibit O2). Additionally, aerial imagery taken during wet seasons show ponding in the areas mapped with depressional soils. The entire area has a functioning drain tile network (Exhibit H) as well as drainage ditches constructed to divert hydrology from the St. Thomas State Wildlife Management Area from entering the farmland. By disabling this tile system, it is expected that shallow and deep marsh hydrology, as well as fresh (wet) meadow and shrub-carr hydrology, will extend to the limits of the depressional soils.

The proposed restoration is surrounded by cropland with the closest town, Le Sueur, 9 miles away. This is a rural area with no signs that development will ever occur. The stability of the surrounding area remaining the same, with limited or no changes in its immediate watershed make this an exceptional site for restoration.

8. Vegetation Plan

Identify and discuss planned actions to restore vegetation including (but not limited to) seeding, planting, invasive species control, and anticipated maintenance/management activities. Include a seeding/planting zone map (a required figure) and correspondingly identify seed mixes, planting materials, planting rates, and installation methods (hand planted, native seed drill, etc.). Include a schedule of anticipated maintenance and aftercare activities for the initial 5 years of the project and beyond as applicable. Identify and discuss any potential issues (invasive species, sedimentation, drown-out, etc.) and potential corrective actions. Attach and reference supporting documents as necessary.

The goal of this project is to restore the wetland bank site to a native habitat and ecological communities based on MSB data, soil data, survey data, and historical imagery. The upland buffer will be restored to a mesic prairie by using the 35-241 (Mesic Prairie General) seed mix which will include species that are typical of this type of natural community. The wetland areas will be restored to fresh (wet) meadow, shallow marsh, deep marsh, and shrub-carr basins. The fresh (wet) meadow and shallow marsh will be seeded with aggressive custom mixes designed to outcompete reed canary grass. The deep marsh will be seeded with a pilot seed mix and planted with plant plugs on a 20' x 20' grid. These species were selected because of their aggressive nature that will aid in the development of a restoration dominated by native species. The shrub-carr basin will be planted with a combination of the 34-171 (Wetland Rehabilitation) seed mix and native plantings consisting of native shrubs.

The shrubs will be planted in the fall of the second growing season to allow the herbaceous layer and wetland hydrology to establish. Once the herbaceous layer is established it will reduce foraging by animals. Fall planting of the shrubs is preferred because it allows for roots to develop before the ground freezes. This time of year also provides better rates of precipitation going into to winter. Spring planting can be delayed by prolonged spring melt and periods of precipitation, not giving the shrubs time to develop before the hotter summer days that provide less precipitation. The shrubs will be planted in an 8' x 8' grid, with random species placement in the grid.

Pages C1.01 and C5.01 of the attached plan set details the planting plan.

The native vegetation of these communities will be established using proven vegetative management techniques until the performance standards are met. These techniques include periodic burning, herbicide treatments, along with mowing and interseeding. The vegetation will be closely monitored to ensure that a

native plant community flourishes and invasive and weedy species are controlled. Once the native plant community is established, spot mows and herbicide treatments, as well as periodic burns will still take place in order to sustain the native plant community.

Certain invasive species can be expected to be present in wetland restorations, while others that are present before the restoration can become an issue. Species that may be present during the monitoring period of this restoration project are reed canary grass, smooth brome, Canada thistle and hybrid cattail.

Constant monitoring of reed canary grass will take place throughout the monitoring period, as this species reproduces prolifically through high seed volumes and rhizomes and is present in surrounding wetlands. A treatment regime of mowing the species in the spring to prevent seed production and herbicide treatments in the fall for rhizome treatment will continue throughout the monitoring period.

Smooth brome is present on the proposed conservation easement. As with reed canary grass, this species reproduces prolifically through high seed volumes and rhizomes. Spring herbicide treatments will be used to eradicate the species.

Canada thistle can develop in bare areas that have been affected by flooding or herbicide overspray, forming large colonies. Where identified, the colonies will be mowed in the spring and an herbicide treatment will be conducted in the fall.

Hybrid cattail is an invasive species that easily migrates through wind born seeds. This species may become a nuisance at this site. As part of the vegetative management, hybrid cattail will be identified and treated using an aquatic approved glyphosate chemical application. For large populations, the application will be applied using backpack sprayers and for sparse populations a more controlled approach of wicking individual plants will be employed.

The sponsor is considering having the vegetative management being taken care of by a professional contractor that has experience in restoration of native vegetation in order to ensure the establishment of a native vegetation community.

To ensure the native seed germination won't be hindered by pre-emergent and post-emergent herbicides; the bank Sponsor provided a list of herbicide applications used over the last two planting seasons:

- **2019**
 - Surestart II – half-life of 20 days
 - Incinerate – half-life of 32 days
 - Roundup PowerMax – half-life of 47 days
- **2020**
 - Sonic – half-life of 70 days
 - Fusilade – half-life of 38 days
 - Flexstar GT – half-life of 47 days

This treatment should not leave any residual herbicides in the soils at the time of planting that would inhibit growth of native species.

The seed bed will be prepared by first disking the site to decompact surface soils and break large chunks of soil down. A harrow will then be implemented to further pulverize the soils and smooth the surface of the restoration site. Finally, the entire area will be finished with a cultipacker or roll to give a smooth planting surface. Once the seed bed preparation has been completed, the seed and planting zones will be staked in the field (C5.01). Seed mixes and plantings will be used for the project as follows:

- State Seed Mix 35-241 – Mesic Prairie General drilled @ 36.5 lb/ac
- Custom Wet Meadow Mix– Fresh (wet) Meadow broadcast @ 3.3 lbs/ac
- Custom Emergent Mix– Shallow Marsh broadcast @ 5.2 lbs/ac
- Deep Marsh Pilot Mix – Deep Marsh broadcast @ 3.1 lbs/ac
- Wetland Rehab Mix 34-171 – Shrub-Carr broadcast @ 5.3 lbs/ac
- Deep Marsh Plug Plantings in a 20' x 20' grid below 994.0 feet
- Shrub Plantings (856) planted in a 8' x 8' grid below 1000.00 feet

All seed mixes and plant stock must be harvested or grown within 150 miles of the site. Seed tags will be collected and kept on file. Site preparation will be completed after the tile system has been disabled. The seeding plan and specifications is found on page C5.01 of the attached plan set.

The following vegetative management schedule is an estimate of maintenance activities. It is recognized that actual maintenance of the site is a fluid and revolving process. The following schedule is submitted as a general outline for maintenance activities for the required monitoring period, with the understanding that as situations arise, this timeline and/or activities may change. All maintenance activities shall be documented to show due-diligence in vegetative management.

Short Term Maintenance Schedule	
DATE	ACTIVITY
Site Establishment	
October (after harvest)	-Complete on-site grading -Construct site embankment -Construct outlet structure
Late October	-Begin blocking and daylighting drain tiles, seed bed preparation and planting.
November	-Seed entire site and plant plugs in the deep marsh area.
Growing Year 1	
Late May	-Mow entire area, wetland and buffer, to a height of 6-8 inches. It is recommended that slow tractor speeds and a flail type mower be used. This is to prevent the creation of dense mulch from smothering smaller plants. Avoiding the disturbance and rutting the soils is important. Therefore, only conduct mowing in areas that are dry enough to sustain the weight of the equipment. If there are areas that the equipment cannot enter due to soil disturbance, use smaller equipment such as a brush saw with a scythe attachment. -Fourteen days after mowing, spot spray patches of reed canary grass, thistle, smooth brome and any other non-native, invasive species with glyphosate-based herbicide. Be careful not to create any overspray that may destroy desirable species.
August	-Mow per specifications. -Fourteen days after mowing, spot spray patches of reed canary grass, thistle, smooth brome and any other non-native, invasive species with glyphosate-based herbicide. Be careful not to create any overspray that may destroy desirable species.

Short Term Maintenance Schedule	
DATE	ACTIVITY
Late October	-Spot spray patches of reed canary grass, thistle, smooth brome and any other non-native, invasive species with glyphosate-based herbicide. Be careful not to create any overspray that may destroy desirable species.
Growing Year 2	
May	-Spot spray patches of reed canary grass, thistle, smooth brome and any other non-native, invasive species with glyphosate-based herbicide. Be careful not to create any overspray that may destroy desirable species.
Early June	-Mow patches of reed canary grass, thistle, smooth brome or other non-native, invasive species.
October	-Plant shrubs per specifications.
Late October	-Spot spray patches of reed canary grass, thistle, smooth brome and any other non-native, invasive species with glyphosate-based herbicide. Be careful not to create any overspray that may destroy desirable species.
Winter	-Mow fire breaks around any heat or fire sensitive receptors such as, tile outlets, outlet control structures, EOF, shrub-carr area etc. The width of fire breaks should be approximately three times the height of the surrounding vegetation for fire sensitive receptors (e.g., wooden nest boxes), and six times the height of the surrounding vegetation for heat sensitive receptors (e.g., plastic structures).
Growing Year 3	
Late April	-Perform prescribed burn of emergent wetland and upland areas, avoiding the shrub-carr area. The goal of this burn is to eliminate thatch and herbaceous areas and to kill shrubs and woody species.
May	-Spot mow or spray herbaceous layer in shrub-carr as per mowing specifications. Treat shrub-carr area with animal deterrent such as Plantskydd.
Early June	-Mow patches of reed canary grass, thistle, smooth brome or other non-native, invasive species.
August	-Spot mow or spray herbaceous layer in shrub-carr as per mowing specifications. Treat shrub-carr area with animal deterrent such as Plantskydd.
Late October	-Spot spray patches of reed canary grass, thistle, smooth brome and any other non-native, invasive species with glyphosate-based herbicide. Be careful not to create any overspray that may destroy desirable species.
Winter	-Mow fire breaks around any heat or fire sensitive receptors such as, tile outlets, outlet control structures, EOF, shrub-carr area etc. The width of fire breaks should be approximately three times the height of the surrounding vegetation for fire sensitive receptors (e.g., wooden nest boxes), and six times the height of the surrounding vegetation for heat sensitive receptors (e.g., plastic structures).
Growing Year 4	
Late April	- Burn emergent wetland and buffer, avoiding the shrub-carr. The goal of this burn is to eliminate thatch in herbaceous areas.
May	-Spot mow or spray herbaceous layer in shrub-carr as per mowing specifications. Treat shrub-carr area with animal deterrent such as Plantskydd.
Early June	-Mow patches of reed canary grass, thistle, smooth brome or other non-native, invasive species.
August	-Spot mow or spray herbaceous layer in shrub-carr as per mowing specifications. Treat shrub-carr area with animal deterrent such as Plantskydd.
Late October	-Spot spray patches of reed canary grass, thistle, smooth brome and any other non-native, invasive species with glyphosate-based herbicide. Be careful not to create any overspray that may destroy desirable species.

Short Term Maintenance Schedule	
DATE	ACTIVITY
Growing Year 5	
Early June	-Mow patches of reed canary grass, thistle, smooth brome or other non-native, invasive species.
October	-Plant or thin shrubs in the sub-carr community dependent on the Year 4 shrub survey.
Late October	-Spot spray patches of reed canary grass, thistle, smooth brome and any other non-native, invasive species with glyphosate-based herbicide. Be careful not to create any overspray that may destroy desirable species.
Winter	-Mow fire breaks around any heat or fire sensitive receptors such as, tile outlets, outlet control structures, EOF, shrub-carr area etc. The width of fire breaks should be approximately three times the height of the surrounding vegetation for fire sensitive receptors (e.g., wooden nest boxes), and six times the height of the surrounding vegetation for heat sensitive receptors (e.g., plastic structures).
Growing Year 6	
Late April	-Burn emergent wetland and buffer. The goal of this burn is to eliminate thatch in herbaceous areas.
October	-Plant or thin shrubs in the sub-carr community dependent on the Year 5 shrub survey.
Growing Year 7	
October	-Plant or thin shrubs in the sub-carr community dependent on the Year 6 shrub survey.

(Glyphosate based herbicides include RoundUp, Rodeo, Accord, AquaMaster, AquaPro)

Long Term Management:

The Sponsor is responsible for long-term management of the Bank Site such that it achieves and maintains the functional performance level described; the success criteria contained are indicators of expected function based on implementation. The Sponsor shall maintain the Bank Site in accordance with the provisions of the recorded conservation easement. Consistent with the recorded easement, the Sponsor will adaptively manage the site to control pest, weed, or invasive species as required by state and federal law.

In order to maintain a native plant community and ensure that the structures (embankment, outlet structures, inlets, and outlets) are maintained, the Sponsor will conduct annual site inspections. If these inspections find deficiencies, the appropriate measures will be taken to correct the deficiencies. It is foreseen that these corrective actions could include invasive species control through herbicide treatments, spot mowing and/or winter mows, inlet and outlet maintenance and outlet structure maintenance. Inspection of the site and any corrective actions will be conducted by a contractor of the Sponsor's choice.

The following long-term management schedule is flexible and can be modified if conditions warrant. Conditions that may cause a more intense maintenance schedule would be an outbreak of an invasive species due to native species dying off because of drought or flooding. Reseeding any infected areas may be warranted. Issues that may arise will be handled on a case-by-case basis, as each incident may require different techniques to remedy and new management techniques may develop over the years.

Long Term Maintenance Schedule	
DATE	ACTIVITY
June	-Inspect outlet structures and inlets for any blockages or structural issues -Inspect embankments for signs of settling, erosion and rodent damage. - Spot spray patches of reed canary grass, thistle, smooth brome and any other non-native, invasive species with glyphosate-based herbicide.
Late October	-Identify and record any areas of invasive and undesired plant species. -Spot spray invasive species.
Every 3 Years	-Mow fire breaks around any heat or fire sensitive receptors such as, tile outlets, outlet control structures, EOF, shrub-carr area etc. The width of fire breaks should be approximately three times the height of the surrounding vegetation for fire sensitive receptors (e.g., wooden nest boxes), and six times the height of the surrounding vegetation for heat sensitive receptors (e.g., plastic structures). -Burn emergent wetland area and uplands, avoiding the shrub-carr.

Adaptive Management Plan

Hydrology:

If the water level of the basin is higher than the designed NWL for a prolonged period of time during a normal or dry year, the outlet will be resized and replaced.

Invasive Species Control:

If flooding and/or drought causes native species to die off and an outbreak of invasive species has occurred which exceeds the performance standards, treatment of invasive species and reseeding of any infected areas will occur.

Vegetation:

If native vegetation has not reached a Vegetation Interim standard within one or two years, reseeding of bare areas, interseeding and additional plantings, or removal of excess vegetation in open water areas will take place.

Low Shrub Survival:

If any of the annual shrub surveys show low survival rates of specific species, then another species shall be introduced that may be more suitable to site conditions.

Shrub Crowding:

If the shrub surveys show a high survivability rate, then the shrub layer will be thinned based on the results of the annual survey.

Embankment Issues:

If the embankment shows sign of erosion, the erosional issues will be repaired and armored with an appropriate technique such as fabric matting or inka mat. The affected area will be seeded with the designed seed mix called out for the area.

If sloughing occurs, it may indicate that the embankment has been breached by rodents. In this case, the sponsor shall investigate the sloughing areas and correct the damages to the embankment. Further measures such as fencing or additional rock shall be incorporated to the embankment repair to deter future rodent infestations.

9. Construction Plan

Address the following subparts and attach and reference supporting documents as necessary:

9.1 Design Approach

Discuss the general design approach proposed to achieve the planned restoration goals for hydrology such as disable drainage system, divert water, impound water, etc. Provide a detailed description of the proposed construction work to be performed for each wetland area to be restored or created.

Tile blocks will be utilized on tiles leaving proposed wetlands, either at the wetland boundaries or at the property boundary. According to the Minnesota Wetland Restoration Guide, tile blocks are the preferred methodology for restoring wetlands drained by subsurface drainage tiles. This method is less invasive than removal or plugging of the full length of existing tile which can be expensive and requires extra consideration for backfilling and stabilizing areas that are excavated. Tile blocks will consist of a predetermined length of tile being removed, with the ends of the tiles sealed with concrete blocks. The lengths will be dependent on the types of soils the block is located in and the estimated lateral effect of the soil. Being that most of the blocks will be within depressional soils, the blocks are expected to be approximately 100-feet in length. The trench is to be backfilled with compacted soils to an elevation above the remaining tile and then capped with the soils existing on site. This technique of blocking tiles in depressions has been used extensively to great success.

Tiles will also be daylighted at the wetland boundary, if elevations allow. Three daylights are being proposed, all associated with Wetland 1. Two of the daylighted tiles will be brought to the surface at a slope that will allow for continued drainage of surrounding properties but not be prone to soil erosion. The outlet will be armored with a concrete headwall which will include a rodent barrier. The third tile daylight is located at the north end of the CSAH 28 road ditch. This tile serves the Hansen property, but it is unknown if it is a functioning tile. This will be verified during construction.

One earthen embankment is being proposed along the north side of the conservation easement to protect the CSAH 28 road ditch and maintain surrounding drainage. The earthen embankment will be constructed with a clay core trench to prevent seepage (Plan Set C3.02). The embankment will include a rock rodent trench using angled basalt rock to deter rodent burrowing. This technique has been used to great success on other projects and has been found to be more effective than using fencing or other barriers.

Capillary rise is assumed to be at two feet for this project because of the drawdown periods of the pool. The pool drawdown is restricted by the 18-inch RCP outlet. This will cause the NWL to float at a half foot higher, allowing for a higher capillary rise. The ground elevations on the Hansen property will experience surface inundation as a result of creating a pool elevation in the restored wetland basins for rainfall events that exceed the 100-year event. Therefore, an easement land swap has been secured and recorded with the county on the Hansen property. The outlet for the restoration will consist of an 18-inch reinforced concrete pipe with an apron at an elevation of 994.50 feet. Two anti-seep collars will be installed on each end of the outlet to prevent seepage from the wetland. The outlet will be inspected on a yearly basis to ensure that it does not get plugged. An armored emergency overflow at an elevation of 996.5 feet will be constructed within the embankment to ensure surrounding properties do not experience hydrology issues. The outlet elevation of 994-feet is one foot below the MnDNR NWL for the St. Thomas wetland. This elevation is the approximate outlet of the wetland to the north. Hydrologic modeling shows that any outlet elevation above 994-feet will result in flooding issues on the properties to the south. The ditch that runs along the northeast side of the easement will be maintained within the easement and will function as it currently does. This ditch will be within the wetland boundary but is receiving 0% credit as it will continue to function as a drainage feature. It is proposed that the ditch will remove reed canary grass seeds as the ditch flows off-site, rather than allowing the seeds to remain on the site; this will help in establishing native vegetation. The ditch overflowing would be a 100-year event and it is not anticipated to occur frequently based on hydraulic modeling. The drainage ditch holds water year-round. Therefore, it is not believed that the lateral effect of the ditch will have a negative effect on the restoration. Attached in the appendix of this document is a final plan set and hydraulic report.

9.2 Site Capability

Discuss the capability of the site to produce and maintain wetland characteristics related to drainage area, wetland area, soils, and topography.

Historical imagery, soils mapping, and topography all indicate that the area being restored once maintained wetland hydrology. Although extensively drained, a level 1 wetland delineation identified three seasonally flooded basins through the use of an off-site hydrology assessment. This indicates that the remnant wetlands have the capability to be hydrologically restored.

The restoration will be achieved through an embankment maintaining hydrology in Wetland 1 with a fixed outlet consisting of an 18-inch RCP pipe. Hydrology will be restored to Wetland 2 by breaking field tiles and allowing historical saturation to be restored. The Sullivan Wetland Bank will restore hydrology and native vegetation to 4.9 acres of fresh (wet) meadow, 1.9 acres of shallow marsh, 4.7 acres of deep marsh, 8.0 acres of shrub-carr, and 19.5 acres of mesic prairie.

The upland buffer serves as protection to the wetland from erosion, herbicide over spray and encroachment from farming practices, such as equipment turn around rutting wetland areas. This area also provides habitat for mammal species and nesting habitat for migratory and native bird species. This project lies within the Northern Plains Migratory Bird corridor. The corridor sees thousands of migratory birds passing and nesting throughout the Prairie Pot Hole Region, making the restoration of both wetland and prairie habitat extremely valuable to the environment. The additional upland buffer acreage will recover important breeding grounds and foraging sites that have been lost to agriculture and development.

9.3 Site Investigations

Discuss and provide information about the locations, methods, and results of any subsurface investigations and analysis performed for the project site.

A Level 1 & 2 Wetland Delineation (see appendix) was completed and submitted for review on August 7, 2019.

9.4 Hydrologic and Hydraulic Analysis

Discuss the hydrologic and hydraulic analyses conducted to define existing site conditions and to design the proposed wetland bank project. Report the following related to hydrology/hydraulics report:

- *Method of analysis, values used for pertinent variable and computed peak flows and water surface elevations for the 2-year, 10-year, 25-year, and 100-year, 24-hour events and associated wetland storage volumes.*
- *Hydraulic design of existing and proposed water control structures.*
- *Discussion of both upstream and downstream impacts.*

See attached Hydraulics Report

10. Supplemental Information

If the project involves protection of wetlands previously restored via conservation, restoration and protection of exceptional natural resource value, or preservation credit actions (WCA rule subparts 6, 8, and 9 respectively), provide a narrative discussion of how the project meets the requirements of actions. Discuss and reference applicable guidance documents and support materials. If necessary, discuss any other information that is relevant to the plan and not discussed in the other sections of the document.

N/A

11. Monitoring Plan

Describe a plan to annually monitor vegetation and hydrology as it relates to the identified credit release criteria. The plan should include anticipated transects and sampling point locations, and a description of the methodology to estimate important measures such as vegetation areal coverage, species diversity, and water table elevations. Plans should identify the proposed frequency and timing of annual monitoring efforts.

Monitoring of the emergent wetland and upland area will be conducted for five years or until the performance standards are met. Monitoring of the shrub-car wetland will begin in the third growing season and will last five years or until the performance standards are met.

Monitoring will be conducted by a Minnesota certified wetland delineator. Site visits to identify plant species will take place a minimum of two times a year. These site visits will be based on bloom time of plant species to aid in identification. Native plant species surveys will be conducted along seven predetermined transects, extending through all plant communities. Each sampling transect will have a five-foot radius plot for herbaceous species and fifteen-foot plots for shrub species. These plots have been predetermined using soils and survey data. At each sampling plot, plants species will be identified and the percent cover of each species will be determined. This information will be compiled to give an accurate representation of species diversity throughout the restoration. These surveys will occur once a year.

Invasive and weedy species will be identified twice a year using a meander survey and located using a GPS unit. This information will be shared with the sponsor to aid in invasive control and tracked in the monitoring reports.

Plant community boundary surveys will occur in Year 3 of monitoring. This will give plant species time to germinate and for the hydrology of the site to stabilize. Waiting until year three will give an accurate representation of the plant community sizes within the bank.

Hydrology will be monitored using data loggers that will take daily readings throughout the growing season. The data loggers will be installed within shallow depth monitoring wells placed at predetermined locations based on elevations, soil types and proposed wetland type boundaries, as follows (Exhibit M):

- **W-1: Located along the Le Sueur-Lester complex and Klossner muck soils, at an elevation along the proposed fresh (wet) meadow and shallow marsh of Wetland 1. This location will represent the northwest side of Wetland 1.**
- **W-2: Located within Cordova clay loam soils at an elevation within the fresh (wet) meadow. This well will provide insight into the swale that reaches to the southwest from Wetland 1.**
- **W-3: Located within Cordova clay loam soils at an elevation within the southern portion of the fresh (wet) meadow and shallow marsh of Wetland 1. This well will provide insight into the connection between the fresh (wet) meadow and shallow marsh of Wetland 1 for this soil type.**
- **W-4: Located within Le Sueur loam soils at an elevation within the shrub-carr. This well will provide insight into the connection between the mesic prairie and the shrub-carr of Wetland 2 for the far northern end of Wetland 2 and this soil type.**
- **W-5: Located within Cordova clay loam soils at an elevation within the shrub-carr. This well will provide insight into the connection between the mesic prairie and the shrub-carr of Wetland 2 for this soil type.**
- **W-6: Located within Glencoe clay loam soils at an elevation within the shrub-carr. This well will provide insight into the connection between the mesic prairie and the shrub-carr of Wetland 2 for this soil type.**

Monitoring wells will not be established in upland buffer areas. The wells will be installed when the ground is free of frost, this usually happens in April. The ground elevation will be recorded at each well. This elevation will be used to determine the elevation of the groundwater and correlated to the the daily data being recorded through the loggers. The groundwater elevations will be graphed against ground elevations allowing for precise understanding of where the groundwater is throughout the growing season. The data loggers will be removed at the end of the growing season, usually late October, every year. The loggers will be utilized until it is evident that wetland hydrology has been established and the hydrology performance standard has been met. This data will be presented in the annual monitoring report.

The following monitoring schedule is a general outline of monitoring activities. This schedule may be modified depending on the success of the restoration site.

ANNUAL MONITORING SCHEDULE	
Late April	-Set data loggers when frost is gone.
May	-Conduct invasive species survey.
June	-Conduct native plant species survey. -Conduct plant community boundary survey, in Year 3 and final year.
July	-Conduct final delineation, last year only.
August	-Conduct native plant species survey.
September	-Conduct invasive species survey.
October	-Remove data loggers.

All findings for each year will be presented to the reviewing agencies through an annual monitoring report. The report will be submitted to reviewing agencies by December 31st of each monitoring year. The report will include the following items:

1. A project location map with legal description.
2. A description of restoration goals in terms of size, proposed credits, wetland types, hydrology and wetland functions.
3. A description of the performance standards achieved, with a comparison to the final goals that have been set for the restoration.
4. A description of activities completed during the past year and activities planned for the following year.
5. Hydrology measurements acquired from the data logger and a map accurately showing the location of the data logger.
6. A list of plant species along with percent cover for each species for each plant community type.
7. Color photographs taken from fixed reference points between July 1st and September 30th of each year.

A final wetland delineation will be completed at the end of the final growing season of the monitoring period and will be included with the final monitoring report. This delineation will give an accurate measurement of credits for the final credit release.

Attached in the appendix is Exhibit M: Monitoring Plots which shows the planned monitoring plots, well locations, and photo reference points.

12. Special Considerations

WCA rules (8420.0515) identify nine factors that must be considered when submitting a wetland replacement/banking plan. Identify and discuss any and all of these factors that are applicable or potentially applicable to the project and site.

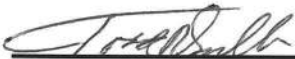
- **Endangered or threatened species** – No threatened or endangered species are known to exist within the conservation easement.
- **Rare Natural Communities** – No rare natural communities are known to exist within the conservation easement.
- **Special Fish and Wildlife Resources** - No special fish and wildlife resources are known to exist within the conservation easement.
- **Archaeological, historic or Cultural Resource Sites** – A Phase I Archaeological Survey was conducted by Bolton & Menk, Inc. in December of 2020 and no archeological, historic or cultural resources were encountered within the conservation easement.
- **Groundwater Sensitivity** – No adverse effects to groundwater are foreseen as a result of this project.
- **Sensitive Surface Waters** – This project will not adversely affect any outstanding resource value waters found on the list in MN Rule part 7050.0180.
- **Education and Research Use** – No impacts to wetlands known to be used for educational or research purposes are foreseen as a result of this project.
- **Waste Disposal Sites** – No known waste disposal sites exist within the within the conservation easement.
- **Consistency with Other Plans** – A wetland restoration such as this one, is consistent with the overall watershed management plan to improve water quality.

Signature

By signing this form I acknowledge that:

- A. I am authorizing the review of my Mitigation Plan by the appropriate regulatory authorities as part of establishing a compensatory wetland mitigation project.
- B. I am familiar with the information contained in this submittal and, to the best of my knowledge and belief, all information is true, complete, and accurate.
- C. No areas proposed to receive wetland bank credit were previously restored or created under a prior approved WCA wetland replacement or banking plan.
- D. No areas proposed to receive wetland bank credit were impacted under a WCA exemption during the previous 10 years.
- E. No areas proposed to receive wetland bank credit will be restored, created, or preserved with financial assistance from public conservation programs or for other unrelated regulatory purposes.
- F. All individuals and entities providing funding for this project are aware that this project will provide credits to offset regulatory wetland impacts.
- G. The project will be monitored in accordance with the approved monitoring plan.
- H. I understand that Mitigation Plan review may require regulatory agency staff to inspect my project site, that agency staff will contact me in advance to schedule a site visit, and I agree (or am authorized) to allow agency staff reasonable access to the property when prior notification is given.

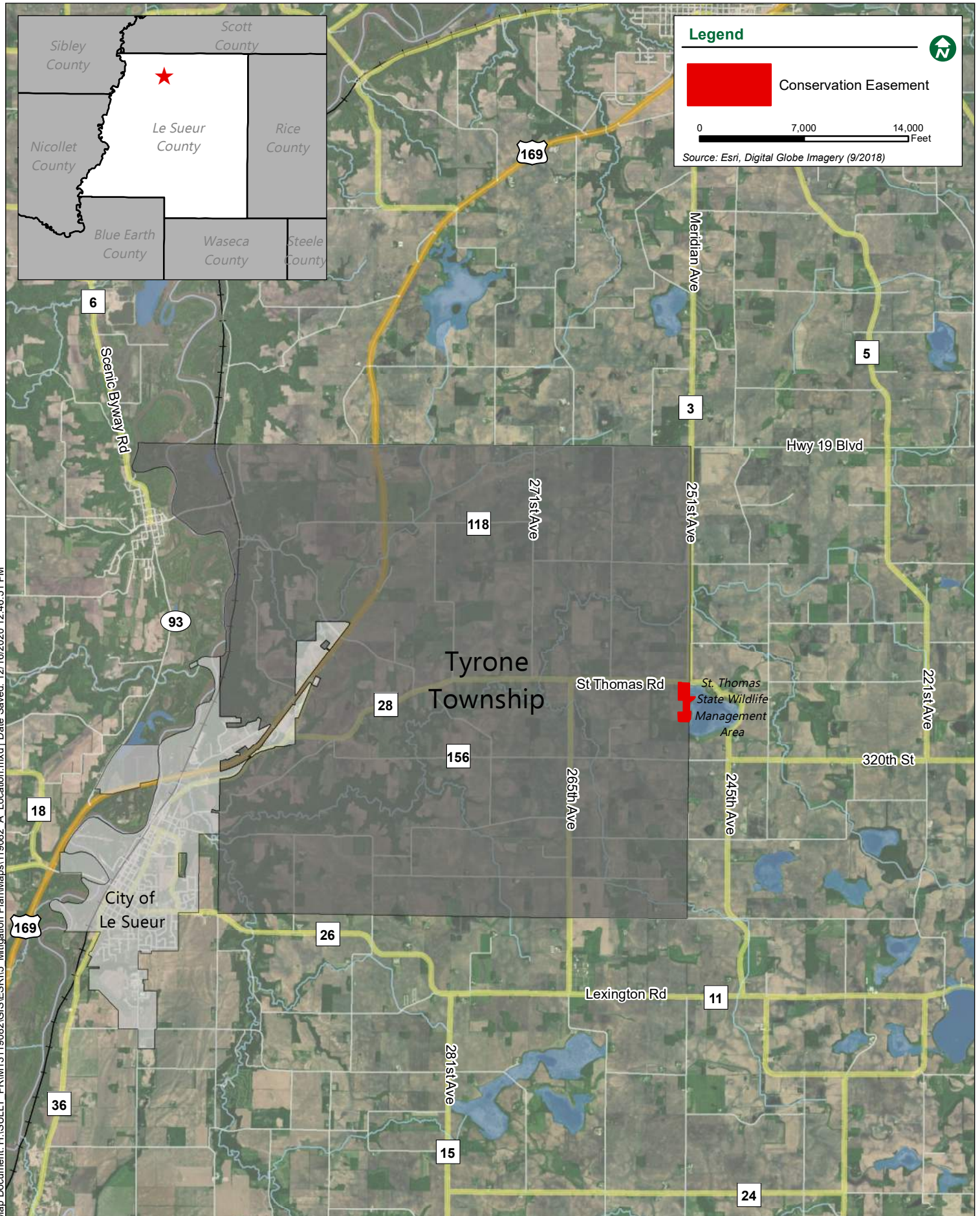
If I am not the fee title owner of property, I have obtained permission from the fee title owner to allow agency staff reasonable access to the property when prior notification is given.



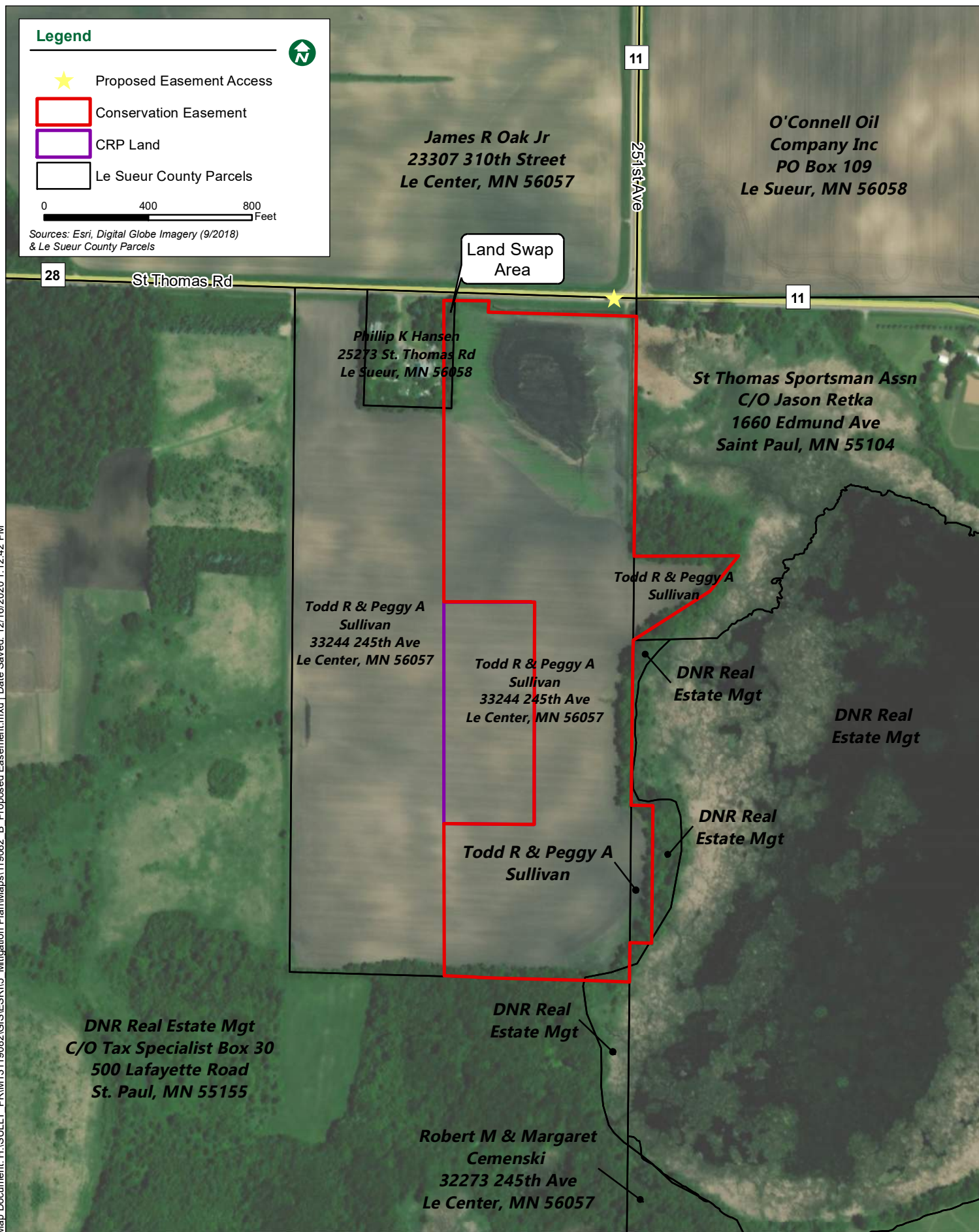
Signature of Project Sponsor

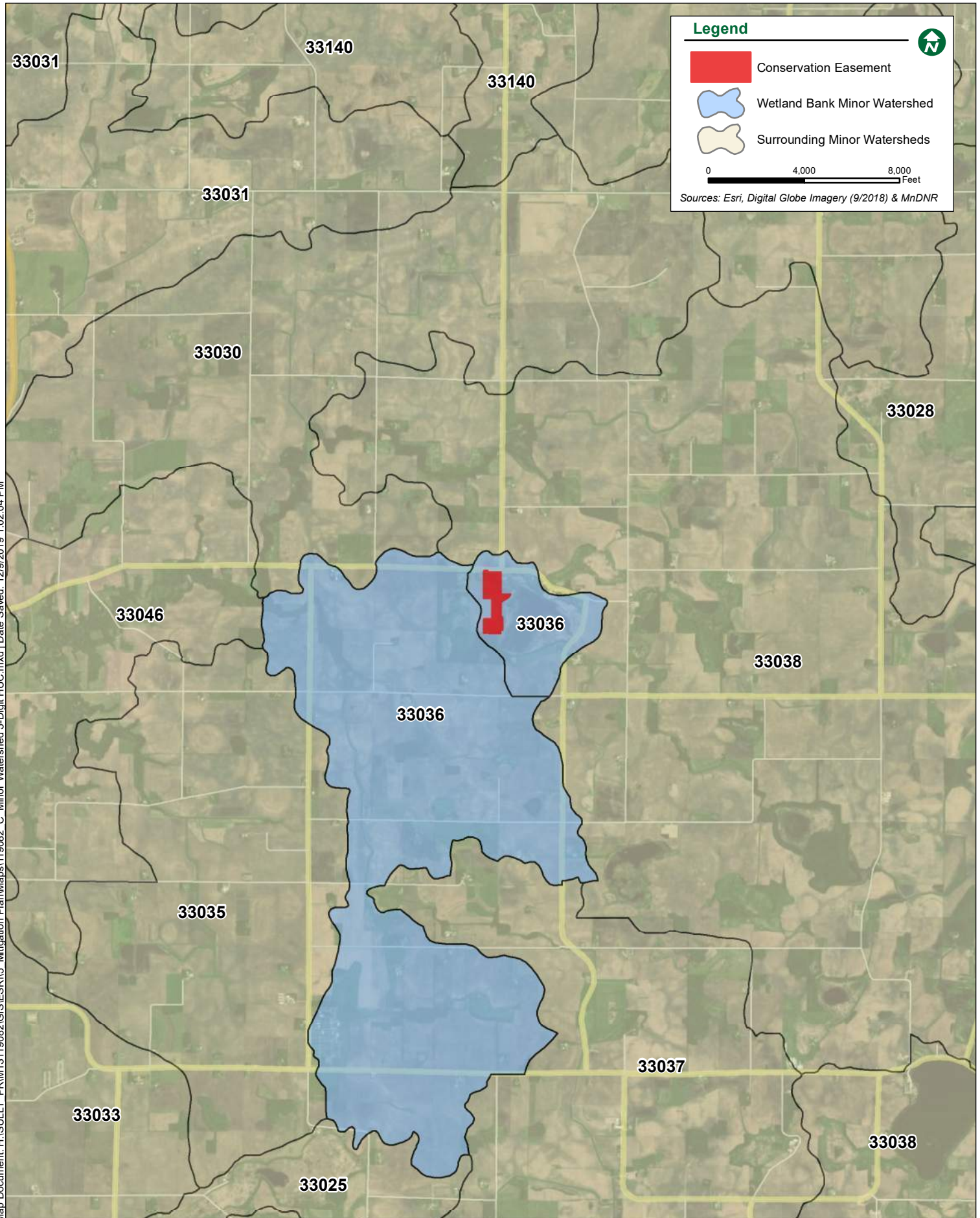
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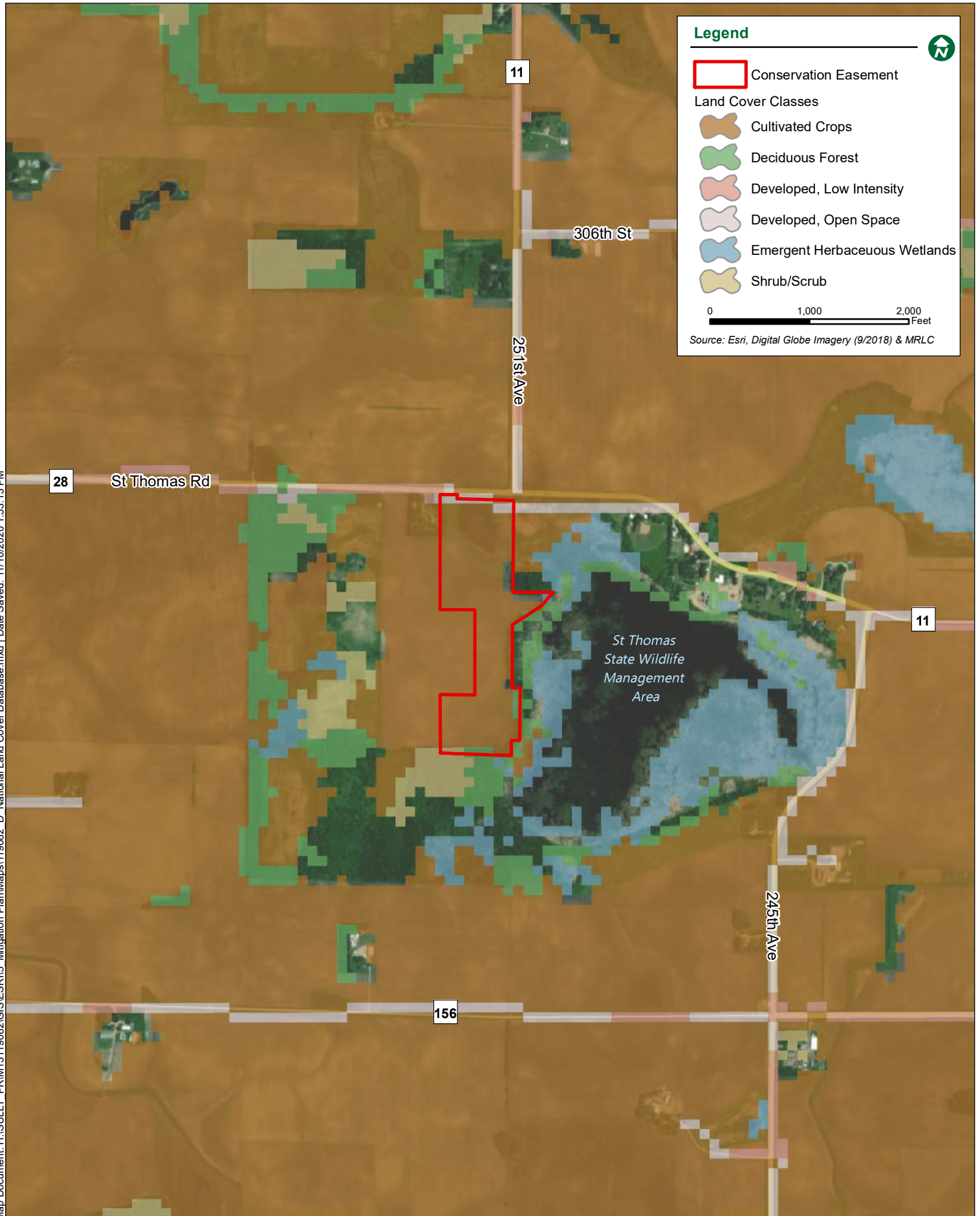
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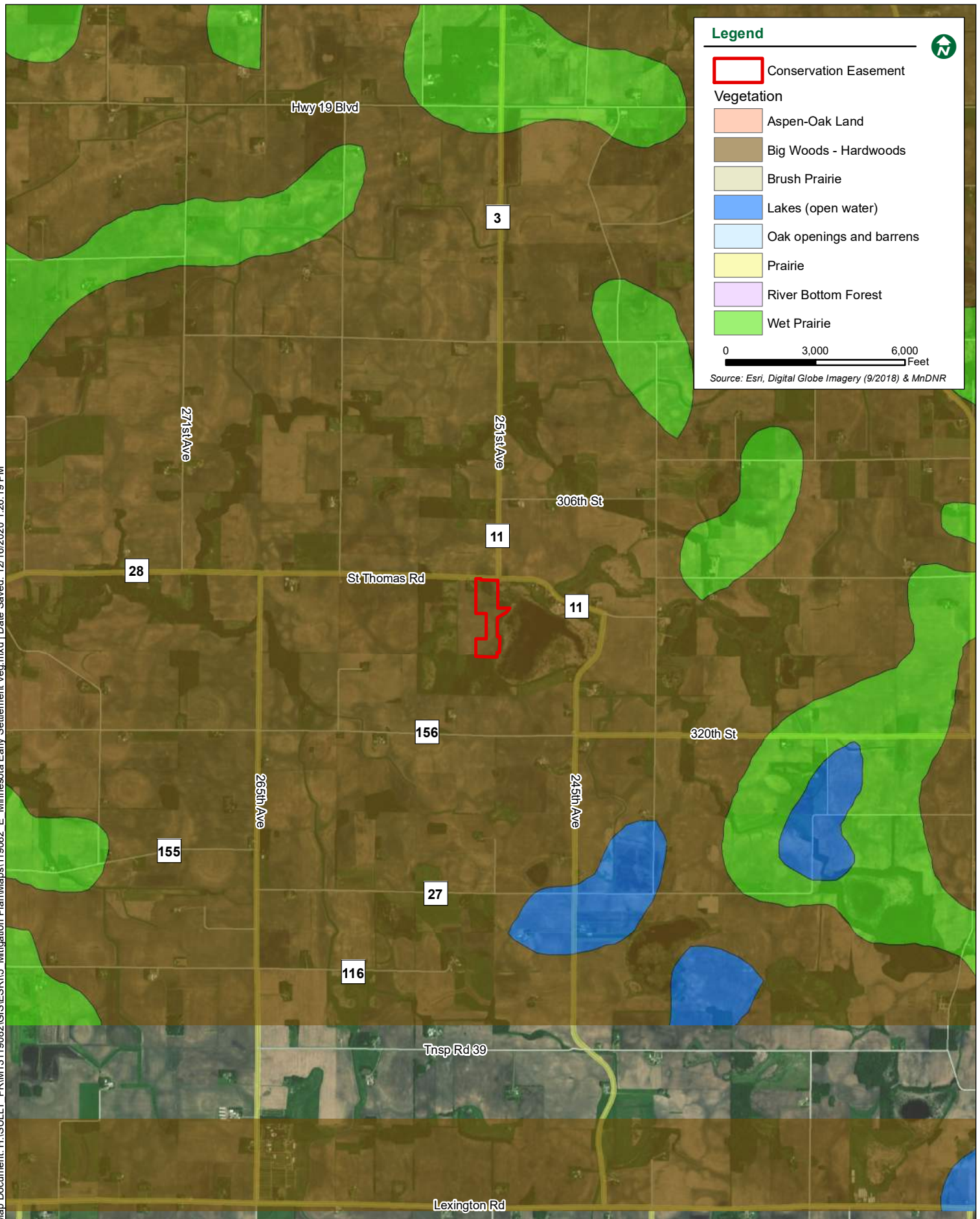


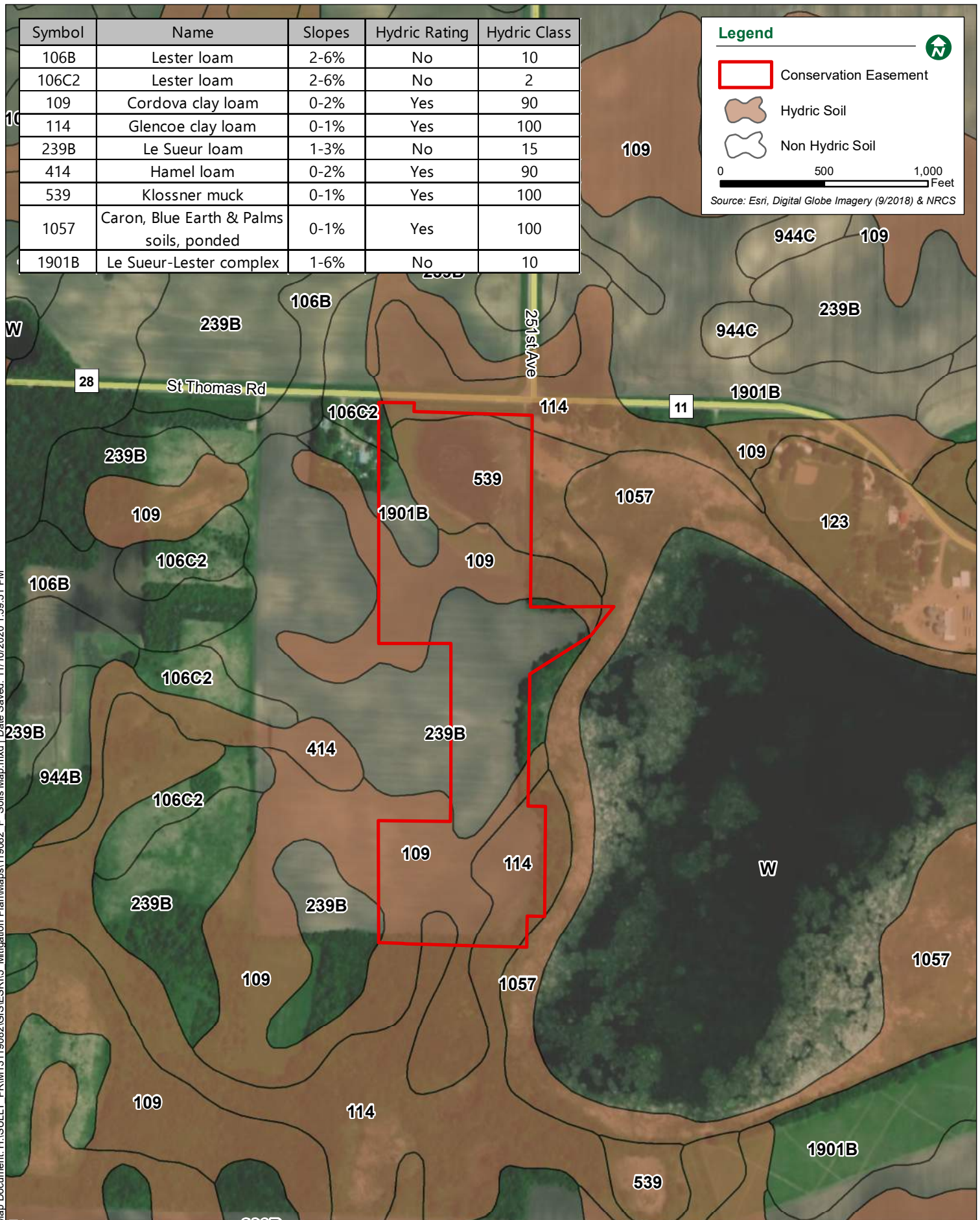
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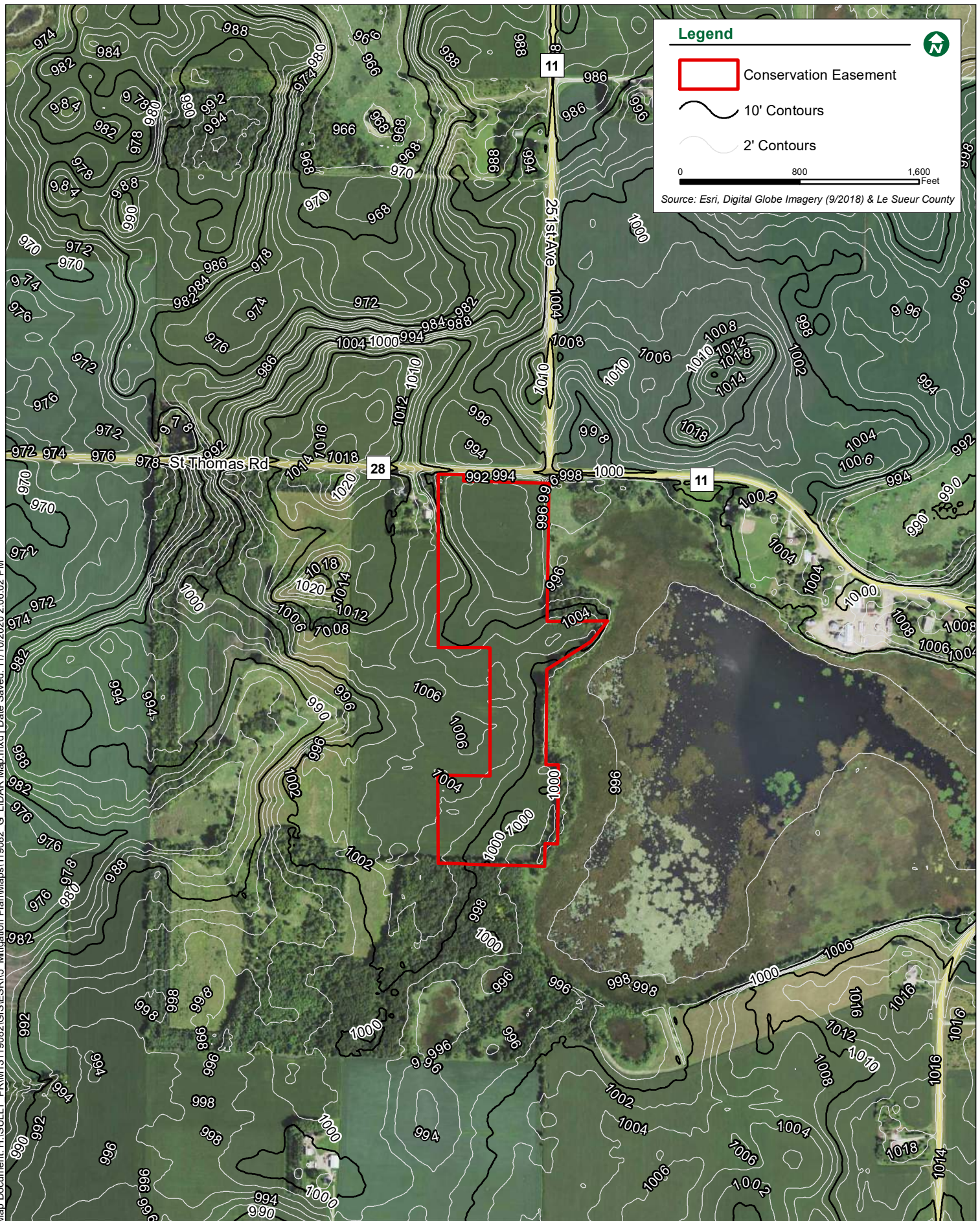


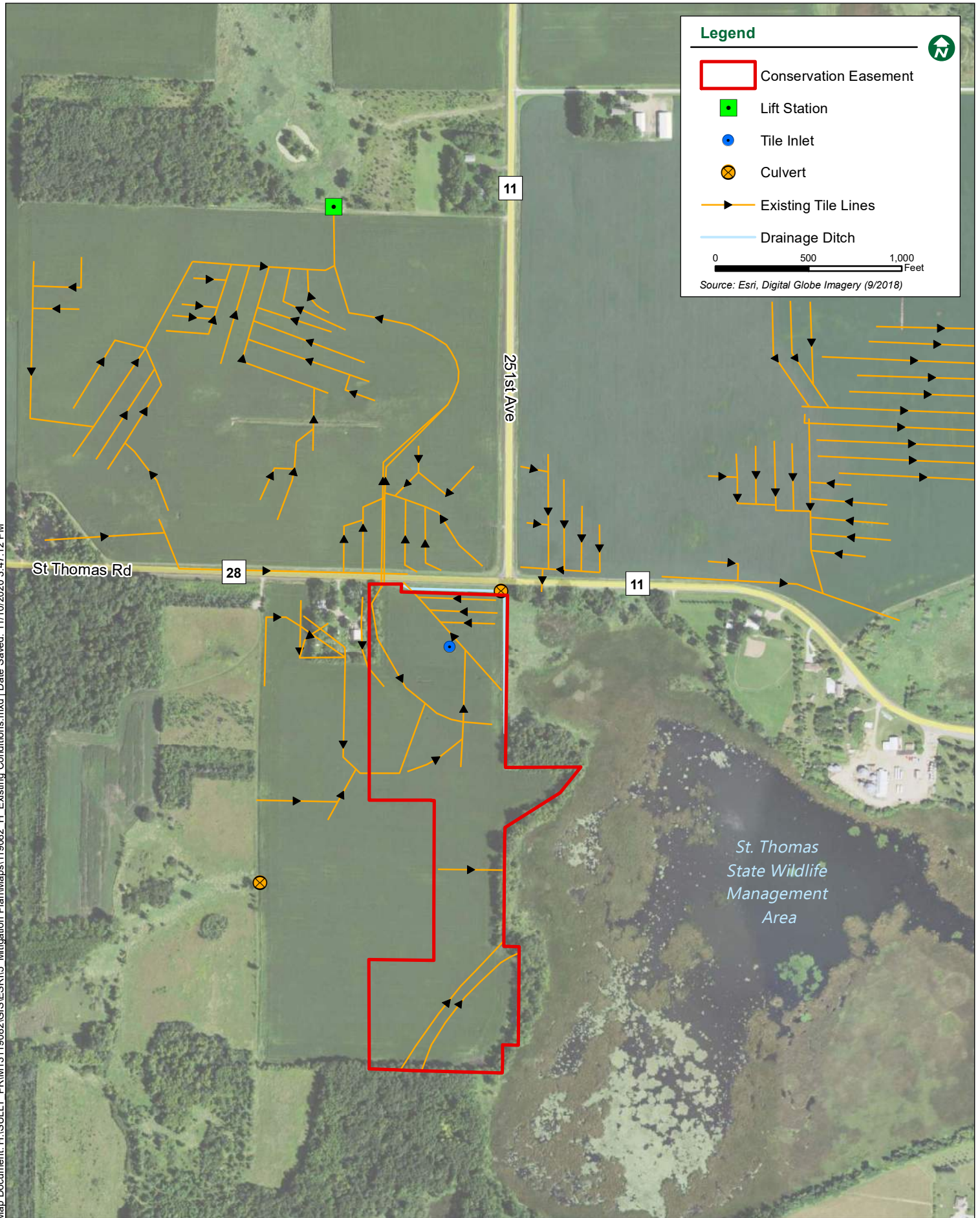


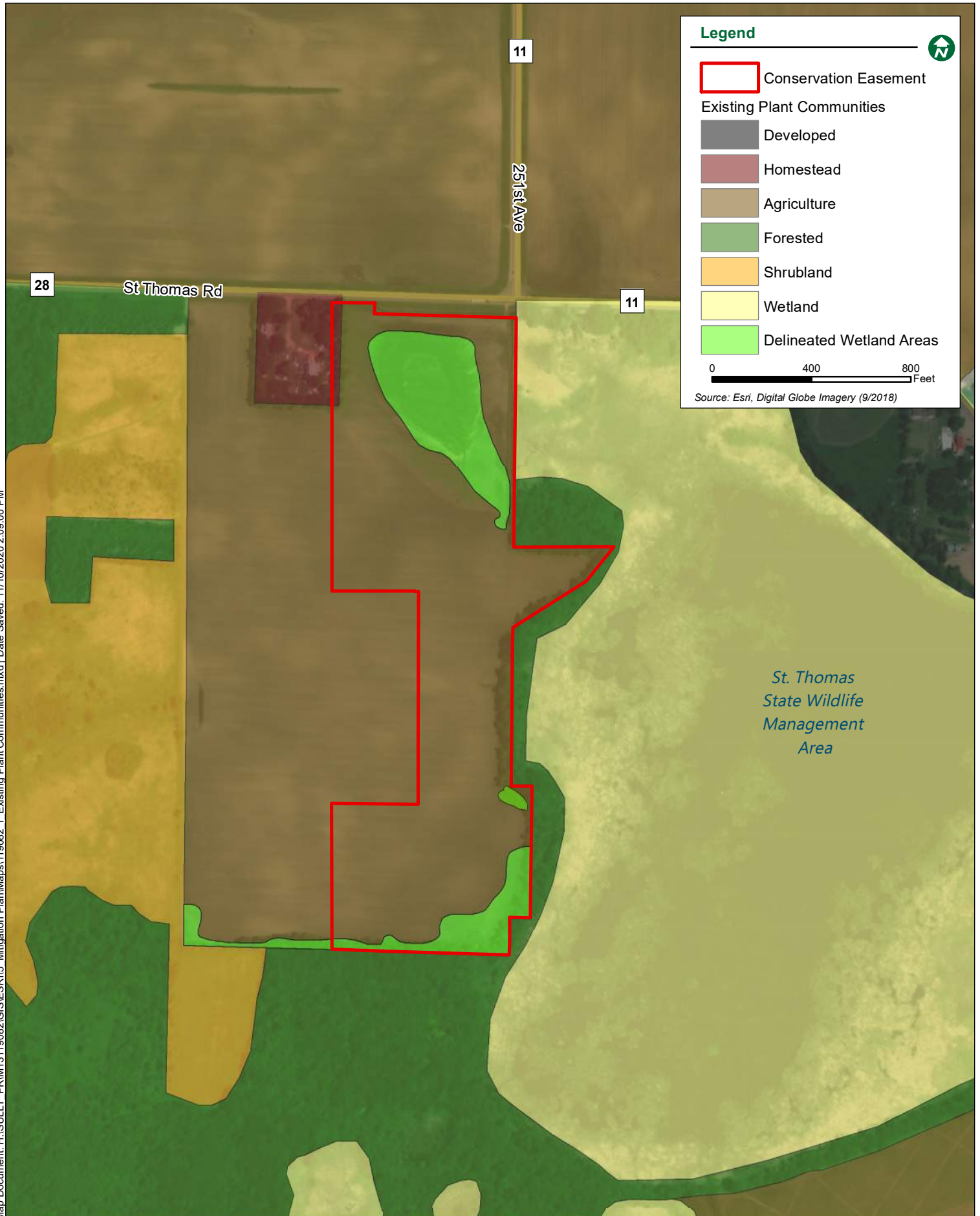


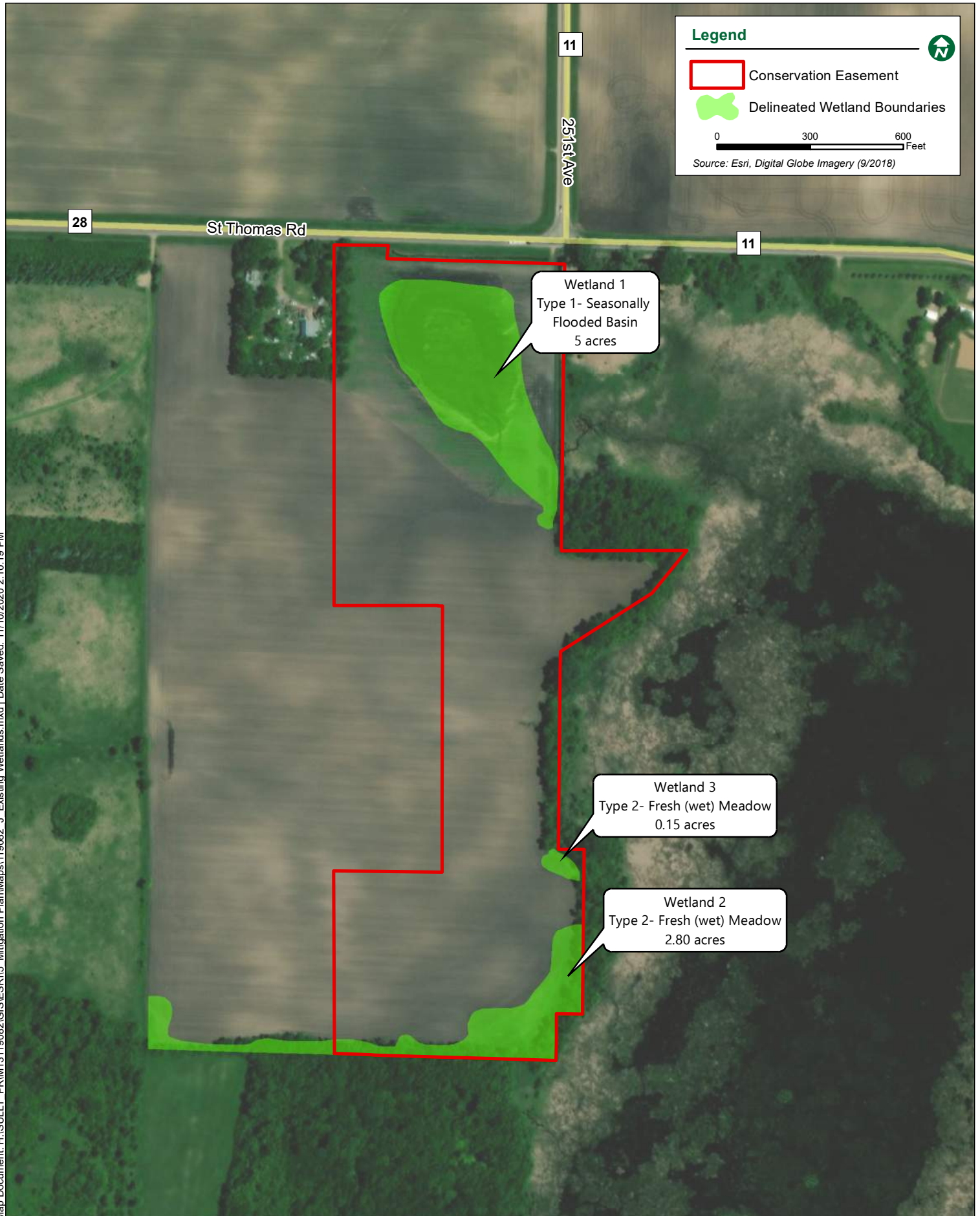


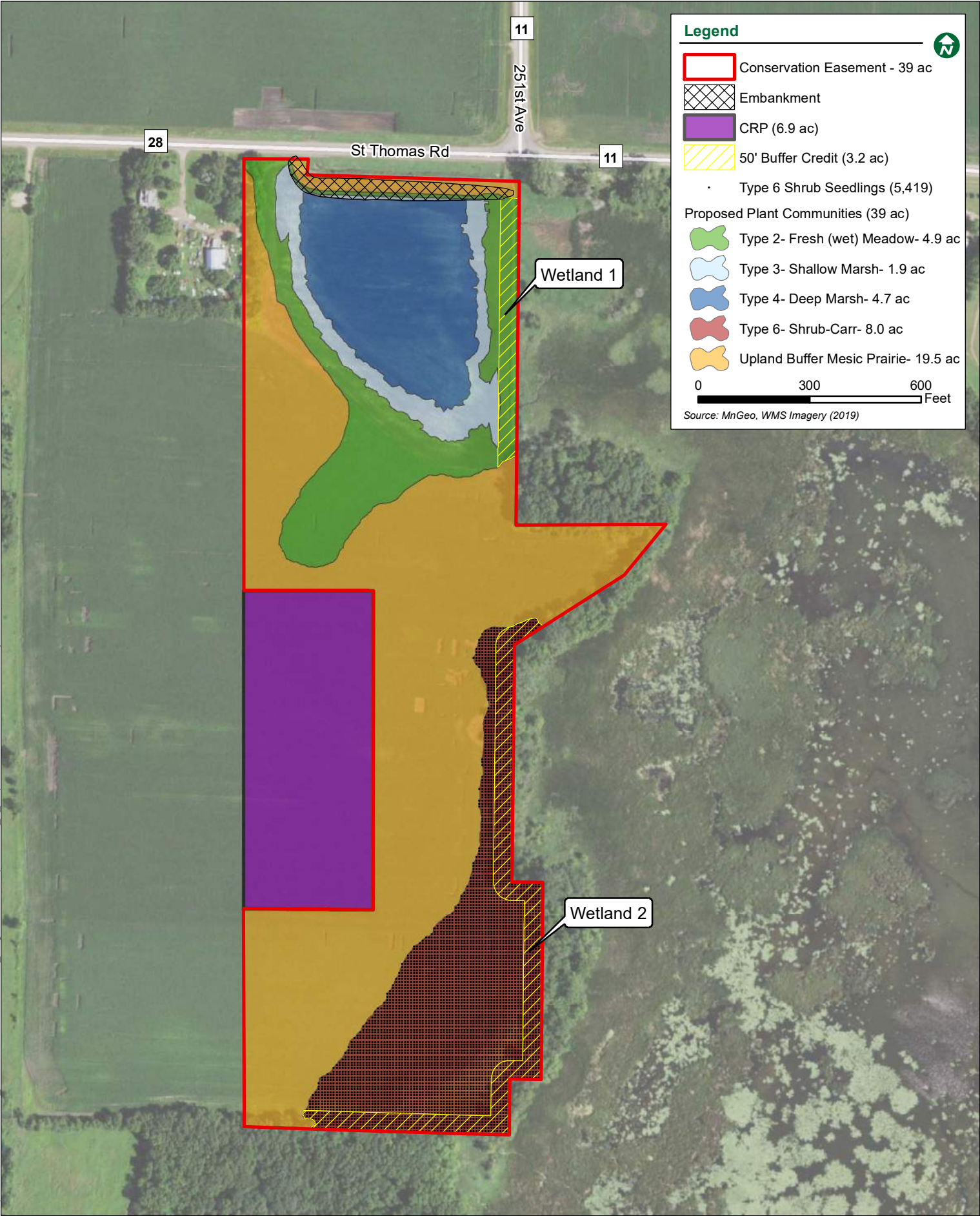


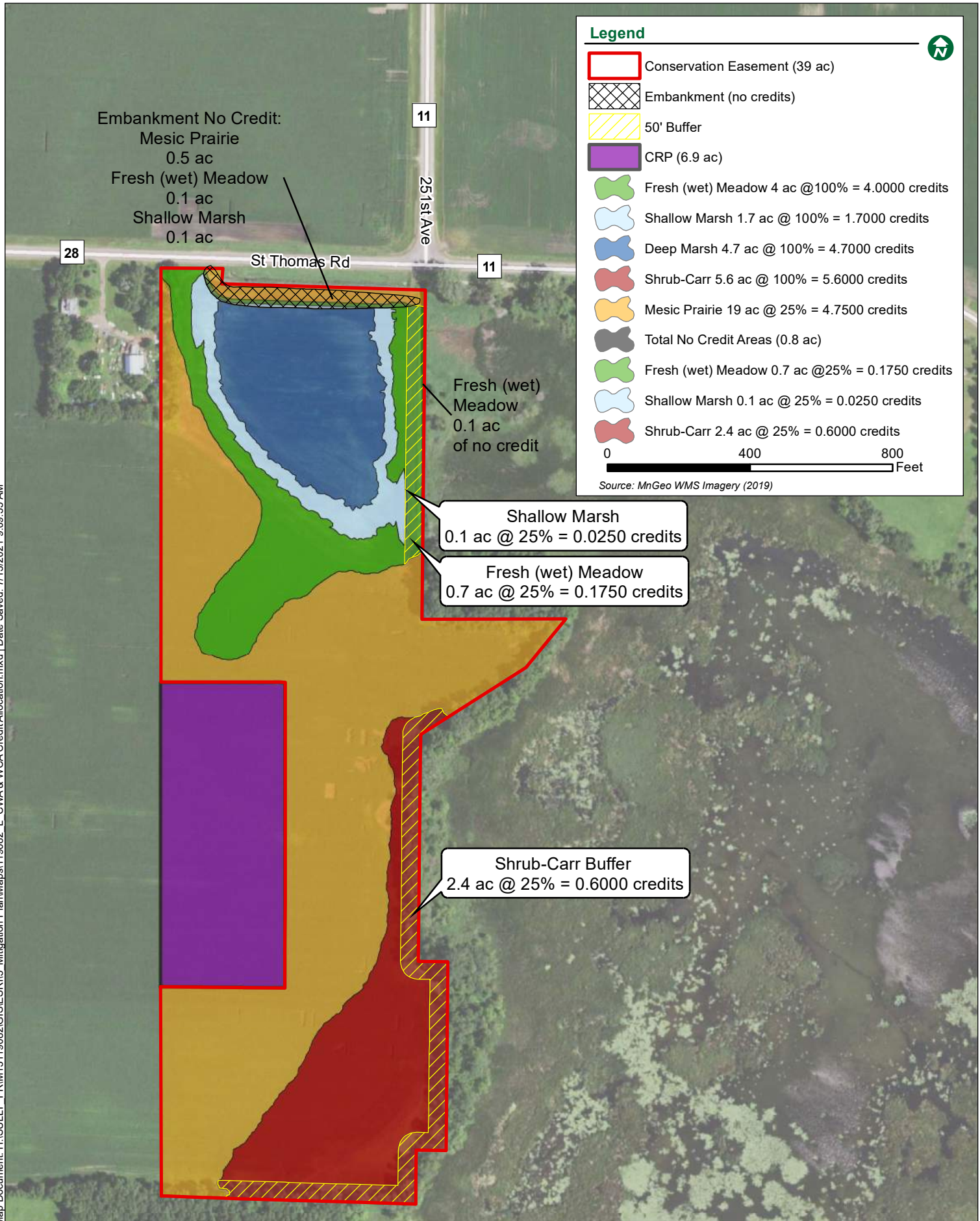


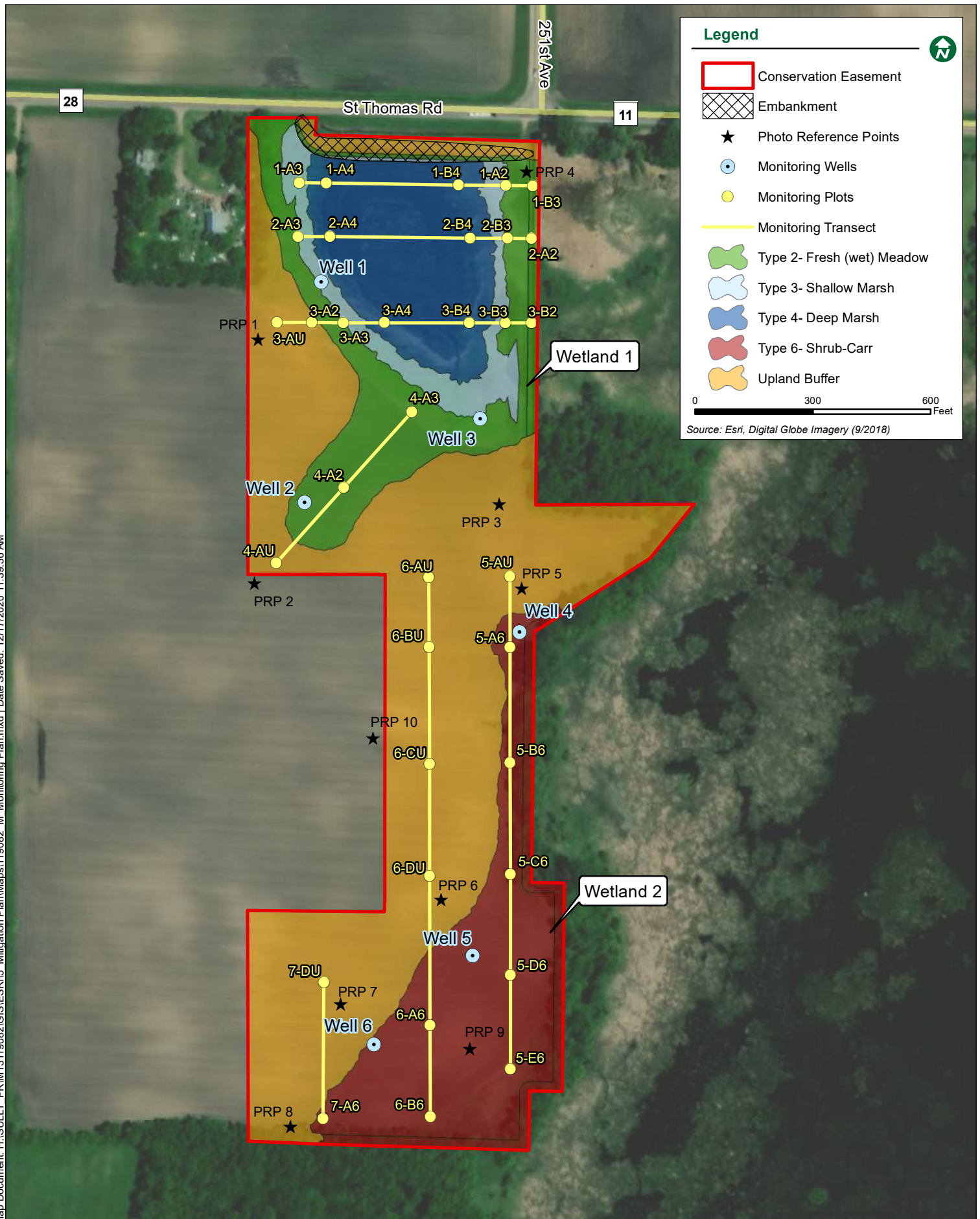


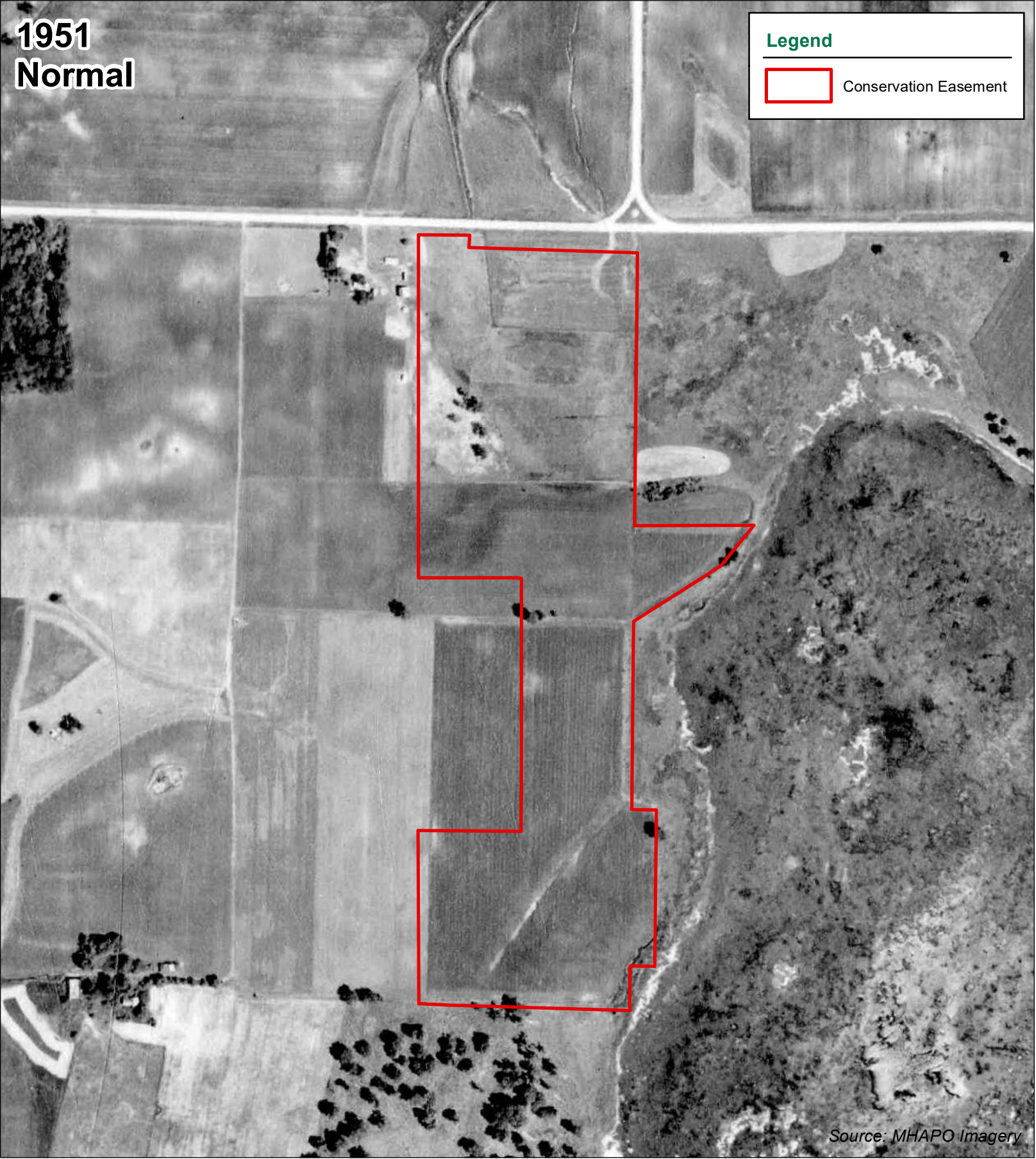


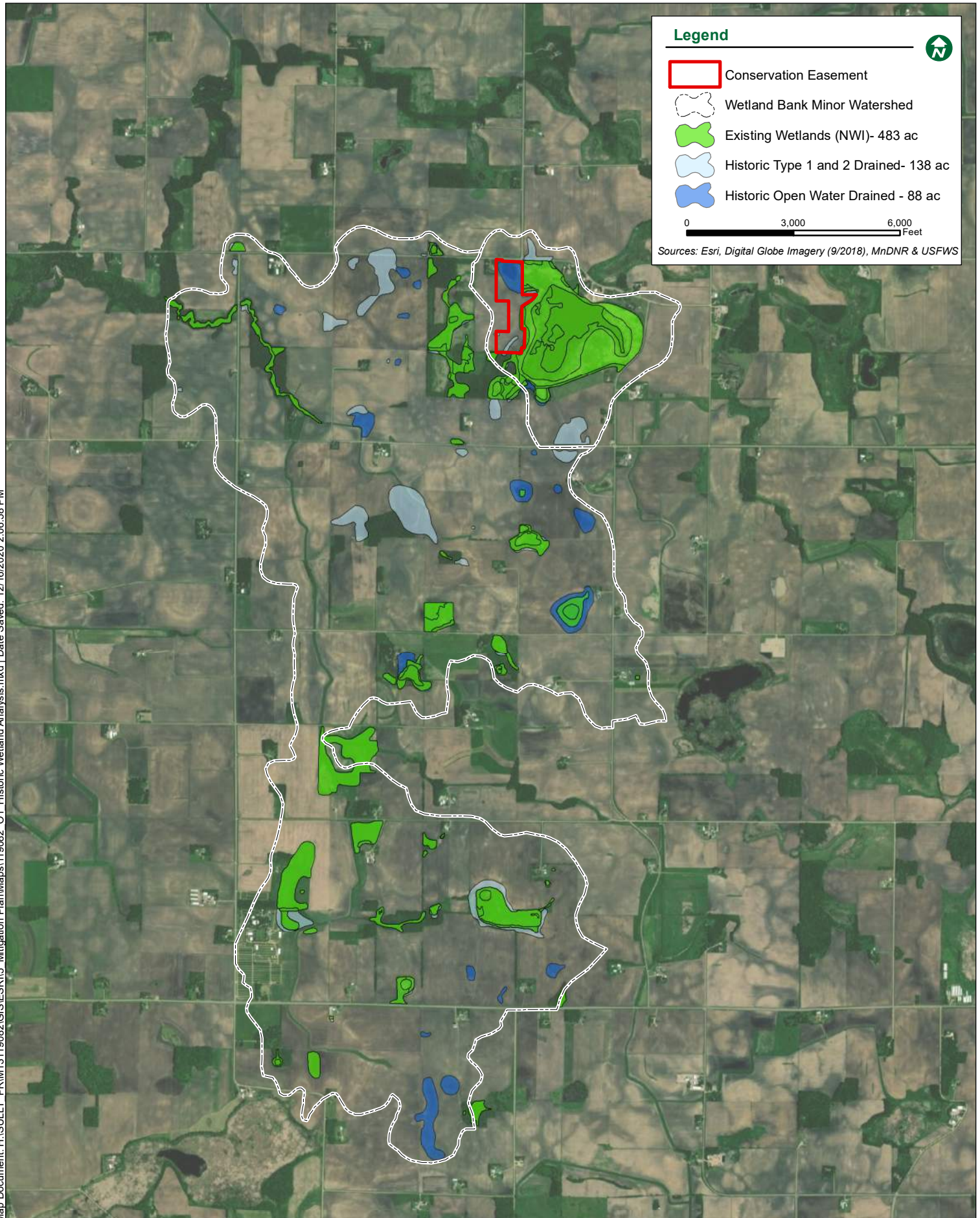


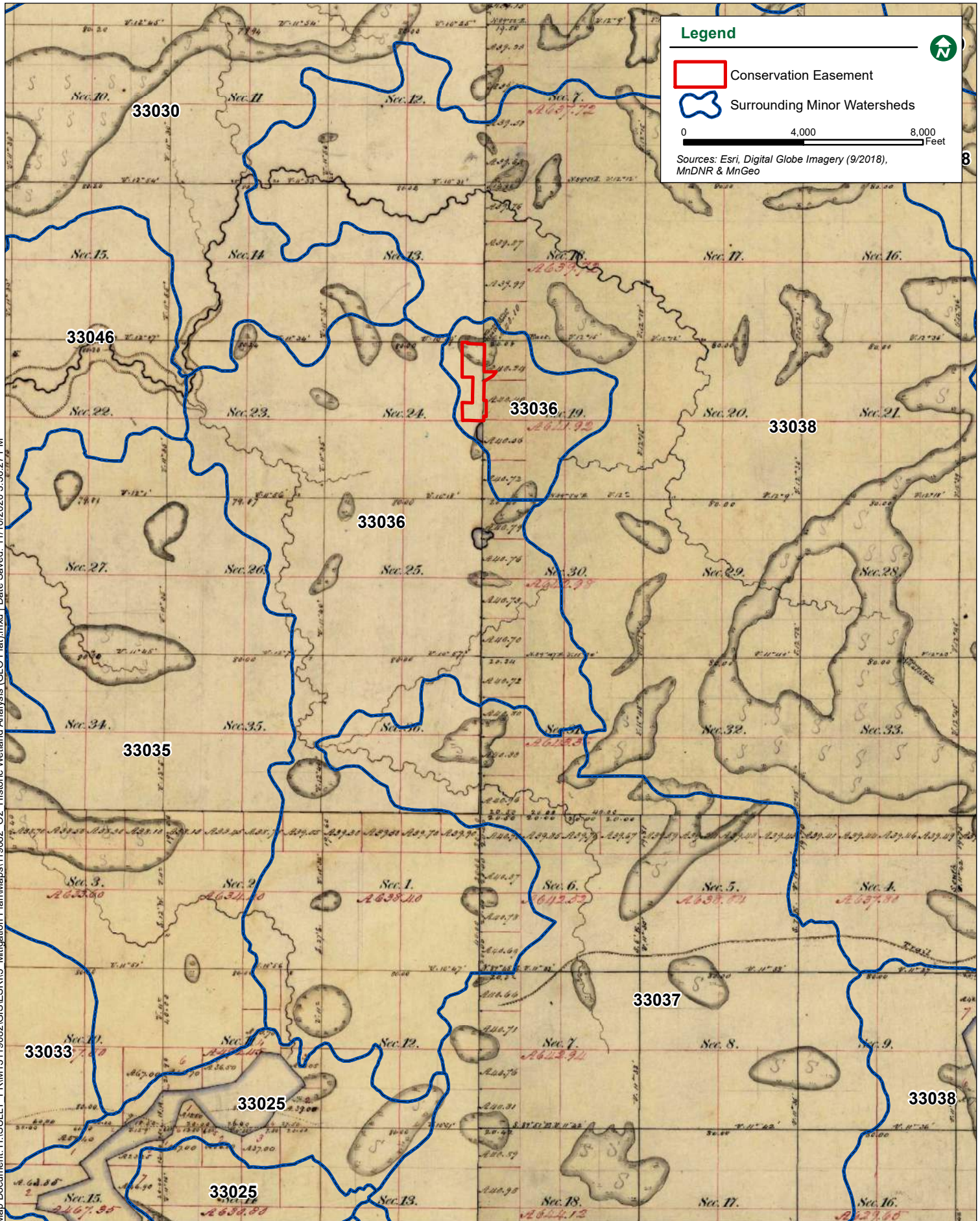


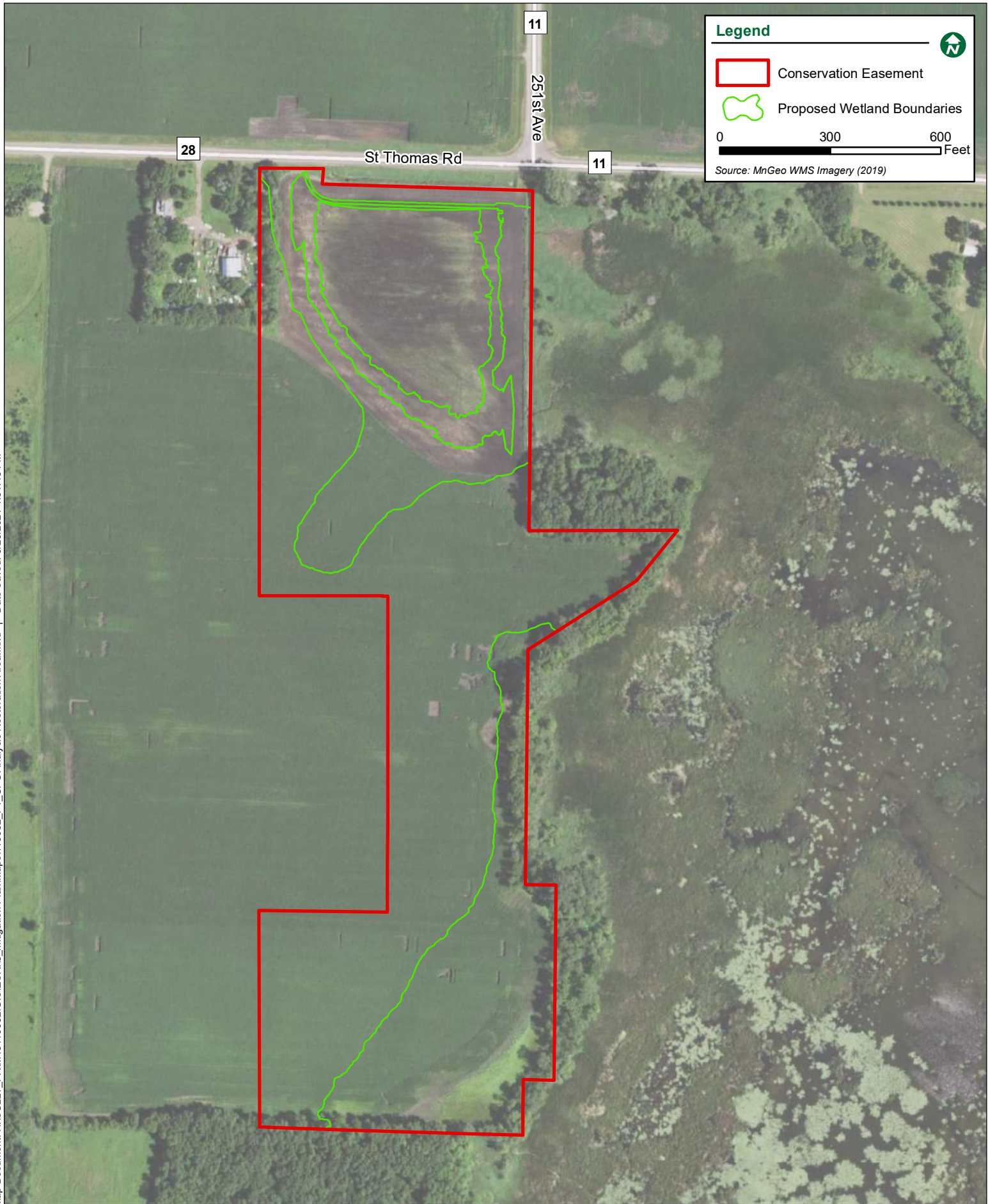


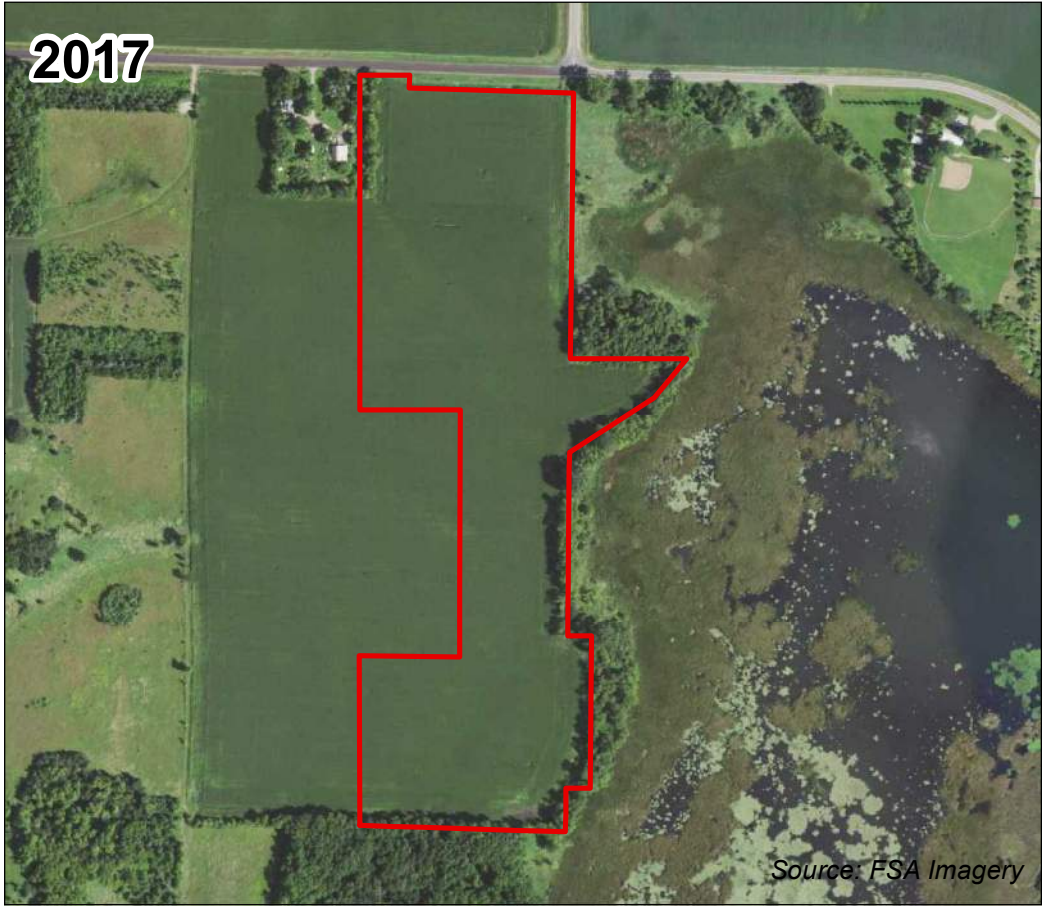
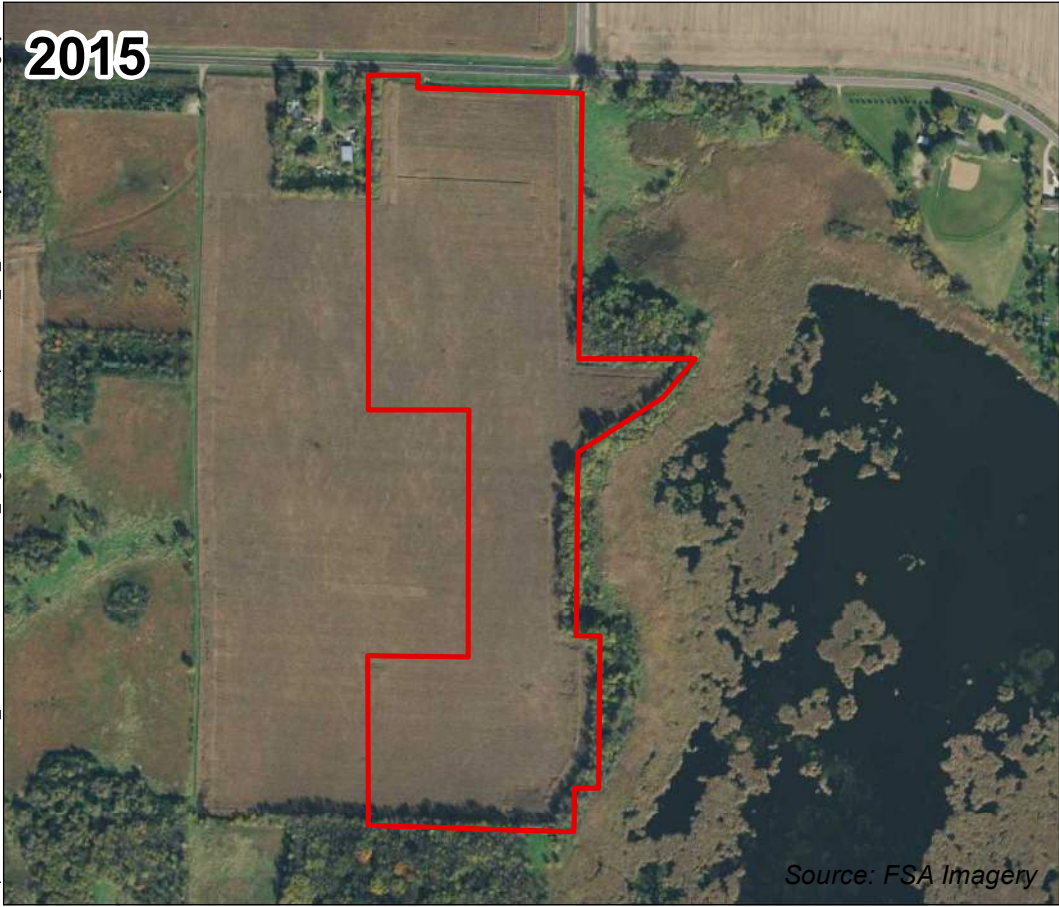
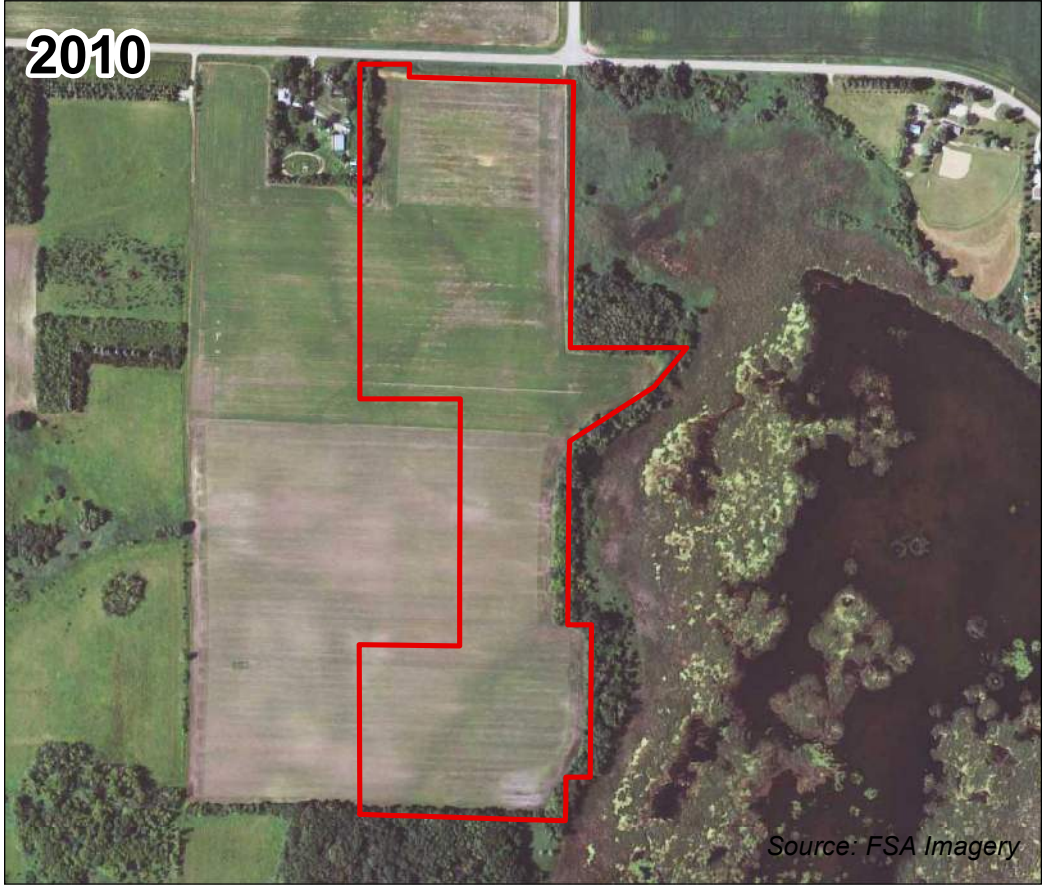
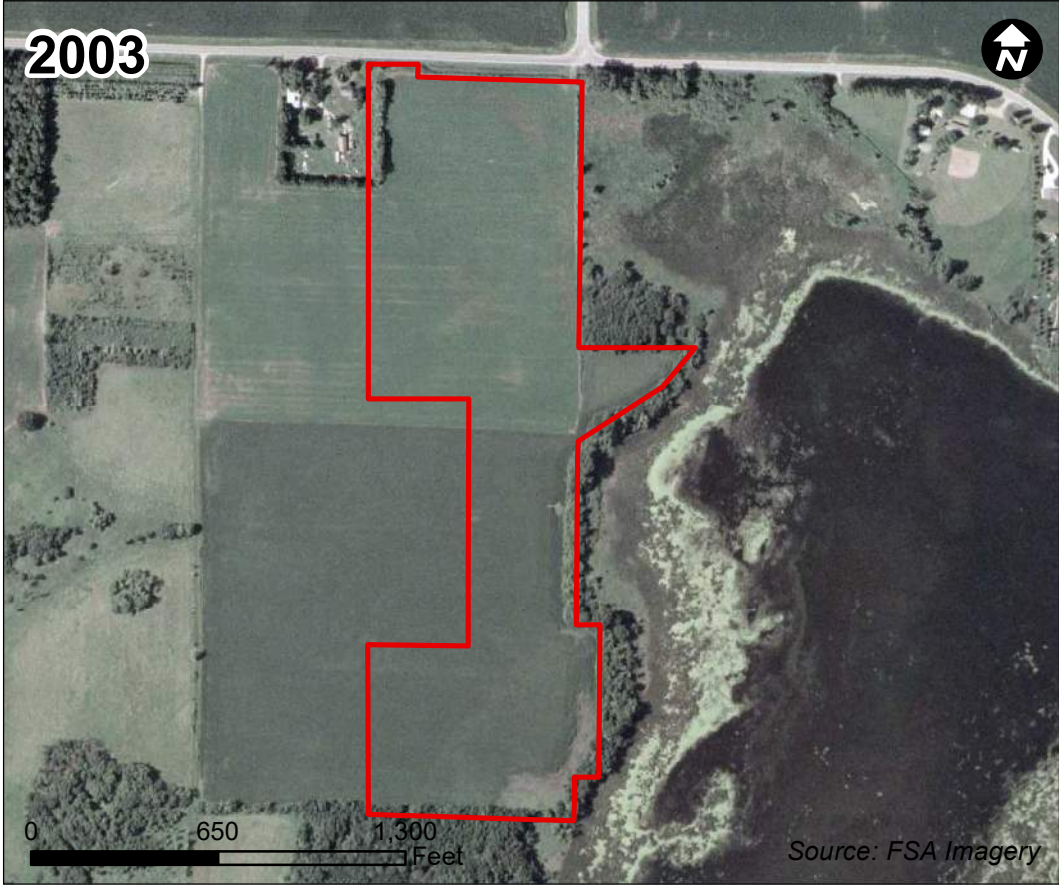












Acknowledged 6/14/2021

Dani Blaschko

County Auditor-Treasurer

By Deputy: SB

PID No(s)

03.019.0300

03.019.0400

12.024.2500

No Delinquent Taxes

eCRV not Required

LeSueur
COUNTY | MINNESOTA

SHARON J BUDIN

COUNTY RECORDER

By Deputy: AML

Document No. 436915

Certified, Filed, Recorded On

6/14/2021 1:59 PM

Recording Fee: \$46.00

State Deed Tax: \$1.65

Page(s): 4

Top 3 inches reserved for recording data)

QUIT CLAIM DEED

Individual(s) to Individual(s)

eCRV number: N/A

DEED TAX DUE: \$1.65

DATE: 6/14/21

FOR VALUABLE CONSIDERATION, **Todd Sullivan, aka Todd R. Sullivan and Peggy A. Sullivan, husband and wife ("Grantor")**, hereby conveys and quitclaims to **Todd R. Sullivan and Peggy A. Sullivan ("Grantee")**, as

(Check only one box.) ☐ tenants in common, *(If more than one Grantee is named above and either no box is checked or both boxes are checked, this conveyance is made to the named Grantees as tenants in common.)*
☒ joint tenants,

real property in Le Sueur County, Minnesota, legally described as follows:

See attached legal description.

The consideration for this transaction is \$3,000.00 or less.

together with all hereditaments and appurtenances belonging thereto.

Check applicable box:

- ☐ The Seller certifies that the Seller does not know of any wells on the described real property.
- ☐ A well disclosure certificate accompanies this document or has been electronically filed. (If electronically filed, insert WDC number: [...].)
- ☐ I am familiar with the property described in this instrument and I certify that the status and number of wells on the described real property have not changed since the last previously filed well disclosure certificate.

Grantor



Todd R. Sullivan

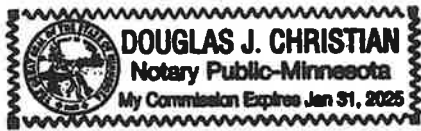


Peggy A. Sullivan

State of Minnesota, County of **Le Sueur**

This instrument was acknowledged before me on 6/4/21, by **Todd R. Sullivan and Peggy A. Sullivan, husband and wife.**

(Stamp)



Doug Christian
(signature of notarial officer)

Title (and Rank): _____

My commission expires: _____
(month/day/year)

THIS INSTRUMENT WAS DRAFTED BY:
Douglas J. Christian (ID# 187203)
Christian, Keogh, Moran & King
65 S. Park Avenue
P.O. Box 156
Le Center, MN 56057
507-357-2278

TAX STATEMENTS FOR THE REAL
PROPERTY DESCRIBED IN THIS
INSTRUMENT SHOULD BE SENT TO:
Todd R. and Peggy A. Sullivan
33244 245th Avenue
Le Center, MN 56057

Parcel 1

Part of PID 12.024.2500 ✓

The Southeast Quarter of the Northeast Quarter of Section 24-112-25, in Le Sueur County, Minnesota.

Parcel 2

Part of PID 12.024.2500 ✓

The Northeast Quarter of the Northeast Quarter of Section 24, Township 112 North of Range 25 West;

Less the following described parcel:

Beginning at a point on the North line of Section No. 24-112-25, Le Sueur County, Minnesota, said point being 700.00 feet West of the Northeast corner of said Section No. 24, thence South 446.00 feet, thence West 339.00 feet, thence North 446.00 feet to the North line of said Section No. 24, thence East on said North line 339.00 feet to place of beginning. Being 3.47 acres of the Northeast Quarter of the Northeast Quarter of said Section No. 24, Township 112 North of Range Twenty-five West, Le Sueur County, Minnesota.

Also less the following described parcel:

That part of the Northeast Quarter of the Northeast Quarter in Section 24, Township 112 North, Range 25 West, Le Sueur County, Minnesota described as follows: Beginning at the Northeast Corner of said Section 24, Thence North 88 degrees 09 minutes 23 seconds West along the North line of the Northeast Quarter, a distance of 1039.00 feet to the point of beginning; thence South 01 degrees 50 minutes 37 seconds West, a distance of 446.00 feet; thence North 88 degrees 09 minutes 23 seconds West, a distance of 209.36 feet; thence North 00 degrees 31 minutes 51 seconds East, a distance of 446.12 feet to the said North line of the Northeast Quarter; thence South 88 degrees 09 minutes 23 seconds East along the said North line of the Northeast Quarter, a distance of 219.58 feet to the point of beginning, excepting therefrom that part of the Northeast Quarter (NE $\frac{1}{4}$) of the Northeast Quarter (NE $\frac{1}{4}$) in Section 24, Township 112 North, Range 25 West: Beginning at the Northeast Corner of said Section 24, thence North 88 degrees 09 minutes 23 seconds West along the North line of the Northeast Quarter, a distance of 700.00 feet to the point of beginning; thence South 01 degrees 50 minutes 37 seconds West, a distance of 446.00 feet; thence North 88 degrees 09 minutes 23 seconds West, a distance of 29.64 feet; thence North 00 degrees 01 minutes 06 seconds East, a distance of 446.23 feet to the said North line of the Northeast Quarter; thence South 88 degrees 09 minutes 23 seconds East along the said North line of the Northeast quarter, a distance of 43.85 feet to the point of beginning.

Parcel 3

PID 03.019.0400 ✓

The South ten acres of the Northwest Quarter of the Northwest Quarter (S10 A NW1/4 NW1/4), in Section Numbered Nineteen (19), Township One Hundred and Twelve (112), North of Range Twenty-four (24), in Le Sueur County, Minnesota, except all that part of the South Half of the South Half of the Northwest Quarter of the Northwest Quarter (S1/2 of S1/2 of NW1/4 of NW1/4), Section Nineteen (19), Township One Hundred Twelve (112), Range Twenty-four (24) West of the 5th P.M., lying Southerly of the following described line: Beginning at the North 1/16 corner on the West line of said section, thence North 59 degrees 16 minutes East, 350.0 feet; thence North 33 degrees 16 minutes East, 176.7 feet; thence South 89 degrees 38 minutes East 936.1 feet and there terminating on the West 1/16 line of said Section.

Parcel 4

PID 03.019.0300 ✓

The Southwest Quarter of the Northwest Quarter of Section 19-112-24, Le Sueur County, Minnesota. Excepting therefrom that part and portion thereof heretofore conveyed to the State of Minnesota, by Warranty Deed dated March 6, 1958, of record in Book 116 of Deeds, Page 641, and described as follows: All of the Southwest Quarter of the Northwest Quarter of Section 19-112-24, West of the 5th P.M. except that part lying Westerly of the following described line: Beginning on the West line of said Section 138.0 feet North of the West Quarter corner; thence North 39 degrees 46 minutes East, 136.0 feet, thence North 01 degrees 16 minutes East, 426.0 feet, thence North 23 degrees 44 minutes West, 87.0 feet, and there terminating on the West line of said Section.



Real People. Real Solutions.

1960 Premier Drive
Mankato, MN 56001-5900

Ph: (507) 625-4171
Fax: (507) 625-4177
Bolton-Menk.com

MEMORANDUM

Date: January 10th, 2021
To: Thomas A Wenzel, P.E., BWSR
From: Joshua G. Stier, P.E.
Subject: Sullivan Farms Wetland Bank

Introduction

The proposed Sullivan Wetland Bank is located in Tyrone Township in Le Sueur County, approximately 10 miles northeast of the City of Le Sueur. The 76.5-acre property is in a rural area south of the intersection of St. Thomas Rd (CSAH 28) and 251st Ave (CSAH 11). It is directly adjacent to the western edge of the St. Thomas State Wildlife Management Area. The proposed bank will restore wetland hydrology to an area that has been tiled and used for row crop production for 80+ years, while also maintaining drainage capacity to ensure no hydraulic impacts to adjacent properties

Existing Conditions

The Sullivan Wetland Bank is located in a generally low-lying area that experiences frequent inundation following rainfall events. There is a private drainage ditch on the north side of the site that parallels CSAH 28. This ditch serves over 475 acres to the south, including approximately 200 acres of farmland. The ditch is served by a private 36-inch tile that drains north across the Oak property. Historically the lowland areas of the Sullivan property have been tiled and the north tile systems outlet to the private drainage ditch. There is also a known private tile flowing through the Sullivan Property that serves the Hansen property.

East of the Sullivan property is a drainage ditch that serves St. Thomas Lake, southeast of the site. This ditch is restricted by a field entrance culvert, from CSAH 28, which is an 18-inch metal culvert that has a slide gate to further restrict flowrates. The general operation procedure for this gate is unknown and is currently in a partially to fully closed position. This culvert is a substantial hydraulic restriction that causes the east ditch to back up onto the Sullivan Property and overflow to the north ditch, essentially bypassing the 18-inch culvert. Also, the slide gate mechanism creates extended drawdown times, east of the driveway for small rainfall events, resulting in unnecessary impacts to vegetation and farming practices to upstream landowners.

Hydraulic Modeling

To analyze the existing and proposed conditions, a hydrologic and hydraulic model was created using Autodesk's Storm & Sanitary Analysis (SSA) 2019. SSA uses the Soil Conservation Service's (SCS) Technical Release No. 20 (TR-20) methodology to route watershed runoff through the system using a rainfall hydrograph. The Atlas 14 rainfall depths for the site were used along with the MSE 3 rainfall distribution. The rainfall depths used for the 2-, 10-, 25-, and 100-year, 24-hour events are 2.86", 4.24", 5.28" and 7.14", respectively.

The existing drainage areas are shown on Figure 1 in Appendix A, along with several labeled ponding locations. Table 1 summarizes the existing high-water levels for the 2-, 10-, 25-, and 100-year events for the ponding locations labeled in Figure 1. Table 2 reports the existing flowrates through the 36" pipe that serves as an exit for water from the property.

Table 1: Existing High-Water Levels

SITE	High Water Level (ft.)				
	BOTTOM/ NWL	2 - YEAR	10 - YEAR	25 - YEAR	100 - YEAR
P-01	992.07	993.38	993.67	993.93	994.64
P-02	992.45	994.39	995.03	995.45	996.08
P-03	988.19	990.39	993.41	993.92	994.64
P-04	988.96	993.26	996.40	996.64	996.83
P-05	995.40	996.48	997.02	997.39	997.93
P-06	995.86	996.25	996.48	996.69	996.99

Table 2: Existing Flowrates through 36" Pipe Crossing

EVENT	FLOWRATE (CFS)
2-YEAR	16.4
10-YEAR	29.9
25-YEAR	32.2
100-YEAR	33.3

Proposed Conditions

The proposed design focuses on maintaining existing or improving drainage conditions for neighboring property owners and creating negligible downstream impacts, while also adding storage to the watershed by restoring a wetland to its historical conditions.

Hydrology will be restored primarily by the construction of a berm running parallel to CSASH 28, directly adjacent to the existing ditch. The earthen embankment will be constructed with a clay core to prevent seepage and an emergency overflow will be provided to serve all events that exceed the 100-year event (996.50'). The existing tile system on the Sullivan Property will be removed in select locations to ensure that subsurface flow patterns are disrupted. A normal water level (NWL) of 994.50 is proposed to restore wetland hydrology to a condition that historically matches the prehistoric site. An 18" RCP Culvert with an upstream invert set at the NWL will serve as the outlet structure. There are three private drain tile systems that will be daylighted to the restored wetland.

As part of the restoration, it is proposed to remove the existing 18" metal field entrance culvert and slide gate mechanism and replace it with a 24" RCP culvert and no slide gate. This will provide an improved drainage condition for the O'Connell property and St. Thomas Lake outlet ditch while also reducing backup onto the Sullivan property. The increased culvert capacity will make restoration dependent on the immediate 38-acre drainage area for up to the 10-year event. For events that exceed the 10-year, the east ditch will still back up onto the Sullivan wetland property.

A summary highwater levels and flowrates to the 36-inch private culvert are listed in Tables 3 & 4 below, respectively.

Table 3: Proposed High Water Levels

SITE	High Water Level (ft.)				
	BOTTOM/ NWL	2 - YEAR	10 - YEAR	25 - YEAR	100 - YEAR
Wetland 01	994.50	994.89	995.21	995.48	996.49
P-02	992.45	994.39	995.03	995.44	996.08
P-03	988.19	990.65	993.52	994.18	994.89
P-04	988.96	993.64	996.21	996.57	996.84
P-05	995.40	996.48	997.02	997.36	997.93
P-06	995.86	996.26	996.48	996.67	996.98

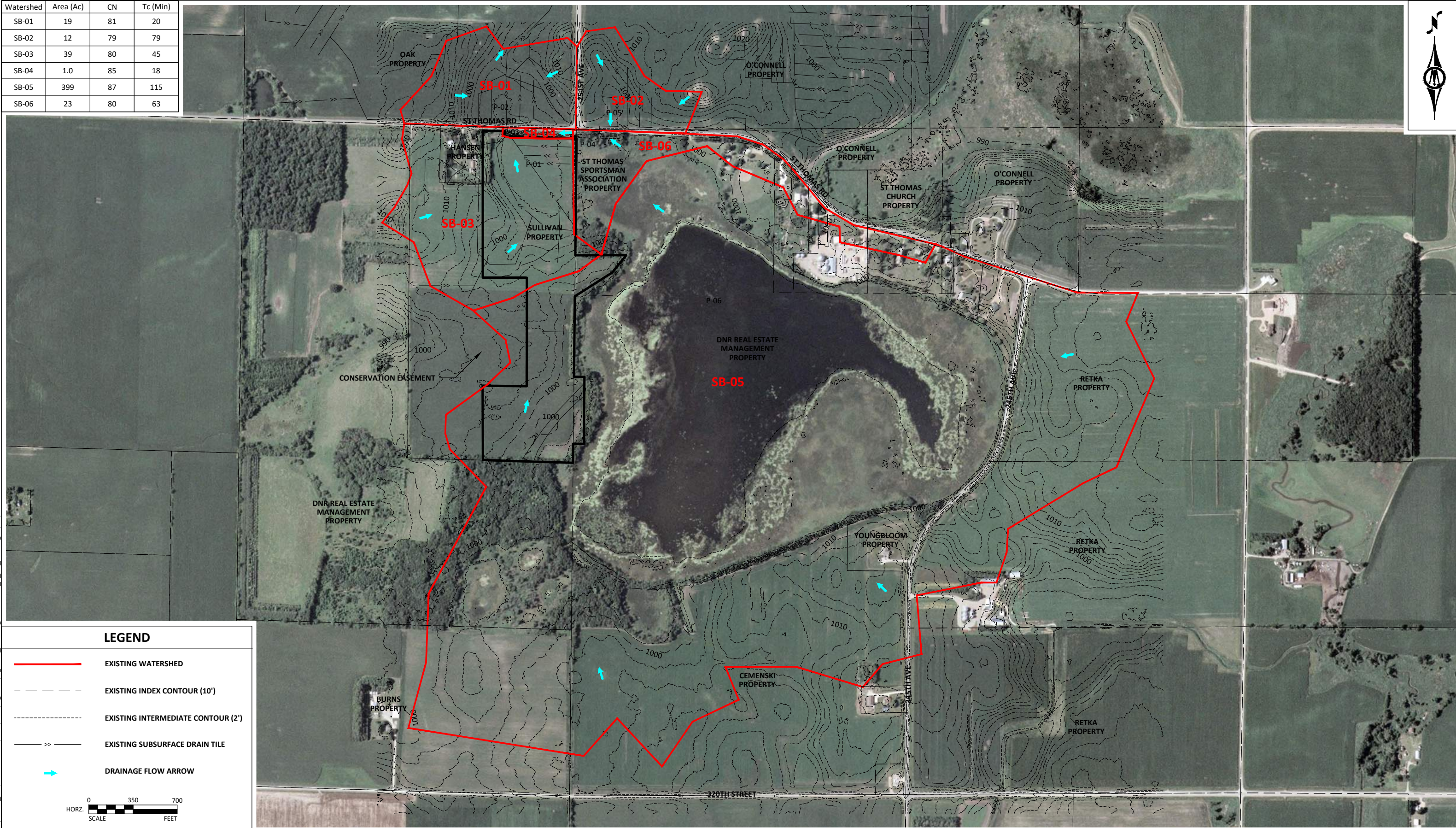
Table 4: Proposed Flowrates through 36" Pipe Crossing

EVENT	FLOWRATE (CFS)	FLOW RATE CHANGE
2-YEAR	18.9	-15.48%
10-YEAR	30.4	-1.7%
25-YEAR	32.2	0.0%
100-YEAR	34.1	-2.4%

The flow rates at the private 36-inch tile will be increased as the hydraulic slide gate restriction is removed. Ponding capacities on the Oak Property (P-02) were considered and are not expected to be impacted substantially from a high-water level and ponding duration standpoint. This is due to non-coincidental peaks associated with the immediate watershed on the Oak Property relative to the overall watershed to the 36-inch private tile.

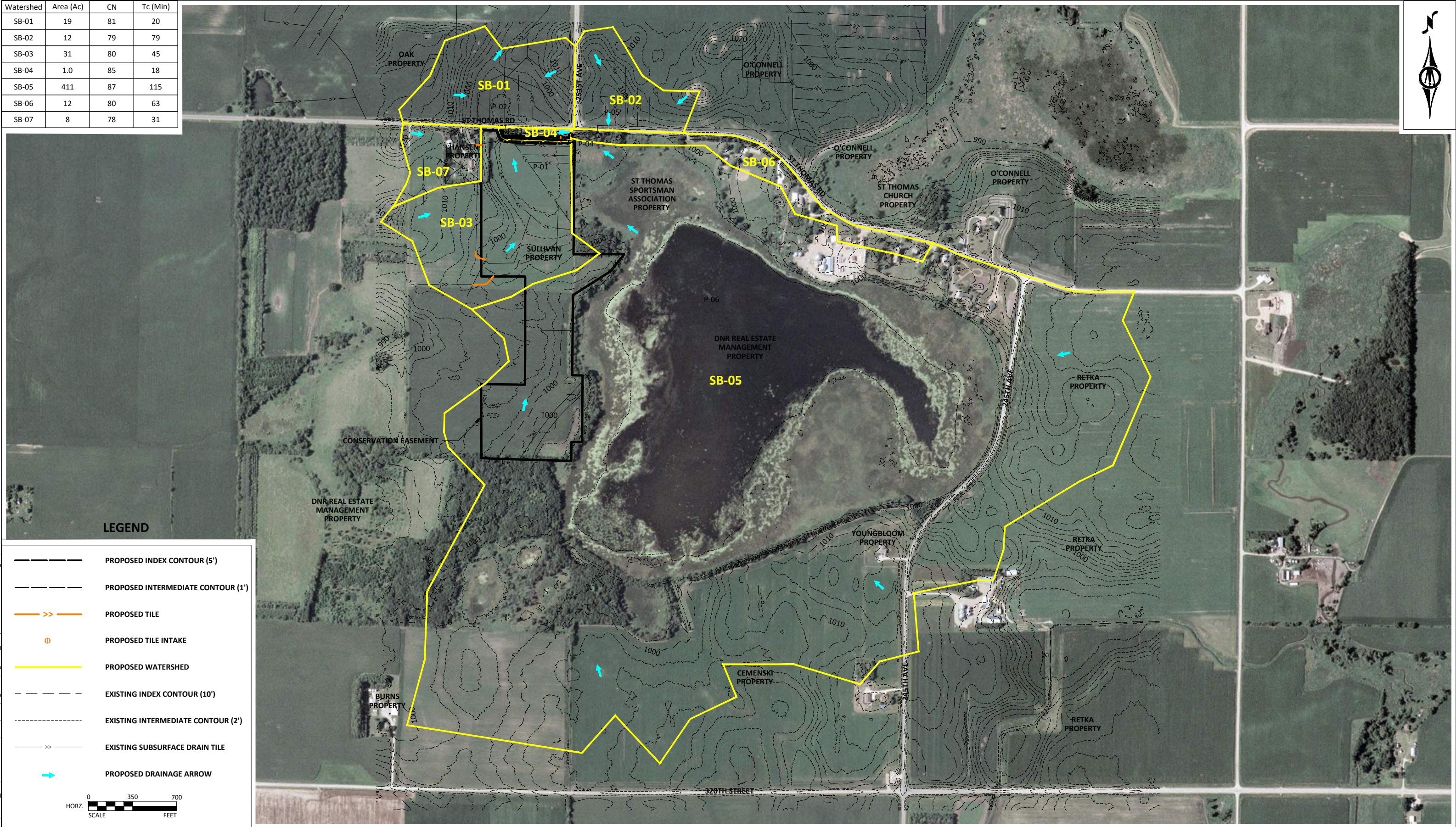
The Sullivan Wetland Restoration will restore hydrology to an area that historically was part of the larger St. Thomas Lake wetland complex. The proposed improvements will ultimately provide a net benefit to neighboring properties through hydraulic and vegetation improvements. Please feel free to contact me with any questions at (952) 217-2287 or Joshua.Stier@bolton-menk.com.

Watershed	Area (Ac)	CN	Tc (Min)
SB-01	19	81	20
SB-02	12	79	79
SB-03	39	80	45
SB-04	1.0	85	18
SB-05	399	87	115
SB-06	23	80	63



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Watershed	Area (Ac)	CN	Tc (Min)
SB-01	19	81	20
SB-02	12	79	79
SB-03	31	80	45
SB-04	1.0	85	18
SB-05	411	87	115
SB-06	12	80	63
SB-07	8	78	31



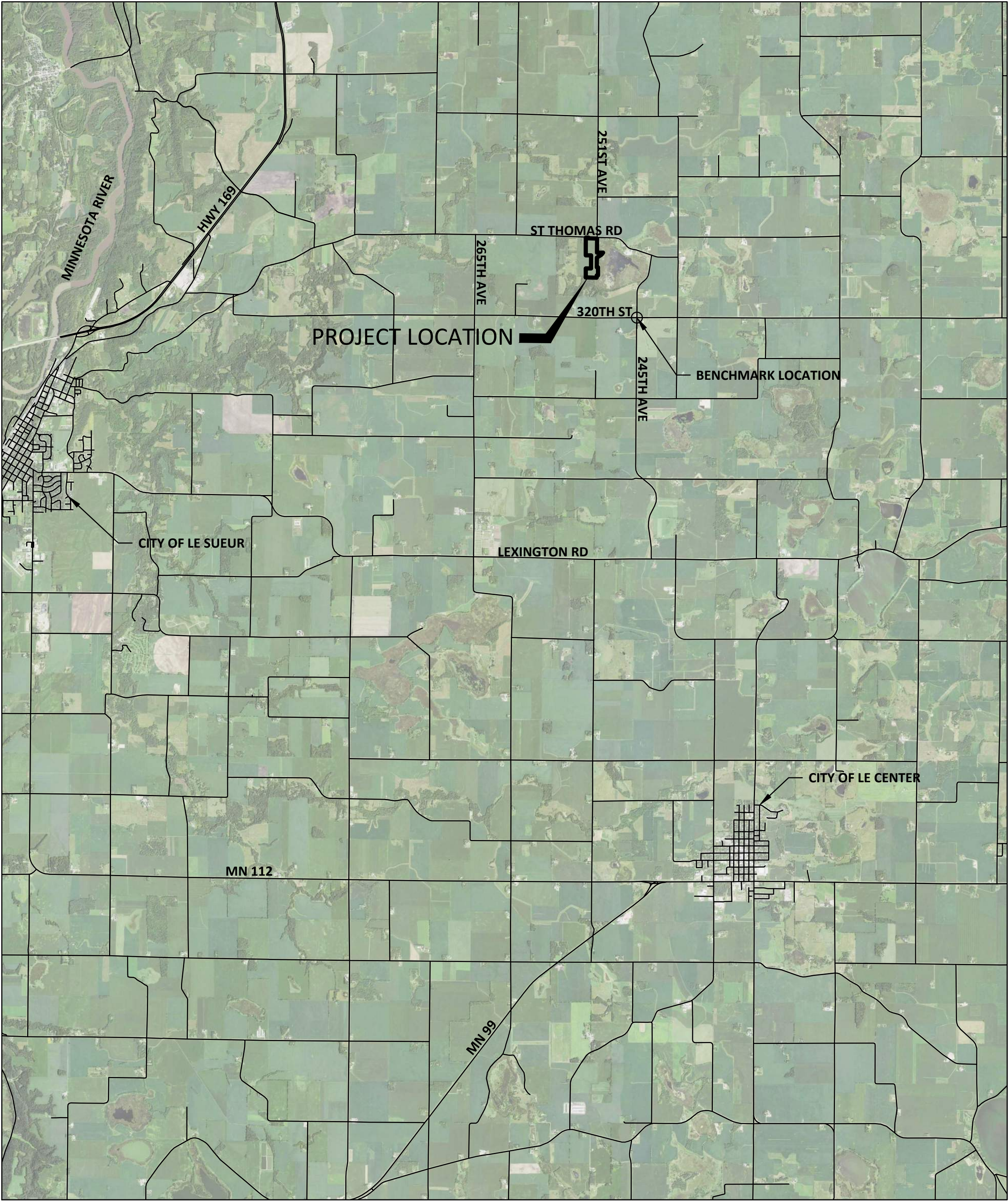
CONSTRUCTION PLANS FOR

SULLIVAN WETLAND BANK

VEGETATION ESTABLISHMENT & WETLAND RESTORATION

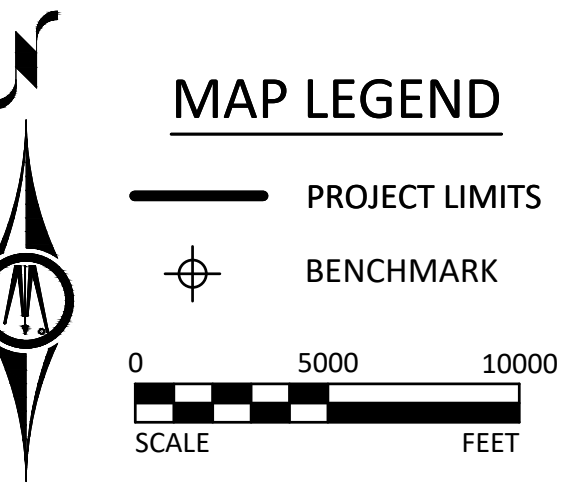
LE SUEUR COUNTY, MINNESOTA

JANUARY 2021



SHEET NUMBER	SHEET TITLE
G1.01	TITLE SHEET
C1.01-C1.04	CONSTRUCTION DETAILS & SPECIFICATIONS
C2.01	EXISTING SITE PLAN
C2.02	REMOVAL PLAN
C3.01 - C3.04	PROPOSED SITE PLAN
C4.02 - C4.03	BERM CROSS SECTIONS
C5.01	PROPOSED SEEDING PLAN
THIS PLAN SET CONTAINS <u>15</u> SHEETS.	

STATEMENT OF ESTIMATED QUANTITIES			
ITEM #	ITEM	UNIT	QUANTITY
1	MOBILIZATION	LUMP SUM	1
2	TILE INVESTIGATION/EXPLORATION	HRS	10
3	COMMON EXCAVATION (P)	CY	2180
4	COMMON BORROW (CV, P)	CY	1240
5	COMMON BORROW (CLAY CORE) (CV,P)	CY	2613
6	TOPSOIL REMOVAL, SALVAGE, AND SPREADING	CY	2613
7	TILE INLET BULKHEAD	EA	1
8	TILE REMOVAL	LF	1633
9	CULVERT REMOVAL	LF	36
11	BALLAST ROCK	CY	102
12	GEOTEXTILE FABRIC, TYPE IV	SY	608
13	RANDOM RIPRAP, CL III	CY	80
14	8" CPDT	LF	290
15	10" CMP	LF	60
16	18" RC PIPE CULVERT	LF	68
17	18" RC APRON	EA	2
18	24" RC PIPE CULVERT	LF	39
19	24" RC APRON	EA	2
20	MARMAC DISSIMILAR PIPE COUPLER	EA	3
21	10" STAINLESS STEEL RODENT GUARD	EA	3
22	5'x5' HDPE ANTI-SEEPAGE COLLAR	EA	3
23	STATE SEED MIX 35-241	LB	712
24	CUSTOM WET MEADOW MIX	LB	515
25	CUSTOM EMERGENT MIX	LB	10
26	PILOT SEED MIX - DEEP MARSH	LB	15
27	WETLAND REHAB SEED MIX	LB	43
28	NURSERY RAISED SUBMERGENT PLUGS - TYPE 4	EA	515
29	NURSERY RAISED SUBMERGENT PLUGS - TYPE 6	EA	856
30	BROADCAST SEEDING	AC	19.5
31	DRILL SEEDING	AC	19.5
32	PLUG INSTALLATION	AC	12.7



NOTE:
EXISTING UTILITY INFORMATION ON THIS PLAN HAS BEEN PROVIDED BY THE OWNER.
THE CONTRACTOR SHALL FIELD VERIFY EXACT LOCATIONS OF ALL EXISTING UTILITIES
PRIOR TO COMMENCING CONSTRUCTION AS REQUIRED BY STATE LAW. NOTIFY
GOPHER STATE ONE CALL 1-800-252-1166 OR 651-454-0002

REFERENCE MNDOT 2018 SPECIFICATIONS UNLESS OTHERWISE NOTED WITHIN

CONTACTS

PROJECT ENGINEER: JOSHUA G. STIER, P.E.
507.625.4171 EXT. 2962

PROJECT TECHNICIAN/ WETLAND SPECIALIST: DANIEL DONAYRE,
507.625.4171 EXT. 2646

⊕ BM=1007.108 MnDOT GEODETIC MARKER: 95 GJS NW OF JUNCTION OF CR 28 & CR 30 CONCRETE MONUMENT (NGVD 29)	PROJECT DATUM: HORIZONTAL: LE SUEUR COUNTY COORDINATE SYSTEM, NAD83 (2011) VERTICAL: NAVD 1988	RECORD DRAWING INFORMATION	
		OBSERVER:	
		CONTRACTOR:	
		DATE:	
TODD SULLIVAN		SHEET	
SULLIVAN WETLAND BANK		G1.01	
TITLE SHEET			

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED
BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED
PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

JOSHUA G. STIER
LIC. NO. 54171 DATE 1/04/2021



1960 PREMIER DRIVE
MANKATO, MINNESOTA 56001
Phone: (507) 625-4171
Email: Mankato@bolton-menk.com
www.bolton-menk.com

DESIGNED	NO.	ISSUED FOR	DATE
HEG	B	ADD 2	04/02/2021
DRAWN	HEG		
CHECKED	JGS		
CLIENT PROJ. NO.	M13.119082		

PROPOSED EMBANKMENT

REMOVING, SALVAGING AND SPREADING TOPSOIL

The work shall consist of the removal of topsoil from borrow, embankment and spillway area(s), stockpiling the suitable topsoil material and then spreading it back on those areas as directed after construction is completed. Suitable topsoil material shall consist of friable surface soil reasonably free of grass, roots, weeds, sticks, stones or other foreign materials.

Spreading shall not be done when the ground or topsoil is frozen or excessively wet. Surfaces to be covered shall be lightly scarified just prior to the spreading operation. Upon completing construction of the embankment and spillway, blend topsoil against the borrow, embankment and spillway area and trim to blend with the area or slopes. Respread topsoil evenly over the entire crest and side slopes of the embankment, spillway and/or the surface of borrow area(s) in a 4-6 inch layer or as otherwise directed. Where the borrow site is outside the bank boundary area shown on the plan, the topsoil shall be reestablished at its original thickness. The surface of the topsoil shall be finished to a reasonably smooth surface free of low spots, humps, or large stones and ready for seed.

The Topsoil Removal, Salvage & Spreading quantity in borrow areas is estimated using an average depth of borrow of three feet. The contractor shall remove and salvage all friable topsoil material over the borrow area. All slopes in the borrow site shall be graded to drain toward the wetland and shall have a maximum slope of 8:1 (H:V)

EXCAVATION

This work shall include all labor, materials, and equipment required for the excavation, hauling and spreading of materials as required by the drawings or as staked. The work includes the control of water during excavation, the shaping of slopes to the lines and grades shown and the disposal of unsuitable materials.

To the extent they are needed, suitable materials from the specified excavations may be used in the construction of permanent earthfill. Borrow area(s) shall be excavated and finally dressed in a manner to eliminate steep or unstable side slopes or other hazardous or unsightly conditions.

EARTHFILL/EMBANKMENTS

All fill materials for the embankment construction shall be obtained from required excavations and designated borrow areas. Fill materials shall contain no sod, brush, roots or other perishable materials. Topsoil and/or organic material (black) material shall not be used in the embankment, except as specified for topdressing. Rock larger than 4 inches in diameter shall be removed prior to compaction of the fill. Under no circumstances shall frozen materials be used in the construction of earthfills or embankments.

The core trench and subgrade section of the embankment shall be constructed of compacted, relatively impermeable material consisting of inorganic clay. The embankment fill material above the existing ground surface and clay core shall consist of inorganic clay and/or silty material. The proposed berm shall be capped with six inches of topsoil, to allow for stabilization of the embankment.

The top surfaces of embankments shall be maintained approximately level during construction, except that a crown or cross-slope of approximately 5 percent shall be maintained to ensure effective drainage

The moisture content of the fill material shall be maintained within the limits required to: a) allow the soil to form a ball that does not readily separate when kneaded in the hand; b) prevent adherence of the fill material to the equipment treads or tracks; c) prevent rutting by equipment, and; d) ensure that blending of the soil results in a reasonably homogenous mass.

Material that is too wet when deposited on the fill shall either be removed or dried to the specified moisture content prior to compaction. If the top surface of the preceding layer of compacted fill or a foundation or abutment surface in the zone of contact with the fill becomes too dry to permit suitable bond, it shall either be removed or scarified and moistened by sprinkling to an acceptable moisture content prior to placement of the next layer of fill.

RIPRAP, GEOTEXTILE & TURF REINFORCEMENT MAT:

GENERAL

The work shall consist of furnishing and placing loose rock riprap and associated geotextile filter materials and turf reinforcement mats (TRMs) at the locations shown on the drawing, as a protective covering at inlets and outlets where the soil is susceptible to erosion.

MATERIALS

RANDOM RIPRAP (MnDOT 3601)

- Unless otherwise stated, quarry stone (angular crushed bedrock) rock riprap shall be used.
- Stones shall be generally round or cubiorm in shape. Each individual stone shall have at least one fractured face
 - Stone shall be free of soil and/or other debris prior to placement
 - Contain less than 10 percent of the following by weight:
 - Stones with defects that could cause rapid or excessive deterioration or degradation during service, such as cracks or seams;
 - Stones with a width or thickness less than 30 percent of the length.
 - For carbonate quarry/bedrock material used in total or inpart for riprap, the portion of the insoluble residue passing the #200 sieve is no greater than 10 percent.
 - Use 100% virgin materials for riprap and granular filter.

The approximate gradation (size) of stones for loose rock riprap shall meet MnDOT Specification 3601 for specified class. The stones shall be reasonably well graded within the percentages shown. The Contractor shall provide to the Project Technician documentation that the proposed material meets the gradation requirements, as specified.

GEOTEXTILE FILTER (MnDOT 3733)

Geotextiles shall meet or exceed the requirements of MnDOT Specification 3733. Unless otherwise specified, the Contractor shall furnish and install the geotextile to the quantities shown. The Contractor shall provide to the Project Technician manufacturer's certification that the geotextile used has minimum average roll values, which meet or exceed the requirements specified herein.

The geotextile shall be a non-woven fabric of polymeric filaments or yarns such as polypropylene, polyethylene, polyester, or polyamide formed into a stable network such that the filaments/yarns retain dimensional stability relative to each other. Geotextile shall be resistant to biological and chemical environments normally found in soils, and that is free of chemical treatment or coating that may significantly reduce porosity or permeability.

Geotextile shall be uniform in texture, thickness and appearance, and be free of defects, flaws, cuts, punctures or tears that would significantly alter its strength or filtering properties. The geotextile shall conform to the physical requirements specified herein.

Deliver rolls of geotextile with an opaque plastic covering to protect the material from ultraviolet rays or contamination with

mud, dirt, dust, or debris. Provide rolled geotextile labeled on the outside wrap and inside the core in accordance with ASTM D 4873 and as follows:

- Manufacturer,
- Product Name, and
- Roll number.

Geotextile shall not be left exposed to the sun for a period in excess of 7 days without being covered by the appropriate protective soil or rock layer. Replace contaminated geotextile or geotextile exposed to the sun for more than seven days, as directed by the engineer.

Provide geotextile meeting the requirements of Table 3733-1.

TURF REINFORCEMENT MAT (MnDOT 3885)

Turf Reinforcement Mats shall be made of a three-dimensional matrix of synthetic material, continuously bonded at filament intersections meeting the requirements of Table 3885-5 .

CONSTRUCTION REQUIREMENTS

SUBGRADE SURFACE PREPARATION

The surface on which the geotextile and rock riprap are to be placed shall be cut or filled to the lines and grades as shown on the drawings. The surface shall be reasonably smooth, free of holes, depressions, mud, running water, stumps, large rocks, or other debris that would tend to tear or puncture the fabric. Compact loose foundation material before placing the riprap or filter material. Rock riprap and the geotextile filter materials shall not be placed until the foundation preparation is completed and the subgrade surfaces have been inspected and approved.

PLACEMENT OF GEOTEXTILE (MnDOT 2511.3B.2)

Geotextile shall be used beneath all rock riprap. The geotextile shall be uniformly placed on the approved prepared subgrade surface at the locations and in accordance with the details shown on the drawings and as specified.

Place the fabric with the longest dimension parallel to the direction of water flow. If using fabric that is not seamed, overlap splices and joints at least 18 inches, except overlap splices and joints placed under water 36 inches. Provide shingled joint laps in the flow direction and from top to bottom of a slope to direct water flow over the joint without undermining the geotextile filter. The Contractor may sew multiple fabric pieces together, as specified in 3733, "Geotextiles," in lieu of joint overlapping. Bury the upgrade edges of the fabric a minimum of 6 inches to direct water flow over the fabric and prevent undermining. If not seamed, place washed steel pins, edge stakes, stones, or other material at locations and in quantities as approved by the engineer, to prevent movement of the geotextile during placement of riprap.

PLACEMENT OF RIPRAP (MnDOT 2511)

The rock riprap shall be placed on the geotextile material in such a manner that the smaller size material remains evenly distributed throughout. The maximum drop height of rock riprap onto the geotextile shall be 1-foot. Do not dump stones at teh top of the slope and roll stone down the slope. When placing riprap, start at the lowest elevations and work upwards. Do not operate construction equipment directly on top of placed riprap.

Rock riprap shall be carefully placed by hand or machine on the surfaces to a depth equal to twice the d50 of the specified riprap, unless specified otherwise. Stones shall be securely bedded with individual stones firmly in contact one to another. Sufficient handwork shall be performed to produce a neat and uniform surface.

The in-place rock riprap shall be well graded. If necessary, individual stones shall be rearranged by hand to produce a well-graded mass. Spaces between the larger rocks shall be filled with smaller rocks. Smaller rocks shall not be grouped as a substitute for larger rock. Flat slab rock shall be laid on edge.

PLACEMENT (TURF REINFORCEMENT MAT)

Turf reinforcement mat shall be installed per manufacturer's recommendations including installation procedures, anchors, and fill material.

Turf reinforcement mat to be installed on all disturbed soils down gradient of the emergency overflow.

DRAINAGE PIPE

DESCRIPTION

The work shall include all labor, materials, and equipment required to assemble the pipe sections, excavate and prepare the bed for the pipe and place and compact the backfill to the lines and grades shown on the drawings.

MATERIALS REQUIREMENTS

GENERAL

All materials must be handled and stored in a careful and workmanlike manner. All pipes and fittings must be of the length, size and type specified. Unless otherwise noted, all pipes and fittings must be attached according to manufacturers' recommendations. All materials shall be carefully inspected before they are installed. All materials with physical imperfections or that are damaged, lost, broken or deemed unsuitable due to the Contractor's method of installation, handling, or negligence must be replaced at the Contractor's expense.

CORRUGATED POLYETHYLENE DRAINAGE TUBING (CPDT)

All Corrugated Polyethylene Drainage Tubing (CPDT) and fittings furnished shall be in compliance with material standards ASTM F405 & F667, as appropriate for the type and size specified.

3 - 6" = ASTM-F-405

8"- 24" = ASTM-F-667

Joints shall be minimized to the extent practical. When required and unless otherwise shown on the drawing, coupling bands of the appropriate size and type are to be provided at each pipe joint. The hardware for fastening the coupling bands to the connecting pipes shall be fabricated to permit sufficient tightening to provide the required joint tensile strength and, if required, water-tightness, without failure of the fastening.

DUAL-WALL HDPE PIPE

Unless otherwise specified, the High Density Polyethylene Pipe (HDPE) shall have a smooth interior and annular exterior corrugations. Manning's "n" value for the pipe shall not exceed 0.012.

10-Inches & Smaller

The pipe shall meet the requirements of AASHTO M252 Type S. Pipe and fitting material shall be high-density polyethylene meeting the requirements of ASTM D3350 minimum Cell Classification 324420C. Gasketed couplers shall be provided for each pipe joint and must meet the requirements of ASTM F477. The gaskets shall be those recommended by the manufacturer for use with the coupler, fittings, and pipe to provide watertightness to the joint.

12-Inches & Larger

The pipe shall meet the requirements of AASHTO M294 Type S. Pipe and fitting material shall be high-density polyethylene meeting the requirements of ASTM D3350 Cell Classification 325420C. Where joints are necessary, pipes shall be joined with a bell-and-spigot joint meeting the requirements of AASHTO M252 or M294. The bell shall be an integral part of the pipe and provide a minimum pull-apart strength of 400 lbs. The bell-and-spigot joint shall incorporate a rubber gasket meeting the requirements of ASTM F477 and shall be watertight meeting ASTM D3212. Gaskets shall be installed on the pipe or as recommended by the pipe manufacturer. A joint lubricant supplied by the manufacturer shall be used on the gasket and bell during assembly.

CORRUGATED METAL PIPE (CMP)

Unless otherwise specified, the pipe corrugations may be either riveted annular or lock-seam helical. Lock-seam helical pipe shall have re-rolled ends with each end having a minimum of four corrugations.

All corrugated metal pipe shall be prefabricated corrugated galvanized steel per MnDOT Specification 3226. When necessary, fittings including coupling bands shall be made from steel conforming to ASTM-A-444, A-742, A-806, and A-885. The fittings shall have an aluminized coating to further prevent corrosion.

CONSTRUCTION REQUIREMENTS

HANDLING THE PIPE

The Contractor shall furnish all equipment necessary to transport and place the pipe without damaging it or its coatings. When handling and placing the pipe, care shall be taken to prevent impact blows, abrasion damage, and gouging or cutting (by equipment or other site materials).

All special handling requirements of the manufacturer shall be strictly observed. Special care shall be taken to avoid impact when the pipe must be handled at temperatures of 40° F or less. The pipe shall be stored on a relatively flat surface so that the full length of the pipe is evenly supported.

CONNECTIONS

Where existing tile lines not shown on the drawings are crossed, they shall be bridged across the new trench or they shall be connected into the new tile lines.

INSTALLATION AND ASSEMBLY OF PIPE

The trench or excavation for the placement of the pipe shall be constructed to elevations and grades as shown.

Unless otherwise noted, excavation for and subsequent installation of pipe sections shall begin at the outlet end and progress upstream. All field cut pipe ends shall have all burrs removed prior to assembling the joints. All pipelines shall be free of foreign material during installation.

Pipe placed during any day shall be blinded by the end of the day.

Trench shields, shoring and bracing, or other methods necessary to safeguard the workers and the work, and to prevent damage to existing improvements, shall be furnished, placed, and subsequently removed by the Contractor.

CPDT

All CPDT shall be installed in compliance with ASTM 449 standard practice, unless otherwise approved by the engineer.

For pipes 6" diameter and smaller, a 90° V-Groove bottom may be used, for all larger pipe a trapezoidal bottom or a circular bottom conforming to the outside diameter of the pipe shall be used. Prior to the installation of CPDT, contractor must prove to the engineer that the installation requirements, including the shape of the trench bottom, will be accomplished.

Where trench bottom is in firm undisturbed soil, shape trench base groove. Where excess cut occurs, overexcavate and place minimum four (4) inch thick, layer of Fine Filter Aggregate (MnDOT 3149.2.J.2).

Native soils may be used as backfill material unless unstable trench conditions prevent the trench bottom holding the shaped groove. If the trench bottom will not hold a groove shape, contractor shall notify engineer immediately. A flat bottom trench installation will then be assumed.

Minimum trench width is the pipe outside diameter plus four (4) inches for plowed installation and pipe outside diameter plus twelve (12) inches for open trench installation.

All lateral connections, elbows, tees, alignment curves, start holes and all portions of the trench not meeting the grooved trench installation requirements shall be filled to a minimum of six (6) inches of cover over the pipe with Coarse Filter Aggregate (MnDOT 3149.2.H). Unless due to contractor error, this bedding material will be paid under the Tile Trench Stabilization item.

With the installation of the first reach of CPDT on the project, contractor is required to work with the engineer to check and confirm that the pipe stretch, if any, does not exceed 5%.

Alignment turns may be made using either a manufactured fitting or curving the line with a 25 foot minimum radius.

DUAL-WALL HDPE /CORRUGATED METAL PIPE

Unless otherwise specified, the proposed pipe shall be placed and bedded in accordance with the requirements of ASTM -D-2321 "Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications"

OUTLET LOCATION MARKING

All pipe outlets including concrete headwalls and pipe aprons shall be marked with a guide post.

BACKFILLING

Earth backfill material shall be placed in the trench in a manner to ensure that the pipe does not become displaced. Do not use compaction equipment or methods that produce horizontal or vertical earth pressures that may cause excessive displacements or damage to the pipe. Excute backfill to the lines and grades shown on the plans or as staked.

Automatic backfilling machines may be used only when approved by the Engineer. Backfill shall extend above the ground surface and be well rounded over the trench.

Unless otherwise specified, where the pipe is laid under roads, terraces and other locations as designated on the drawings or by the Engineer, the backfill shall be placed in successive layers of not more than 6 inches and each layer shall be compacted before the next layer is placed.

TILE REMOVAL, INTAKE PLUG & ADJUST TILE INTAKE:

TILE REMOVAL

The work shall include all labor, materials and equipment required to complete the excavation and removal of all identified tile drainage systems.

Drain tile shall be removed in 100 ft. lengths every two feet of vertical rise/fall for all slopes greater than 4%. For slopes 4% or less, 100 foot tile breaks shall be constructed every four feet of vertical rise/fall.

At the end of each tile branch, a 100 ft. length shall be removed, see plan for locations.

Unless otherwise specified, all fragments of the drainage tile shall be removed from the excavated trench and backfill material.

Each end of the exposed drainage tile in the excavated trench shall be plugged with concrete (minimum 2 ft. in length). Concrete shall be cured and plugs shall be water tight prior replacing backfill material.

Backfill and tamp by hand a minimum distance of two feet around each sealed tile end with suitable soil material. Backfill the remaining trench with the most suitable material available and compact to a density equal to or greater than the surrounding undisturbed soil.

INTAKE PLUG

The work shall include all labor, materials and equipment required to complete the excavation and plugging of drainage intakes.

Remove intake grate and excavate to atleast 18 inches below the finish grade elevation. The existing tile riser shall be removed to a depth of at least six inches below the proposed ground surface. A polyethylene pipe plug or cap shall be placed on the end of the existing tile. The existing end of the tile and cap shall be encased in concrete. Concrete shall be cured and water tight prior to replacing backfill material.

Backfill and tamp by hand a minimum distance of two feet around each sealed tile end with suitable soil material.

ADJUST TILE RISER

The work shall include all labor, materials and equipment required to complete the adjustment of existing tile intakes.

Internal snap couplers shall be used for all plastic tile risers. All other tile risers couplers shall be approved by the engineer.

Expose the existing tile riser and verify condition is suitable to install an internal snap coupler. Add specified riser intake and drain guard.

Backfill and tamp by hand a minimum distance of two feet around each tile inlet with suitable soil material.

SEEDING:

GENERAL

Seed bed preparation shall be conducted throughout the entire restoration site, wetland and buffer, and shall include the proposed earthen berm.

SEED BED PREPARATION

The seed bed shall be disked to loosen surface soils and break apart large clumps of soil. A harrow shall then be implemented to further pulverize the soil and smooth the surface of the restoration site. The entire area will be finished with a cultipacker or roller to give a smooth planting surface. Once the seed bed preparation has been completed, the seed zones shall be staked in the field.

NURSERY RAISED SHRUBS

Native shrubs shall be planted below an elevation of 1000.0. Submergent nursery raised plugs shall be planted below the elevation of 994.5. All pots will be planted using a 20' x 20' grid spacing.

SEQUENCING OF SEEDING

- Plant nursery raised plugs and shrubs in specified locations.
- Seed the Wetland Rehab Mix in specified location.
- Seed the Pilot Seed Mix in specified location.
- Seed the Custom Emergent Mix, followed by Custom Wet Meadow Mix, followed by 35-241.

SEED MIXES

Seed Mixes will be used for the project as follows

- Upland Buffer - State Seed Mix 35-241, Mesic Prairie General
- Type 2 Wetland - Custom Wet Meadow Mix
- Type 3 Wetland - Custom Emergent Mix
- Type 4 Wetland - Pilot Seed Mix - Deep Marsh

SEEDING RATES

The upland seed mix (35-241) shall be planted using a drill seeder at a rate of 36.5 lbs/acre. The Custom Wet Meadow seed mix shall be broadcast seeded at a rate of 105.1 lbs/ acre. The Custom Emergent seed mix shall be broadcast seeded a rate of 5.16 lbs/acre. The Pilot Seed Mix shall be broadcast seeded at a rate of 3.1 lbs/acre. The Wetland Rehabilitation Mix shall be broadcast seeded at a rate of 5.30 lbs/ac.

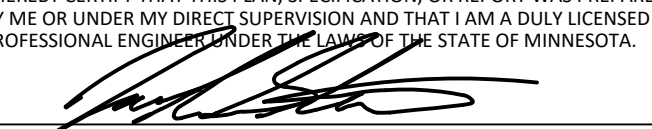
TYPE FOUR PLUG SPECIES LIST

- 103 - *Bolboschoenus fluvialis* (River Bulrush)
- 103 - *Alisma triviale* (Water Plantain)
- 103 - *Sagittaria latifolia* (Arrowhead)
- 103 - *Sparganium eurycarpum* (Giant Burweed)
- 103 - *Carex lacustris* (Lake Sedge)

TYPE SIX PLUG SPECIES LIST

- 148 - *Cornus sericea* (Redosier dogwood)
- 148 - *Spirea alba* (Meadowsweet)
- 148 - *Cephalanthus occidentalis* (Buttonbush)
- 148 - *Sambucus canadensis* (American elder)
- 148 - *Viburnum trilobum* (High bush cranberry)
- 148 - *Viburnum lentago* (Nannyberry)

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.



JOSHUA G. STIER
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CONSTRUCTION DETAILS & SPECIFICATIONS

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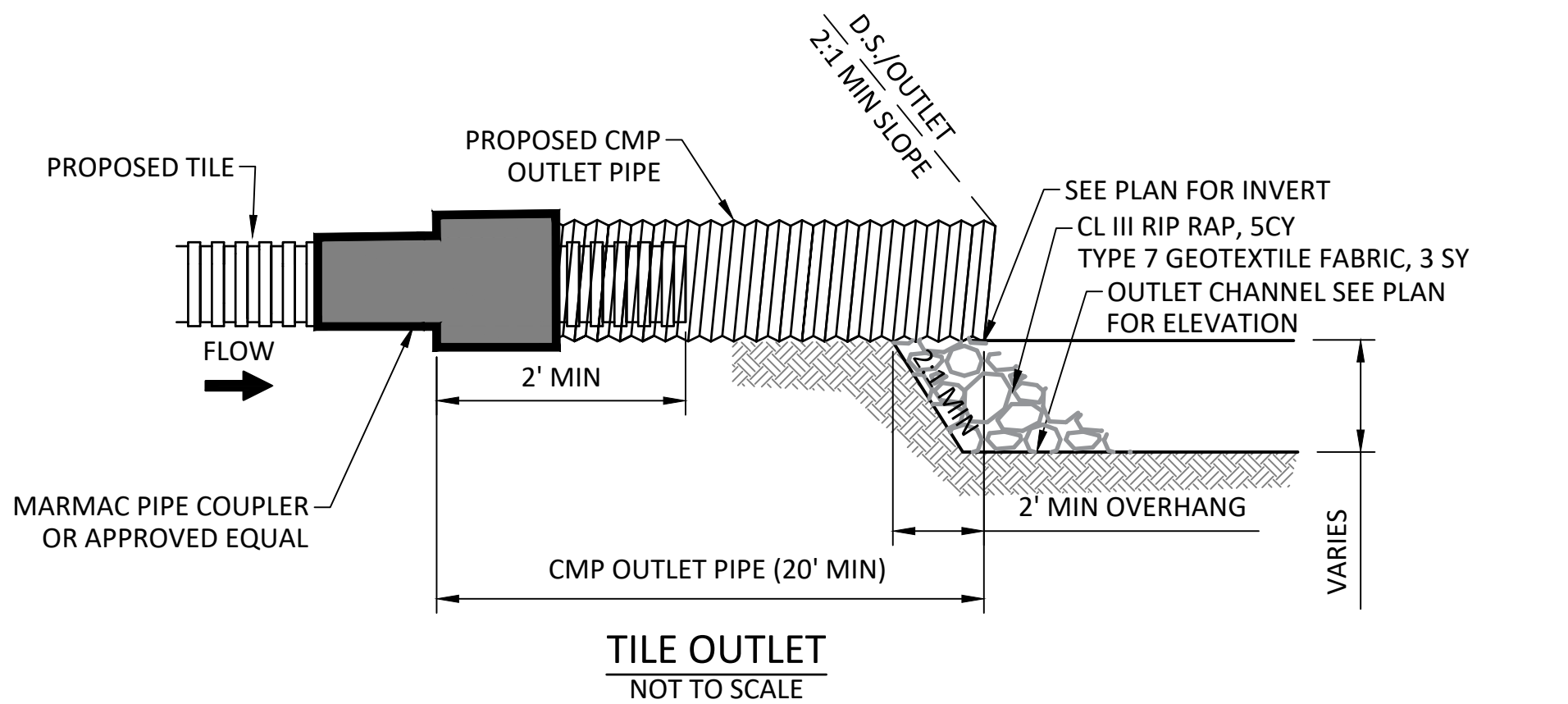


Table 3601-1 Random Riprap Gradation Requirements						
Weight, lbs	Size, inch*	Approximate Percent of Total Weight Smaller Than Given Weight				
		Class of Riprap				
		I	II	III	IV	V
2,000	30	-	-	-	-	100
1,000	24	-	-	-	100	-
650	21	-	-	-	-	75
400	18	-	-	100	-	-
250	15	-	-	-	75	50
120	12	-	100	75	50	-
50	9	-	75	50	-	10
15	6	100	50	-	-	-
5	4	-	-	-	10	-
2	3	50	-	10	-	-
-	2	-	10	-	-	-
-	1	10	-	-	-	-

* Weight to size conversion based on a specific gravity of 2.60 and a volume average between a sphere and cube

TABLE 3149-9 COARSE FILTER AGGREGATE GRADATION REQUIREMENTS	
Sieve Size	Percent Passing
1 in	100
¾ in	85 - 100
⅝ in	20 - 60
No. 4	0 - 10

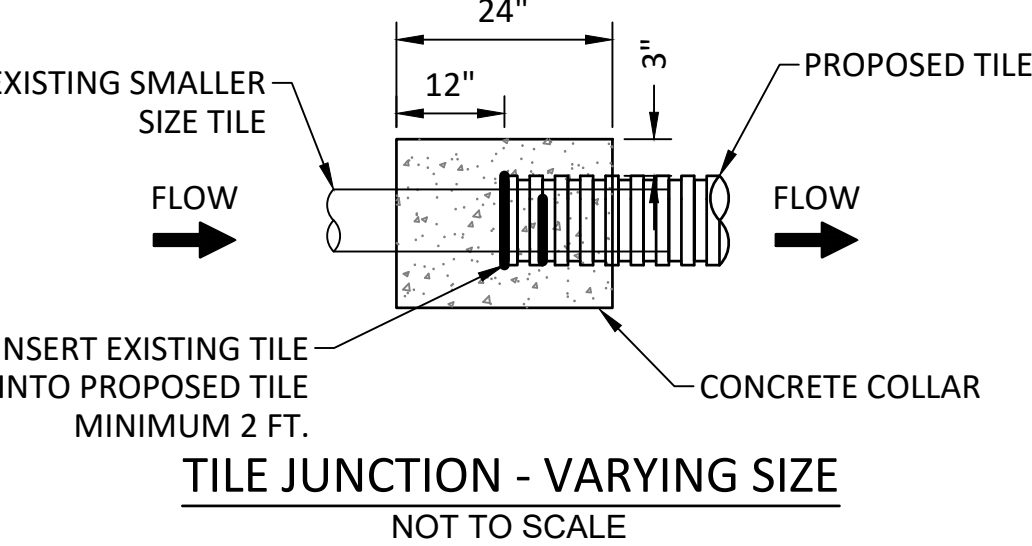
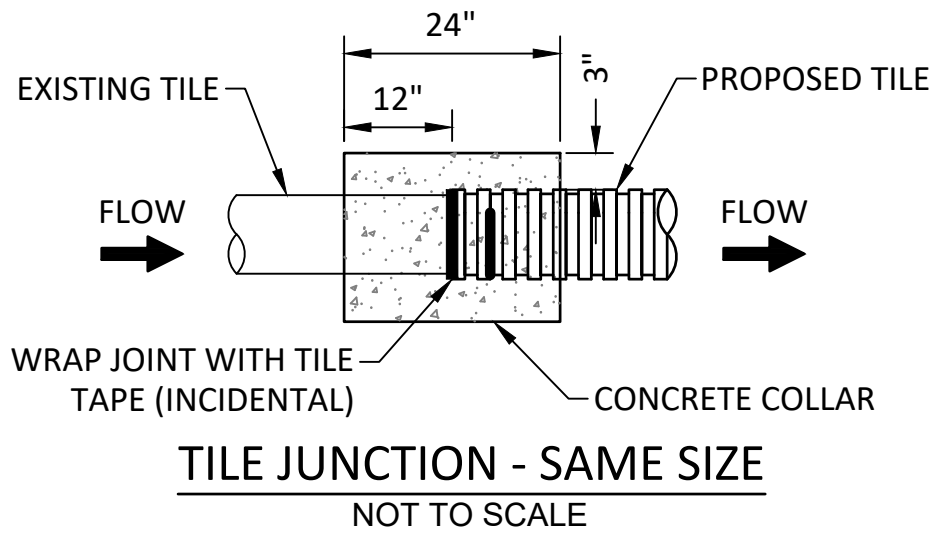
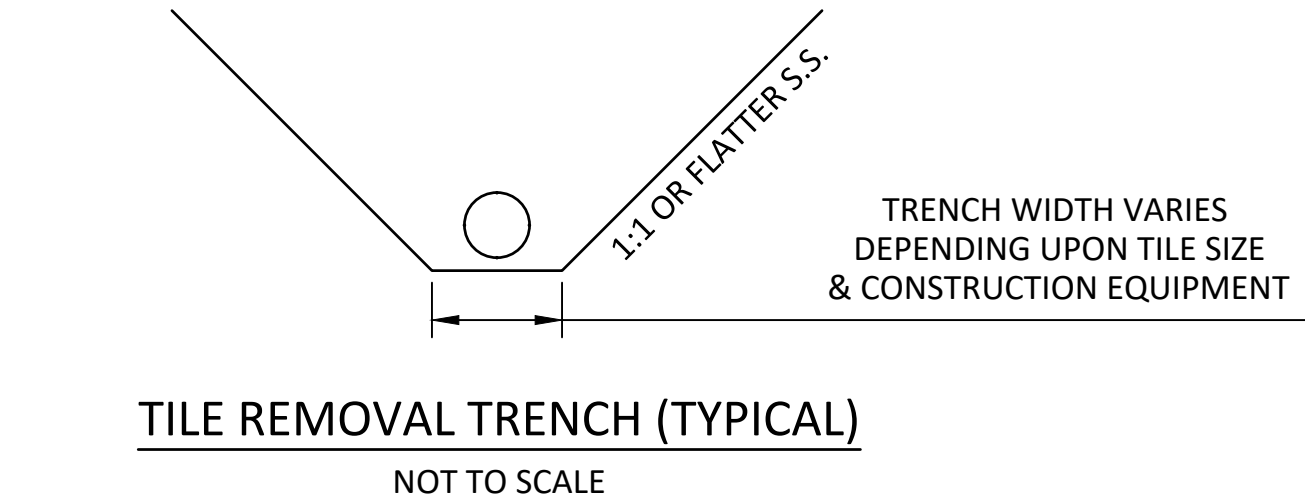
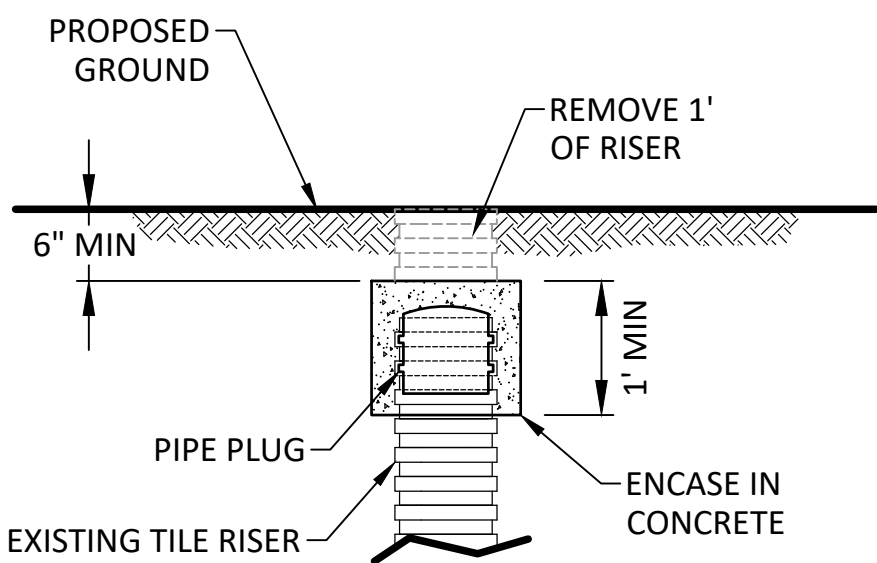
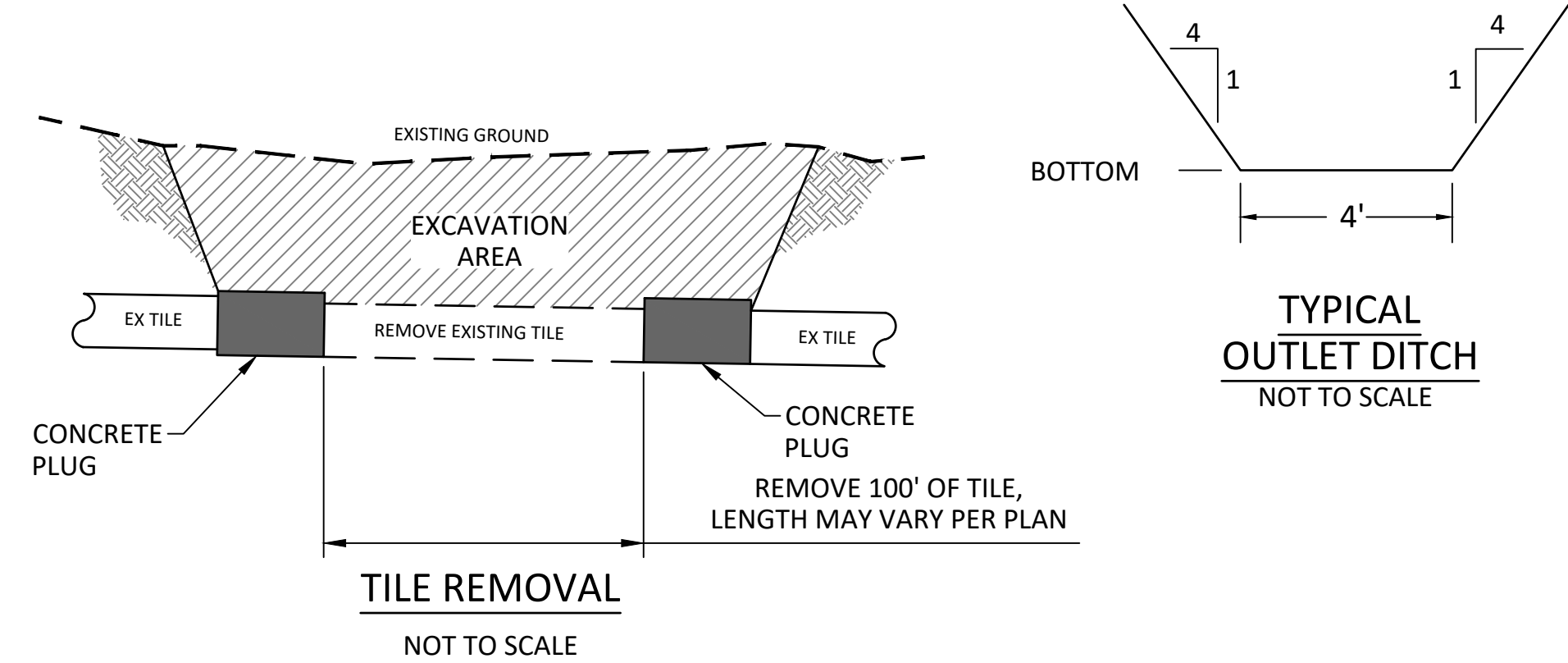
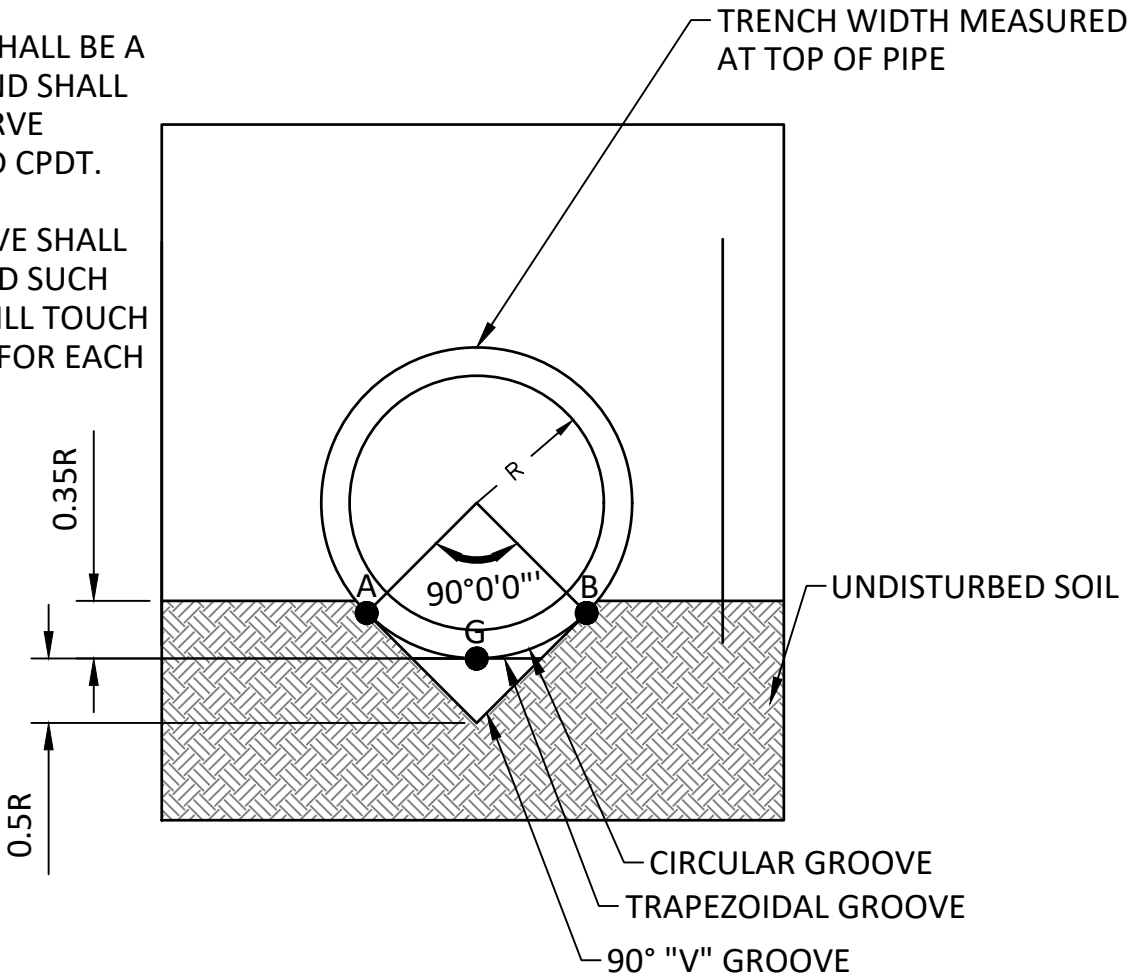
TABLE 3149-11 FINE FILTER AGGREGATE GRADATION REQUIREMENTS	
Sieve Size	Percent Passing
¾ in	100
No. 4	90 - 100
No. 10	45 - 90
No. 40	5 - 35
No. 200	0 - 3.5

GRANULAR BEDDING AND MATERIAL ENCASEMENT GRADATION REQUIREMENTS	
Sieve Size	Percent Passing
1 ½"	100
¾ in	45-90
No. 4	35-80
No. 10	20-60
No. 40	5-35
No. 200	0-15

TABLE 1 MAXIMUM ALLOWABLE BURIED DEPTH TO FLOWLINE OF CPDT					
Nominal Pipe Diameter, IN.	Pipe Quality (ASTM)	Trench Width at top of the pipe, Ft.			
		12"	18"	24"	30" or greater
4	Standard	13	7	5.5	5
	Heavy-duty	any	10	7	6
6	Standard	10	7	5.5	5
	Heavy-duty	any	9.5	6.5	6
8	Standard	10	7	5.5	5
	Heavy-duty	any	10	7	6
10	Heavy-duty	...	9	7	6
12	Heavy-duty	...	9	7	6
15	Heavy-duty	7	6

NOTES:
THE CIRCULAR GROOVE SHALL BE A MINIMUM 0.35R DEEP AND SHALL MATCH THE OUTSIDE CURVE SHAPE OF THE DEFLECTED CPDT.

THE TRAPEZOIDAL GROOVE SHALL BE SHAPED AND ADJUSTED SUCH THAT POINTS A, B, & C WILL TOUCH THE UNDEFLECTED CPDT FOR EACH SIZE INSTALLED.

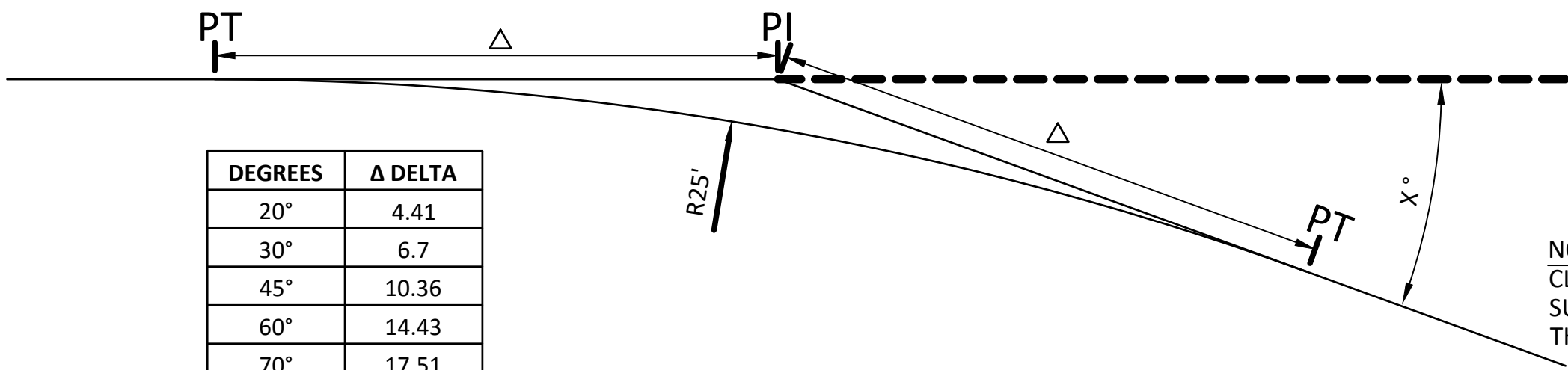


¾" POLYETHYLENE PLATES WITH 1.5" OVERLAP AND ¼" STAINLESS STEEL BOLTS AT 6" ON CENTER

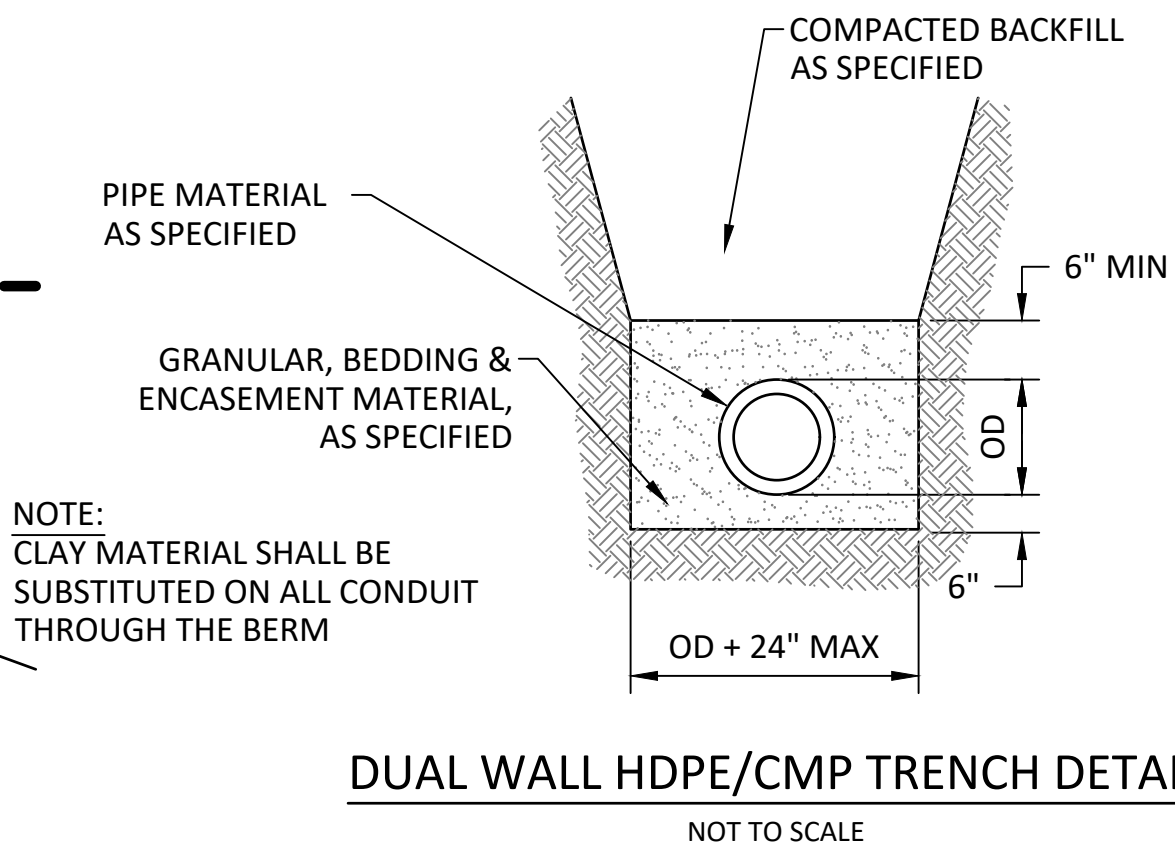
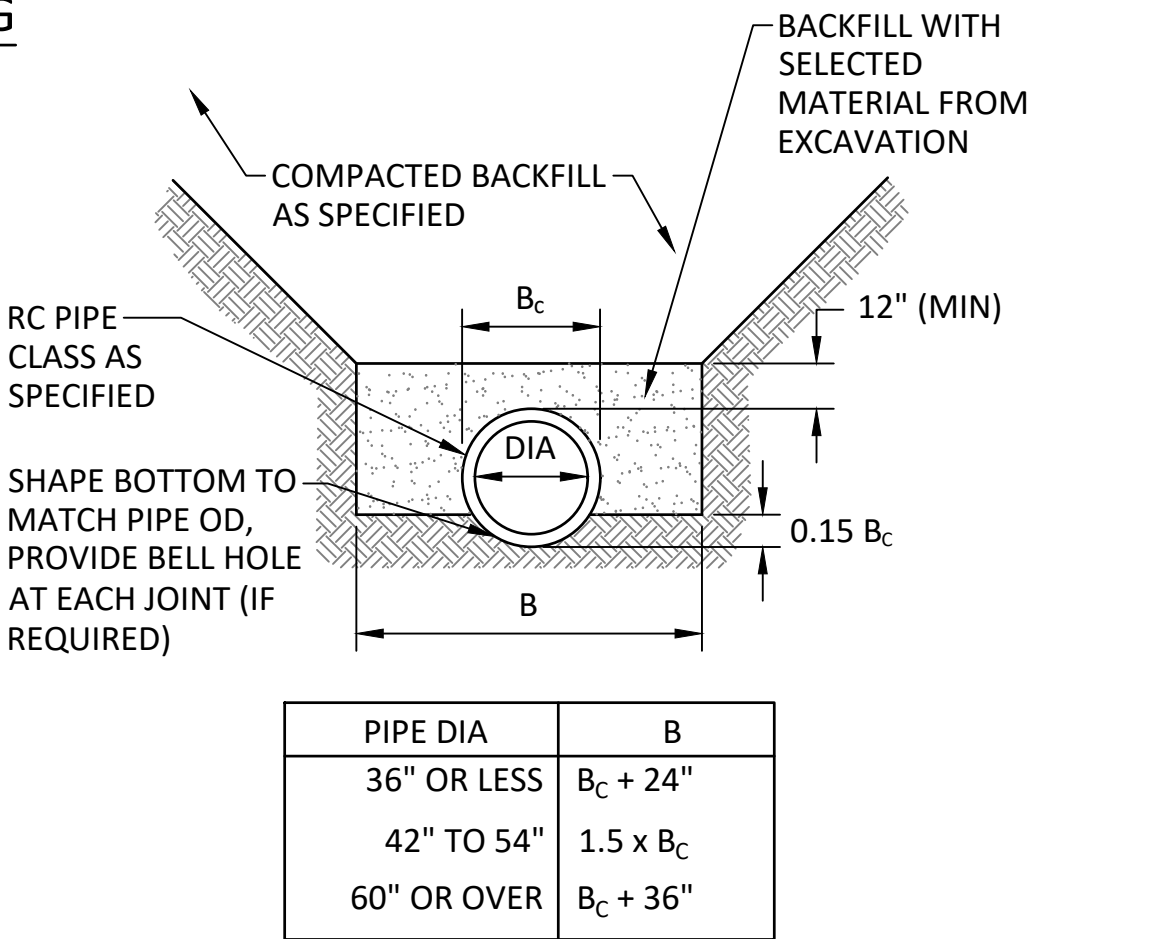
INSTALLATION INSTRUCTIONS:

1. APPLY TAR OR MASTIC TO COLLAR AND LAY PIPE ON COLLAR.
2. APPLY MASTIC TO TOP HALF OF COLLAR AND SET IN PLACE LINING UP RED STRIPES AND BOLTING HALVES TOGETHER.
3. APPLY MASTIC AS NEEDED FOR A GOOD SEAL.
4. BACKFILL AND HAND TAMP.

ANTI-SEEP COLLAR DETAIL
NOT TO SCALE

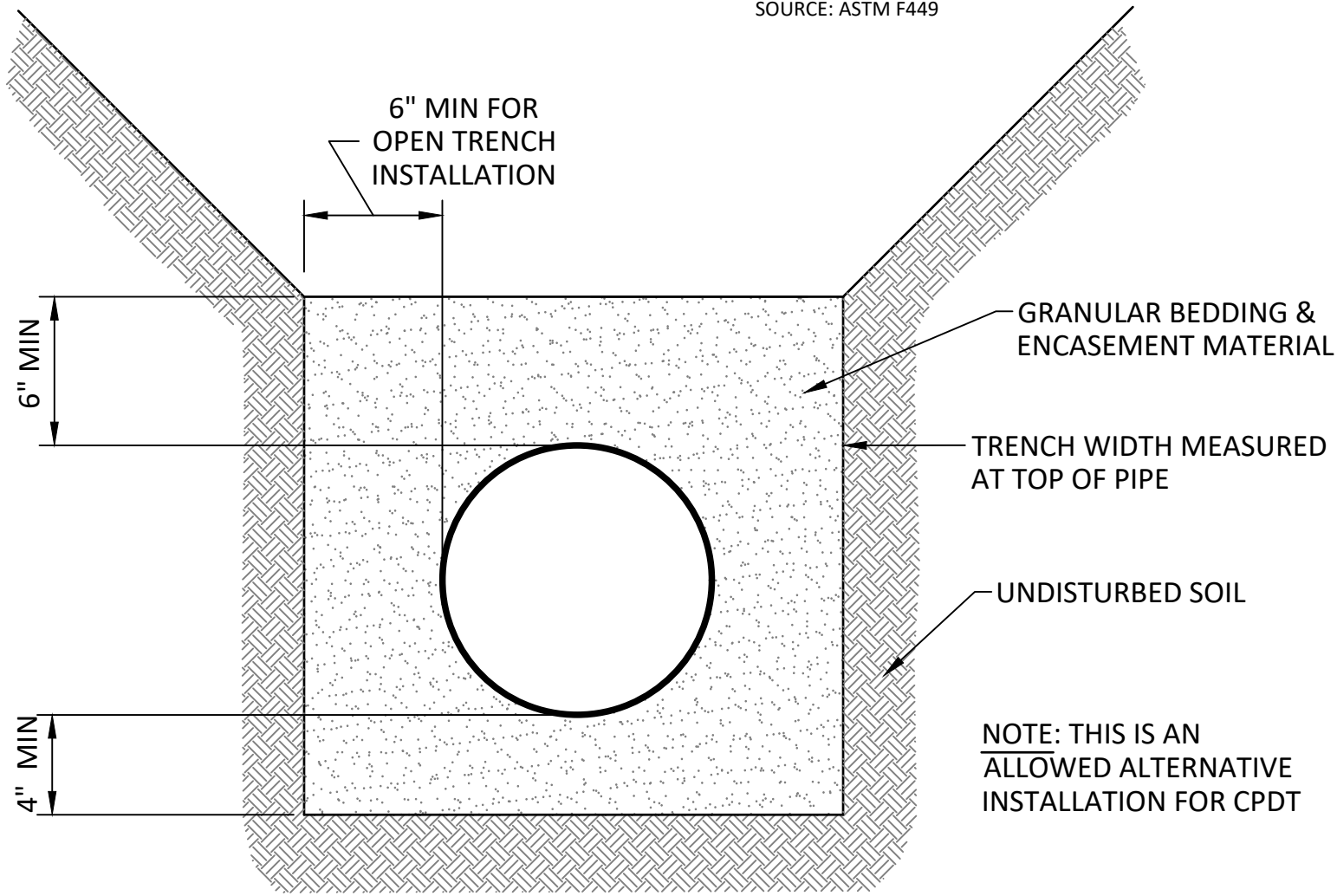


DEGREES	Δ DELTA
20°	4.41
30°	6.7
45°	10.36
60°	14.43
70°	17.51
80°	20.98
90°	25



CPDT PREFERRED TRENCH INSTALLATION BOTTOM

TRAPEZOIDAL GROOVE, "V" GROOVE, & CIRCULAR GROOVE
NOT TO SCALE
SOURCE: ASTM F449



FILL TRENCH TO 6" ABOVE TOP OF PIPE WITH CRUSHED STONE OR GRAVEL MEETING THE REQUIREMENTS IN TABLE 2. BEDDING MATERIAL SHALL BE INCIDENTAL TO THE PIPE INSTALLATION.

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JOSHUA G. STIER
LIC. NO. 54171 DATE 1/04/2021



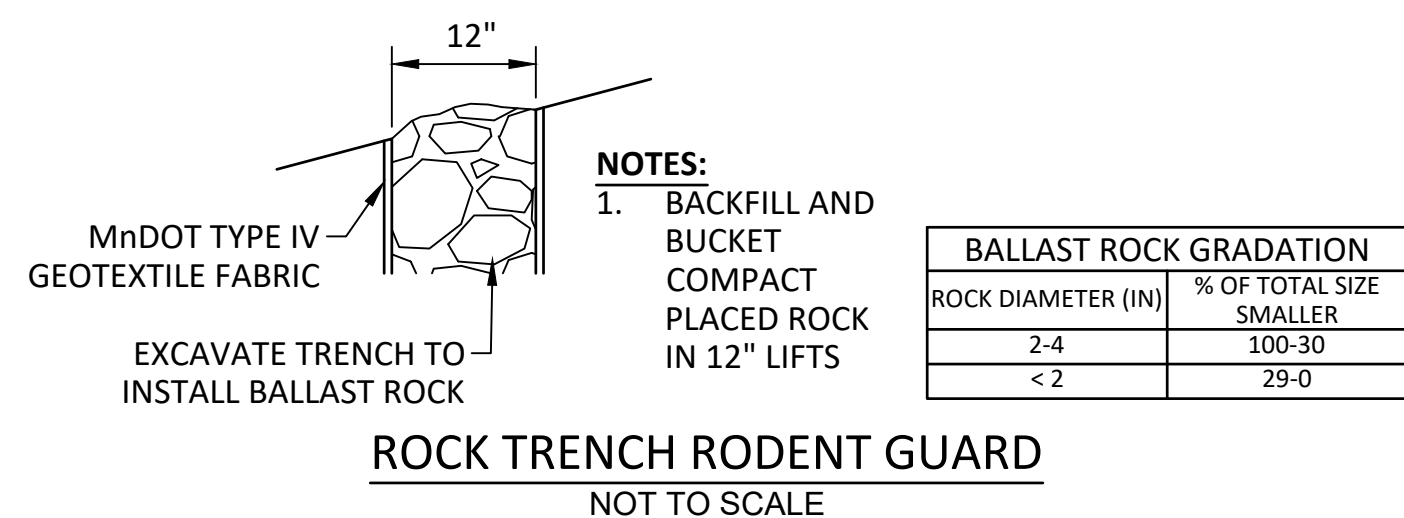
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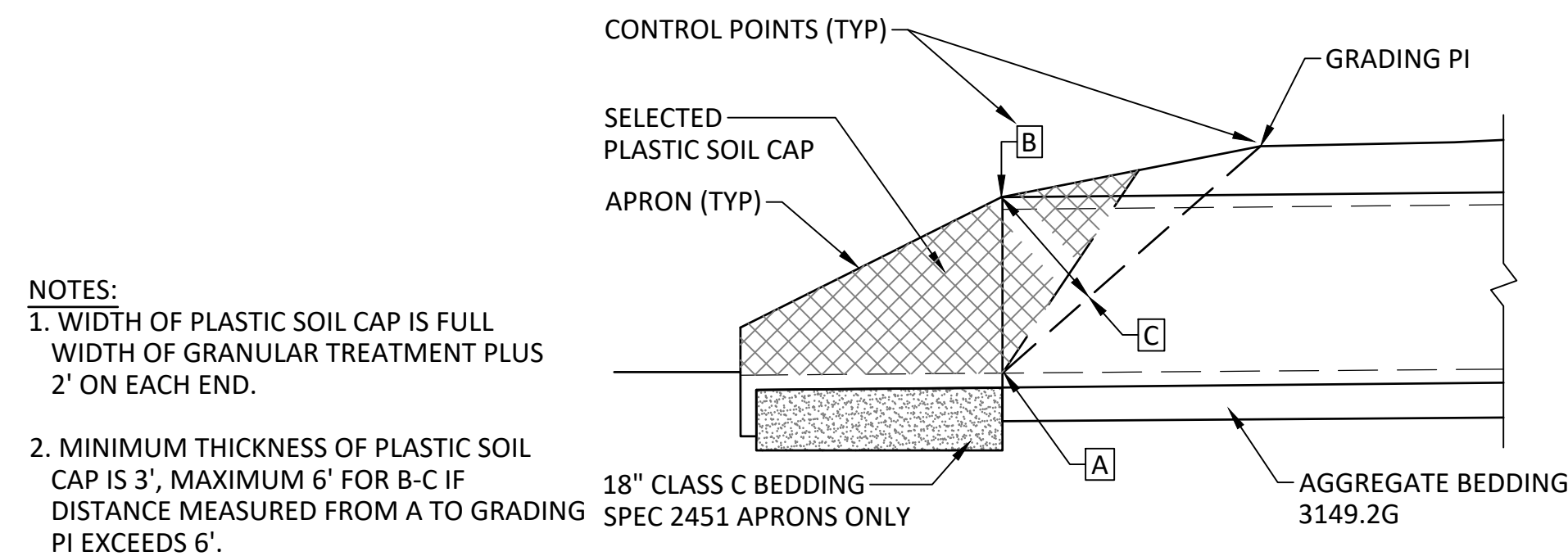
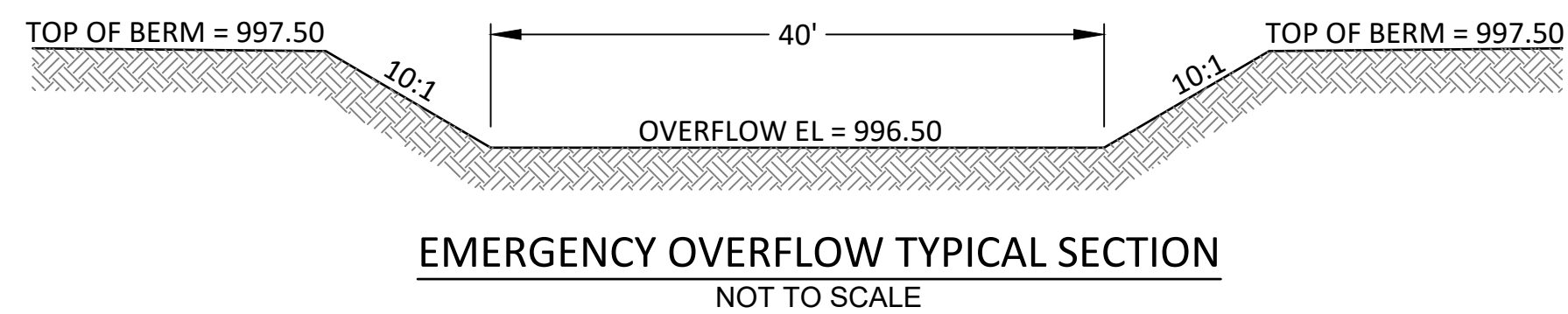
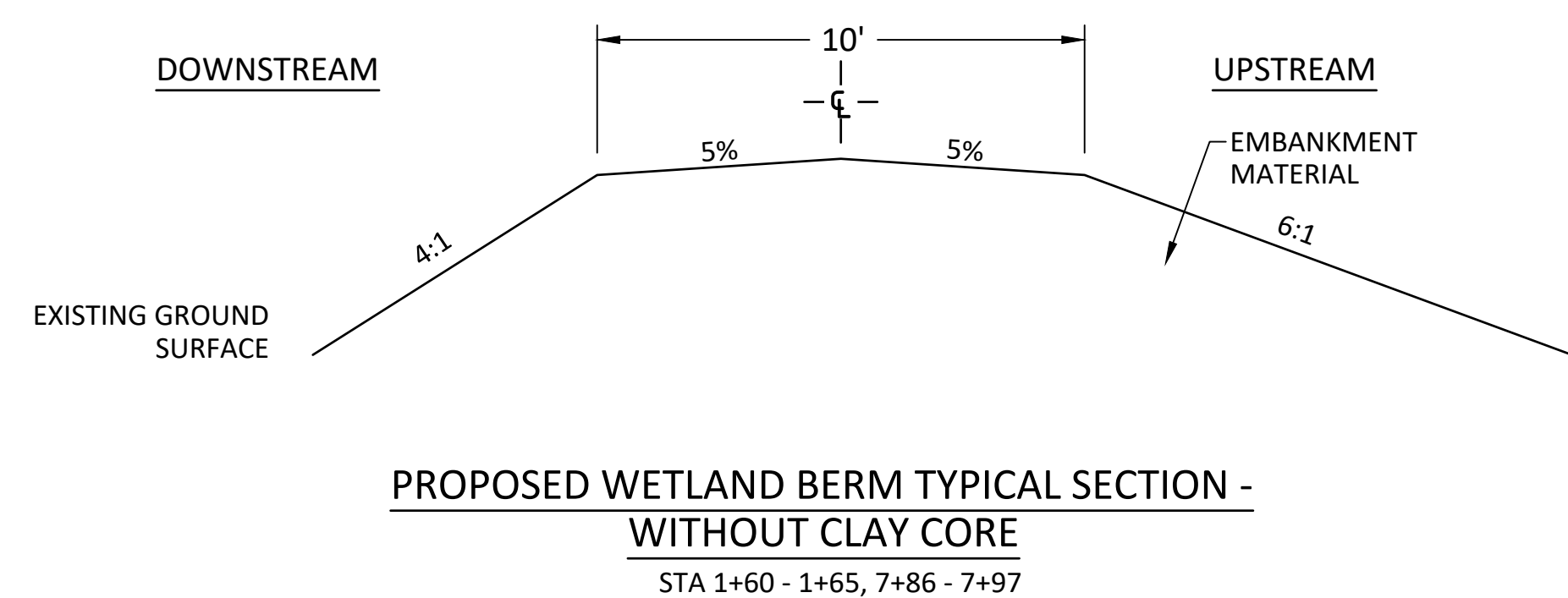
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EARTH WORK BALANCE					
LOCATION	RAW CUT (CY)		RAW FILL (CY)	FILL FACTOR	BALANCE (CY)
WETLAND BERM	1,755		2,270	1.5	-1,650
CLAY CORE			2,010	1.3	-2,613
TILE DAYLIGHT	425		10	1.5	410

COMMON EXCAVATION - 2,180 CY
COMMON BORROW - 1,240 CY
COMMON BORROW - CLAY CORE - 2,613 CY
TOPSOIL REMOVAL, SALVAGE, AND SPREADING - 2,613 CY



PLASTIC SOIL CAP AT CULVERT
NOT TO SCALE



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Wet Meadow - Grasses Mix			
Common Name	Scientific Name	Rate (lb/ac)	% of Mix (% by wt)
Fringed brome	<i>Bromus cialatus</i>	1	55.56%
Virginia Wild Rye	<i>Elymus virginicus</i>	0.5	27.78%
Reed Manna Grass	<i>Glyceria grandis</i>	0.1	5.56%
Rice Cut Grass	<i>Leersia oryzoides</i>	0.2	11.11%
Total Grasses:		1.8	100.00%
Totals:		1.8	100.00%

Wet Meadow - Forbs and Grasses mix			
Common Name	Scientific Name	Rate (lb/ac)	% of Mix (% by wt)
Scarlet Toothcup	<i>Ammannia coccinea</i>	0.125	3.81%
Rose milkweed	<i>Asclepia incarnata</i>	0.25	7.62%
Swamp Aster	<i>Aster puniceus</i>	0.063	1.90%
False aster	<i>Boltonia asteroides</i>	0.063	1.90%
Joe Pye Weed	<i>Eupatorium maculatum</i>	0.063	1.90%
Boneset	<i>Eupatorium perfoliatum</i>	0.031	0.95%
Bottle Gentian	<i>Gentiana andrewsii</i>	0.063	1.90%
Northern Blue Flag	<i>Iris versicolor</i>	0.125	3.81%
Prairie Blazing Star	<i>Liatris pycnostachya</i>	0.188	5.71%
Great Blue Lobelia	<i>Lobelia siphilitica</i>	0.063	1.90%
Water Horehound	<i>Lycopus americanus</i>	0.063	1.90%
Prairie Loosestrife	<i>Lysimachia quadriflora</i>	0.031	0.95%
Wild Mint	<i>Metha arvensis</i>	0.063	1.90%
Monkey Flower	<i>Mimulus ringens</i>	0.031	0.95%
Pinkweed	<i>Polygonum pensylvanicum</i>	0.063	1.90%
Mountain Mint	<i>Pycnanthemum virginianum</i>	0.031	0.95%
Black-eyed Susan	<i>Rudbeckia hirta</i>	0.188	5.71%
Grass-leaved Goldenrod	<i>Solidago graminifolia</i>	0.031	0.95%
Great Bur Reed	<i>Sparganium eurycarpum</i>	0.5	15.24%
Blue Vervain	<i>Verbena hastata</i>	0.125	3.81%
Golden Alexanders	<i>Zizia aurea</i>	0.188	5.71%
Total Forbs		2.343	71.43%
Porcupine sedge	<i>Carex hystericina</i>	0.188	5.71%
Common Fox Sedge	<i>Carex stipata</i>	0.375	11.43%
Brown Fox Sedge	<i>Cares vulpinoidea</i>	0.188	5.71%
Canada Rush	<i>Juncus canadensis</i>	0.063	1.90%
Common Rush	<i>Juncus effusus</i>	0.063	1.90%
Dark-green Bulrush	<i>Scirpus atrovirens</i>	0.063	1.90%
Total Sedges and Rushes		0.938	28.57%
Totals:		3.281	100.00%

Oats Cover Crop			
Common Name	Scientific Name	Rate (lb/ac)	% of Mix (% by wt)
Oats	<i>Avena sativa</i>	100	100.00%
Total:		100	100.00%

Custom Wet Meadow Mix 105.08 lbs/ac

Deep Marsh Pilot Seed Mix					
Common Name	Scientific Name	Rate (kg/ha)	Rate (lb/ac)	% of Mix (% by wt)	Seeds/sq ft
Sweet Flag	<i>Acorus calamus</i>	0.28	0.25	8.10%	0.6
Total Forbs		0.28	0.25	8.10%	0.6
American Slough Grass	<i>Beckmannia syzigachne</i>	1.21	1.08		20
Tall Manna Grass	<i>Glyceria grandis</i>	0.44	0.39		10
Total Graminoids		1.65	1.48	48.10%	30
River Bulrush	<i>Bolboschoenus fluviatilis</i>	0.85	0.76		1.2
Marsh Spikerush	<i>Eleocharis palustris</i>	0.07	0.06		1.1
Soft Stem Bulrush	<i>Schoenoplectus tabernaemontani</i>	0.59	0.53		6
Total Sedges		1.51	1.35	43.80%	8.3
Totals:		3.44	3.07	100%	38.9
Purpose:	For the stabilization and establishment of deep marsh areas of wetland restoration projects.				
Planting Area:	Statewide				

Emergent Wetland - Grasses Mix			
Common Name	Scientific Name	Rate (lb/ac)	% of Mix (% by wt)
American Slough Grass	<i>Beckmannia syzigachne</i>	0.7	40.00%
Reed Manna Grass	<i>Glyceria grandis</i>	0.25	14.29%
Rice Cut Grass	<i>Leersia oryzoides</i>	0.3	17.14%
Cord Grass	<i>Spartina pectinata</i>	28.57	5.00%
Total Grasses			100.00%
Totals:		1.75	100.00%

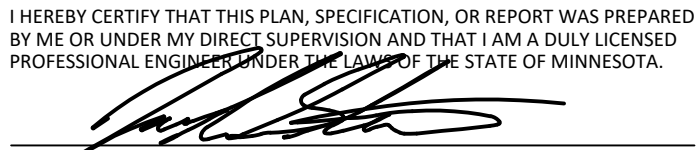
Emergent Wetland - Forbs and Sedges			
Common Name	Scientific Name	Rate (kg/ha)	Rate (lb/ac)
Sweet Flag	<i>Acorus americanus</i>	0.31	0.28
Large-flowered Water Plantain	<i>Alisma trivale</i>	0.45	0.4
Scarlet Toothcup	<i>Ammannia coccinea</i>	0.07	0.06
Rose Milkweed	<i>Asclepias incarnata</i>	0.31	0.28
Pinkweed	<i>Polygonum pensylvanicum</i>	0.07	0.06
Common Arrowhead	<i>Sagittaria latifolia</i>	0.34	0.3
Great Bur Reed	<i>Sparganium eurycarpum</i>	0.55	0.49
Total Forbs		2.1	1.87
Buttonbush	<i>Cephalanthus occidentalis</i>	0.13	0.12
Total Trees, Shrubs, and Vines		0.13	0.12
Bristly Sedge	<i>Carex comosa</i>	0.2	0.18
Common Lake Sedge	<i>Carex lacustris</i>	0.07	0.06
Common Fox Sedge	<i>Cares stipata</i>	0.2	0.18
Common Tussock Sedge	<i>Carex stricta</i>	0.04	0.04
Spike Rush	<i>Eleocharis acicularis</i>	0.1	0.1
Great Spike Rush	<i>Eleocharis palustris</i>	0.1	0.1
Torrey's Rush	<i>Juncus torreyi</i>	0.04	0.04
Wool Grass	<i>Scirpus cyperinus</i>	0.06	0.05
Chairmaker's Rush	<i>Scirpus pungens</i>	0.17	0.15
Great Bulrush	<i>Scirpus validus</i>	0.17	0.15
Total Sedges and Rushes		1.18	1.05
Totals:		3.41	3.04

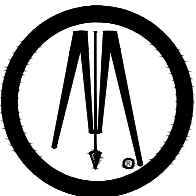
Custom Emergent Wetland Mix 5.16 lbs/ac

35-241		Mesic Prairie General			
Common Name	Scientific Name	Rate (lb/ac)	Rate (kg/ha)	% of Mix (by weight)	Seeds/ sq ft
big bluestem	<i>Andropogon gerardii</i>	2.00	2.24	5.48%	7.35
Indian grass	<i>Sorghastrum nutans</i>	2.00	2.24	5.48%	8.82
side-oats grama	<i>Bouteloua curtipendula</i>	1.60	1.79	4.39%	3.53
	<i>Schizachyrium scoparium</i>	1.60	1.79	4.39%	8.82
little bluestem	<i>Elymus canadensis</i>	1.17	1.31	3.20%	2.23
nodding wild rye	<i>Elymus canadensis</i>	1.17	1.31	3.20%	2.23
slender wheatgrass	<i>Elymus trachycaulus</i>	1.00	1.12	2.73%	2.53
kalm's brome	<i>Bromus kalmii</i>	0.50	0.56	1.37%	1.47
prairie dropseed	<i>Sporobolus heterolepis</i>	0.07	0.08	0.18%	0.39
switchgrass	<i>Panicum virgatum</i>	0.06	0.07	0.17%	0.32
Grasses Subtotal		10.00	11.21	27.39%	35.46
black-eyed susan	<i>Rudbeckia hirta</i>	0.31	0.35	0.86%	10.56
purple prairie clover	<i>Dalea purpurea</i>	0.19	0.21	0.51%	1.03
Early Sunflower	<i>Helioopsis helianthoides</i>	0.13	0.15	0.34%	0.29
blue giant hyssop	<i>Agastache foeniculum</i>	0.06	0.07	0.15%	1.82
lead plant	<i>Amorpha canescens</i>	0.06	0.07	0.15%	0.25
Canada milk vetch	<i>Astragalus canadensis</i>	0.06	0.07	0.17%	0.39
white prairie clover	<i>Dalea candida</i>	0.06	0.07	0.17%	0.44
Canada tick trefoil	<i>Desmodium canadense</i>	0.06	0.07	0.18%	0.13
stiff sunflower	<i>Helianthus pauciflorus</i>	0.06	0.07	0.17%	0.09
wild bergamot	<i>Monarda fistulosa</i>	0.06	0.07	0.17%	1.61
stiff goldenrod	<i>Oligoneuron rigidum</i>	0.06	0.07	0.17%	0.94
smooth aster	<i>Symphyotrichum laeve</i>	0.06	0.07	0.17%	1.26
hoary vervain	<i>Verbena stricta</i>	0.06	0.07	0.17%	0.64
golden alexanders	<i>Zizia aurea</i>	0.06	0.07	0.15%	0.23
common milkweed	<i>Asclepias syriaca</i>	0.04	0.04	0.10%	0.06
butterfly milkweed	<i>Asclepias tuberosa</i>	0.04	0.04	0.10%	0.06
blue vervain	<i>Verbena hastata</i>	0.04	0.04	0.12%	1.50
rough blazing star	<i>Liatris aspera</i>	0.03	0.03	0.08%	0.18
great blazing star	<i>Liatris pycnostachya</i>	0.03	0.03	0.09%	0.13
	<i>Symphyotrichum ericoides</i>	0.03	0.03	0.09%	2.30
Forbs Subtotal		1.50	1.68	4.11%	23.89
Oats	<i>Avena sativa</i>	25.00	28.02	68.50%	11.14
Cover Crop Subtotal		25.00	28.02	68.50%	11.14
Total		36.50	40.91	100.00%	70.49
Purpose:	General mesic prairie mix for native roadsides, ecological restoration, or conservation program plantings.				
Planting Area:	Tallgrass Aspen Parklands, Prairie Parkland, and Eastern Broadleaf Forest Provinces. Mn/DOT Districts 2(west), 3B, 4, Metro, 6, 7 & 8.				

34-171		Wetland Rehabilitation			
Common Name	Scientific Name	Rate (kg/ha)	Rate (lb/ac)	% of Mix (% by wt)	Seeds/ sq ft
Virginia wild rye	<i>Elymus virginicus</i>	3.36	3.00	56.61%	4.63
fowl bluegrass	<i>Poa palustris</i>	1.12	1.00	18.89%	47.80
Total Grasses		4.48	4.00	75.50%	52.43
fox sedge	<i>Carex vulpinoidea</i>	0.22	0.20	3.85%	7.50
path rush	<i>Juncus tenuis</i>	0.18	0.16	3.03%	59.00
dark green bulrush	<i>Scirpus atrovirens</i>	0.40	0.36	6.70%	60.00
woolgrass	<i>Scirpus cyperinus</i>	0.09	0.08	1.51%	50.00
Total Sedges and Rushes		0.90	0.80	15.09%	176.50
nodding bur marigold	<i>Bidens cernua</i>	0.15	0.13	2.45%	1.00
Water Horehound	<i>Lycopus americanus</i>	0.37	0.33	6.29%	23.15
blue monkey flower	<i>Mimulus ringens</i>	0.04	0.04	0.67%	30.00
Total Forbs		0.56	0.50	9.41%	54.15
Totals:		5.94	5.30	100.00%	283.08
Purpose:	Interseeding into establishing wetlands after weed control spraying. Also suitable for two to five year short term soil stabilization for areas with saturated soils.				
Planting Area:	Statewide				

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LIC. NO. 54171 DATE 1/04/2021



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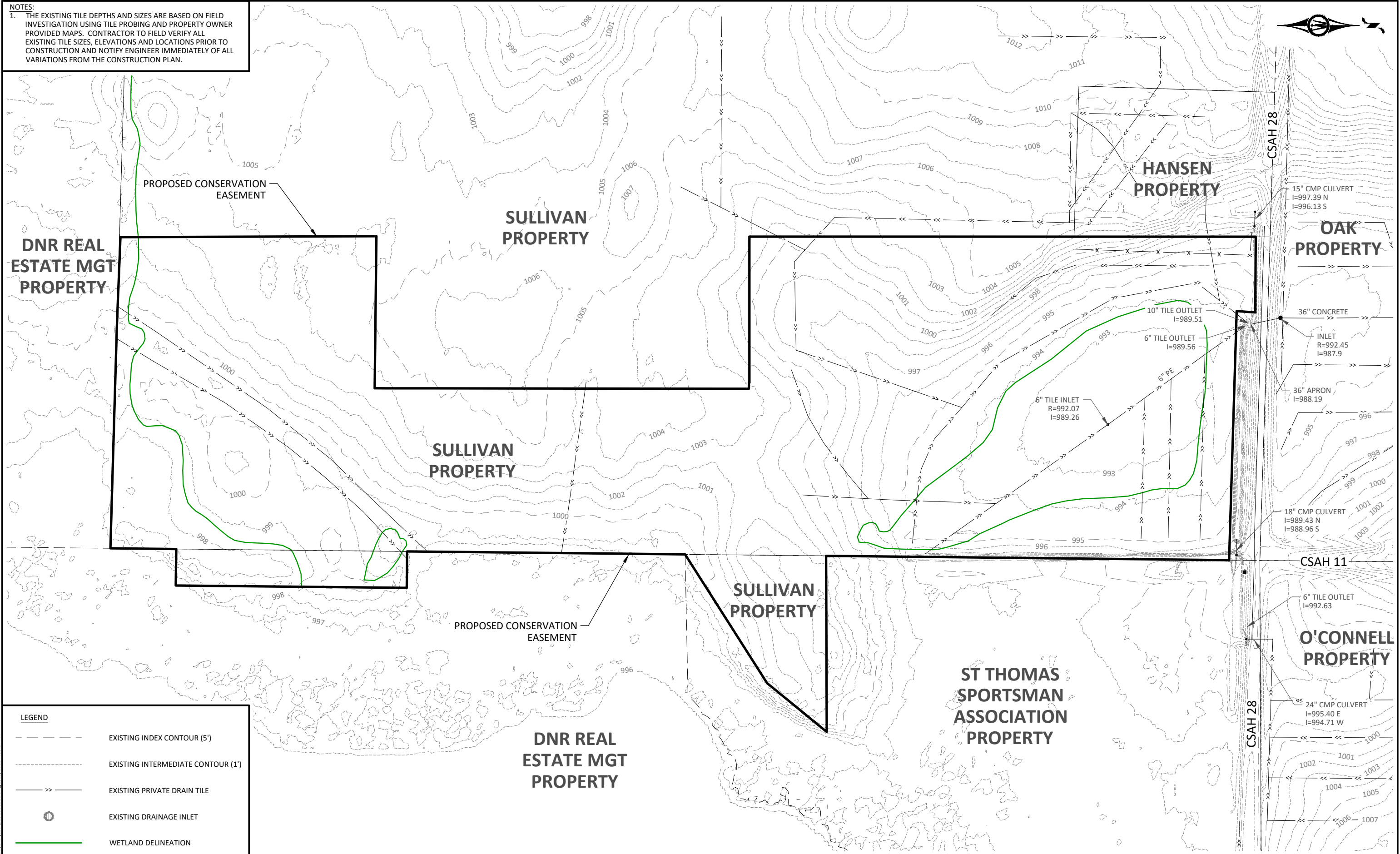
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CONSTRUCTION DETAILS & SPECIFICATIONS	

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NOTES:
1. THE EXISTING TILE DEPTHS AND SIZES ARE BASED ON FIELD INVESTIGATION USING TILE PROBING AND PROPERTY OWNER PROVIDED MAPS. CONTRACTOR TO FIELD VERIFY ALL EXISTING TILE SIZES, ELEVATIONS AND LOCATIONS PRIOR TO CONSTRUCTION AND NOTIFY ENGINEER IMMEDIATELY OF ALL VARIATIONS FROM THE CONSTRUCTION PLAN.



LEGEND

EXISTING INDEX CONTOUR (5')

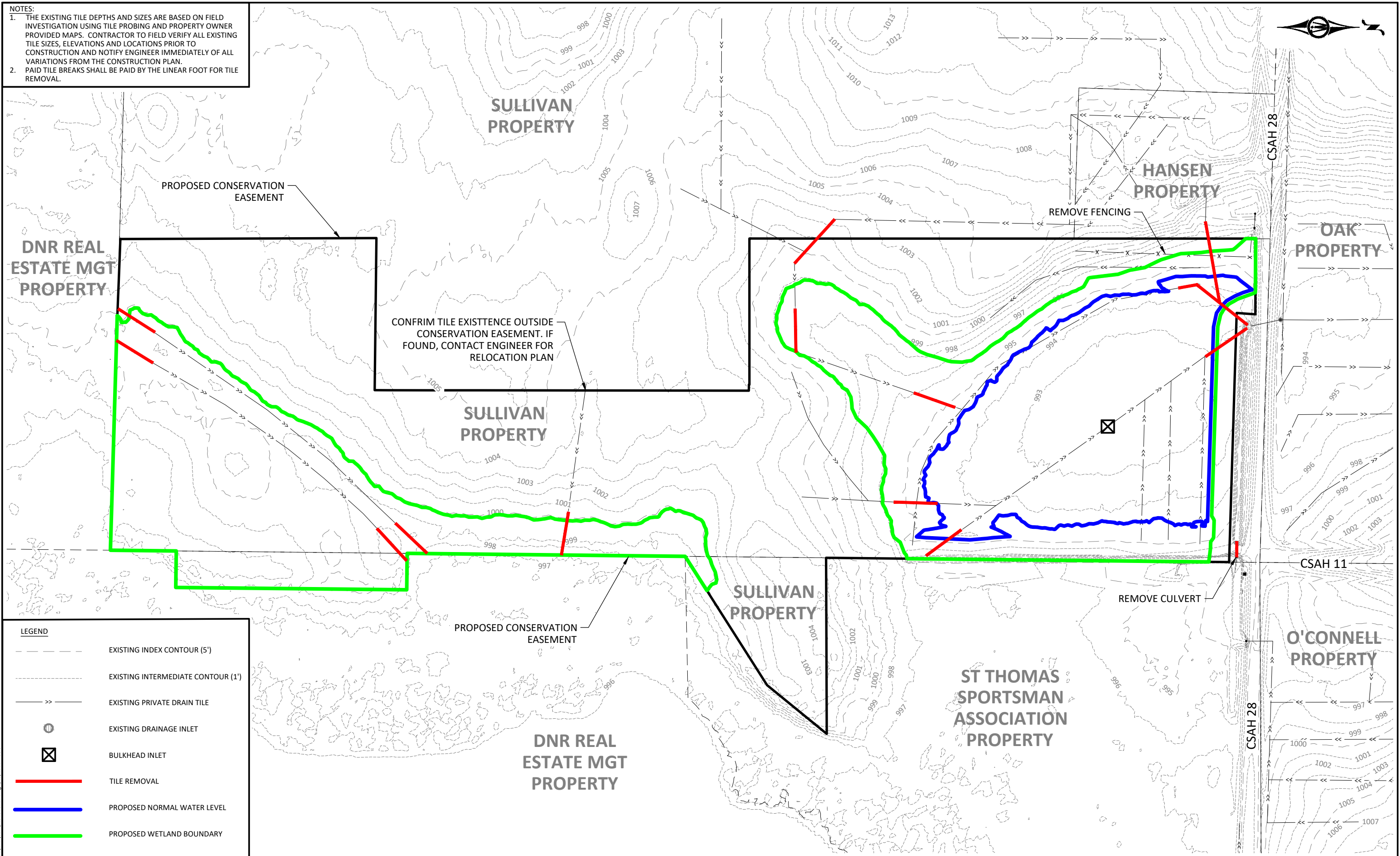
EXISTING INTERMEDIATE CONTOUR (1')

EXISTING PRIVATE DRAIN TILE

EXISTING DRAINAGE INLET

WETLAND DELINEATION

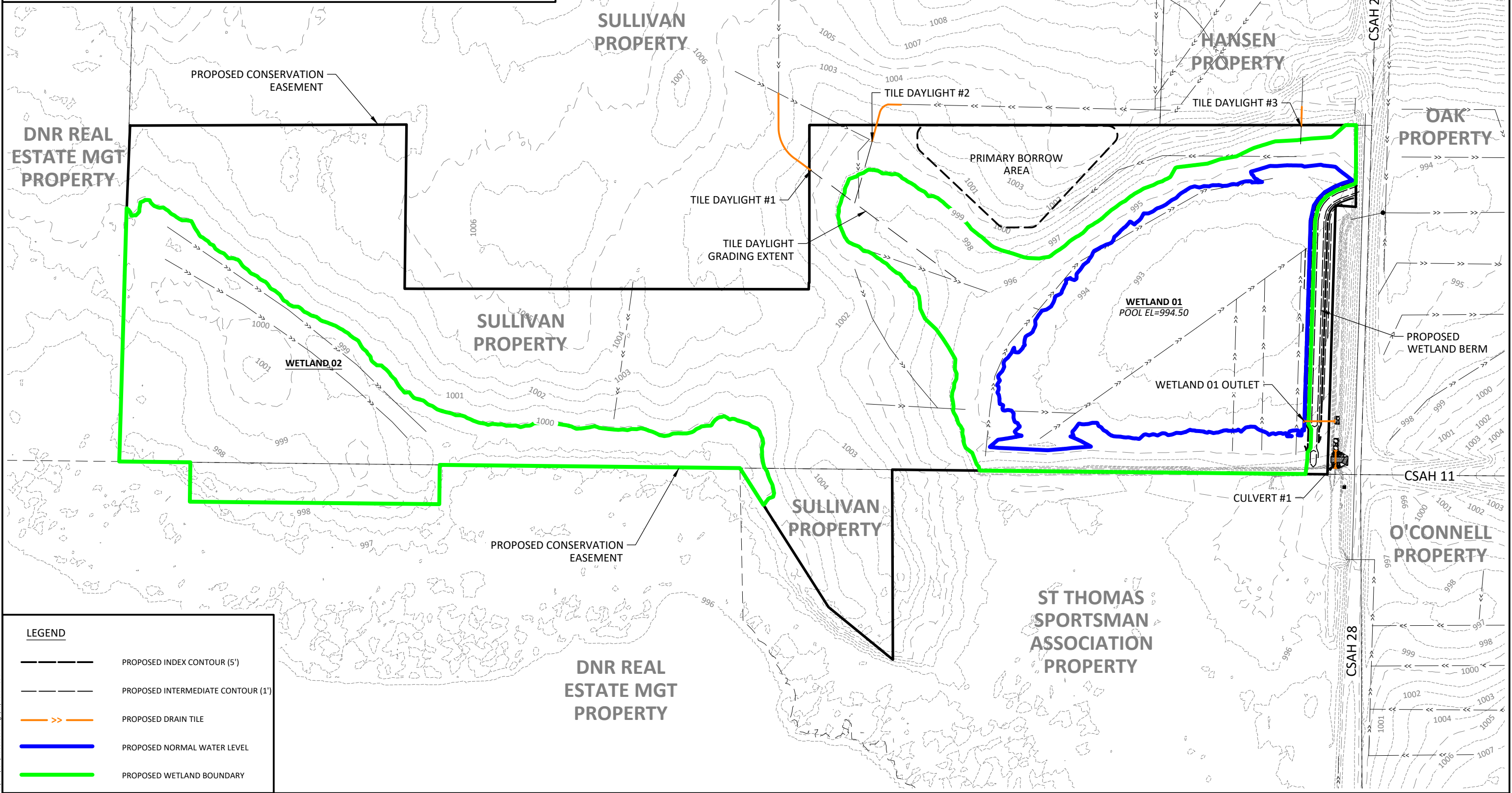
NOTES:
1. THE EXISTING TILE DEPTHS AND SIZES ARE BASED ON FIELD INVESTIGATION USING TILE PROBING AND PROPERTY OWNER PROVIDED MAPS. CONTRACTOR TO FIELD VERIFY ALL EXISTING TILE SIZES, ELEVATIONS AND LOCATIONS PRIOR TO CONSTRUCTION AND NOTIFY ENGINEER IMMEDIATELY OF ALL VARIATIONS FROM THE CONSTRUCTION PLAN.
2. PAID TILE BREAKS SHALL BE PAID BY THE LINEAR FOOT FOR TILE REMOVAL.



LEGEND

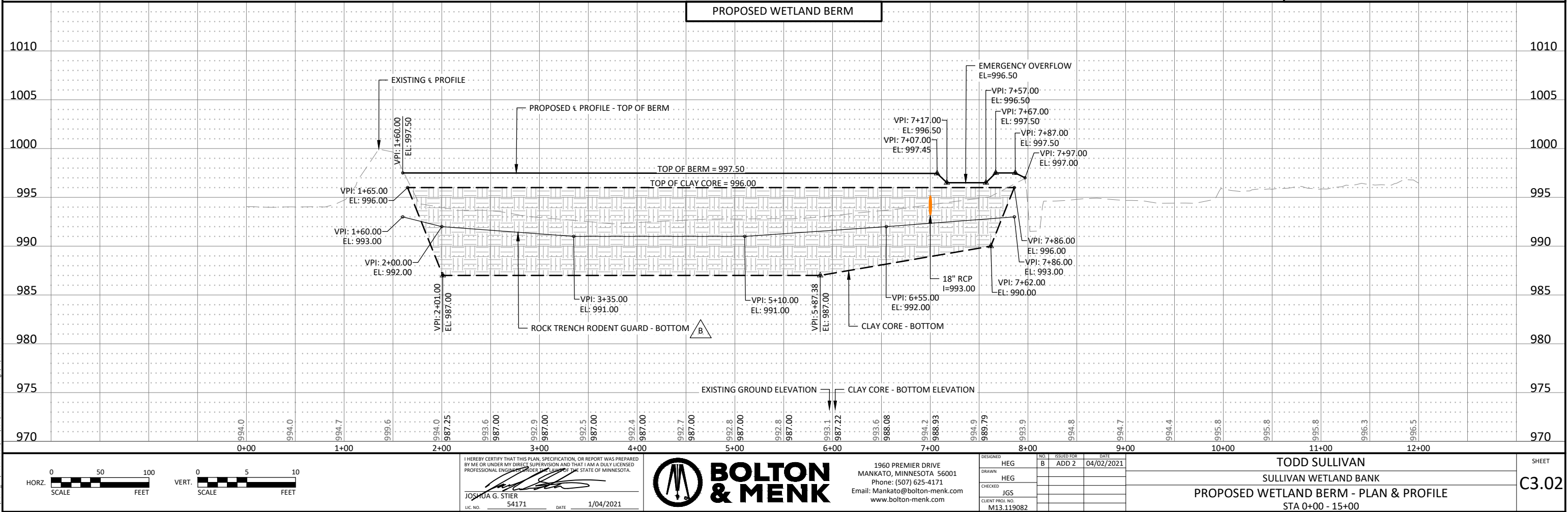
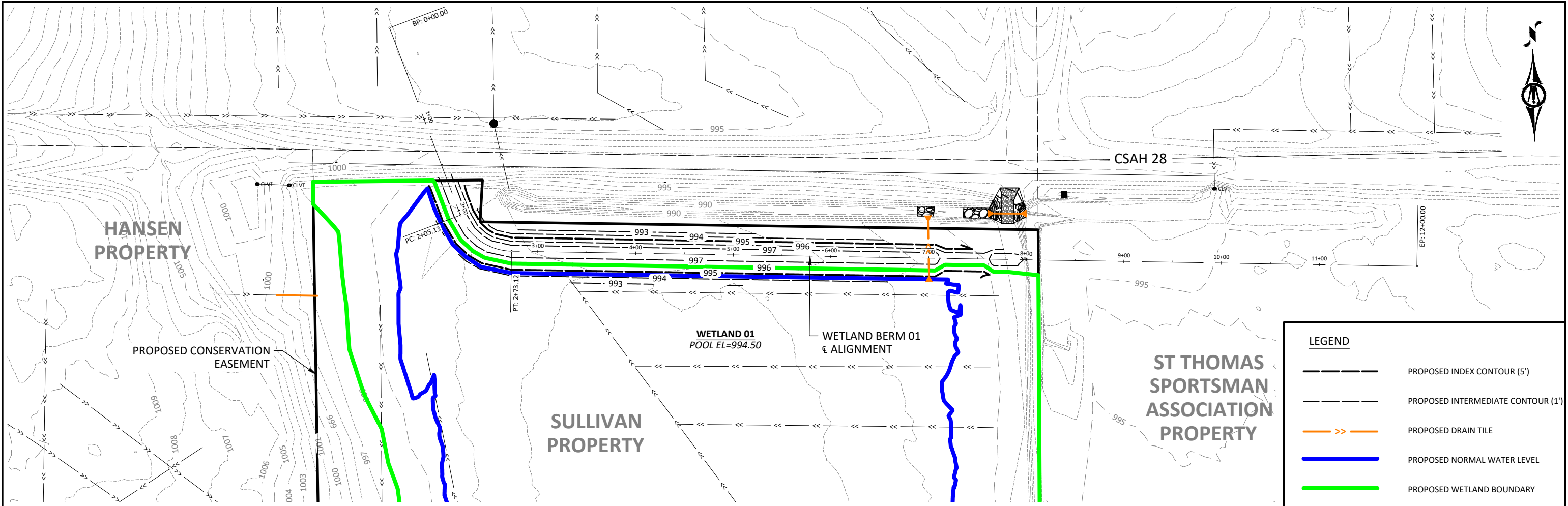
- EXISTING INDEX CONTOUR (5')
- EXISTING INTERMEDIATE CONTOUR (1')
- EXISTING PRIVATE DRAIN TILE
- EXISTING DRAINAGE INLET
- BULKHEAD INLET
- TILE REMOVAL
- PROPOSED NORMAL WATER LEVEL
- PROPOSED WETLAND BOUNDARY

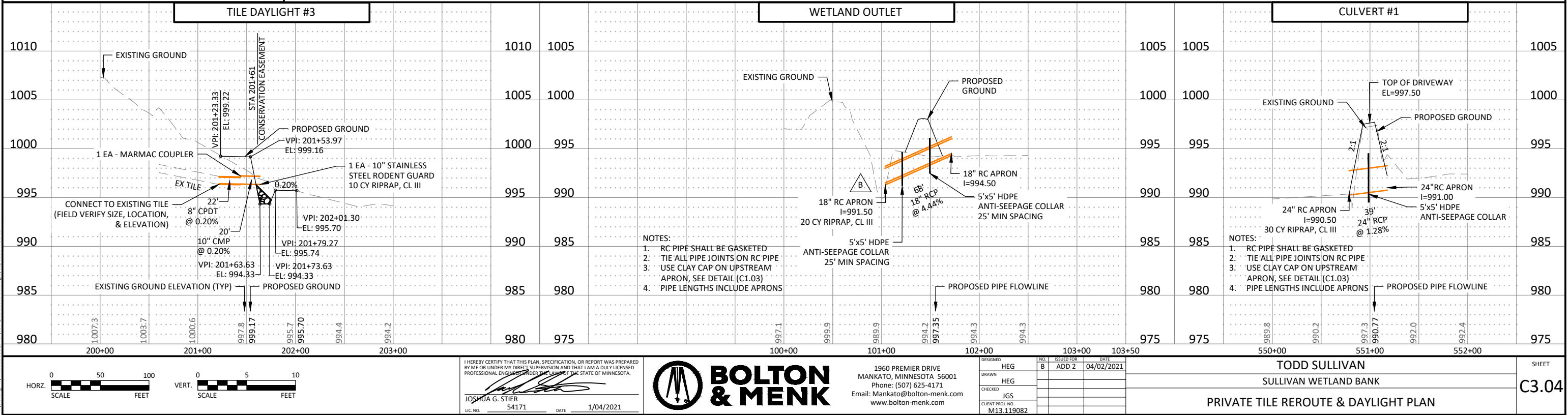
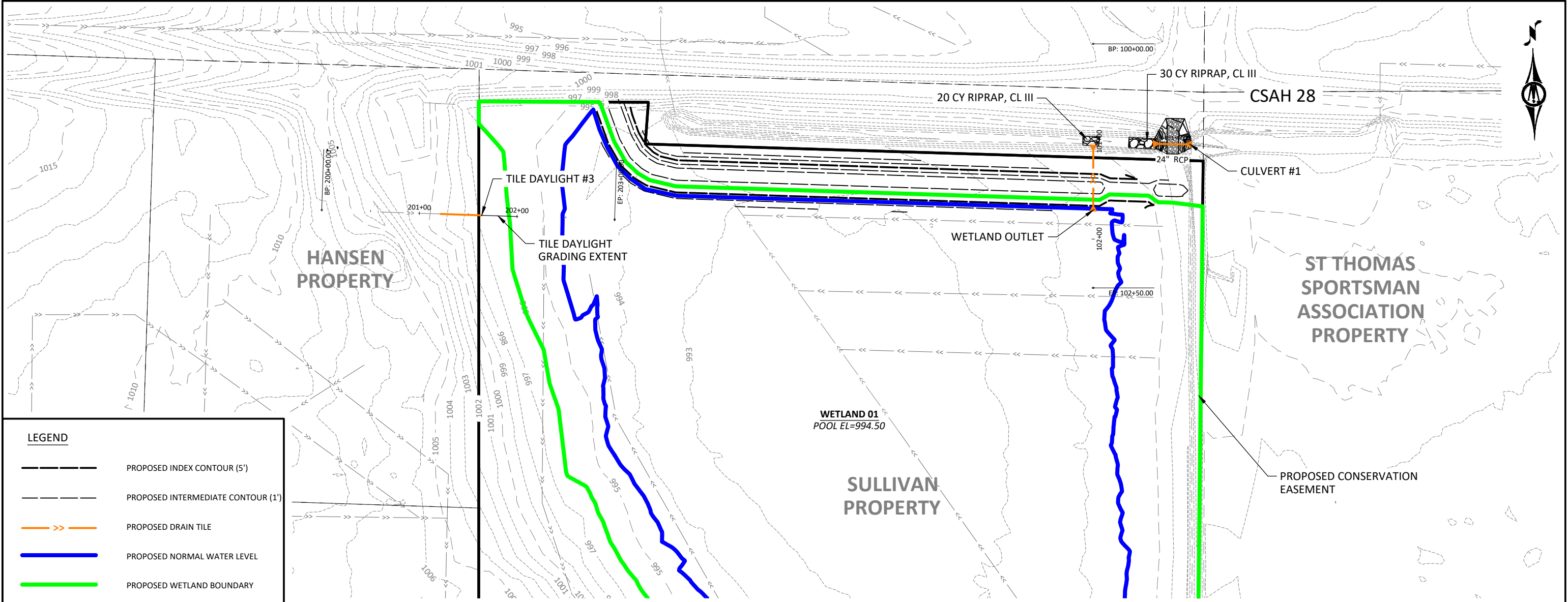
- NOTES:
1. PRIOR TO CONSTRUCTION FIELD VERIFY ALL LOCATIONS AND ELEVATIONS OF EXISTING DRAINAGE INFRASTRUCTURE. CONTACT ENGINEER IF DIFFERENT FROM CONSTRUCTION PLANS. CONTRACTOR TO REMOVE AT LEAST 100 LINEAR FEET OF TILE DOWNSTREAM OF PROPOSED DAYLIGHT LOCATIONS.
 2. ALL PROPOSED TILE DAYLIGHT LOCATIONS SHALL HAVE AT LEAST 20 LINEAR FEET OF CORRUGATED METAL PIPE AT OUTLET. GUIDE POSTS SHALL BE INSTALLED AT ALL TILE DAYLIGHT LOCATIONS.
 3. ALL TILES DOWNSTREAM OF REROUTED TILES AND OUTSIDE OF THE CONSERVATION EASEMENT SHALL BE REMOVED AND BULKHEADED INSIDE THE CONSERVATION EASEMENT.
 4. SEE PROPOSED TILE PROFILES FOR PERFORATED/NON-PERFORATED TILE DESIGNATION. ALL TILE INSIDE THE CONSERVATION EASEMENT SHALL BE NON-PERFORATED UNLESS OTHERWISE SPECIFIED.
 5. BORROW & SPOIL AREAS SHALL DRAIN TOWARDS WETLAND FOLLOWING GRADING ACTIVITIES
 6. ALL PRIVATE TILE SEVERED DURING CONSTRUCTION MUST BE RECONNECTED.

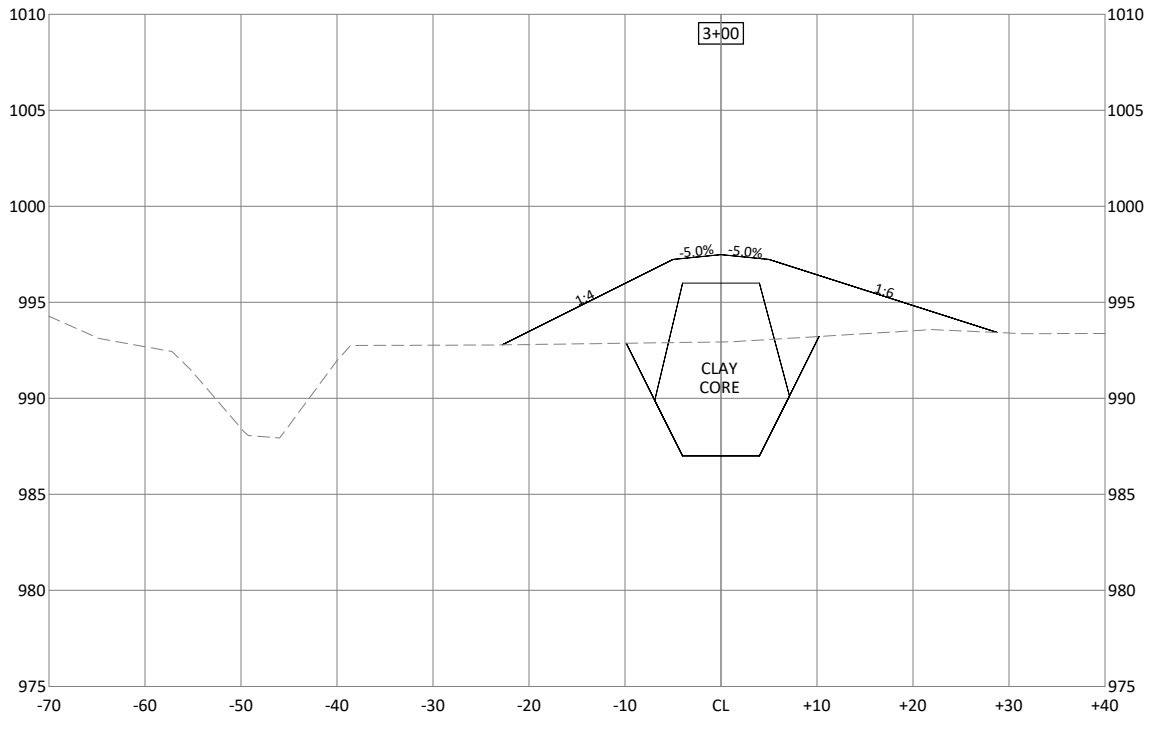
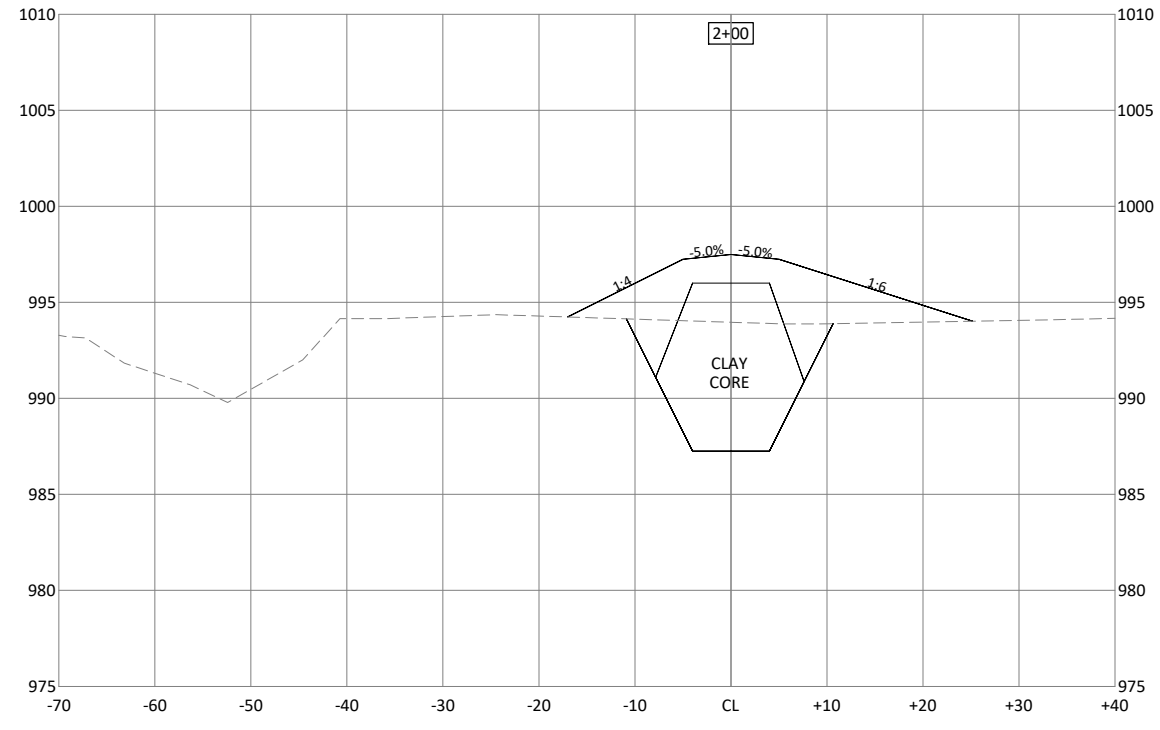
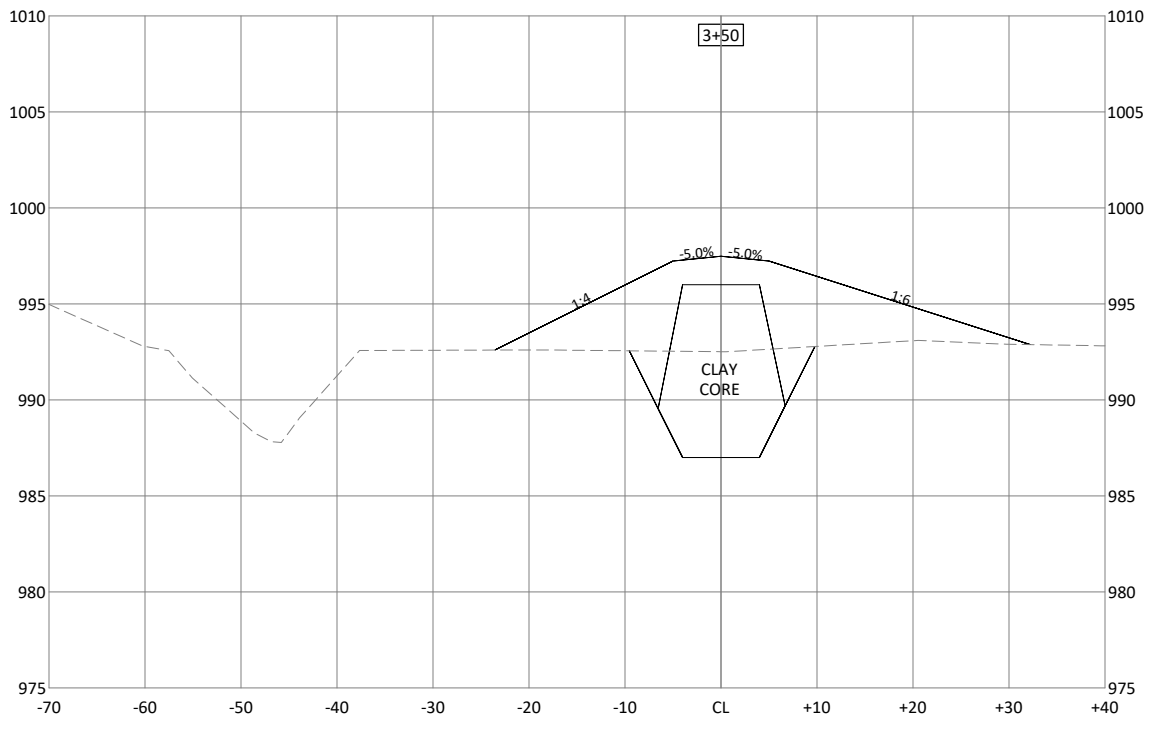
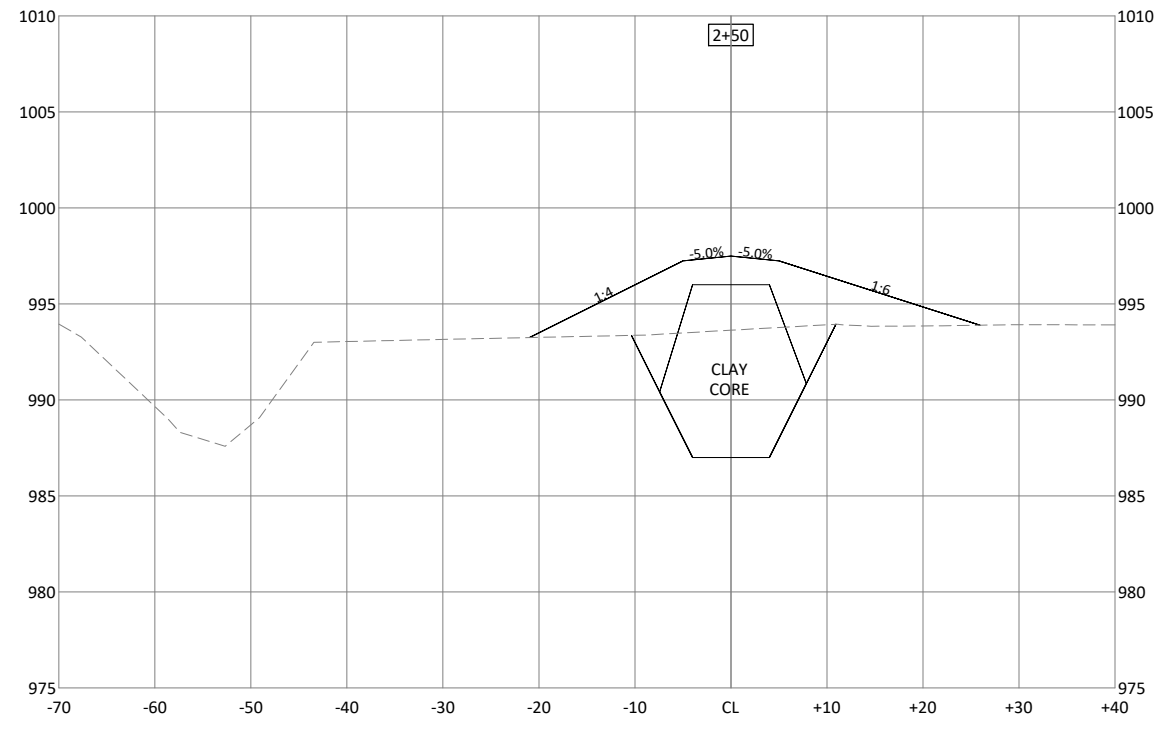


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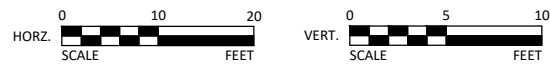
- PROPOSED INDEX CONTOUR (5')
- PROPOSED INTERMEDIATE CONTOUR (1')
- PROPOSED DRAIN TILE
- PROPOSED NORMAL WATER LEVEL
- PROPOSED WETLAND BOUNDARY







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Joshua G. Stier
JOSHUA G. STIER
LIC. NO. 54171 DATE 1/04/2021

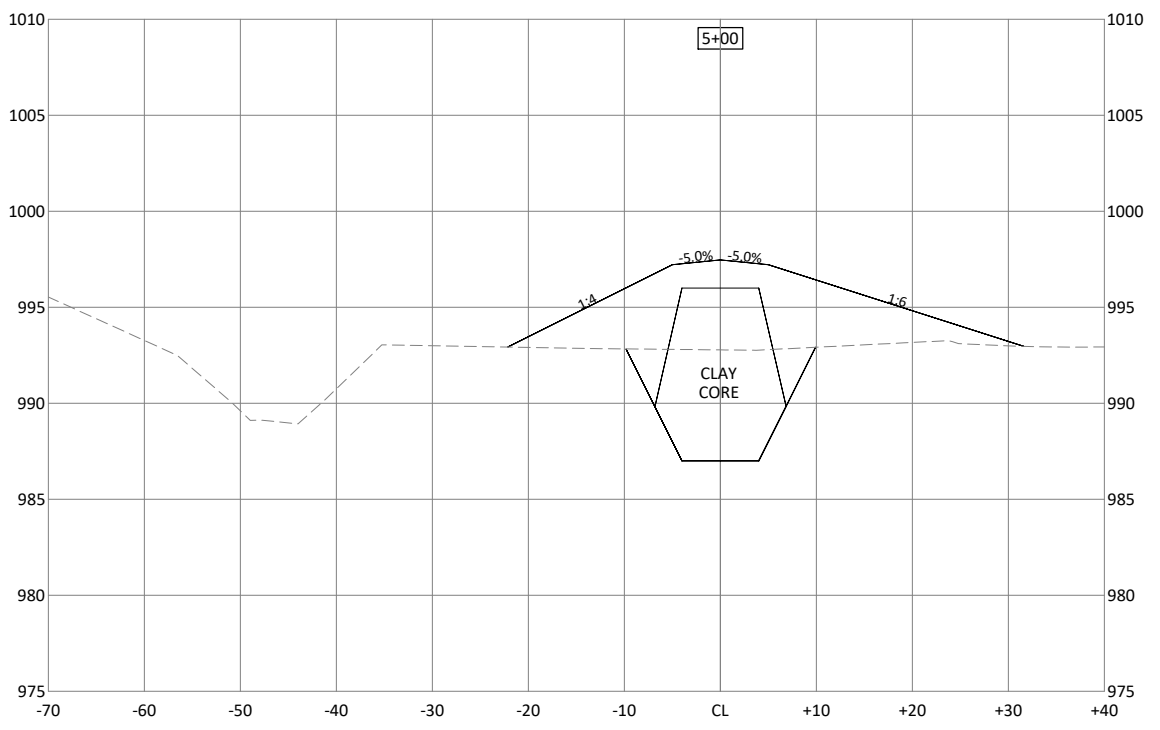
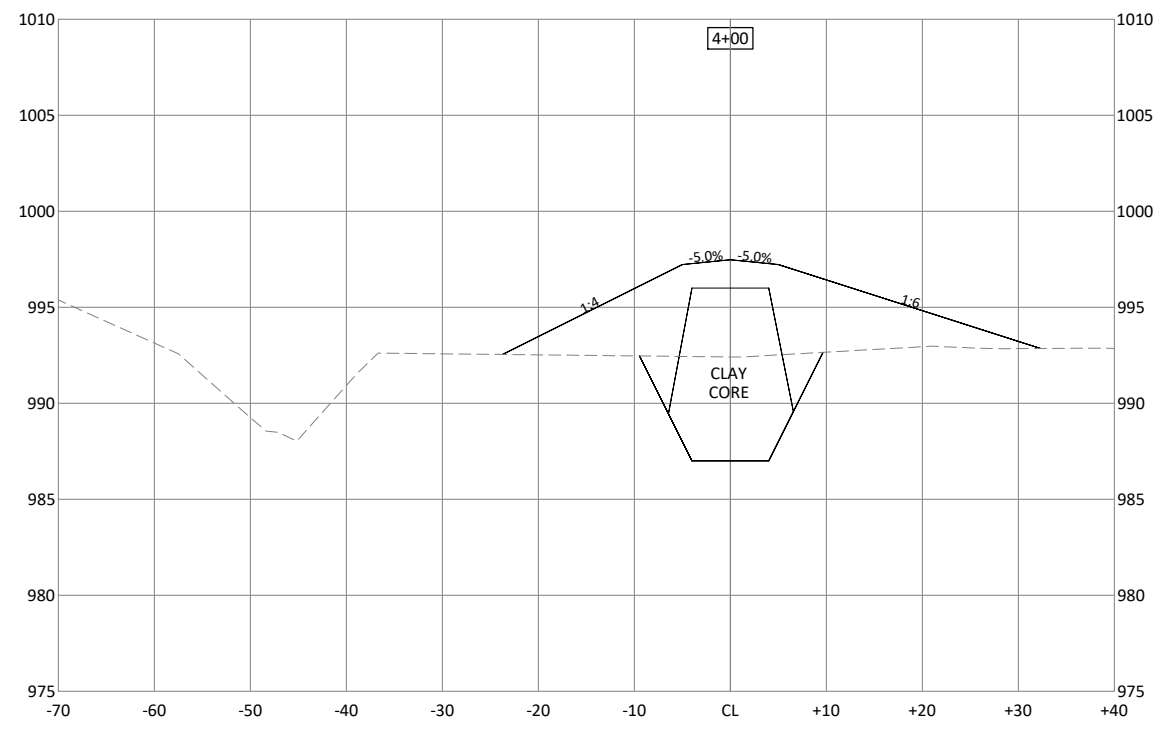
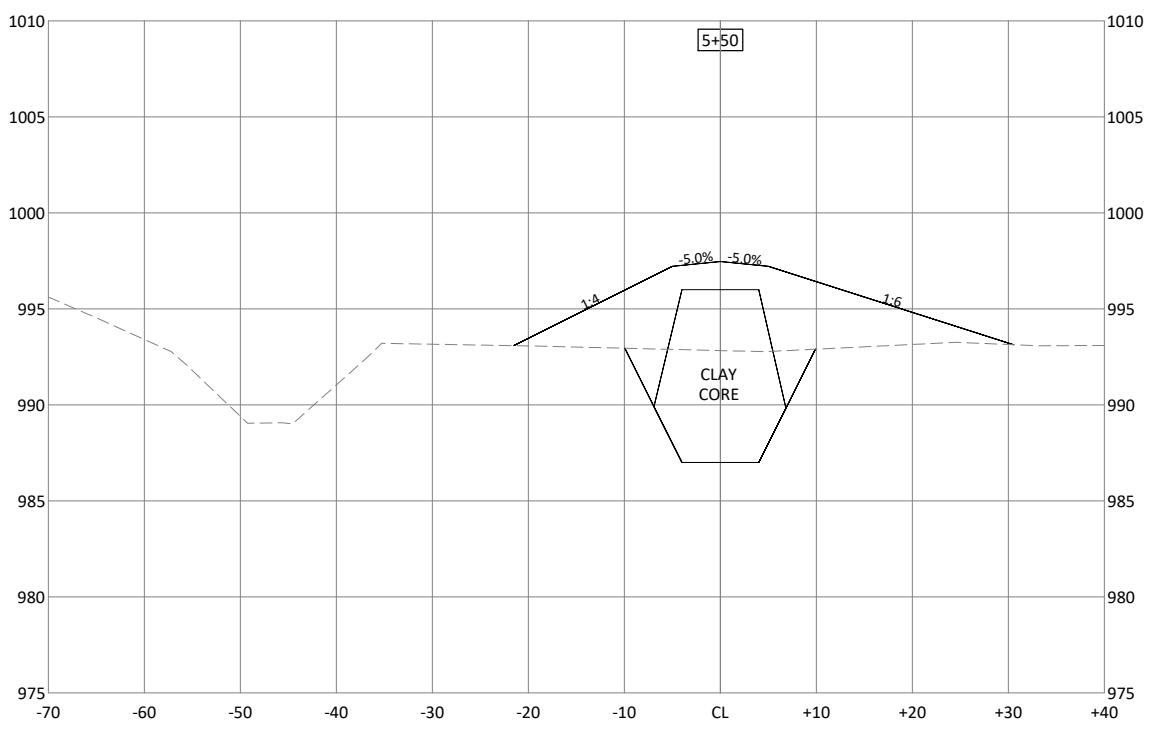
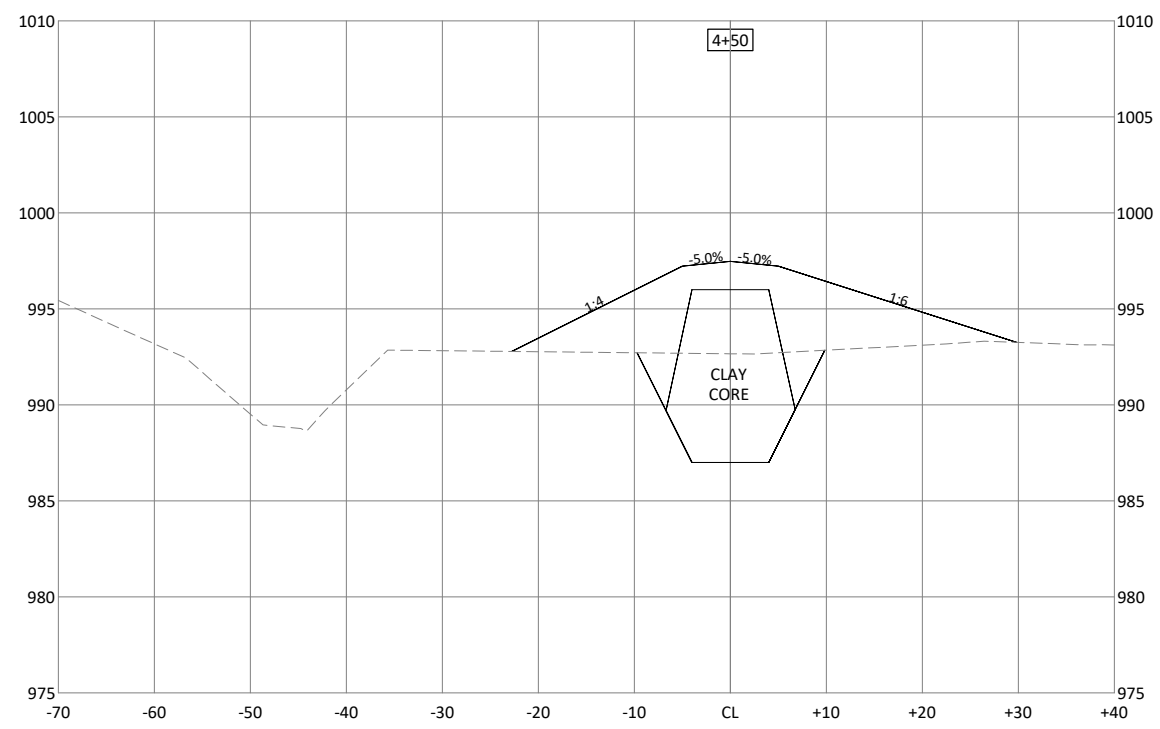


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Email: Mankato@bolton-menk.com
www.bolton-menk.com

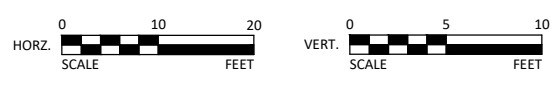
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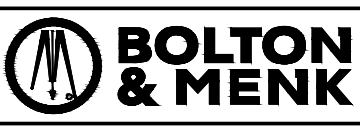


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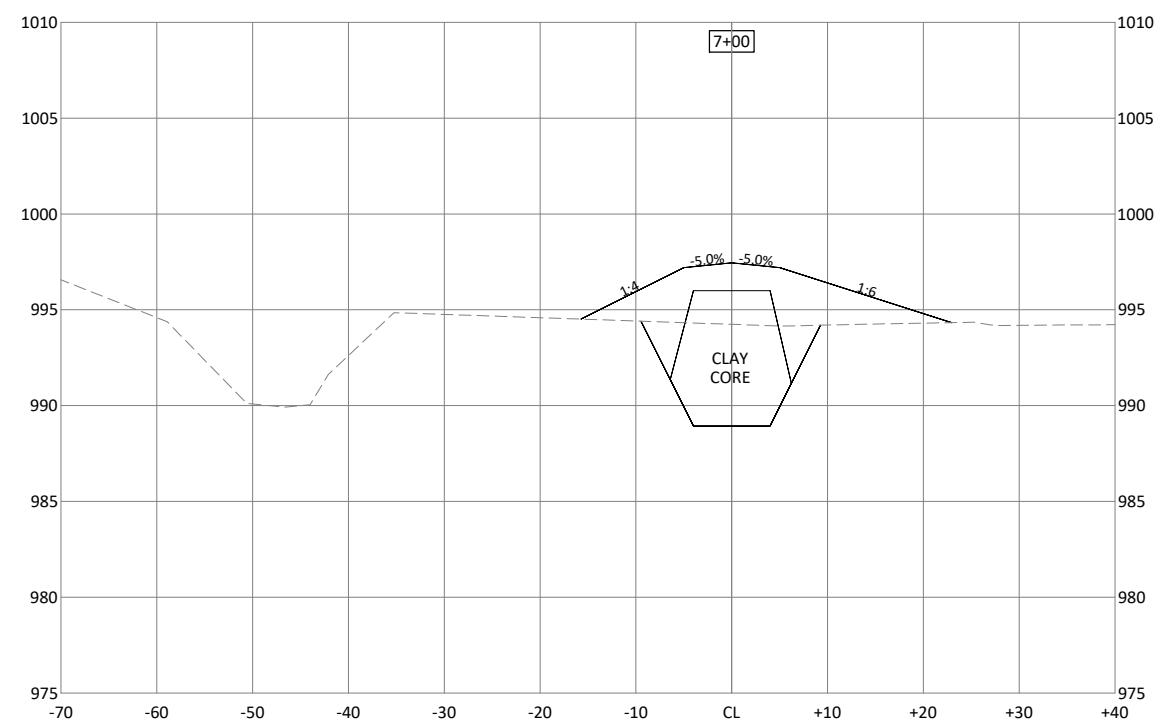
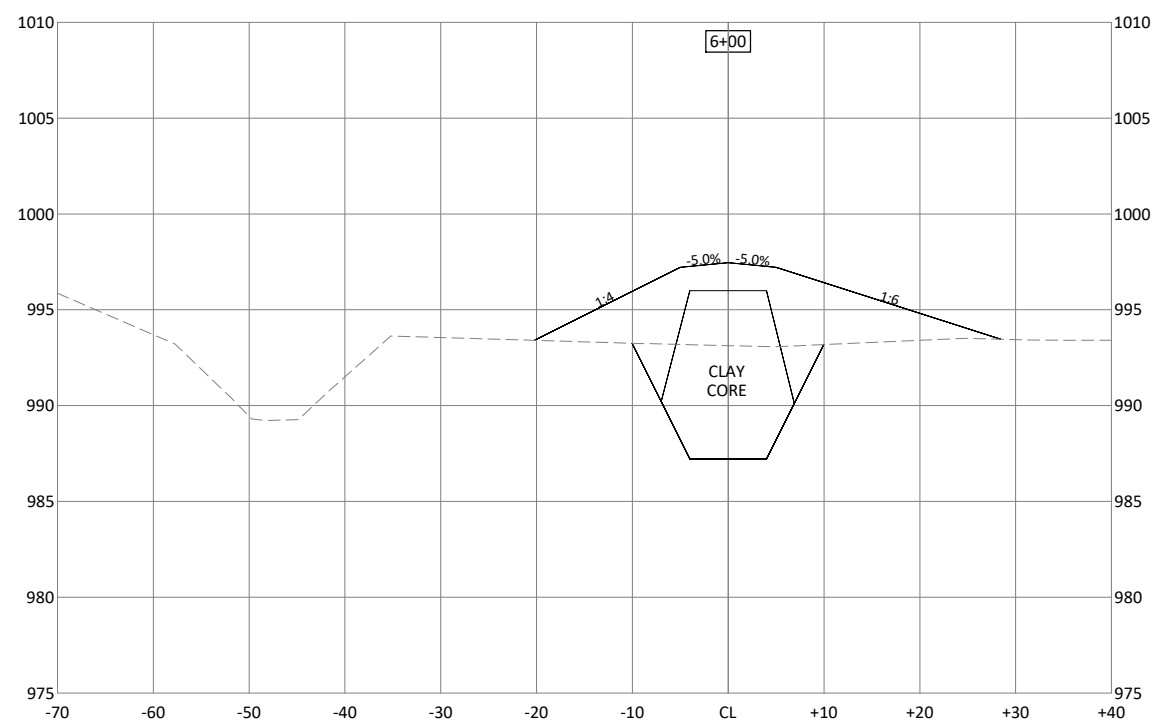
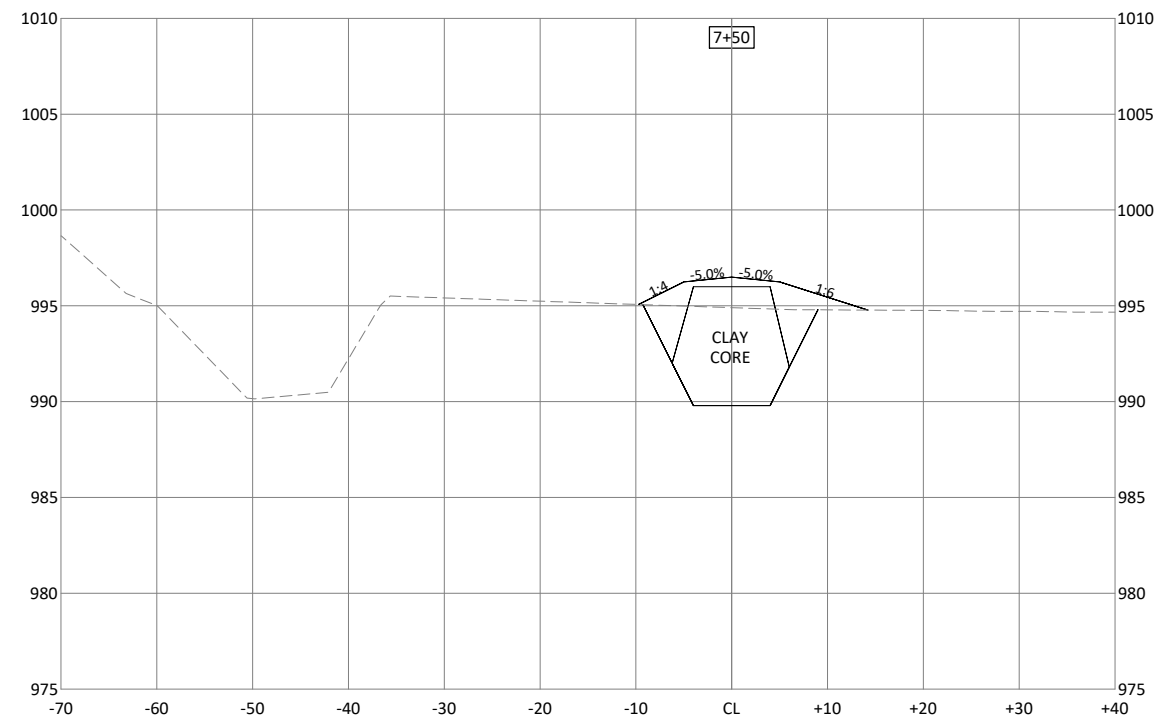
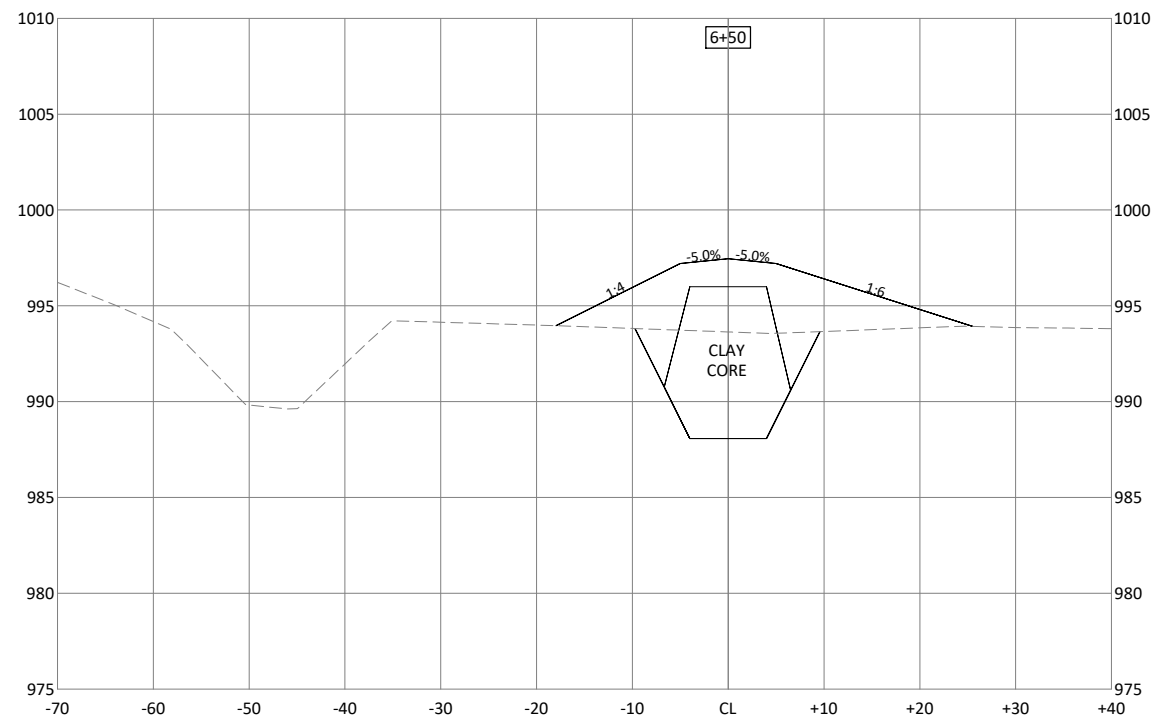


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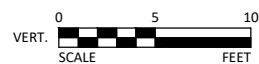
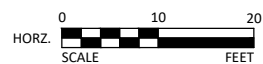
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DNR REAL
ESTATE MGT
PROPERTY

PROPOSED CONSERVATION
EASEMENT

SULLIVAN
PROPERTY

HANSEN
PROPERTY

OAK
PROPERTY

SULLIVAN
PROPERTY

WETLAND 02

WETLAND 01
POOL FL=994.50

SULLIVAN
PROPERTY

O'CONNELL
PROPERTY

PROPOSED CONSERVATION
EASEMENT

DNR REAL
ESTATE MGT
PROPERTY

ST THOMAS
SPORTSMAN
ASSOCIATION
PROPERTY

LEGEND

STATE SEED MIX 35-241 (19.5 ACRES)

CUSTOM WET MEADOW MIX (4.9 ACRES)

CUSTOM EMERGENT MIX (1.9 ACRES)

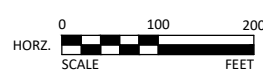
DEEP MARSH PILOT SEED MIX (4.7 ACRES)

WETLAND REHAB SEED MIX (8.0 ACRES)

A

TYPE 4 PLUGS (515 PLUGS)

TYPE 6 SHRUB PLUGS (856 PLUGS)



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LIC. NO. 54171 DATE 1/04/2021



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