

# Judicial Ditch 15 Branch B56 Improvement

Preliminary Engineer's Report  
*Renville County, Minnesota*

October 1, 2024



Architecture  
Engineering  
Environmental  
Planning  
ISGInc.com

REPORT FOR:  
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## SIGNATURE 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.



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**Judicial Ditch 15 Branch B56 Improvement  
Renville County, Minnesota**

Engineer's Project Number: 23-29278

Dated this 1<sup>st</sup> day of October, 2024

## TABLE OF CONTENTS

SIGNATURE SHEET.....	I
TABLE OF CONTENTS.....	II
APPENDICES.....	II
EXECUTIVE SUMMARY .....	1
PETITION + ORDER .....	1
SYSTEM WATERSHED.....	1
HISTORY.....	2
PRESENT CONDITION OF SYSTEM BY OBERSVATION AND ANALYSIS .....	2
PROPOSED PROJECT .....	5
PRELIMINARY COST ESTIMATES .....	7
STATUTE REQUIRED + SUGGESTED EFFORTS .....	8
SUMMARY OF FINDINGS, CONCLUSIONS + RECOMMENDATIONS.....	11
PRELIMINARY PLANS .....	11

## APPENDICES

APPENDIX A: PRELIMINARY PLANS.....	A
APPENDIX B: PETITION + ORDER .....	B
APPENDIX C: MULTIPURPOSE DRAINAGE MANAGEMENT .....	C
APPENDIX D: DRAINAGE CALCULATIONS.....	D
APPENDIX E: HYDRAULIC MODELING .....	E
APPENDIX F: PRELIMINARY COST ESTIMATES .....	F
APPENDIX G: MAPS.....	G

## EXECUTIVE SUMMARY

A petition was submitted to the Board of Managers of the Buffalo Creek Watershed as the drainage authority for Judicial Ditch No. 15 (JD 15) requesting that they improve the Judicial Ditch No. 15 Branch B56 drainage system. The drainage authority appointed Bailey Bocchino of ISG to complete a Preliminary Engineer's Report (PER) for the proposed project. JD 15 Branch B56 drains a 527-acre watershed.

The proposed project, Option 1, includes the replacement and redesign of multiple system tile lines, being Branch B56, 64, and 37. A second option, Option 2, is identical to Option 1 with the additional inclusion of a storage basin to bolster the storage potential of the Branch B56 system. Both proposed options align with the Buffalo Creek Watershed District's drainage system rules and regulations. The preliminary cost for this project is approximately \$689,000 for Option 1, and \$1,166,000 for Option 2.

The Branch B56 system is undersized, aged, and likely has exhausted its intended lifespan. The condition of the tile has been televised and confirmed to be poor condition.

## PETITION + ORDER

A petition was received by the Board of Managers of the Buffalo Creek Watershed District on February 7, 2024. The petition requested that an improvement be completed on JD 15 Branch B56. The improvement petitioned is to enlarge the tile and increase capacity of the system to the maximum allowable drainage coefficient per the Buffalo Creek Watershed District rules and regulations of 3/8<sup>th</sup> of an inch per day along Branch B56, and all tributaries of Branch B56 (Branch B37, B61, B62, & B64).

On May 28, 2024, the Board of Managers of the Buffalo Creek Watershed District made an order in which it accepted the petition for JD 15 Branch B56 and appointed Bailey Bocchino as Engineer. A copy of the petition and signed order can be found in Appendix B.

## SYSTEM WATERSHED

### Location

Judicial Ditch No. 15 is located in Sections 13, 24-25, and 36 of Bird Island Township in Renville County and Sections 1-2, and 12 of Norfolk Township in Renville County and Sections 1, and 11-36 of Melville Township in Renville County and Sections 1-16 and 24 of Palmyra Township in Renville County and Sections 1-34 and 36 of Hector Township in Renville County and Sections 1, 3-9, 16-20 and 29-30 of Martinsburg Township in Renville County and Sections 7-8, 15-21 and 28-33 of Preston Lake Township in Renville County and Sections 4-6 and 8-9 of Grafton Township in Sibley County. The Main open ditch runs generally east from its beginning in Section 20 of Melville Township to its outlet into Buffalo Creek in Section 25 of Preston Lake Township. This improvement specifically looks at Branch B56 which generally flows south and east, and is in Sections 25, 26, 35, and 36 of Melville Township.

### Watershed Description

Judicial Ditch No. 15 drains approximately 59,805 acres, 528 of which are drained by Branch B56. Its watershed is characterized by rolling hills, with an elevation difference of approximately 76 feet across the entire JD 15 watershed, with 20 feet of elevation difference in the Branch B56 watershed. The predominant land use within the watershed is agricultural row crops. There are several wetlands within the JD 15 watershed that have been identified by the National Wetland Inventory. A Level 1 wetland delineation was completed for the Branch B56 watershed and seven wetlands were identified. These wetlands are located within Section 26 of Melville Township. The outlet of JD 15 is Buffalo Creek. Their junction is located in the SE 1/4 of Section 25 of Preston Lake Township in Renville County. After consulting the historical DNR Public Waters Inventory Map, the DNR Buffer Map, and the GIS version of the Public Waters Inventory Map, the Buffalo Creek is a Public Water. Buffalo Creek also is a Water of the US. This stream is listed as an MPCA Impaired Water. It is an impaired water from benthic macroinvertebrates bioassessments. Branch B56 outlets into the JD 15 Main Open Ditch in the NW 1/4 of Section 36 in Melville Township of Renville County. The Main open ditch is a public ditch and is also on the MPCA impaired waters because of benthic macroinvertebrates bioassessments. See the Public Waters, Public and Conservation Lands Map in Appendix G.

The predominant hydrologic soil type in the Branch B56 watershed is type "C/D," which is considered a dual hydrologic soil group, a soil that has the potential to be adequately drained. The "D" in this group corresponds to the soil having over 40 percent clay and restricted water movement. The "C" signifies the soil in its drained condition. That means if adequately drained, the soil would have moderately high runoff potential when thoroughly wet.

See Appendix G for maps depicting the watershed's location, elevation, hydrologic soils, unified soil classification, and Level 1 Wetland Delineation.

## HISTORY

The original establishment for JD 15 was in 1923, making the system approximately 100-years old. There have been no repairs or improvements on record for the JD 15 Branch B56 system. The original Branch B56 with its laterals is approximately 28,400 feet of tile. Branch B56 itself is approximately 8,800- feet of tile ranging from 5-inch to 18-inches with grades ranging from 2.3% to 0.10%. The other contributing branches making up approximately 19,600 feet of tile.

Judicial Ditch No. 15 has completed multiple repairs and improvements throughout the watershed since its establishment outside of the project area.

## Early Coordination and Feasibility Report

Prior to the Petition for this drainage improvement, Renville County staff had coordinated with landowners who wished to pursue a project to enhance area drainage functionality. ISG developed a feasibility study detailing costs and options for potential improvement or repair. Ultimately, one of the options presented at this phase, being presently proposed Option 1, was chosen and a petition was developed. Renville County staff has also coordinated with landowners and SWCD staff to identify potential storage locations as well as potential funding opportunities.

Upon fully executing the bond and oath, the Engineer immediately coordinated with the Department of Natural Resources and local water planning authorities to initiate early coordination. The Engineer provided feasibility studies and petition to the Area Hydrologist, Alan Gleisner, the southern region drainage, Renville County Ditch Inspector, Seth Sparks, Renville SWCD, Kyle Richter, and Buffalo Creek Watershed District, Larry Phillips on June 21, 2024.

## Investigation of External Sources of Funding and Technical Assistance

Section 103E.015, Subd. 1a of the Drainage Code requires that an investigation of external sources of funding and technical assistance be conducted prior to an order on the engineer's preliminary survey report for a drainage project or the engineer's report for a repair. The funding can be used for wetland preservation or restoration or creation of water quality improvements, flood control, or alternative measures (per Section 103E.015, Subd. 1, clause (2)). The sources of funding authorized under this Section can be used outside the benefitted area but must be used in the watershed of the system.

The investigation of external sources of funding and technical assistance for the Branch B56 system was conducted by ISG on behalf of the drainage authority. ISG has investigated funding opportunities that include the BWSR Water Quality and Storage grant as well as the BWSR Multi-purpose Drainage Management (MDM) grant. Opportunities will be inquired where local water planning authorities such as the Buffalo Creek Watershed District or Renville SWCD may have available funding for multi-purpose drainage management. Following the approval of PER, ISG will provide more in-depth review and begin pursuing grant opportunities for eligible practices, where applicable.

## PRESENT CONDITION OF SYSTEM BY OBSERVATION AND ANALYSIS

The present condition of JD 15 Branch B56 was determined via a topographic survey, historic aerial images, and televising of the existing tiles.

### Present Condition of Drainage Infrastructure

#### DITCHES

The open ditch receiving the Branch B56 tile outlet appears to be in a functional condition with no present erosion concerns as observed during topographic survey which was conducted downstream to the 465<sup>th</sup> Street crossing on the Mainline Open Ditch.

#### CULVERTS & BRIDGES

Two crossings exist immediately downstream of the Branch B56 tile outlet. The first is a timber bridge, followed by a 10' x 11' reinforced concrete box culvert at the 465<sup>th</sup> Street crossing. Both appear to be in a functional condition with no present maintenance concerns.

#### TILE

The existing subsurface tile is aged with no record of repair or improvement. The tile was constructed approximately 100-years reaching its expected lifespan. The landowner has experienced flooding issues in the area most likely due to issues present in the existing tile and limited capacity. Televising was conducted on the existing tile to determine its present condition. The tile was found to be in poor condition and in need of repair for a majority of the improvement area. There was approximately 2,000-linear feet of tile that was found to be in need of immediate attention.



Figure 1: Televising Images Branch 56

#### CONDITION OF THE OUTLET

The JD 15 main open ditch was surveyed from the Branch B56 outlet approximately 1.6 miles downstream to the 465<sup>th</sup> Street crossing. These efforts did not reveal any concerns with the present crossings, which exhibited a functional condition, nor did the side slopes exhibit any significant failure.

#### System Capacity

The capacity of agricultural tile is expressed as a drainage coefficient, which is defined as the depth of water over the entire area of the upstream watershed that a tile or ditch can drain in a 24-hour period (inches per day (in/day)).

The following culvert table summarizes the hydraulic analysis of the Judicial Ditch 15 culvert immediately downstream of the proposed improvement in the existing condition. These capacities are calculated from the surveyed culverts and represent their existing size and slope. These calculations do not take into consideration any flow restrictions from sediment buildup, vegetation, or damage to the culvert.

TABLE 1. CULVERT CAPACITIES

Ditch Description	Roadway	Existing Type	Existing Material	Existing Width (ft)	Existing Height (ft)	Existing Slope (%)	Drainage Area (Acres)	Existing Drainage Coefficient (in/day)
Main	465th Street	BOX CULVERT	RCP	10	11	0.07%	26440	0.68

The following table summarizes the hydraulic capacity of the JD 15 Branch B56 tile. These calculations are computed for the As Constructed or Subsequently Improved Conditions (ACSC) – meaning that the tile sizes and slopes come from the most recent repair or improvement plans if available, or the original construction plans if the system has not been improved. These calculations reflect the capacity of the tile as though it were brand new, and do not reflect the existing capacity, which likely has maintenance issues (i.e.. offset joints, cracks, debris) that would reduce the current capacity of the tile.

TABLE 2. ACSIC TILE CAPACITIES

Area	ACSlC Size (in)	ACSlC Slope (%)	Drainage Area (Acres)	ACSlC Drainage Coefficient (in/day)
Branch 37	6	0.10%	19.5	0.22
Branch 56	18	0.14%	527.5	0.18
	18	0.12%	454.0	0.19
	18	0.10%	366.1	0.22
	12	0.20%	238.1	0.16
	10	0.36%	176.8	0.18
	8	0.18%	88.5	0.14
	6	0.40%	34.3	0.25
	6	0.14%	21.2	0.24
Branch 57	5	0.12%	7.8	0.37
Branch 58	6	0.10%	22.3	0.19
Branch 59	6	0.40%	10.9	0.78
Branch 60	6	0.10%	11.9	0.35
Branch 61	8	0.50%	80.3	0.25
	8	0.10%	53.9	0.17
	6	0.10%	36.3	0.12
Branch 62	6	0.20%	30.5	0.20
Branch 63	8	0.10%	35.0	0.26
	6	0.70%	16.7	0.67
Branch 64	8	0.50%	70.2	0.29
	8	0.10%	70.2	0.13
	8	0.10%	22.5	0.41
	6	0.30%	18.3	0.40
	6	1.60%	1.2	14.12
Branch 65	6	0.24%	22.8	0.29
Branch 66	10	0.10%	48.1	0.34
	6	0.60%	29.2	0.35
	6	0.44%	3.8	2.36
Branch 67	6	0.20%	3.8	1.57
Branch 68	6	0.40%	9.9	0.85
Branch 69	6	0.20%	22.1	0.27
Branch 70	6	0.50%	22.7	0.42
Branch 77	6	0.20%	17.7	0.34

# PROPOSED PROJECT

The following project has been proposed in response to the Petition with due regard to the results of the Preliminary Survey.

## Project Design Parameters

### COEFFICIENT OF DRAINAGE

The industry standard drainage coefficient for agricultural tile is 0.375 to 0.50 in/day. Field crossing culverts are generally designed to a minimum of a 1.0 in/day drainage coefficient, with the hydrology and hydraulics of the system further influencing the design. Culverts under roads and highways are designed after completing a detailed hydraulic analysis; there are no standard drainage coefficients for these crossings.

### SYSTEM DEPTH

The tile depth of JD 15 Branch B56 is controlled by three criteria: 1. Provide a minimum of five feet of cover in low spots along public tile alignments, 2. Increase tile grades to improve capacity, and 3. Provide deeper outlets for private tile.

### EROSION CONTROL

Required temporary erosion control will consist of silt fence or bio-roll around all surface intakes, and ditches until vegetation is established. The temporary erosion control will be maintained throughout the construction process according to the Minnesota Pollution Control Agency (MPCA) regulations.

Permanent erosion control will consist of riprap around all tile outlets into ditches and ponds as necessary. Seeding and erosion control blanket will be placed on all disrupted areas around road crossings. At disturbed vegetation throughout the project will be reseeded with the appropriate seed mix and mulch.

An Erosion Control Plan or a Storm Water Pollution Prevention Plan will be developed before final construction plans are complete and a National Pollution Discharge and Elimination System (NPDES) permit application will be filed before construction, if applicable.

### SYSTEM EASEMENT

If Option 2 were selected, a new easement would be placed upon the proposed storage basin. This easement would encompass the full limits of the storage basin as well as a 16.5-foot buffer strip surrounding the basin to allow maintenance and inspection access.

Upon completion of the project, the existing public tile lines that were replaced with new tile will be legally abandoned. At that point, the existing tile easement will be removed, and replaced with an easement centered over the new improvement tile.

### TILE AND CONNECTION MATERIALS

All public tile is solid non-perforated dual wall HDPE or RCP pipe with watertight gaskets at all straight-line pipe joints. All angle pipe joints and prefabricated fitting connections will be soil tight.

### TILE REPLACEMENT AND CONNECTIONS

The existing public tile branches and main that will be replaced by the improvement tile will be legally abandoned after the improvement is constructed. This abandoned tile will be left in the ground to service any existing private tile that is connected to it. The abandoned tile will periodically be connected into the improvement tile, funneling all water through the new tile.

## Project Components

### TILE

The proposed project includes improving Branch 56, Branch 64, and Branch 37. Branch 64 would be improved in its entirety, where Branches B56 and B37 would see improvements to only portions of the subsurface line. The capacity of the proposed tile is shown in Table 3 below. Drainage capacity is sized for a 3/8<sup>th</sup> inch/day drainage coefficient to remain in alignment with the Buffalo Creek Watershed District's rules and regulations with the exception of upstream portions of Branch 64 which drain minimal area. This exceedance is proposed due to limited availability of pipe sizes as well as to prevent unnecessary excavation. The proposed tile is an improvement because it is deeper and has increased capacity when compared to the ACCIC system. The capacity and design of the proposed tile for both Option 1 and Option 2 is identical. Where the proposed tile replaces an existing branch, the existing system will be periodically connected into the proposed system and the existing tile and outlet will be abandoned.

TABLE 3. PROPOSED TILE CAPACITIES OPTION 1 &amp; 2

Area	ACSC Size (in)	Proposed Size (in)	ACSC Slope (%)	Proposed Slope (%)	Drainage Area (Acres)	ACSC Drainage Coefficient (in/day)	Proposed Drainage Coefficient (in/day)
Branch 37	6	8	0.10%	0.07%	19.5	0.22	0.39
Branch 56	18	24	0.14%	0.13%	527.5	0.18	0.37
	18	24	0.12%	0.10%	454.0	0.19	0.38
	18	24	0.10%	0.07%	366.1	0.22	0.39
	12	18	0.20%	0.13%	238.1	0.16	0.38
	10	15	0.36%	0.18%	176.8	0.18	0.37
	8	12	0.18%	0.15%	88.5	0.14	0.37
	6		0.40%		34.3	0.25	
	6		0.14%		21.2	0.24	
	8	12	0.50%	0.10%	70.2	0.29	0.38
Branch 64	8	10	0.10%	0.25%	70.2	0.13	0.37
	8	8	0.10%	0.10%	22.5	0.41	0.41
	6	8	0.30%	0.10%	18.3	0.40	0.50
	6	8	1.60%	1.60%	1.2	14.12	30.40

#### Drop Intakes

A drop intake is a structure used along a tile to aid in televising tile, accessing the tile to check for sediment accumulation, and draining surface water. They are installed periodically along tile alignments, generally in low areas and/or on each side of road crossings. They are also placed at property lines and as replacements for existing drop intakes.

Standard drop intakes are designed to provide surface drainage through slotted intakes during low flow events. The slots are cut in each rib from 10-inches above grade to as much as 4-feet below grade (surrounded with rock in order to promote sedimentation and infiltration). During high flow events, a standard surface inlet trash rack provides an overflow in order to prevent extensive flooding.

With the existing mainline and branch tile lines remaining in place, the new mainlines and branch tiles may not be constructed through the lowest point of road ditches or fields. To assure proper drainage, water quality intakes will be offset into these low areas and connected to the drop intake. Water quality intakes are designed to provide surface drainage infiltration through a washed rock filter during low flow events. This allows for increased settling out of sediment. An integrated slotted (or perforated) intake provides an overflow during high flow events, preventing extensive flooding similar to a standard drop intake.

#### WATER STORAGE PRACTICES

Drainage improvements can increase flows and change timing of flows. Water storage practices are proposed to control flows and reduce flooding downstream. The proposed Option 2 storage basin will allow sediment to settle out of the water, thereby improving water quality. It will also delay water from leaving the system, which will reduce flooding downstream.

Two areas throughout the Branch B56 watershed were identified as a potential sites storage locations. Areas include the area immediately adjacent to the system outlet as well as the depressional area west of County Road 16 along the Branch B56 tile alignment. Ultimately, the area adjacent the Branch B56 outlet was selected for pursuit in Option 2 as it is favored by affected landowners, as well as its enhanced capabilities to mitigate peak flowrates.

The proposed storage area is presently proposed as a 5-acre basin. Approximately 1.5-acres is proposed as a deeper basin to allow immediate retention of tile driven runoff, where the remaining 3-acres is proposed to be excavated to a more shallow depth so as to reduce construction costs, while allowing additional retention capabilities during substantial storm events.

## Alternative Projects/Options

Alternative projects exist for the Branch B56 system and can be explored provided they remain economically feasible as well as hydraulically effective. Potential alternates include:

- Increased capacity upstream of an improvement, provided storage is incorporated.
- Alternate locations of proposed storage in Option 2
- “Do Nothing”

A “Do Nothing” alternative is not desirable as present drainage concerns and issues exist and will only be exaggerated due to system failure in time.

## PRELIMINARY COST ESTIMATES

### Separable Maintenance

When proposing to do an improvement and a separable portion of a larger system needs repair, the drainage statute, Section 103E.215, Subd. 6, allows the separation of the cost of repair from the cost of the improvement project. Separable maintenance can be applied to the portions of the existing system that will be replaced or improved by the proposed project. As the existing system is approximately 100-years old, the original concrete tile is more likely than not experiencing failure and at the very least nearing the end of its design life. Televising was completed on the improvement tiles and a majority of the tiles were found to be in poor conditions. Detailed cost estimates of the potential repair and potential improvement costs have been included in Appendix F which is summarized below in Tables 4 & 5.

### Road Authority Costs

The road authority is responsible for the cost to replace the crossing as it was originally installed within their right of way. Costs associated with increasing the size or depth of the crossing are improvement costs and are included in the landowner costs.

A review of the provided JD 15 historic documents show that all the roads in the watershed crossed by the drainage system existed at the time of the original construction of the public drainage system. Therefore, road authority costs do not apply and the cost for all road crossings have been included in the cost estimate for the associated tile branch.

### Other Project Related Costs

All drainage projects have indirect costs that must be accounted for in project cost estimates and used in cost benefit analyses. They include costs related to drainage authority administration; topographic survey; reports, plans, and specifications; and construction staking and administration.

### Cost Estimates

The following tables summarize the estimated cost for the proposed improvement options.

TABLE 4. PROPOSED COST ESTIMATE – OPTION 1

Area	Separable Maintenance	Improvement Cost	Net Cost
Branch 56 Option 1	\$ 433,371	\$ 527,037	\$ 93,666
Branch 64 Option 1 & 2	\$ 110,853	\$ 122,510	\$ 11,657
Branch 37 Option 1 & 2	\$ 35,806	\$ 36,058	\$ 252
<b>Total Project Costs</b>	<b>\$ 580,030</b>	<b>\$ 685,605</b>	<b>\$ 105,575</b>
Subtotal Separable Maintenance Costs		\$ 580,030	
Net Costs		\$ 105,575	
Viewing Costs		\$ 3,168	
<b>Total Project Costs for Landowners</b>		<b>\$ 688,773</b>	

TABLE 5. PROPOSED COST ESTIMATE – OPTION 2

Area	Separable Maintenance	Improvement Cost	Net Cost
Branch 56 Option 2	\$ 433,371	\$ 507,069	\$ 73,698
Branch 64 Option 1 & 2	\$ 110,853	\$ 122,510	\$ 11,657
Branch 37 Option 1 & 2	\$ 35,806	\$ 36,058	\$ 252
Storage Option 2	\$ -	\$ 497,618	\$ 497,618
<b>Total Project Costs</b>	<b>\$ 580,030</b>	<b>\$ 1,163,254</b>	<b>\$ 583,224</b>
Subtotal Separable Maintenance Costs			\$ 580,030
Net Costs			\$ 583,224
Viewing Costs			\$ 3,168
<b>Total Project Costs for Landowners</b>			<b>\$ 1,166,422</b>
Potential Grant Funding			\$ 447,856
<b>Total Project Costs for Landowners (Pending Grant Funding)</b>			<b>\$ 718,566</b>

## STATUTE REQUIRED + SUGGESTED EFFORTS

### Project Necessity

After examining the Petition, present condition, and ACSIC design of JD 15 Branch B56 both observationally and by analysis, it is deemed necessary to replace the existing, aged infrastructure and improve the drainage capacity of JD 15 Branch B56 to meet the drainage standards for current farming practices. This improved drainage capacity will help increase crop yields and prevent crops from drowning out in depressional areas of the watershed.

### Environmental, Land Use, and Multipurpose Water Management Considerations (Section 103E.015, Subd. 1)

The Drainage Code requires that the drainage authority assess the necessity and feasibility of a drainage project in relation to the environmental, land use, and multipurpose water management criteria of Section 103E.015, Subd. 1. To assist in providing thoroughness and clarity, the law will be used as the outline for this portion of the report.

#### 103E.015 CONSIDERATIONS BEFORE DRAINAGE WORK IS DONE

*Subdivision 1. Environmental, land use, and multipurpose water management criteria. Before establishing a drainage project, the drainage authority must consider each of the following criteria:*

(1) *private and public benefits and costs of the proposed drainage project;*

The proposed drainage system will replace aging and deteriorating infrastructure and meet today's farming needs for drainage and support a sustainable agricultural economy. The proposed system will decrease the duration of standing water in farm fields, which reduces the potential for crop loss and improves the farmability of land within the watershed.

Since the proposed improvements are for a public drainage system, the benefitted landowners will bear their financial cost. The proposed project will improve the drainage of benefitted landowners and will not negatively impact the environment.

(2) *alternative measures, including measures identified in applicable state-approved and locally adopted water management plans, to:*

- (i) *conserve, allocate, and use drainage waters for agriculture, stream flow augmentation, or other beneficial uses;*
- (ii) *reduce downstream peak flows and flooding;*
- (iii) *provide adequate drainage system capacity;*
- (iv) *reduce erosion and sedimentation; and*
- (v) *protect or improve water quality;*

The following water management plans were consulted to see what alternative measures might be applicable to the proposed drainage project:

- Buffalo Creek Watershed District Overall Plan
- Renville County Comprehensive Local Water Management Plan

The plans listed above focus on improving water quality. The plans proposed to reach these goals through a variety of best management practices. Best management practices in the proposed project include water quality intakes at road crossings, and a storage basin in Option 2. The proposed storage basin would provide a higher degree of sediment and nutrient capture along with added residency time to subsequently reduce peak flowrates which aligns with the referenced plans.

- (3) *the present and anticipated land use within the drainage project or system, including compatibility of the project with local land use plans;*

The present land use for the system is primarily agricultural. No changes to land use are expected as part of this project. An exception to this premise exists in the event Option 2 were selected, as roughly 5-acres would be converted from agricultural land to a storage area.

- (4) *current and potential flooding characteristics of property in the drainage project or system and downstream for 5-, 10-, 25-, and 50-year flood events, including adequacy of the outlet for the drainage project;*

The ACSIC and proposed conditions were modeled with Infoworks ICM, a dynamic modeling software that combines 1-dimensional flow calculations (open channel, pipe flow, etc.) with 2-dimensional flow calculations (floodplain, overland flow, etc.) to better analyze hydrologic and hydraulic conditions. The 1D aspect incorporates land use, soil type, topography, and the associated 2D components to simulate overland and floodplain flow from a watershed runoff event. A model was developed for the 5, 10, 25, and 50-year rainfall events for a 24-hour storm duration.

Table 6 below shows the peak flow rates at the outlet of the system. Table 7 compares the peak velocity at the outlet of Branch 56. A comparison of the total runoff volume delivered to the Branch B56 outlet is shown in Table 8.

TABLE 6. JD 15 BRANCH B56 OUTLET PEAK FLOW COMPARISON

OPTION 1				OPTION 2			
Rainfall Event	ACSC (cfs)	Proposed (cfs)	% Change	Rainfall Event	ACSC (cfs)	Proposed (cfs)	% Change
5-yr	21.8	32.6	50%	5-yr	21.8	15.6	-28%
10-yr	23.1	34.8	51%	10-yr	23.1	16.2	-30%
25-yr	24.1	38.1	58%	25-yr	24.1	16.5	-32%
50-yr	24.2	39.5	63%	50-yr	24.2	17.1	-29%

TABLE 7. JD 15 BRANCH B56 OUTLET PEAK VELOCITY COMPARISON

OPTION 1				OPTION 2			
Rainfall Event	ACSC (ft/s)	Proposed (ft/s)	% Change	Rainfall Event	ACSC (ft/s)	Proposed (ft/s)	% Change
5-yr	10.6	9.3	-12%	5-yr	10.6	5.6	-47%
10-yr	11.0	9.9	-10%	10-yr	11.0	5.7	-48%
25-yr	11.3	10.6	-6%	25-yr	11.3	5.7	-50%
50-yr	11.3	11.0	-3%	50-yr	11.3	5.8	-49%

TABLE 8. JD 15 BRANCH B56 OUTLET VOLUME COMPARISON

OPTION 1				OPTION 2			
Rainfall Event	ACSC (AC-ft)	Proposed (AC-ft)	% Change	Rainfall Event	ACSC (AC-ft)	Proposed (AC-ft)	% Change
5-yr	58.5	66.2	13%	5-yr	58.5	65.5	12%
10-yr	73.8	84.4	14%	10-yr	73.8	83.3	13%
25-yr	98.2	112.7	15%	25-yr	98.2	111.6	14%
50-yr	119.8	138.3	15%	50-yr	119.8	137.0	14%

Option 1 shows increases to peak flowrate of 50% to 63% for the modeled storm events at the Branch B56 outlet into the receiving open ditch. This is the result of the improved tile capacity as compared to the ACSIC condition. Increases to peak flowrates require exploration as related to the adequacy of downstream drainage infrastructure to convey the added hydraulic load. Additionally, there is no overland flow exiting the Branch B56 watershed into the adjacent open ditch in any modeled option for any storm event. Velocities are reduced at the tile outlet in Option 1. This is the result of the cross-sectional area of the pipe outlet being increased. Decreases to outlet velocity will reduce scour near the tile outlet. Total runoff volume received by the open ditch increases by 13% to 15% for the modeled storm events. This increase to volume of runoff is the result of increased capacity within the Branch B56 system which reduce inundation on the landscape as well as total infiltration.

Option 2 shows decrease in peak flowrate as compared to the ACSIC condition ranging from 28% to 32% for the modeled storm events. This is the result of the storage area near the tile outlet which adds residency time and ponding area not present in the ACSIC condition. Additionally, the baseflow outlet from the storage basin displays a reduced capacity as compared to the ACSIC condition which promotes these reductions. Velocity is reduced as well, by an average of nearly 50% across all modeled storm events. This reduction will allow large levels of erosion protection within the immediate areas surrounding the Branch B56 tile outlet as compared to the ACSIC condition. Total runoff volume received by the open ditch increases by 12% to 14% as compared to the ACSIC condition. This increase is the result of increased capacity within the Branch B56 system. The added storage in Option 2 allows some additional infiltration as compared to Option 1, yet the present soils do not allow rapid infiltration and the storage area will only provide a small level of volume reduction.

A detailed model report and additional analysis can be found in Appendix E.

*(5) the effects of the proposed drainage projects on wetlands;*

Drainage projects must comply with a variety of state and federal wetland regulations: USACE 404, Minnesota Wetland Conservation Act (WCA), and USDA Swampbuster. There are several wetlands within the Branch B56 watershed that have been identified by a Level 1 wetland delineation. The proposed improvements do not encroach upon these wetland areas. Typically, where the tile improvements encroach on identified wetland areas, non-perforated tile and watertight connections will be utilized. Connections of existing private tiles would not have been enlarged with the improvement of these areas. There are no anticipated wetland impacts with this drainage project.

*(6) the effects of the proposed drainage project on water quality;*

Water quality issues pertinent to drainage projects can include erosion, sediment transport potential, and non-point source pollution (e.g. nutrients, pesticides, and bacteria). After checking available TMDL information and the MPCA Impaired Waters listing, it was concluded that the Main open ditch of JD 15 is impaired for benthic macroinvertebrates bioassessments.

The proposed project is not anticipated to have any effect on this impairment. The water quality practices proposed within the Option 2 improvement project are projected to reduce sediment and nutrient loading. This will work towards the goals of both the Buffalo Creek Watershed District Overall Plan and the Renville County Comprehensive Local Water Management Plan, which highlight goals of sediment and nutrient reduction through the implementation of BMPs.

Please refer to the multi-purpose drainage management plan in Appendix C for additional water quality and best management practices. The multi-purpose drainage management plan was shared with landowners for opportunities to implement preventative, control, and treatment measures. The Renville County SWCD can assist landowners with the implementation. Other preventative practices can be incorporated throughout the watershed by private landowners to further improve water quality and soil health.

*(7) the effects of the proposed drainage project on fish and wildlife resources;*

The proposed project is not expected to impact fish and wildlife resources as no major landscape changes are anticipated.

Natural Heritage Information System (NHIS) data for Renville County has been obtained by ISG via a license agreement with the Minnesota DNR. A review of this database was conducted by ISG staff to identify any rare features that could potentially be located within the Branch B56 watershed. No rare features or endangered plants were identified in the project area. Buffalo Grass (*Buchloe dactyloides*) and Small White Lady's Slipper (*Cypripedium candidum*) have been observed within the JD 15 watershed, but are not located within the Branch B56 watershed, and will not be impacted by the proposed project.

*(8) the effects of the proposed drainage project on shallow groundwater availability, distribution, and use; and*

There are no anticipated effects to shallow groundwater from the proposed project. The project should only impact soil saturation levels. There are 3 private wells located in the project's watershed. The closest well is approximately 500-feet away from any proposed drainage. Therefore, the wells are not located within a proximity that would be affected by the drainage tiles of the proposed improvement.

(9) the overall environmental impact of all the above criteria.

The project will have a negligible environmental impact as there are no major land use changes, wetland impacts, fish and wildlife habitat changes, or any adverse effects to water quality.

## Statement of Necessity and Feasibility, Section 103E.015, Subd. 1

After assessing the necessity and feasibility of this drainage project on behalf of the Buffalo Creek Watershed District in relation to the environmental, land use, and multipurpose water management criteria of Section 103E.015, Subd. 1, the Engineer deems the proposed project to be both necessary and feasible.

### Soil Survey

Through a review of the USGS soil survey, the soil through much of the construction area was found to be clay loam. The Engineer has determined at this time that no additional soil survey investigation is needed as the soil characteristics are consistent with other projects in the area.

### Public Waters and Potential Permits

The Engineer believes that if the project moves forward, the drainage authority will not need to apply for a Public Waters Work Permit because the work does not take place within a public water, nor will result in any adverse effects for downstream public waters, which are 16.5 miles downstream of the proposed project. The DNR will continue to be consulted through the JD 15 Branch B56 improvement process to evaluate this need.

Prior to project construction, permits will be acquired from road authorities, applicable utilities, and the Minnesota Pollution Control Agency, as necessary.

## SUMMARY OF FINDINGS, CONCLUSIONS + RECOMMENDATIONS

After a review of the JD 15 Branch B56 system, the existing system is undersized, promoting excessive flooding within the Branch B56 watershed. The system is approximately 100 years old, which is the life expectancy for public drainage system tile constructed in the first half of the 20<sup>th</sup> century. This improvement would be a public benefit and contribute to the public welfare of the area.

The proposed project, be it Option 1 or Option 2, will furnish new drainage infrastructure at enhanced capacity and depth to promote adequate drainage and protection of the proposed system. Proposed capacity is a 3/8ths inch/day drainage coefficient to remain in keeping with the guidelines put forward in the Buffalo Creek Watershed District rules and regulations.

A hydraulic/hydrologic model was created to compare the As Constructed drainage system with the proposed Improvement to compare flood extents, durations, and outlet flows. Option 1 increases peak flows and total volume of runoff received by the open ditch, but subsequently reduces velocities. Option 2 reduces both peak flowrates and velocities received by the open ditch and reduces volume increase as compared to Option 1. Both proposed options are sized to a 3/8 inch/day drainage coefficient, whereas the culvert downstream is sized to a 0.68 inch/day drainage coefficient. Being that the receiving infrastructure is sized for a larger capacity than the proposed improvement, the outlet is adequate when considering hydraulic capacity. The proposed improvement is considered a cost effective and feasible improvement and is recommended by the Engineer.

In accordance with Section 103E.245, Subd. 1: Whereas the Engineer has examined the petition and order and conducted a preliminary survey and, whereas the Engineer has found the proposed drainage project to be necessary due to problems found and clarified during the survey, and whereas the Engineer has determined the proposed drainage project is necessary and feasible with reference to the environmental, land use, and multipurpose water management criteria in Section 103E.015, Subd. 1 and whereas the Engineer determined that the proposed drainage project does not substantially affect Public Waters, and whereas the Engineer has examined the nature and capacity of the outlet and any extension of the outlet, therefore the Engineer recommends the proposed project or its alternative to the Buffalo Creek Watershed District for preliminary approval.

## PRELIMINARY PLANS

Since the Engineer finds the proposed drainage project in the petition is feasible and complies with the environmental, land use, and multipurpose water management criteria in Section 103E.015, Subd. 1, the Engineer has in accordance with Section 103E.245, Subd. 4 included a set of preliminary plans of the drainage project in Appendix A. They are preliminary plans and are therefore unsigned.

## Appendix A: Preliminary Plans

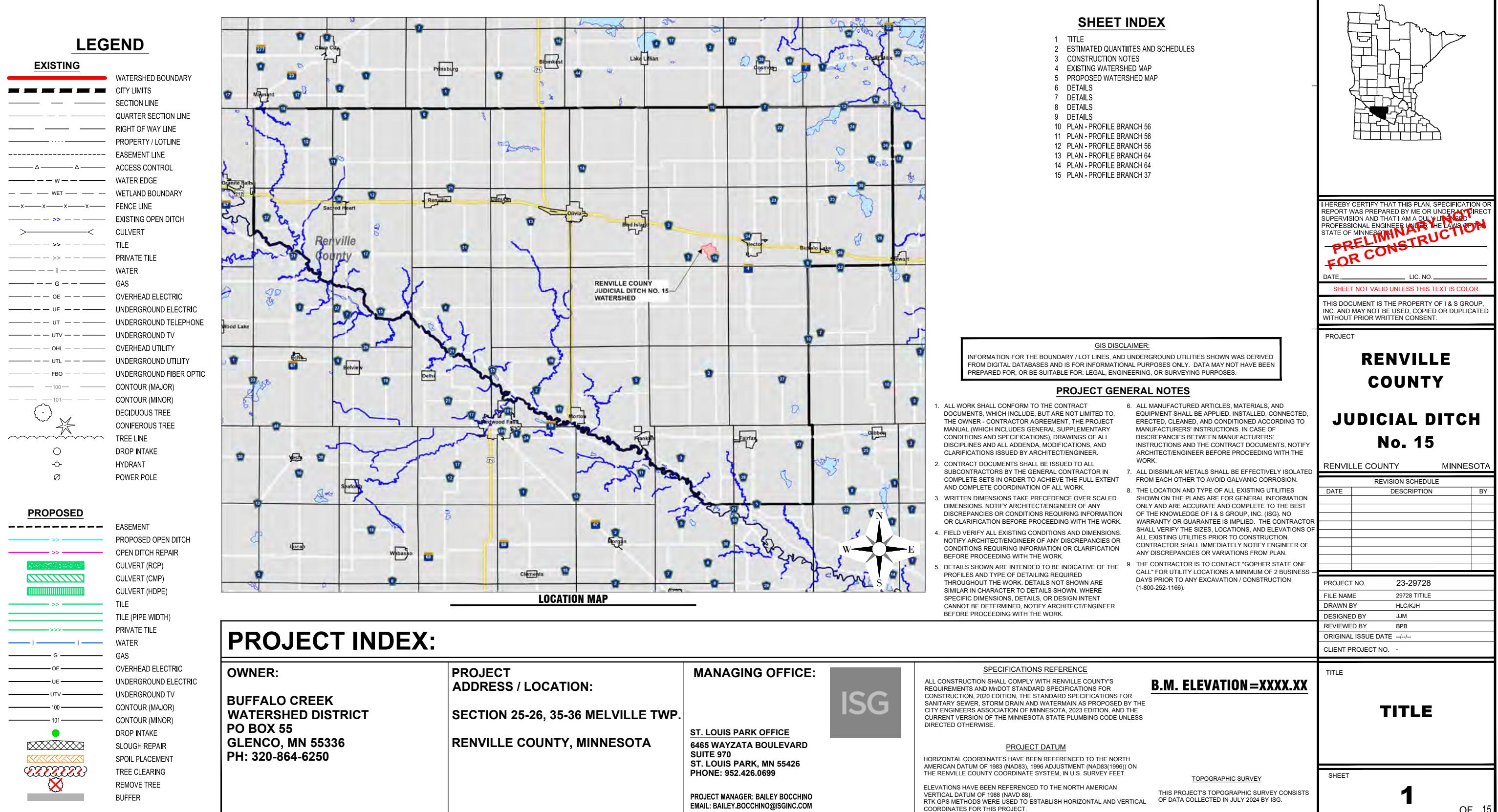
# RENVILLE COUNTY JUDICIAL DITCH No. 15 BRANCH 56

RENVILLE COUNTY, MINNESOTA

## PRELIMINARY ENGINEERING REPORT

ISG PROJECT # 23-29728

ISG





TOTAL ESTIMATED QUANTITIES (OPTION 1)			
Item Code	Item	Unit	Estimated Quantity
01.7113.1000.01	MOBILIZATION	LS	1
33.0513.1000.02	INSTALL BAR GUARD ASSEMBLY (18-INCH DROP INTAKES)	EA	10
33.0513.1000.02	FURNISH & INSTALL WATER QUALITY INLET	EA	4
33.0513.1000.02	INSTALL DROP INTAKE (18-INCH)	EA	14
33.0513.1000.02	CAP DROP INTAKE (18-INCH)	EA	4
33.0523.1000.03	BORE 24-INCH TILE	LF	65
33.0523.1000.03	SAND OR CLSM FILL PIPE UNDER ROAD (18-INCH)	LF	100
33.4510.1000.02	CONNECT EXISTING TILE (SIZE & MATERIAL MAY VARY)	EA	45
33.4510.1000.02	CONNECT EXISTING 12-INCH TILE	EA	1
33.4510.1000.02	CONNECT EXISTING 8-INCH TILE	EA	2
33.4510.1000.02	CONNECT EXISTING 6-INCH TILE	EA	4
33.4510.1000.02	18-INCH CROSS-CONNECT W/40LF OF SPECIFIED PIPE	EA	5
33.4510.1000.02	12-INCH CROSS-CONNECT W/40LF OF SPECIFIED PIPE	EA	3
33.4510.1000.02	10-INCH CROSS-CONNECT W/40LF OF SPECIFIED PIPE	EA	1
33.4510.1000.02	8-INCH CROSS-CONNECT W/40LF OF SPECIFIED PIPE	EA	3
	24-INCH TILE OUTLET		
33.4510.1000.02	(20 LF OF PIPE & RIPRAP ON GEOTEXTILE FABRIC)	EA	1
33.4510.1000.03	24-INCH AGRICULTURAL TILE	LF	2885
33.4510.1000.03	18-INCH AGRICULTURAL TILE	LF	1570
33.4510.1000.03	15-INCH AGRICULTURAL TILE	LF	600
33.4510.1000.03	12-INCH AGRICULTURAL TILE	LF	2877
33.4510.1000.03	10-INCH AGRICULTURAL TILE	LF	850
33.4510.1000.03	8-INCH AGRICULTURAL TILE	LF	2070
	INSTALL 8-INCH PERFORATED TILE		
33.4510.1000.03	(WATER QUALITY INLET)	LF	130
33.4510.1000.07	GRANULAR PIPE FOUNDATION	CY	70
34.0100.1000.02	OPEN CUT & RESTORE GRAVEL ROAD OR DRIVEWAY	EA	1
32.9219.1000.04	SEED MIX 25-142 W/MNDOT EROSION CONTROL BLANKET	SY	700
	CATEGORY 3		

DATE LIC. NO.

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## PROJECT

# RENVILLE COUNTY

# JUDICIAL DITCH

## No. 15

RENNILLE COUNTY MINNESOTA

TOTAL ESTIMATED QUANTITIES (OPTION 2)				
Item Code	Item	Unit	Estimated Quantity	
01.7113.1000.01	MOBILIZATION	LS	1	
31.2316.1000.05	TOP SOIL STRIP & PLACE SPOILS	AC	15	
31.2316.1000.07	COMMON EXCAVATION - POND (P) (EV)	CY	51750	
	16.5' BUFFER STRIP SEEDING			
32.9219.1000.10	(SEED MIX: BUFFER BLEND WITH TYPE 3 MULCH)	AC	1.1	
	SIDESLOPE SEEDING			
32.9219.1000.10	(SEED MIX: BUFFER BLEND WITH TYPE 8 MULCH)	AC	1.1	
	POND BOTTOM SEEDING			
32.9219.1000.10	(SEED MIX: 33-261 W/ TYPE 7 (BFM) MULCH)	AC	2.8	
33.0513.1000.02	INSTALL BAR GUARD ASSEMBLY (18-INCH DROP INTAKES)	EA	10	
33.0513.1000.02	FURNISH & INSTALL WATER QUALITY INLET	EA	4	
33.0513.1000.02	INSTALL DROP INTAKE (18-INCH)	EA	14	
33.0513.1000.02	CAP DROP INTAKE (18-INCH)	EA	4	
33.0513.1000.02	INSTALL STRUCTURE 5-1 WITH GALVANIZED GRATE	EA	1	
33.0523.1000.03	BORE 24-INCH TILE	LF	65	
33.0523.1000.03	SAND OR CLSM FILL PIPE UNDER ROAD (18-INCH)	LF	100	
33.4510.1000.02	CONNECT EXISTING TILE (SIZE & MATERIAL MAY VARY)	EA	45	
33.4510.1000.02	CONNECT EXISTING 12-INCH TILE	EA	1	
33.4510.1000.02	CONNECT EXISTING 8-INCH TILE	EA	2	
33.4510.1000.02	CONNECT EXISTING 6-INCH TILE	EA	4	
33.4510.1000.02	18-INCH CROSS-CONNECT W/40 LF OF SPECIFIED PIPE	EA	5	
33.4510.1000.02	12-INCH CROSS-CONNECT W/40 LF OF SPECIFIED PIPE	EA	3	
33.4510.1000.02	10-INCH CROSS-CONNECT W/40 LF OF SPECIFIED PIPE	EA	1	
33.4510.1000.02	8-INCH CROSS-CONNECT W/40 LF OF SPECIFIED PIPE	EA	3	
	24-INCH TILE OUTLET			
33.4510.1000.02	(20 LF OF PIPE & RIPRAP ON GEOTEXTILE FABRIC)	EA	1	
33.4510.1000.03	24-INCH AGRICULTURAL TILE	LF	2885	
33.4510.1000.03	18-INCH AGRICULTURAL TILE	LF	1570	
33.4510.1000.03	15-INCH AGRICULTURAL TILE	LF	600	
33.4510.1000.03	12-INCH AGRICULTURAL TILE	LF	2877	
33.4510.1000.03	10-INCH AGRICULTURAL TILE	LF	850	
33.4510.1000.03	8-INCH AGRICULTURAL TILE	LF	2070	
	INSTALL 8-INCH PERFORATED TILE			
33.4510.1000.03	(WATER QUALITY INLET)	LF	130	
33.4510.1000.07	GRANULAR PIPE FOUNDATION	CY	70	
33.4520.1000.03	15-INCH CLASS III RCP PIPE	LF	16	
33.4520.1000.03	24-INCH CLASS III RCP PIPE	LF	60	
33.4520.1000.07	GRANULAR BEDDING MATERIAL	CY	7	
34.0100.1000.02	OPEN CUT & RESTORE GRAVEL ROAD OR DRIVEWAY	EA	1	
31.3700.1000.07	CLASS III RIPRAP WITH GEOTEXTILE FABRIC	CY	55	
33.4510.1000.03	REMOVE EXISTING TILE (SIZE & MATERIAL MAY VARY)	LF	290	

PROJECT NO.	23-29728
FILE NAME	29728 DETAILS
DRAWN BY	HLC/KJH
DESIGNED BY	JJM
REVIEWED BY	BPB
ORIGINAL ISSUE DATE	1-1-1

第11章

## **ESTIMATED QUANTITIES AND SCHEDULES**

CHARTER



#### GENERAL PROJECT NOTES:

1. DURING CONSTRUCTION, CONTRACTOR SHALL MAINTAIN A DRAINAGE OUTLET FOR THE ENTIRE JD 15 PROJECT AREA.
2. ALL PIPE DIMENSIONS REFERENCED IN THE PLANS REFER TO THE INSIDE DIAMETER.
3. RODENT GUARDS SHALL BE INSTALLED ON ALL OUTLETS 18" AND SMALLER. (INCIDENTAL TO RESPECTIVE BID ITEMS).
4. ALL ROAD SIGNAGE, COORDINATION, AND TRAFFIC CONTROL SIGNAGE SHALL BE INCIDENTAL TO ROAD RESTORATIONS AND SHALL CONFORM TO LOCAL ROAD AUTHORITY PERMITS AND REGULATIONS.
5. THE CONTRACTOR SHALL SUBMIT A WINTER CONSTRUCTION PLAN FOR SITE STABILIZATION, EROSION PREVENTION, AND SEDIMENT CONTROL IF THE PROJECT IS NOT COMPLETED BY OCTOBER 15 OF THE GIVEN CONSTRUCTION SEASON, UNLESS APPROVED BY THE ENGINEER. THE PLAN SHALL BE DEVELOPED TO SPECIFICALLY ADDRESS SHUTDOWN PROCEDURES OR ACTIVE CONSTRUCTION PLANS.
6. ALL DEWATERING FOR THE PROJECT IS INCIDENTAL.
7. PRODUCT MATERIAL SHALL BE AS SPECIFIED IN THE PLANS. IF NO SPECIFIC MATERIAL IS CALLED OUT, MATERIAL SHALL CONFORM TO THE APPROVED PRODUCT LIST IN THE APPROPRIATE SPECIFICATION.
8. ALL EFFORTS SHALL BE MADE DURING CONSTRUCTION TO SEPARATE SOIL TYPES. BACKFILL SHALL BE COMPACTED PRIOR TO PLACEMENT OF TOPSOIL, EXCEPT THE TOP TWO (2) FEET, FOR WHICH COMPACTION SHALL BE MINIMIZED TO THE EXTENT POSSIBLE. TOPSOIL SHALL BE PLACED TO A MINIMUM DEPTH OF 18", OR UNIFORM TO THE TOPSOIL DEPTH OF THE SURROUNDING AREA UNLESS SPECIFIED ELSEWHERE IN THE PLANS. EXCAVATED SPOILS SHALL BE SPREAD EVENLY IN CONSTRUCTION AREA AS TO NOT IMPEDE DRAINAGE. ALL EFFORTS SHALL BE MADE TO KEEP TOPSOIL ON TOP AND SEPARATED. NO TOPSOIL SHALL BE PLACED IN THE TRENCH BELOW 2' FROM EXISTING GROUND UNLESS APPROVED BY THE ENGINEER.
9. ALL SPOIL LEVELING, GRADING, AND RESTORATION OF DISTURBED AREAS SHALL BE IN ACCORDANCE TO THE CONTRACT DOCUMENTS AND SHALL BE INCIDENTAL TO THE WORK UNLESS OTHERWISE SPECIFIED.
10. HEAVY VEGETATIVE CLEARING WITH TREE REMOVAL SHALL ONLY BE COMPLETED AS NECESSARY FOR SAFE CONSTRUCTION PRACTICES AND WITHIN THE ALLOWED CONSTRUCTION EASEMENT, UNLESS APPROVED BY THE ENGINEER. TREE REMOVAL AND GRUBBING SHALL BE INCIDENTAL TO HEAVY VEGETATIVE CLEARING WITH TREE REMOVAL BID ITEM.
11. TREES CALLED OUT AS "REMOVE TREE" SHALL BE PAID FOR BY EACH OCCURRENCE. IF TREES ARE NOT CALLED OUT IN THE CONSTRUCTION DOCUMENTS AS REMOVE TREE, THEN THE REMOVAL SHALL BE PAID FOR BY THE ACRE AS HEAVY VEGETATIVE CLEARING WITH TREE REMOVAL.
12. AGGREGATE SURFACE SHALL BE INCIDENTAL TO CROSSING OR ROAD RESTORATION.
13. RIPRAP QUANTITIES ARE ESTIMATED. ADDITIONAL QUANTITY MAY BE REQUIRED BY THE ENGINEER. ALL RIPRAP QUANTITIES SHALL BE PAID BY THE CUBIC YARD INSTALLED, UNLESS RIPRAP IS INCIDENTAL TO A SEPARATE PAY ITEM. ALL EXCAVATION AND GEOTEXTILE FABRIC SHALL BE INCIDENTAL TO RESPECTIVE BID ITEM.
14. ALL WORK SHALL BE DONE IN 2,500 LF SECTIONS, UNLESS APPROVED BY THE ENGINEER. PRIOR TO COMMENCING ON A NEW SECTION, ALL WORK IN THE PREVIOUS SECTION MUST BE COMPLETED IN ADHERENCE WITH THE CONTRACT DOCUMENTS. THE ENGINEER RESERVES THE RIGHT TO CEASE OPERATIONS AND/OR WITHHOLD PAYMENT UNTIL COMPLIANCE HAS BEEN ACHIEVED.
15. EXISTING TILES THAT ARE DISTURBED DURING CONSTRUCTION SHALL BE REPAIRED AT NO COST TO THE PROJECT, UNLESS OTHERWISE SPECIFIED.
16. ALL SIGNS AND MARKERS SHALL BE PROTECTED OR REMOVED AND REINSTALLED AT NO ADDITIONAL COST TO THE PROJECT, UNLESS OTHERWISE SPECIFIED. THE ENGINEER SHALL BE NOTIFIED OF ANY SIGNS OR MARKERS IN POOR CONDITION PRIOR TO REMOVAL.
17. THE DRAINAGE AUTHORITY TAKES NO AUTHORITY OVER OR RESPONSIBILITY FOR ANY AND ALL PRIVATE TILE SHOWN ON THESE PLANS. PRIVATE TILE LOCATIONS HAVE BEEN SUPPLIED BY LANDOWNERS FOR USE BY THE CONTRACTOR.
18. THE CONTRACTOR SHALL PAY ALL DAMAGES OUTSIDE OF THE AGREED UPON EASEMENT IN AN AMOUNT OF \$1,200 PER ACRE OF DISTURBANCE, AS MEASURED BY THE ENGINEER.

#### UTILITY NOTES:

1. THE SUBSURFACE UTILITY INFORMATION IN THIS PLAN IS UTILITY QUALITY LEVEL D. THIS UTILITY QUALITY LEVEL WAS DETERMINED ACCORDING TO THE GUIDELINES OF CI/ASCE 38-22, ENTITLED, "STANDARD GUIDELINES FOR INVESTIGATING AND DOCUMENTING EXISTING UTILITIES".

#### GENERAL TILE INSTALLATION NOTES:

1. UNLESS OTHERWISE NOTED, CONTRACTOR SHALL LIMIT CONSTRUCTION ACTIVITY TO WITHIN A 100-FOOT WIDE SWATH ALONG PROPOSED TILE ALIGNMENTS FOR 24" TILE OR LESS, AND A 150-FOOT SWATH ALONG PROPOSED TILE ALIGNMENTS FOR TILES LARGER THAN 24". THE SWATH NEED NOT BE CENTERED ON THE PROPOSED TILE ALIGNMENT. ALL ACCESS ROADS SHOULD FOLLOW THE PROPOSED ALIGNMENTS. THE SWATH SHALL NOT DISTURB ANY NON-AGRICULTURAL PRIVATE PROPERTY. DISTURBANCE THROUGH ROAD CROSSINGS, ROAD DITCHES, AND GRASS BUFFERS SHALL BE LIMITED TO THE WIDTH OF A TRENCH NECESSARY FOR SAFE CONSTRUCTION PRACTICES AND MUST BE RE-SEEDED WHERE NEEDED.
2. MISCELLANEOUS TREE CLEARING SHALL BE INCIDENTAL TO TILE INSTALLATION UNLESS SPECIFIED IN THE PLANS.
3. ALL PIPE BEDDING AND ENCASEMENT IS INCIDENTAL TO STANDARD TILE INSTALLATION. REFER TO SPECIFICATIONS FOR DEFINITIONS. GRANULAR FOUNDATION MATERIAL SHALL BE USED IF UNSUITABLE OR UNSTABLE SOILS ARE PRESENT. THE USE OF FOUNDATION MATERIAL SHALL BE APPROVED BY THE ENGINEER BEFORE PLACEMENT AND WILL BE PAID FOR BY THE CUBIC YARD.
4. ALL BENDS, FITTINGS, AND TEES SHALL BE BEDDED AND ENCASED IN GRANULAR FOUNDATION MATERIAL, BANDED, AND WRAPPED IN GEOTEXTILE FABRIC. INCIDENTAL TO RESPECTIVE BID ITEM.
5. ALL TILE ENDS MUST BE CAPPED TO NOT TAKE SEDIMENT UNLESS ANOTHER TILE (PRIVATE OR PUBLIC) IS CONNECTED INTO THE PROPOSED TILE. CAPPING SHALL BE INCIDENTAL TO TILE INSTALLATION.
6. THE CONNECTION OF DISSIMILAR PROPOSED PIPE TYPES SHALL BE BEDDED AND ENCASED IN GRANULAR FOUNDATION MATERIAL AND BE MADE WITH A WATER-TIGHT COUPLER APPROVED OF BY THE ENGINEER. THE CONNECTION SHALL BE INCIDENTAL TO TILE INSTALLATION.
7. ALL BENDS SHALL BE CONSTRUCTED AS PRE-FABRICATED BENDS, UNLESS APPROVED BY THE ENGINEER. ANY BENDS LARGER THAN 45° MUST BE CONSTRUCTED WITH MULTIPLE BENDS WITH AT LEAST 40 FEET IN BETWEEN EACH BEND. 45° BENDS SHALL NOT BE USED ON TILE 18 INCHES AND SMALLER.
8. UNLESS SPECIFICALLY NOTED, HDPE AND RCP WILL BE THE ONLY ACCEPTABLE MATERIALS FOR ALL AGRICULTURAL DRAIN TILE. REFER TO SPECIFICATIONS FOR PROPER INSTALLATION REQUIREMENTS AND MATERIALS.
9. VERIFY EXISTING TILE LOCATIONS AND ELEVATIONS PRIOR TO CONSTRUCTION, PAID FOR AS TILE INVESTIGATION BY THE HOUR.
10. ANY ALIGNMENT CHANGES MADE DUE TO TILE INVESTIGATION SHALL BE APPROVED BY THE ENGINEER DURING CONSTRUCTION. ALL EFFORTS WILL BE MADE TO UTILIZE THE SAME FITTINGS AS ORIGINALLY DESIGNED. THE CONTRACTOR WILL ONLY BE COMPENSATED FOR ADDITIONAL LINEAR FOOTAGE OF INSTALLED TILE DUE TO THE ALIGNMENT CHANGE PER THE UNIT BID PRICE.
11. DROP INTAKES WILL BE PAID FOR BY EACH AND NO ADDITIONAL COMPENSATION WILL BE MADE FOR IN-FIELD ELEVATIONS THAT VARY FROM THE PLANS. MINOR SHAPING AROUND DROP INTAKES AND CULVERT INLETS SHALL BE INCIDENTAL TO THEIR RESPECTIVE PAY ITEMS.
12. DROP INTAKES THAT ARE NOT INTENDED TO TAKE SURFACE FLOW MAY BE CAPPED, AS DETERMINED BY THE ENGINEER. INTAKES MAY BE CUT DOWN AND BURIED AFTER FINAL TELEVISING, PER LANDOWNER REQUEST PRIOR TO CLOSEOUT, AND WILL BE PAID FOR AS "CAP DROP INTAKE".
13. DROP INTAKES THAT ARE DESIGNED TO BE ON PROPERTY LINES SHALL BE ADJUSTED IN THE FIELD TO MATCH ACTUAL LOCATION OF PROPERTY LINE.
14. AT CROSSINGS OF EXISTING TILE, ONLY THE UPSTREAM SIDE NEED BE CONNECTED, UNLESS OTHERWISE DEEMED NECESSARY. ALL BENDS, TEES, CONNECTING TILE, AND OTHER FITTINGS NECESSARY FOR CONNECTION SHALL BE INCIDENTAL TO RESPECTIVE BID ITEM.
15. ALL TILE CONNECTIONS MUST BE CONNECTED TO THE PROPOSED TILE ON THE UPSTREAM SIDE OF THE EXISTING TILE.
16. TILE CONNECTIONS SHALL BE CONSTRUCTED WITH TILE THE SAME SIZE OR THE NEXT SIZE LARGER THAN THE EXISTING TILE, UNLESS OTHERWISE SPECIFIED OR APPROVED BY THE ENGINEER. HOPE SHALL BE USED FOR THE CONNECTION OF ALL EXISTING PUBLIC TILES AS WELL AS ALL PRIVATE TILES WHERE THE FILL HEIGHT OVER THE PROPOSED TILE IS GREATER THAN 10 FEET. PE SHALL ONLY BE ALLOWED FOR PRIVATE TILE WITH A PROPOSED FILL HEIGHT LESS THAN OR EQUAL TO 10 FEET. (SEE CONNECT TO EXISTING TILE DETAIL)

#### ABBREVIATIONS

AC	ACRE	GA	GAUGE	PP	POLYPROPYLENE
ADD	ADDENDUM	GAL	GALLON	PSI	POUNDS PER SQUARE INCH
AGG	AGGREGATE	GPM	GALLONS PER MINUTE	PVC	POLYVINYL CHLORIDE
APPROX	APPROXIMATE	HDPE	HIGH DENSITY POLYETHYLENE	PVMT	PAVEMENT
BIT	BITUMINOUS	HORIZ	HORIZONTAL	QTY	QUANTITY
CAD	COMPUTER-AIDED DESIGN	HR	HOUR	RCP	REINFORCED CONCRETE PIPE
CFS	CUBIC FEET PER SECOND	HWL	HIGH WATER LEVEL	REBAR	REINFORCING BAR
CF	CUBIC FOOT	HWY	HIGHWAY	REM	REMOVE
CL	CENTERLINE	HYD	HYDRANT	ROW	RIGHT OF WAY
CMP	CORRUGATED METAL PIPE	I	INVERT	R/W	RIGHT OF WAY
CONC	CONCRETE	ID	INSIDE DIAMETER	SCH	SCHEDULE
CONST	CONSTRUCTION	IN	INCH	SF	SQUARE FOOT
CONT	CONTINUOUS	INV	INVERT	SPEC	SPECIFICATION
CR	COUNTY ROAD	LF	LINEAR FEET	SQ	SQUARE
CSAH	COUNTY STATE AID	LIN	LINEAR	STA	STATION
	HIGHWAY	LS	LUMP SUM	SY	SQUARE YARD
CY	CUBIC YARD	MAX	MAXIMUM	TEMP	TEMPORARY
DI	DROP INTAKE	MH	MANHOLE	THRU	THROUGH
DIA	DIAMETER	MIN	MINIMUM	TRANS	TRANSFORMER
DIM	DIMENSION	MISC	MISCELLANEOUS	TV	TELEVISION
EA	EACH	NO	NUMBER	TYP	TYPICAL
ELEC	ELECTRICAL	NTS	NOT TO SCALE	UT	UTILITY, UNDERGROUND
ELEV	ELEVATION	NWL	NORMAL WATER LEVEL	TELEPHONE	
EOF	EMERGENCY OVERFLOW	OC	ON CENTER	VCP	VITRIFIED CLAY PIPE
EQ	EQUAL	OCEW	ON CENTER EACH WAY	W/O	WITHOUT
EX	EXISTING	OH	OVERHEAD	W/	WITH
FDN	FOUNDATION	OHWL	ORDINARY HIGH WATER	YD	YARD
FPM	FEET PER MINUTE	OZ	OUNCE	YR	YEAR
FPS	FEET PER SECOND	PERF	PERFORATED		
FT	FOOT, FEET	PL	PROPERTY LINE		

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.

**PRELIMINARY AND FOR CONSTRUCTION**

DATE \_\_\_\_\_ LIC. NO. \_\_\_\_\_

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PROJECT

## RENVILLE COUNTY

### JUDICIAL DITCH No. 15

RENVILLE COUNTY MINNESOTA

#### REVISION SCHEDULE

DATE	DESCRIPTION	BY

PROJECT NO. 23-29728

FILE NAME 29728 DETAILS

DRAWN BY HLC/KJH

DESIGNED BY JJM

REVIEWED BY BPB

ORIGINAL ISSUE DATE 09/01/2023

CLIENT PROJECT NO. -

TITLE

## CONSTRUCTION NOTES

SHEET

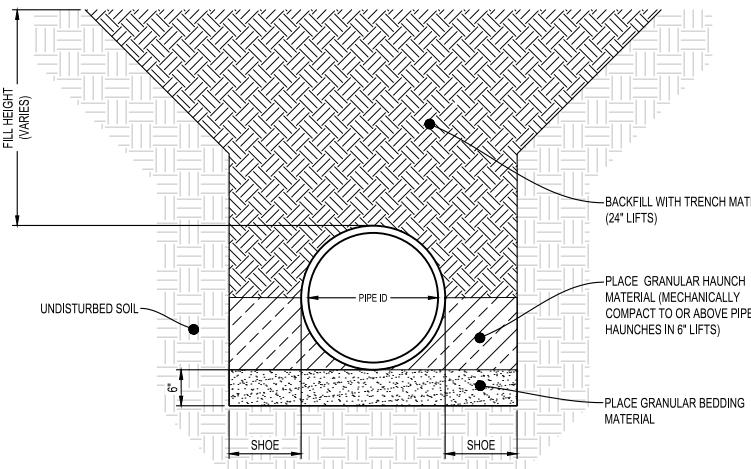
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OF 15





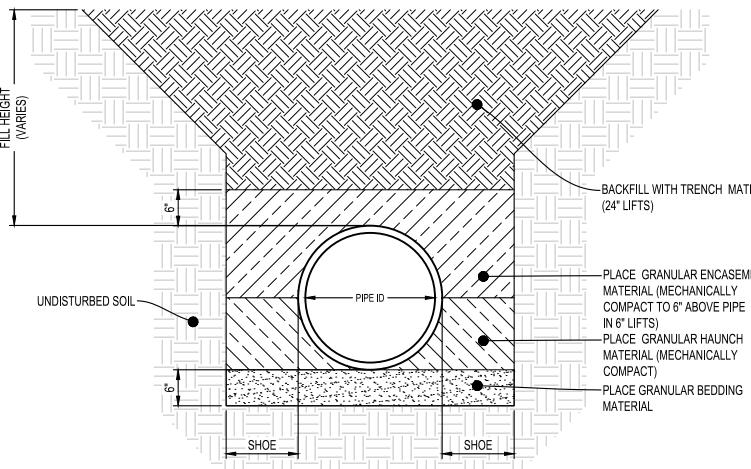
ISG



**NOTES:**

1. GRANULAR BEDDING, GRANULAR ENCASEMENT, AND BACKFILL SHALL BE INCIDENTAL TO CONSTRUCTION.
2. ALL PIPE WITH A FILL HEIGHT GREATER THAN 15-FEET SHALL BE FULLY ENCASED IN ASTM CLASS I MATERIAL.
3. THE SHOE WIDTH SHALL BE THE SAME AS THE COMPACTING MECHANISMS WIDTH OR THE PIPE MANUFACTURER'S SPECIFICATIONS, WHICHEVER IS GREATER.
4. THE CLASS OF RCP REQUIRED SHALL BE BASED ON THE PIPE MANUFACTURER'S SPECIFICATIONS, UNLESS OTHERWISE SPECIFIED.

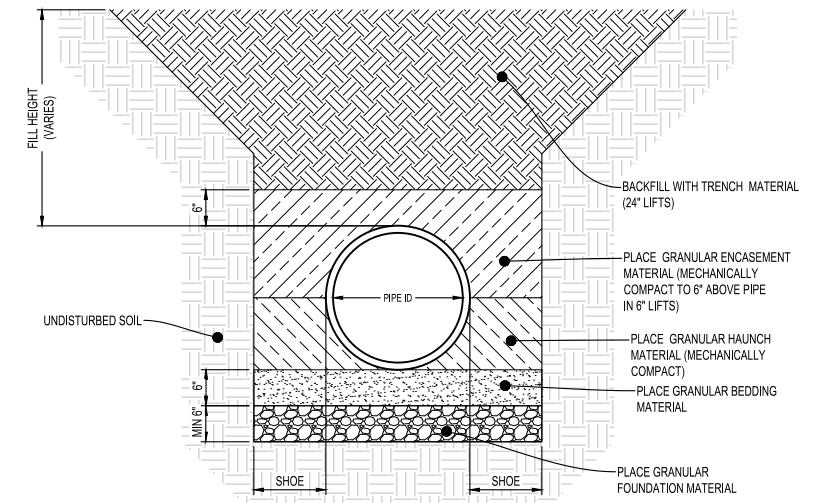
**RCP FLAT BOTTOM TRENCH**  
NTS



**NOTE:**

1. GRANULAR BEDDING, GRANULAR ENCASEMENT, AND BACKFILL SHALL BE INCIDENTAL TO CONSTRUCTION.
2. ALL PIPE WITH A FILL HEIGHT GREATER THAN 15-FEET SHALL BE FULLY ENCASED IN ASTM CLASS I MATERIAL.
3. THE SHOE WIDTH SHALL BE THE SAME AS THE COMPACTING MECHANISMS WIDTH OR THE PIPE MANUFACTURER'S SPECIFICATIONS, WHICHEVER IS GREATER.

**HDPE FLAT BOTTOM TRENCH**  
NTS



**NOTES:**

1. GRANULAR BEDDING, GRANULAR ENCASEMENT, AND BACKFILL SHALL BE INCIDENTAL TO CONSTRUCTION.
2. GRANULAR FOUNDATION BELOW THE PIPE SHALL BE PAID FOR BY THE CUBIC YARD, ONLY WHERE APPROVED BY THE FIELD ENGINEER.
3. ALL PIPE WITH A FILL HEIGHT GREATER THAN 15-FEET SHALL BE FULLY ENCASED IN ASTM CLASS I MATERIAL.
4. THE SHOE WIDTH SHALL BE THE SAME AS THE COMPACTING MECHANISMS WIDTH OR THE PIPE MANUFACTURER'S SPECIFICATIONS, WHICHEVER IS GREATER.

**HDPE FLAT BOTTOM TRENCH  
WITH GRANULAR FOUNDATION**  
NTS

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.

**PRELIMINARY AND  
FOR CONSTRUCTION**

DATE \_\_\_\_\_ LIC. NO. \_\_\_\_\_

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PROJECT

**RENVILLE  
COUNTY**

**JUDICIAL DITCH  
No. 15**

RENVILLE COUNTY MINNESOTA

REVISION SCHEDULE		
DATE	DESCRIPTION	BY

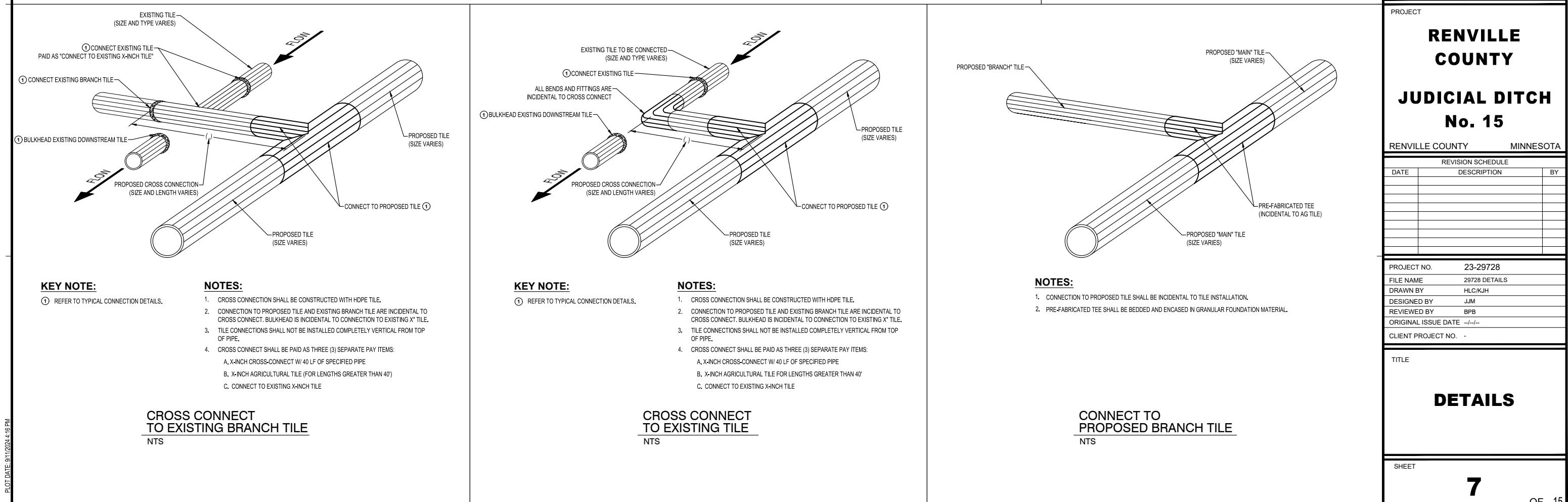
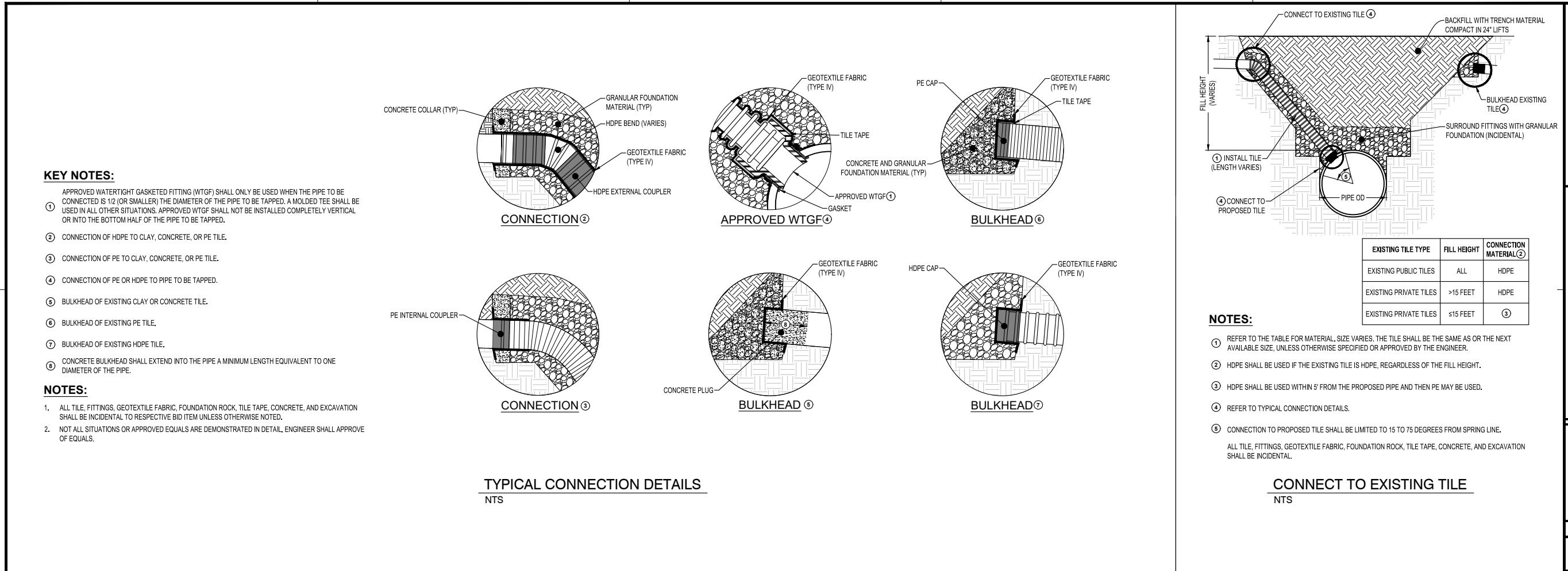
PROJECT NO.	23-29728
FILE NAME	29728 DETAILS
DRAWN BY	HLC/KJH
DESIGNED BY	JJM
REVIEWED BY	BPB
ORIGINAL ISSUE DATE	10/10/2023
CLIENT PROJECT NO.	-

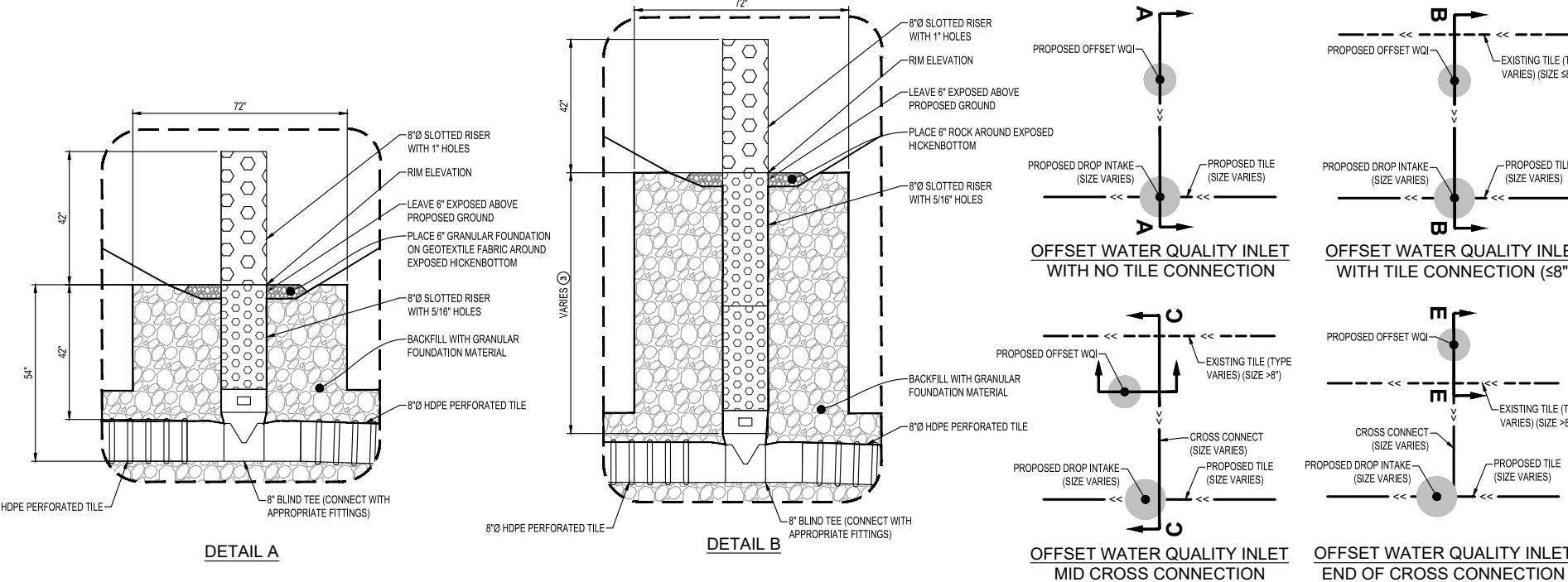
TITLE

**DETAILS**

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**6**  
OF 15





TYPICAL BID ITEM BREAKDOWN:	
SITUATION	BID ITEMS
OFFSET WATER QUALITY INLET WITH NO TILE CONNECTION	1. FURNISH & INSTALL WATER QUALITY INLET (EA) 2. INSTALL 8-INCH PERFORATED TILE (WATER QUALITY INLET) (LF)
OFFSET WATER QUALITY INLET WITH TILE CONNECTION (≤8")	1. FURNISH & INSTALL WATER QUALITY INLET (EA) 2. INSTALL 8-INCH PERFORATED TILE (WATER QUALITY INLET) (LF)
OFFSET WATER QUALITY INLET MID CROSS CONNECTION	1. XX-INCH CROSS CONNECT W/ 40 LF OF SPECIFIED TILE (EA) 2. FURNISH & INSTALL WATER QUALITY INLET (EA) 3. INSTALL 8-INCH PERFORATED TILE (WATER QUALITY INLET) (LF)
OFFSET WATER QUALITY INLET END OF CROSS CONNECTION	1. XX-INCH CROSS CONNECT W/ 40 LF OF SPECIFIED TILE (EA) 2. FURNISH & INSTALL WATER QUALITY INLET (EA) 3. INSTALL 8-INCH PERFORATED TILE (WATER QUALITY INLET) (LF)

BID ITEM INCIDENTALS:		
BID ITEM	UNIT	INCIDENTALS
FURNISH & INSTALL WATER QUALITY INLET	EA	ROCK, GEOTEXTILE FABRIC, RISER PIECES, BLIND TEE, FITTINGS, ALL CONNECTIONS
INSTALL 8-INCH PERFORATED TILE (WATER QUALITY INLET)	LF	PIPE, BEDDING AND ENCASEMENT MATERIAL
CONNECT EXISTING X-INCH TILE	EA	REFER TO CONNECT TO EXISTING TILE DETAIL
XX-INCH CROSS CONNECT W/ 40 LF OF SPECIFIED TILE	EA	REFER TO CROSS CONNECT TO EXISTING TILE DETAIL

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.

DATE \_\_\_\_\_ LIC. NO. \_\_\_\_\_

**SHEET NOT VALID UNLESS THIS TEXT IS COLOR RED.**

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PROJECT

## RENVILLE COUNTY

### JUDICIAL DITCH No. 15

RENVILLE COUNTY MINNESOTA

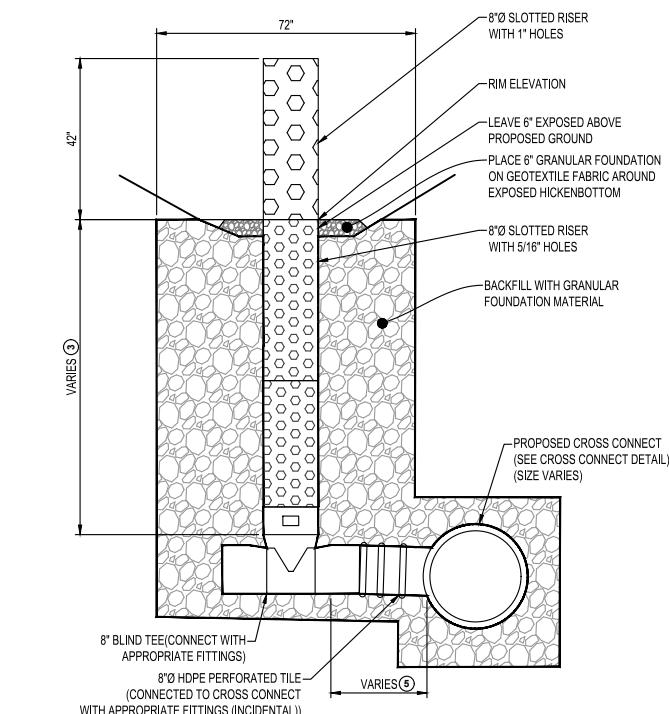
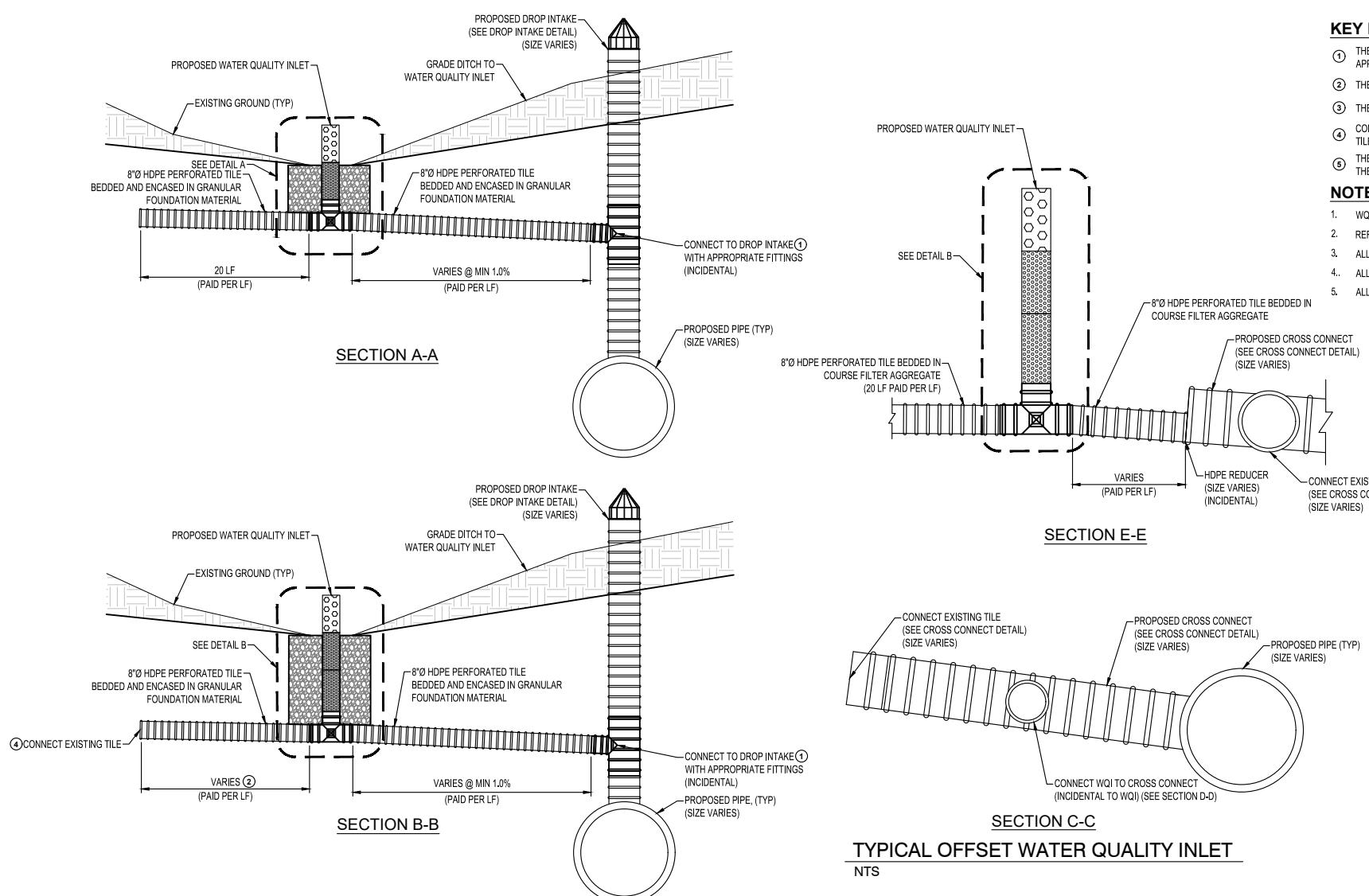
REVISION SCHEDULE		
DATE	DESCRIPTION	BY

PROJECT NO.	23-29728
FILE NAME	29728 DETAILS
DRAWN BY	HLC/KJH
DESIGNED BY	JJM
REVIEWED BY	BPB
ORIGINAL ISSUE DATE	1/1/2024
CLIENT PROJECT NO.	-

TITLE

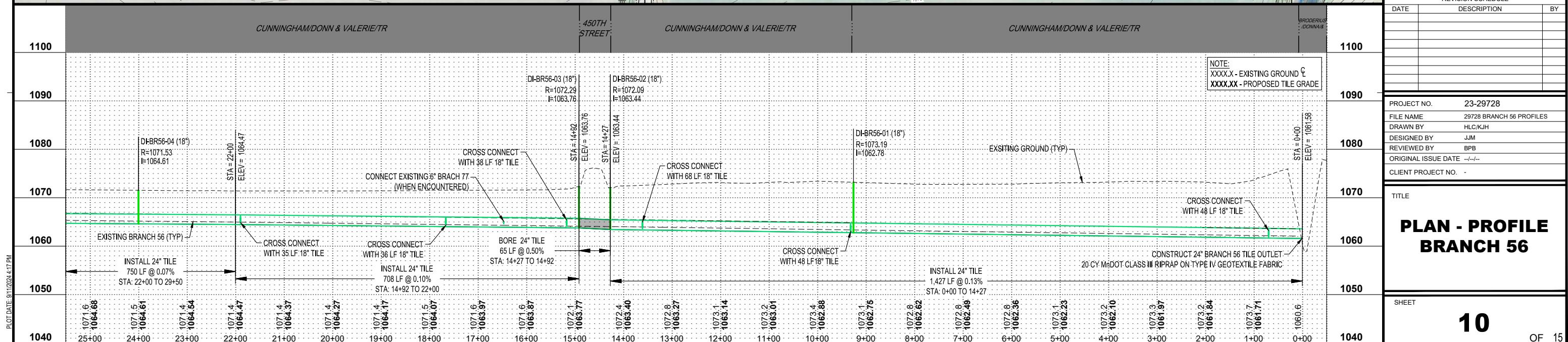
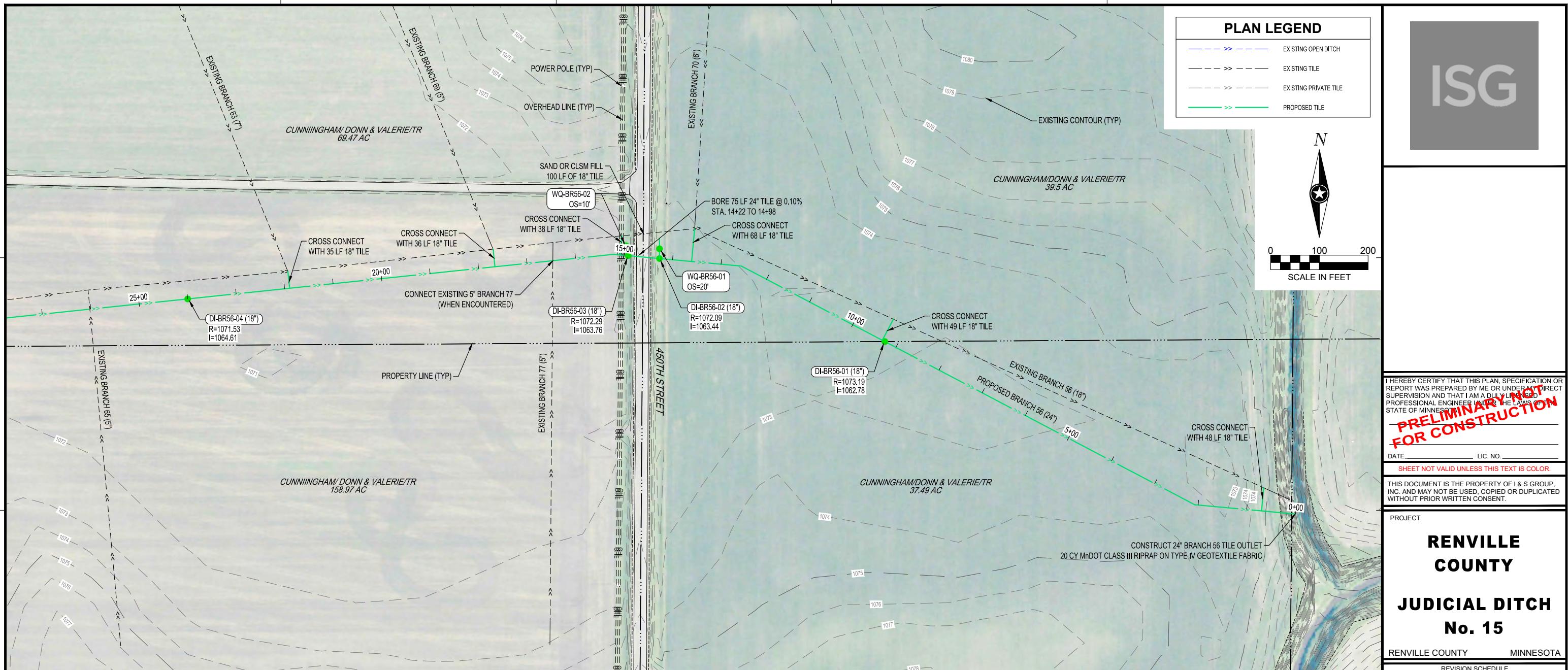
## DETAILS

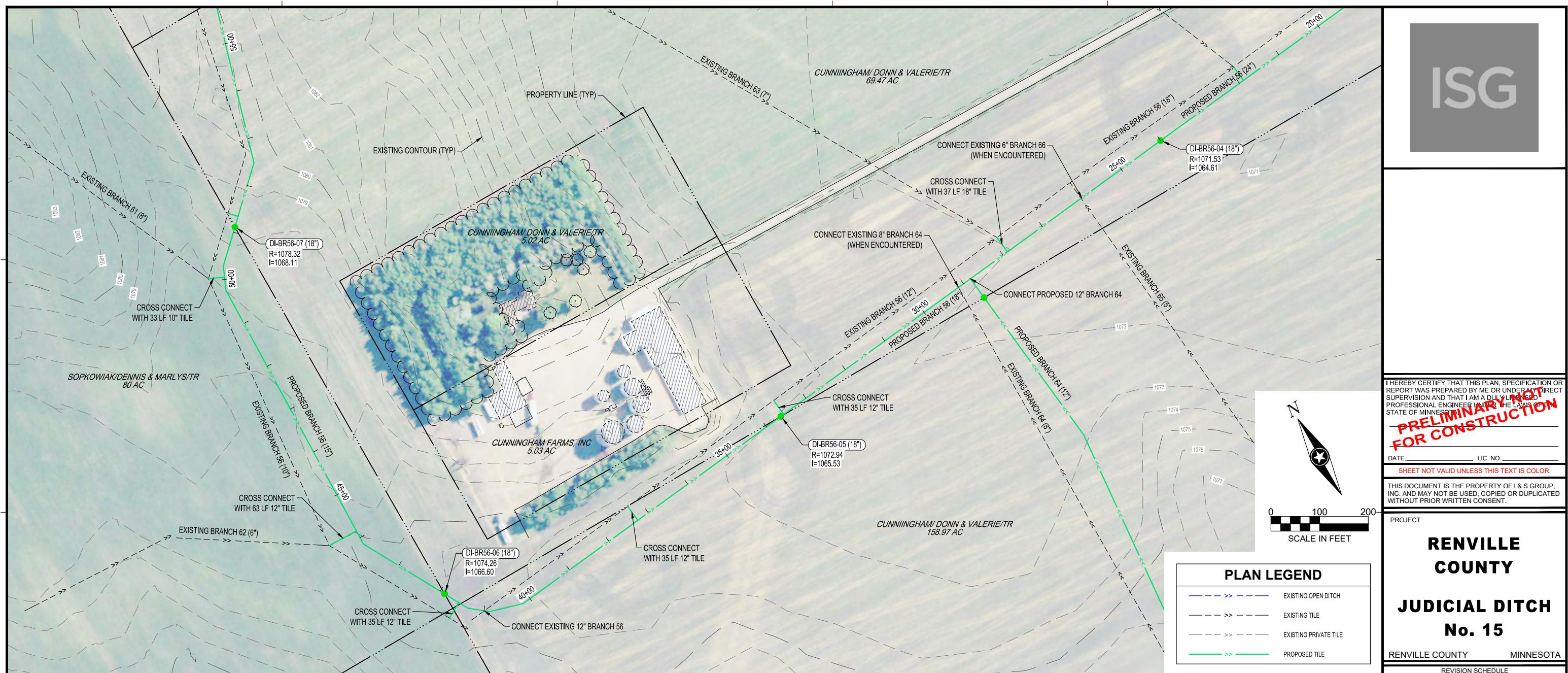
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SECTION D-D







11

OF 15

ISG

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.

PRELIMINARY AND FOR CONSTRUCTION

DATE \_\_\_\_\_ LIC. NO. \_\_\_\_\_

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PROJECT \_\_\_\_\_

RENVILLE  
COUNTYJUDICIAL DITCH  
No. 15

RENVILLE COUNTY MINNESOTA

## REVISION SCHEDULE

DATE DESCRIPTION BY

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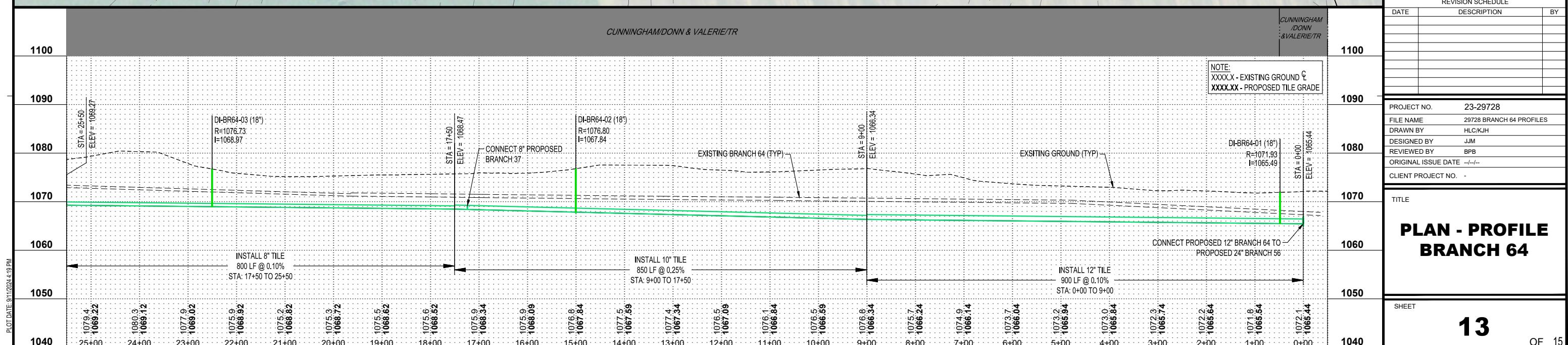
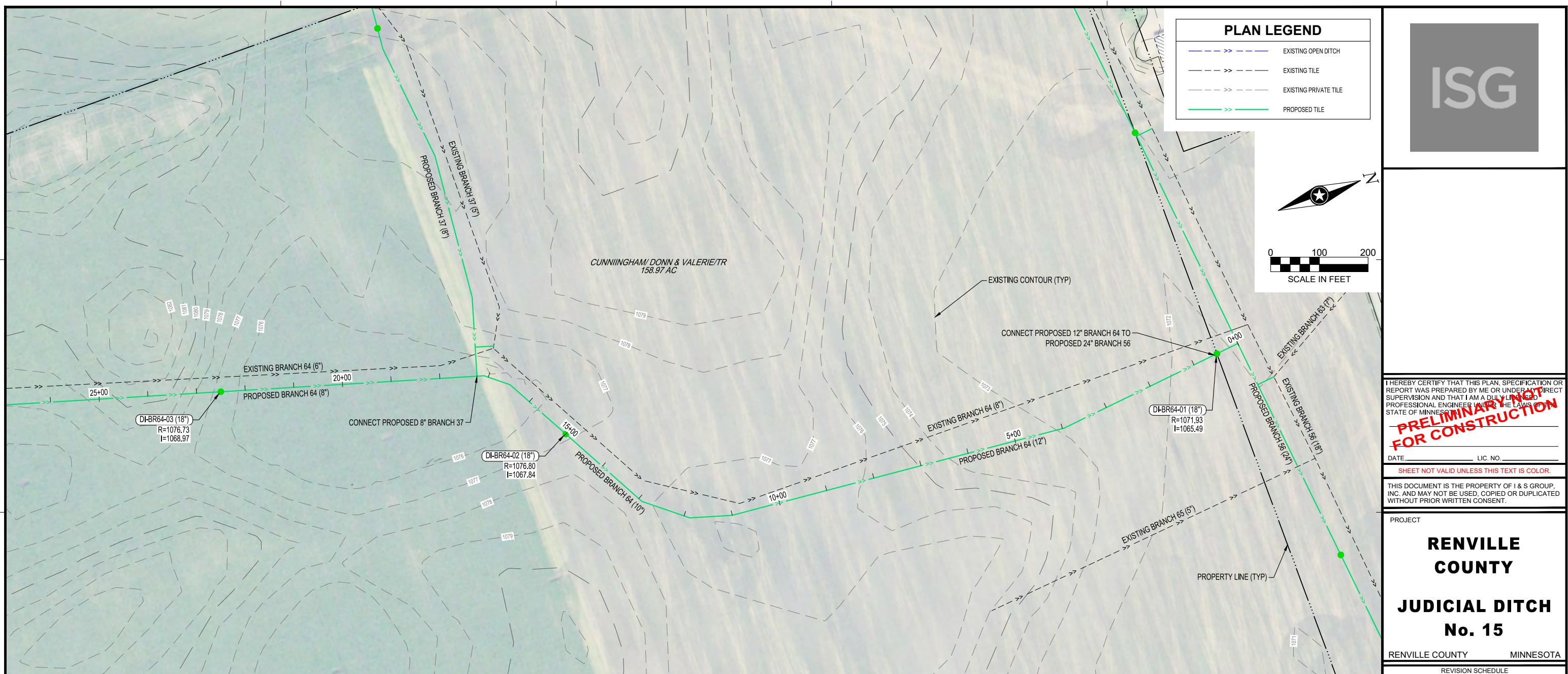
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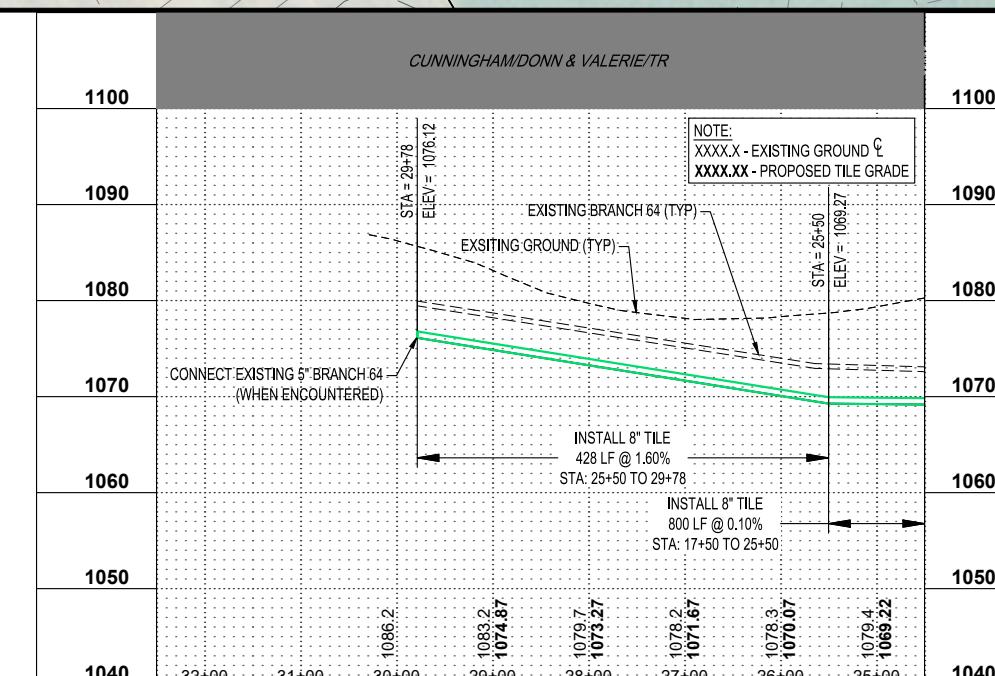
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REBRY CERTIFY THAT THIS PLAN, SPECIFICATION OR  
PORT WAS PREPARED BY ME OR UNDER MY DIRECT  
PERVISION AND THAT I AM A DULY LICENSED  
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STATE OF MINNESOTA.

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SUBMISSION**

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PROJECT

**RENVILLE  
COUNTY  
JUDICIAL DITCH  
No. 15**

RENNVILLE COUNTY MINNESOTA

PROJECT NO.	23-29728
FILE NAME	29728 BRANCH 64 PROFILES
DRAWN BY	HLC/KJH
DESIGNED BY	JJM
REVIEWED BY	BPB
ORIGINAL ISSUE DATE	---/---/---
CLIENT PROJECT NO.	-

**TITLE**

## **PLAN - PROFILE BRANCH 64**

SHEET

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**PRELIMINARY AND FOR CONSTRUCTION**

DATE \_\_\_\_\_ LIC. NO. \_\_\_\_\_

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PROJECT \_\_\_\_\_

## RENVILLE COUNTY

### JUDICIAL DITCH No. 15

RENVILLE COUNTY MINNESOTA

#### REVISION SCHEDULE

DATE	DESCRIPTION	BY

PROJECT NO.	23-29728
FILE NAME	29728 BRANCH 37 PROFILES
DRAWN BY	HLC/KJH
DESIGNED BY	JJM
REVIEWED BY	BPB
ORIGINAL ISSUE DATE	10/10/2023
CLIENT PROJECT NO.	-

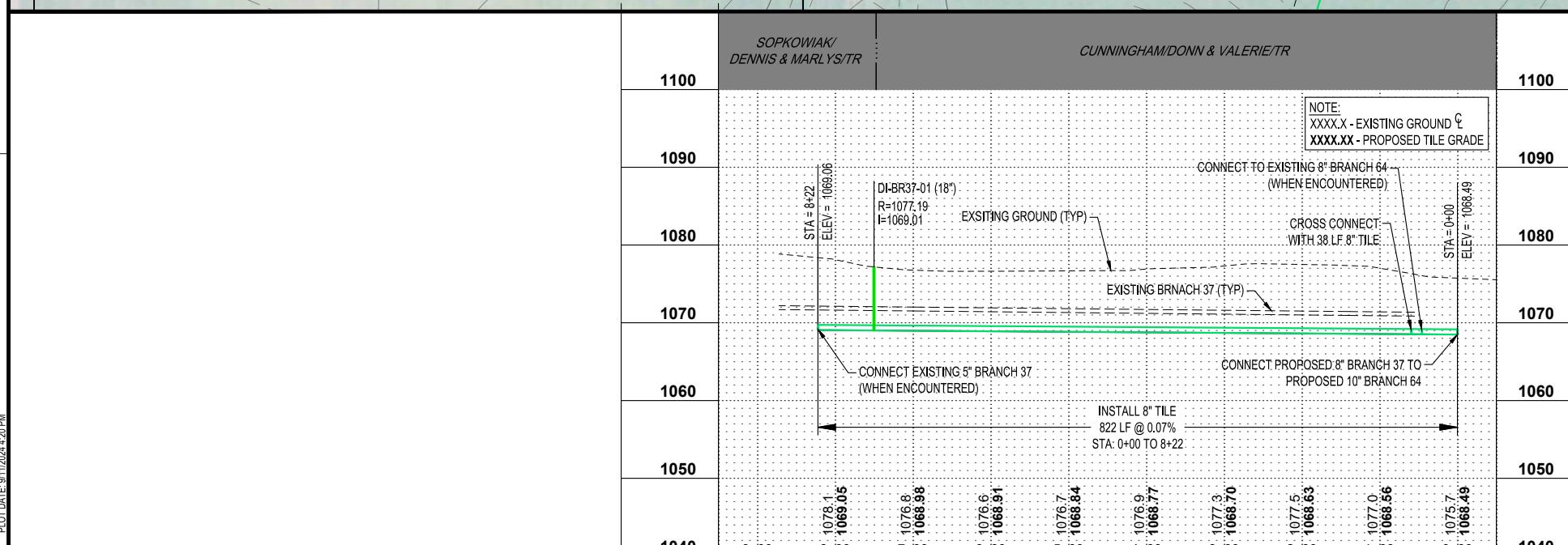
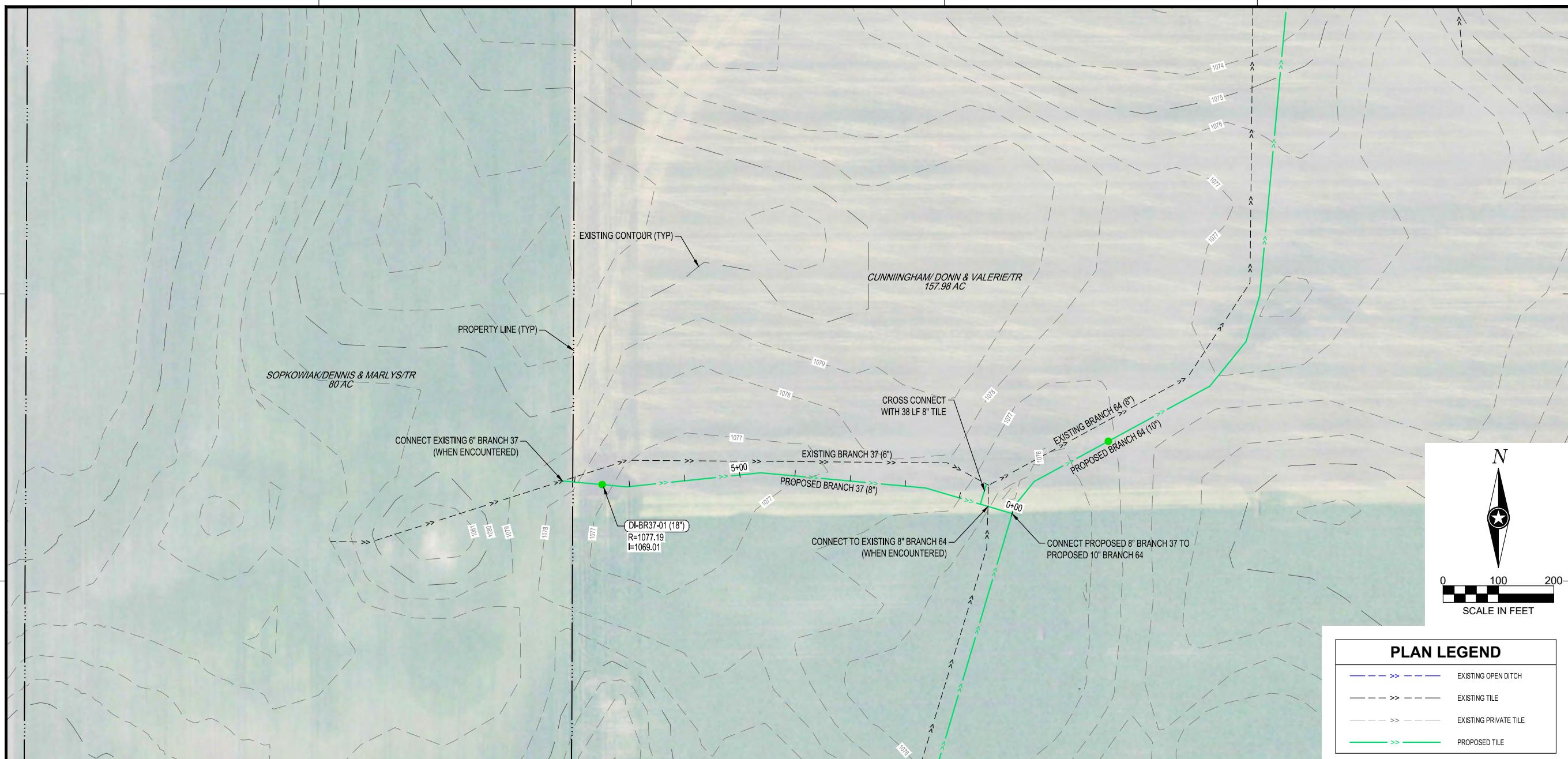
TITLE

### PLAN - PROFILE BRANCH 37

SHEET

15

OF 15



## Appendix B: Petition + Order

**PETITION FOR IMPROVEMENT OF DRAINAGE SYSTEM  
JUDICIAL DITCH NO. 15 BRANCH 56**

TO: THE BOARD OF MANAGERS OF THE BUFFALO CREEK WATERSHED DISTRICT AS THE DRAINAGE AUTHORITY FOR JUDICIAL DITCH NO. 15 (RENVILLE, SIBLEY, MCLEOD COUNTIES)

Petitioners respectfully represent, state and request the following:

**1. Jurisdiction.**

The undersigned Petitioners constitute: (1) at least 26% of the owners of the property affected by the proposed improvement; (2) at least 26% of the owners of property that the proposed improvement passes over; (3) the owners of at least 26% of the property area affected by the proposed improvement; or (4) the owners of at least 26% of the property area that the proposed improvement passes over.

**2. Designation of Drainage System.**

This Petition requests the improvement of the drainage system known by and designated as Judicial Ditch No. 15 located in Renville County, Minnesota.

**3. Need for Improvement.**

The drainage system has insufficient capacity or needs enlarging or extending to furnish sufficient capacity or a better outlet. The drainage system is out of repair and the improvement petitioned for herein is for a separable portion of the drainage system. Therefore, a portion of the cost may be assessed as a repair.

**4. Description of Proposed Improvement.**

The proposed improvement would consist of improving Branch 56 of JD 15, along with certain tributary branches of Branch 56 of JD 15. These branches currently consist of buried tile. These branches would be enlarged and their capacity increased to meet the maximum permitted drainage coefficient currently in effect, which Petitioners understand to be 3/8<sup>th</sup> of an inch drainage coefficient. The improvement would occur along Branch Nos. 37, 56, 61, 62, and 64, (all tributaries of Branch 56 of JD 15) along the entire length of such branches to the point where Branch 56 outlets into the open ditch portion of JD 15. A map showing the proposed improvement is attached hereto as **Exhibit A**.

Set forth below is a list of the 40-acre tracts or government lots that the proposed improvement would pass over, together with the names and addresses of the owners of those tracts; to-wit:

**	Owner	Address	PID	Description	Sec	Twp	Rge	County
5	Gayle O. Degler Trust and Lois J. Degler Trust	541 Pineview Ct. Chanhassen, MN 55317	18-01860-00	SWNE	26	115	33	Renville
11	Richard and Neune Nicolai Trusts	1404 Hillcrest Dr NE Watertown, SD 57201	18-01850-00	NWSE	26	115	33	Renville
15	Dennis and Marlys Sopkowiak Trusts	9790 125 <sup>th</sup> Ave NE Foley, MN 56329	18-01890-00	SESW	26	115	33	Renville
16	Donn and Valerie Cunningham Trusts	1186 Oakwood Court NW Hutchinson, MN 55350	18-01900-00	SWSE	26	115	33	Renville
17	Donn and Valerie Cunningham Trusts	1186 Oakwood Court NW Hutchinson, MN 55350	18-01900-00	SESE	26	115	33	Renville
18	Donn and Valerie Cunningham Trusts	1186 Oakwood Court NW Hutchinson, MN 55350	18-01820-00	SWSW	25	115	33	Renville
20	Donn and Valerie Cunningham Trusts	1186 Oakwood Court NW Hutchinson, MN 55350	18-02090-00	NWNE	25	115	33	Renville
22	Donn and Valerie Cunningham Trusts	1186 Oakwood Court NW Hutchinson, MN 55350	18-02145-00	NWNW	36	115	33	Renville
25	Dennis and Marlys Sopkowiak Trusts	9790 125 <sup>th</sup> Ave NE Foley, MN 56329	18-02090-00	SWNE	35	115	33	Renville

\* ID numbers correspond to 40-acre identification numbers on Exhibit A.

##### **5. Public Utility and Health.**

The proposed improvement will be of public utility and will promote the public health.

##### **6. Agreement by Petitioners.**

The undersigned Petitioners have been informed and understand that they may not withdraw as a petitioner at any time after this Petition is accepted by the drainage authority, except with the written consent of all other Petitioners on the filed Petition. Also, the undersigned Petitioners acknowledge and agree that they will pay all costs and expenses that may be incurred if the improvement proceedings are dismissed.

##### **7. Cost Bond.**

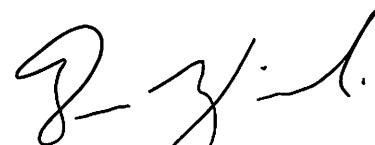
One or more petitioners shall cause a bond to be filed or a check to be delivered in the amount of at least \$10,000.00 payable to the drainage authority. The bond or payment will be

conditioned to pay the costs incurred if the proceedings are dismissed or if a contract is not awarded to construct the proposed improvement described in the petition.

WHEREFORE, the Petitioners respectfully request the following:

- a. That the drainage authority accept this Petition, review it and determine that it is legally adequate; and
- b. That the drainage authority appoint an engineer for purposes of the proposed improvement and direct the engineer to prepare an engineer's preliminary report for the proposed improvement, including allowing the engineer to analyze other potential routes for the proposed improvement and whether separable maintenance may be employed. Petitioners request that **ISG, Inc. engineers** be appointed as project engineers because of their familiarity with the feasibility study previously completed for this project.

Dated: February 7, 2024



---

Dean M. Zimmerli #0396791  
*dzimmerli@gislason.com*  
GISLASON & HUNTER LLP  
Attorneys for Petitioners  
2700 South Broadway  
P. O. Box 458  
New Ulm, MN 56073-0458  
Phone: 507-354-3111

*[Signature pages to follow]*



SIGNATURE PAGE FOR  
PETITION FOR IMPROVEMENT TO JUDICIAL DITCH NO. 15 BRANCH 56  
(RENNILLE COUNTY AND SIBLEY COUNTY, MINNESOTA)

Name of Petitioner(s) (please print or type):

Donn J. Cunningham

Ownership (check one):

- Individual  
 Co-Owners (# of co-owners: \_\_\_\_\_)  
 Partner (name of partnership: \_\_\_\_\_)  
 Corporation or limited liability company (name of corporation or LLC: \_\_\_\_\_)  
 Trust (complete name of trust: Donn and Valerie Cunningham Trusts)  
 Other (explanation: \_\_\_\_\_)

Statement of Authority:

*✓ The Valerie K. Cunningham Revocable Trust Agreement dated January 2, 2014  
\* The Donn J. Cunningham Revocable Trust Agreement  
dated January 2nd, 2014*

The undersigned states and represents that if he or she is executing in a representative capacity, he or she has the authority to execute on behalf of the respective partnership, corporation, limited liability company, trust or other such entity.

The above-named Petitioner(s) owns the following tract(s) which the proposed improvement will pass over or which is affected by the proposed improvement.

Tract Description	Section	Township	Range	County
18-01900-00 SWSE	26	115	33	Renville
18-01900-00 SESE	26	115	33	Renville
18-01820-00 SWSW	25	115	33	Renville
18-02090-00 NWNE	25	115	33	Renville
18-02145-00 NW NW	36	115	33	Renville

Dated: 12-29-23

Donn J. Cunningham  
(signature)

Dated: \_\_\_\_\_

\_\_\_\_\_  
(signature)

Dated: \_\_\_\_\_

\_\_\_\_\_  
(signature)

SIGNATURE PAGE FOR  
PETITION FOR IMPROVEMENT TO JUDICIAL DITCH NO. 15 BRANCH 56  
(RENNILLE COUNTY AND SIBLEY COUNTY, MINNESOTA)

Name of Petitioner(s) (please print or type):

Marky's A. Sopkowick

Dennis J. Sopkowick

Ownership (check one):

Individual

Co-Owners (# of co-owners: 2)

Partner (name of partnership: \_\_\_\_\_)

Corporation or limited liability company (name of corporation or LLC: \_\_\_\_\_)

Trust (complete name of trust: Dennis & marky's Sopkowick TR)

Other (explanation: \_\_\_\_\_)

Statement of Authority:

The undersigned states and represents that if he or she is executing in a representative capacity, he or she has the authority to execute on behalf of the respective partnership, corporation, limited liability company, trust or other such entity.

The above-named Petitioner(s) owns the following tract(s) which the proposed improvement will pass over or which is affected by the proposed improvement.

Tract Description	Section	Township	Range	County
<u>SW NE</u>	<u>35</u>	<u>115</u>	<u>33</u>	<u>Renville</u>
<u>SE SW</u>	<u>26</u>	<u>115</u>	<u>33</u>	<u>Renville</u>

Dated: Jan. 4, 2024

Marky's A. Sopkowick  
(signature)

Dated: Jan. 4, 2024

Dennis J. Sopkowick  
(signature)

Dated: \_\_\_\_\_

\_\_\_\_\_  
(signature)

SIGNATURE PAGE FOR  
PETITION FOR IMPROVEMENT TO JUDICIAL DITCH NO. 15 BRANCH 56  
(RENNILLE COUNTY AND SIBLEY COUNTY, MINNESOTA)

Name of Petitioner(s) (please print or type):

Gayle O Degler Trust

Ownership (check one):

- Individual  
 Co-Owners (# of co-owners: \_\_\_\_\_)  
 Partner (name of partnership: \_\_\_\_\_)  
 Corporation or limited liability company (name of corporation or LLC: \_\_\_\_\_)  
 Trust (complete name of trust: Gayle O Degler Trust)  
 Other (explanation: \_\_\_\_\_)

Statement of Authority:

The undersigned states and represents that if he or she is executing in a representative capacity, he or she has the authority to execute on behalf of the respective partnership, corporation, limited liability company, trust or other such entity.

The above-named Petitioner(s) owns the following tract(s) which the proposed improvement will pass over or which is affected by the proposed improvement.

Tract Description	Section	Township	Range	County
<u>SW 1/4</u>	<u>26</u>	<u>115</u>	<u>33</u>	<u>Renville</u>

Dated: 1/6/24

Gayle Degler  
(signature)

Dated: \_\_\_\_\_

\_\_\_\_\_  
(signature)

Dated: \_\_\_\_\_

\_\_\_\_\_  
(signature)

SIGNATURE PAGE FOR  
PETITION FOR IMPROVEMENT TO JUDICIAL DITCH NO. 15 BRANCH 56  
(RENNILLE COUNTY AND SIBLEY COUNTY, MINNESOTA)

Name of Petitioner(s) (please print or type):

RICHARD NICOLAI  
Jeune Nicolai

Ownership (check one):

- Individual  
 Co-Owners (# of co-owners: \_\_\_\_\_)  
 Partner (name of partnership: \_\_\_\_\_)  
 Corporation or limited liability company (name of corporation or LLC: \_\_\_\_\_)  
 Trust (complete name of trust: RICHARD E. NICOLAI REVOCABLE LIVING TRUST)  
 Other (explanation: \_\_\_\_\_)

Statement of Authority:

The undersigned states and represents that if he or she is executing in a representative capacity, he or she has the authority to execute on behalf of the respective partnership, corporation, limited liability company, trust or other such entity.

The above-named Petitioner(s) owns the following tract(s) which the proposed improvement will pass over or which is affected by the proposed improvement.

Tract Description	Section	Township	Range	County
<u>NWSE</u>	<u>26</u>	<u>115</u>	<u>33</u>	<u>Renville</u>

Dated: Jan 9, 2024

Richard Nicolai  
(signature)

Dated: 1-4-24

Jeune Nicolai  
(signature)

Dated: \_\_\_\_\_

\_\_\_\_\_  
(signature)

STATE OF MINNESOTA  
BUFFALO CREEK WATERSHED DISTRICT  
DRAINAGE AUTHORITY FOR RENVILLE COUNTY JUDICIAL DITCH 15, BRANCH 56

---

The matter of the petition of Donn Cunningham, et al., for the improvement of portions of Judicial Ditch 15, Branch 56

**Preliminary Findings and Order**

---

The Board of Managers of the Buffalo Creek Watershed District, at its regular meeting on May 28, 2024, received the petition and bond of Donn Cunningham and others for the improvement of Branch 56 of Renville, Sibley, McLeod Counties Judicial Ditch 15. Upon review of the petition for improvement and the accompanying bond, Manager Melberg moved, seconded by Manager Kramer, for adoption of the following:

**Findings**

1. The petition was filed with the Board of Managers pursuant to Minnesota Statutes, sections 103D.625, subd. 4 and 103E.215.
2. Improvements of existing drainage systems in the watershed district must be initiated by filing a petition with the Managers.
3. The proceedings for the construction or improvement of drainage systems in the watershed district must conform to chapter 103E.
4. The Board's attorney verified the signatures and ownership interests of the petitioners and finds that the petitioners are the owners of 9 of the 9 – 40-acre or smaller parcels that the proposed improvement passes over and 4 of 4 owners of property that the proposed improvement passes over. As such, petitioners are at least 26 percent of the owners of the property affected by the proposed improvement and the owners of at least 26 percent of the property that the proposed improvement passes over.
5. The petition was properly filed with the Board of Managers to initiate improvement proceedings. For the purpose of a properly filed petition for improvement of a drainage system within the Watershed District, the Board of Managers composes the Drainage Authority for the improvement and, if the improvement is ordered and constructed, for all subsequent actions on the drainage system, or portion thereof.
6. The petition properly designated the drainage system proposed to be improved by number or another description that identifies the drainage system.

7. The petition alleges that the drainage system has insufficient capacity or needs enlarging to furnish sufficient capacity.
8. The petition describes the improvement, including the names and addresses of owners of the 40-acre tracts or government lots and property that the improvement passes over.
9. The petition alleges that the proposed improvement is necessary and will be of public utility and promote the public health.
10. The petition contains an agreement by the petitioners that they will pay all costs and expenses that may be incurred if the improvement proceedings are dismissed.
11. The petition alleges that the existing drainage system needs repair and further petitions the Board to consider separable maintenance when determining the allocation of costs of the improvement.
12. The petition was accompanied by a cash bond in the amount of \$10,000.00. The Board's attorney has determined that the bond is sufficient to meet the requirements of 103E.202. The Board's attorney is recommending that the Board accept the petition and appoint an engineer.
13. The costs incurred before the proposed drainage project is established may not exceed the amount of the petitioners' bond. A claim for expenses greater than the amount of the bond may not be paid unless the bond amount is increased or an additional bond is filed. If the Drainage Authority determines that the cost of the proceeding will be greater than the petitioners' bond before the proposed drainage project is established, the Drainage Authority shall require an increase in the bond amount or an additional bond to cover all costs to be filed within a prescribed time. The proceeding will be stopped until the additional bond prescribed by the Drainage Authority is filed. If the additional bond is not filed within the time prescribed, the proceeding will be dismissed.
14. The Board's attorney has reviewed the petition and has determined it meets the requirement of the drainage code to initiate these proceedings.

Based on the foregoing findings, the Board of Managers adopts the following **Order**:

- a. The Board accepts and files the petition as sufficient to establish jurisdiction in the proceedings herein.
- b. The Board appoints Bailey Buechting, P.E., of ISG, Inc., to make a preliminary survey and file a report within 90 days of this order.
- c. The engineer shall serve as the engineer for the drainage project throughout the proceedings and construction unless otherwise ordered.

- d. The engineer shall file an oath to faithfully perform the assigned duties in the best manner possible and file a bond with the Managers.
- e. The engineer is not authorized to proceed until receiving a notice to proceed. The Board authorizes its attorney to issue the notice to proceed upon receipt of compliant and sufficient oath and bond.
- f. Upon receiving notice to proceed, the engineer shall immediately initiate coordination with the Department of Natural Resources and local, water planning authorities.
- g. The engineer shall include in his preliminary survey and report an investigation of the scope of improvement to include consideration of alternative improvement configurations and the impact of regulatory permitting requirements related to wetlands or other environmental factors on the possible alternatives.
- h. The engineer shall, as part of his work on the preliminary survey and report, investigate the potential use of external sources of funding to facilitate the purposes indicated in section 103E.011, subd. 5, and alternative measures in section 103E.015, subd. 1(2). This investigation shall include early coordination with applicable soil and water conservation district and county and watershed district water planning authorities about potential external sources of funding and technical assistance for these purposes and alternative measures.
- i. The engineer shall include in his preliminary survey and report an investigation of the current condition of the portion of the drainage system proposed to be improved and provide a recommendation on the propriety of a separable maintenance allocation of project costs.

After discussion, the Board President called the question. The question was on the adoption of the foregoing findings and order, and there were 5 yeas and 0 nays as follows:

	<u>Yea</u>	<u>Nay</u>	<u>Absent</u>	<u>Abstain</u>
Donald Belter	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Kevin Lindeman	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Chad Stuewe	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Larry Kramer	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Matt Melberg	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Upon vote, the President declared the motion Passed.

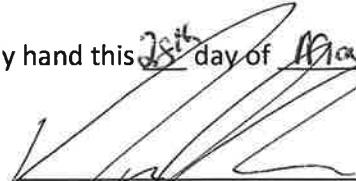
  
Donald Belter  
 Donald Belter, President

Dated: May 28, 2024

\* \* \* \* \*

I, Matt Melberg, Secretary of the Buffalo Creek Watershed District, do hereby certify that I have compared the above motion, findings and order with the original thereof as the same appears of record and on file with the Board of Managers and find the same to be a true and correct transcript thereof as adopted by and filed with the Board of Managers, on May 28, 2024.

IN TESTIMONY WHEREOF, I hereunto set my hand this 28<sup>th</sup> day of May, 2024.



Matt Melberg

## Appendix C: Multipurpose Drainage Management

## **Multi-Purpose Drainage Management Plan**

Multi-purpose drainage management incorporates Best Management Practices (BMPs) which utilize effective measures aimed at reducing sediment and nutrient loading and improving water quality. These BMPs are divided into the following areas.

### **Preventative Measures**

Preventative measures that can be applied throughout the watershed include crop rotation, cover crops, residue management, and nutrient management. These measures are aimed at controlling sediment, minimizing erosion and nutrient loss, and sustaining the soils health, all without dramatically changing the current land use of the landscape.

### **Control Measures**

Control measures are practices aimed at improving water quality directly associated with the flow of water by reducing peak flow and providing in-stream storage, sedimentation, and nutrient uptake. Examples of control measures include alternative tile intakes, grassed waterways, two stage ditches, water control structures, riprap check dams, and controlled subsurface drainage. These practices are directly linked to the conveyance of subsurface tile water or open channel ditch flow.

### **Treatment Measures**

The function of treatment measures is to improve water quality by directly removing sediment and nutrients from the subsurface or surface water flow throughout a watershed. Examples of treatment measures include surge basins (storage ponds), filter/buffer strips, wetland restorations, woodchip bioreactors, constructed oxbows, and water and sediment control basins (WASCOBs). These practices may be incorporated to either the public or private drainage systems.

### **Conservative Drainage Practices**

Conservative drainage practices, such as construction of controlled drainage systems, provide an option for improving the water quality within a drainage system. Through utilization of control structures, these systems are designed to allow agricultural producers to regulate water levels in their fields. The water level in the ground can be lowered during planting and harvest seasons and allowed to rise during the growing season. Water and nutrients stored in the soil during the growing season can then be used by the crops during drier periods, potentially increasing yields.

### **Funding**

There are several outside sources of funding to potentially help pay for water quality improvements implemented in a repair project such as this. A main source of funding for this type of project is through the Minnesota Board of Water and Soil Resources (BWSR) Clean Water Fund (CWF). The primary purpose of activities funded with grants associated with the CWF is to restore, protect and enhance water quality. One CWF grant program is the Multipurpose Drainage Management Grant. This grant is geared towards implementing practices that will reduce the transport of sediment and nutrient loads. Some practices that have been funded in the past include grade stabilization, grassed waterways, water and sediment control basins, alternative side inlets, saturated buffers, storage wetlands, denitrifying bioreactors, etc.

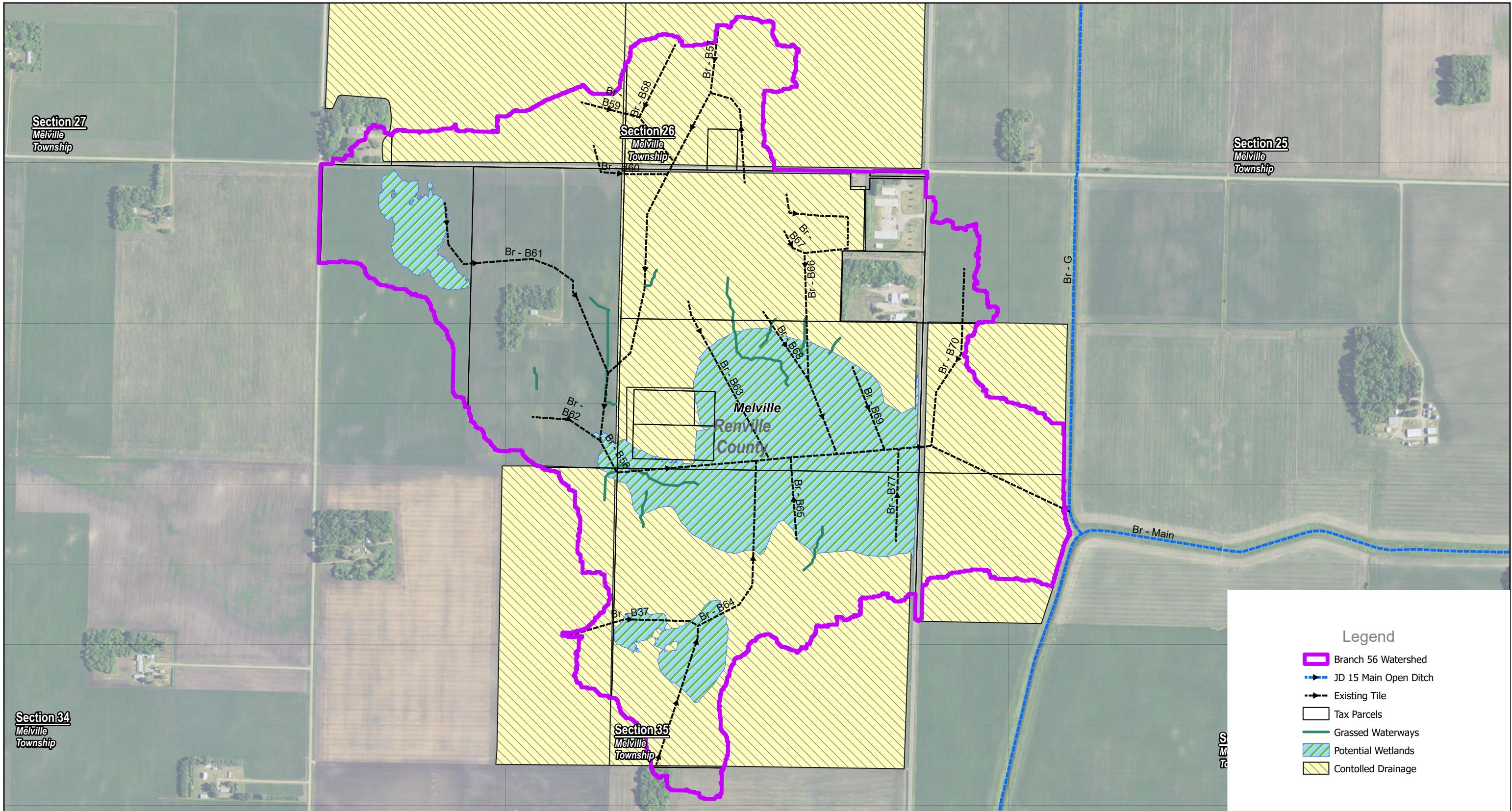
Another potential source is the Legislative-Citizen Commission on Minnesota Resources (LCCMR) Environment and Natural Resources Trust Fund (ENRTF) which was established to provide funding for activities that protect, conserve, preserve, and enhance Minnesota's "air, water, land, fish, wildlife, and other natural resources." The LCCMR prioritizes innovative ideas that provide multiple benefits.

Potential locations for additional BMPs are shown on the Multi-Purpose Drainage Management map in Appendix A. If landowners are interested in pursuing practices that go beyond this project scope, a few programs may be a source for funding. The Agriculture Best Management Practices (BMP) Loan Program provides loans to rural landowners to encourage BMPs that help counteract pollution problems.

Another option for individual landowners that are interested in pursuing additional practices is the Environmental Quality Incentives Program (EQIP) is a voluntary program through the NRCS that provides financial assistance to individual landowners for various conservative practices as identified above.

In addition, the BWSR Community Partners Grant may be an option. This grant leverages the interest of non-governmental partners such as lake and river associations, boy/girl scout troops and other civic groups to install on-the ground projects that reduce runoff and keep water on the land. It also allows for multiple local government units to work together on a project that involves the Community Partners Grant. Projects installed with the Community Partners Grant are intended to be structural or vegetative practices designed to reduce runoff and/or keep water on the land.

Currently, this project includes the addition of water quality intakes at road crossings and a storage basin at the outlet of Branch 56 as a portion of Option 2. The location for other potential BMPs are shown on the *Multi-Purpose Drainage Management Map* and will be proposed to landowners. Furthermore; additional water quality measures can be implemented with this project if requested.



0 500 1,000  
Feet  
1:10000



**MDM Map**  
**Judicial Ditch No 15**  
Renville County, Minnesota

**Source(s):**  
Orthophoto (Mn Geo WMS, 2021)  
Parcels (Renville County, 2024)  
Tile/Ditch (Renville County, 2013)



## Appendix D: Drainage Calculations

**Renville County  
Judicial Ditch No. 15**

**ISG**

**ACSC TILE SUMMARY**

Area	ACSC Size (in)	ACSC Slope (%)	Drainage Area (Acres)	ACSC Drainage Coefficient (in/day)
Branch 37	6	0.10%	19.5	0.22
Branch 56	18	0.14%	527.5	0.18
	18	0.12%	454.0	0.19
	18	0.10%	366.1	0.22
	12	0.20%	238.1	0.16
	10	0.36%	176.8	0.18
	8	0.18%	88.5	0.14
	6	0.40%	34.3	0.25
	6	0.14%	21.2	0.24
	Branch 57	5	0.12%	7.8
Branch 58	6	0.10%	22.3	0.19
Branch 59	6	0.40%	10.9	0.78
Branch 60	6	0.10%	11.9	0.35
Branch 61	8	0.50%	80.3	0.25
	8	0.10%	53.9	0.17
	6	0.10%	36.3	0.12
Branch 62	6	0.20%	30.5	0.20
Branch 63	8	0.10%	35.0	0.26
	6	0.70%	16.7	0.67
Branch 64	8	0.50%	70.2	0.29
	8	0.00%	70.2	0.00
	8	0.10%	22.5	0.41
	6	0.30%	18.3	0.40
	6	1.60%	1.2	14.12
Branch 65	6	0.24%	22.8	0.29
Branch 66	10	0.10%	48.1	0.34
	6	0.60%	29.2	0.35
	6	0.44%	3.8	2.36
Branch 67	6	0.20%	3.8	1.57
Branch 68	6	0.40%	9.9	0.85
Branch 69	6	0.20%	22.1	0.27
Branch 70	6	0.50%	22.7	0.42
Branch 77	6	0.20%	17.7	0.34

**Renville County**  
**Judicial Ditch No. 15**



**PROPOSED TILE SUMMARY**

Area	ACSI C Size (in)	Proposed Size (in)	ACSI C Slope (%)	Proposed Slope (%)	Drainage Area (Acres)	ACSI C Drainage Coefficient (in/day)	Proposed Drainage Coefficient (in/day)
Branch 37	6	8	0.10%	0.07%	19.5	0.22	0.39
Branch 56	18	24	0.14%	0.13%	527.5	0.18	0.37
	18	24	0.12%	0.10%	454.0	0.19	0.38
	18	24	0.10%	0.07%	366.1	0.22	0.39
	12	18	0.20%	0.13%	238.1	0.16	0.38
	10	15	0.36%	0.18%	176.8	0.18	0.37
	8	12	0.18%	0.15%	88.5	0.14	0.37
	6		0.40%		34.3	0.25	
	6		0.14%		21.2	0.24	
	Branch 57	5		0.12%	7.8	0.37	
Branch 58	6		0.10%		22.3	0.19	
Branch 59	6		0.40%		10.9	0.78	
Branch 60	6		0.10%		11.9	0.35	
Branch 61	8		0.50%		80.3	0.25	
	8		0.10%		53.9	0.17	
	6		0.10%		36.3	0.12	
Branch 62	6		0.20%		30.5	0.20	
Branch 63	8		0.10%		35.0	0.26	
	6		0.70%		16.7	0.67	
Branch 64	8	12	0.50%	0.10%	70.2	0.29	0.38
	8	10	0.10%	0.25%	70.2	0.13	0.37
	8	8	0.10%	0.10%	22.5	0.41	0.41
	6	8	0.30%	0.10%	18.3	0.40	0.50
	6	8	1.60%	1.60%	1.2	14.12	30.40
Branch 65	6		0.24%		22.8	0.29	
Branch 66	10		0.10%		48.1	0.34	
	6		0.60%		29.2	0.35	
	6		0.44%		3.8	2.36	
Branch 67	6		0.20%		3.8	1.57	
Branch 68	6		0.40%		9.9	0.85	
Branch 69	6		0.20%		22.1	0.27	
Branch 70	6		0.50%		22.7	0.42	
Branch 77	6		0.20%		17.7	0.34	

## Appendix E: Hydraulic Modeling

# Renville County Judicial Ditch No. 15 Branch 56 Hydrology Report

## PROJECT OVERVIEW

The Renville County Judicial Ditch No. 15 Branch 56 public drainage improvement proposes to replace and improve portions of Branch 56, Branch 64, and Branch 37. There are two proposed options, where Option 1 is an entirely tile improvement displaying a 3/8<sup>th</sup> inch/day drainage coefficient and option 2 displays a storage basin near the Branch 56 outlet and the same tile design. Both options are detailed in the report.

## MODEL PARAMETERS

### Runoff Parameters

The routing method for the models used the SCS Hydrology method. Two parameters were calculated in GIS: the runoff sub-catchment area and the time of concentration. Time of Concentration ( $T_c$ ), calculations were calculated utilizing the TR-55 methodology. The tool referenced is a proprietary ArcMap tool developed by ISG to calculate the time of concentration for a given subwatershed. This tool calculates the longest flowpath and average land slope for each catchment. This data is calculated from county Digital Elevation Model (DEM) data. User input parameters include land use type, surface roughness (based on land use type), and the P2 variable (the depth of rainfall, in inches, of a 2-year 24-hour storm - gathered from NOAA Atlas 14). This tool essentially automates the  $T_c$  calculations given land use and elevation data. This information was calculated for points located strategically along the JD 15 drainage tile. The values used for this tool conservatively assumes that the entire watershed is tile drained. The curve number for agricultural land was found to be relatively uniform, but weighted curve numbers were attributed to each individual subcatchment through review of the land use and soil parameters within the watershed, this resulted in a range between roughly 80.0 and 87.5, where weighted curve numbers were rounded to the nearest 0.5.

The SCS depth, or storage depth, was calculated based on the curve number using the equation:  $SCS\ Depth = \frac{\frac{1000}{CN} - 10}{12}$ . The storage depth is the maximum potential depth of water in feet that could be infiltrated or stored on the surface, or “lost”, before runoff occurs (i.e. through initial infiltration, evaporation, and surface depression storage). The initial abstraction factor was calculated from the curve number using the equation:  $Ia = 0.2 \times (\frac{1000}{CN} - 10)$ .

### Hydraulic Parameters

One assumption made to model the current drainage system in the As Constructed or Subsequently Improved Condition (ACSC) so that the tile is functioning as it was originally constructed. This means it does not take into consideration the blockages and restrictions that are likely throughout the existing tile or open ditch. Both the ACSC and proposed tile systems are modeled using a Manning's n value of 0.013.

### Storm Events

The design storm events were chosen to comply with Minnesota drainage statute (103E.015(4)), “Current and potential flooding characteristics of property in the drainage project or system and downstream for 5-, 10-, 25-, and 50-year flood events, including adequacy of the outlet for the drainage project.”

Modeled rainfall depths were determined through the use of NOAA Atlas 14 Point Precipitation Frequency Estimates: MN as provided for near Hector, MN and the obtained values can be seen in Table 1 below. The 24-hour duration was used as it is the standard design storm duration and is the necessary duration to use the NRCS MSE3 rainfall distribution.

TABLE 1. MODELED 24-HR PRECIPITATION VALUES

Rainfall Event	Rainfall Depth (inches)
5-yr	3.31
10-yr	3.90
25-yr	4.82
50-yr	5.63

## Infiltration

2D hydraulic infiltration was used in the model to allow surface water to infiltrate into the soil. Soil data was imported from GIS to apply infiltration parameters based on the USDA Hydrologic Soil Types as delineated by the USDA Web Soil Survey. Infiltration is applied using the Green-Ampt methodology. When combining this 2D infiltration method with the SCS storage depth, some considerations must be taken so as to not “double count” the initial rapid infiltration volumes. To remedy this, initial Green Ampt Soil Moisture Deficit is set to 0.01 (as near “0”) as the model will allow, what this achieves is modeling an initially saturated soil profile, which would have been achieved through the infiltration accounted for in the SCS storage depth. The majority of the hydrologic soil classification is representative of C/D soils, which contain large percentages of clay and display relatively slow infiltration rates.

## Validation

One method for fact-checking the model is to calculate the runoff coefficient for the ACSIC conditions at the system outlet for each rainfall event and compare it to the runoff coefficient calculated from USGS StreamStats peak flow data. Additional model calibration is done through site visits, drone flights, and landowner testimony.

## MODEL REVIEW

The following results and discussion comprise the detailed analysis of the ACSIC and proposed models. Tables 2 & 3 show a comparison of the peak flow and velocity for Options 1 & 2 at the outlet of JD 15 Branch 56 respectively. Table 4 compares the water volumes leaving the system for both proposed options.

TABLE 2. SYSTEM OUTLET FLOW COMPARISON

OPTION 1				OPTION 2			
Rainfall Event	ACSC (cfs)	Proposed (cfs)	% Change	Rainfall Event	ACSC (cfs)	Proposed (cfs)	% Change
5-yr	21.8	32.6	50%	5-yr	21.8	15.6	-28%
10-yr	23.1	34.8	51%	10-yr	23.1	16.2	-30%
25-yr	24.1	38.1	58%	25-yr	24.1	16.5	-32%
50-yr	24.2	39.5	63%	50-yr	24.2	17.1	-29%

TABLE 3. SYSTEM OUTLET VELOCITY COMPARISON

OPTION 1				OPTION 2			
Rainfall Event	ACSC (ft/s)	Proposed (ft/s)	% Change	Rainfall Event	ACSC (ft/s)	Proposed (ft/s)	% Change
5-yr	10.6	9.3	-12%	5-yr	10.6	5.6	-47%
10-yr	11.0	9.9	-10%	10-yr	11.0	5.7	-48%
25-yr	11.3	10.6	-6%	25-yr	11.3	5.7	-50%
50-yr	11.3	11.0	-3%	50-yr	11.3	5.8	-49%

TABLE 4. SYSTEM OUTLET VOLUME COMPARISON

OPTION 1				OPTION 2			
Rainfall Event	ACSC (AC-ft)	Proposed (AC-ft)	% Change	Rainfall Event	ACSC (AC-ft)	Proposed (AC-ft)	% Change
5-yr	58.5	66.2	13%	5-yr	58.5	65.5	12%
10-yr	73.8	84.4	14%	10-yr	73.8	83.3	13%
25-yr	98.2	112.7	15%	25-yr	98.2	111.6	14%
50-yr	119.8	138.3	15%	50-yr	119.8	137.0	14%

Option 1 shows increases to peak flowrate of 50% to 63% for the modeled storm events at the Branch 56 outlet into the receiving open ditch. This is the result of the improved tile capacity as compared to the ACSC condition. Increases to peak flowrate require exploration as related to the adequacy of downstream drainage infrastructure to convey the added hydraulic load. Additionally, there is no overland flow exiting the Branch 56 watershed into the adjacent open ditch in any modeled option for any storm event. Velocities are reduced at the tile outlet in Option 1. This is the result of the cross-sectional area of the pipe outlet being increased. Decreases to outlet velocity will reduce scour near the tile outlet. Total runoff volume received by the open ditch increases by 13% to 15% for the modeled storm events. This increase to volume of runoff is the result of increased capacity within the Branch 56 system which reduce inundation on the landscape as well as total infiltration.

Option 2 shows decrease in peak flowrate as compared to the ACSC condition ranging from 28% to 32% for the modeled storm events. This is the result of the storage area near the tile outlet which adds residency time and ponding area not present in the ACSC condition. Additionally, the baseflow outlet from the storage basin displays a reduced capacity as compared to the ACSC condition which promotes these reductions. Velocity is reduced as well, by an average of nearly 50% across all modeled storm events. This reduction will allow large levels of erosion protection within the immediate areas surrounding the Branch 56 tile outlet as compared to the ACSC condition. Total runoff volume received by the open ditch increases by 12% to 14% as compared to the ACSC condition. This increase is the result of increased capacity within the Branch 56 system. The added storage in Option 2 allows some additional infiltration as compared to Option 1, yet the present soils do not allow rapid infiltration and the storage area will only provide a small level of volume reduction.

The following Figures 1 and 2 compare the ACSC and proposed flow hydrographs at the outlet of the JD 15 Branch 56 drainage system for the 10-year and 50-year events.

The inundation maps shown below show the time that water deeper than 0.1-foot sits on the landscape. Generally, crop stress from excess water occurs above 24-hours and crops generally die if they remain flooded for longer than 48-hours. These maps illustrate the faster drainage times across the system and where the project will have the greatest impacts.

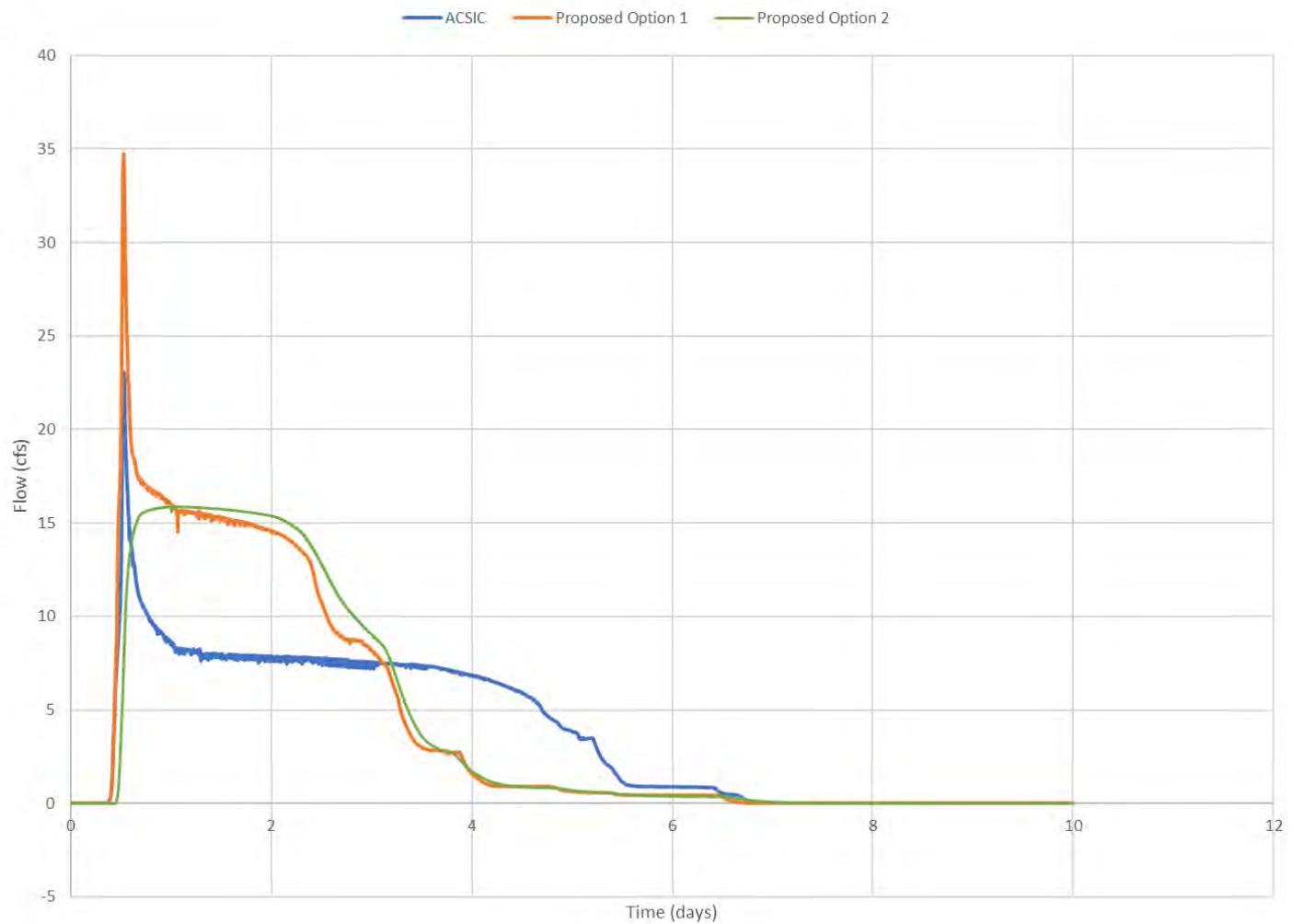


Figure 1. JD 15 Branch 56 Outlet 10-Year Peak Flow Hydrograph Comparison

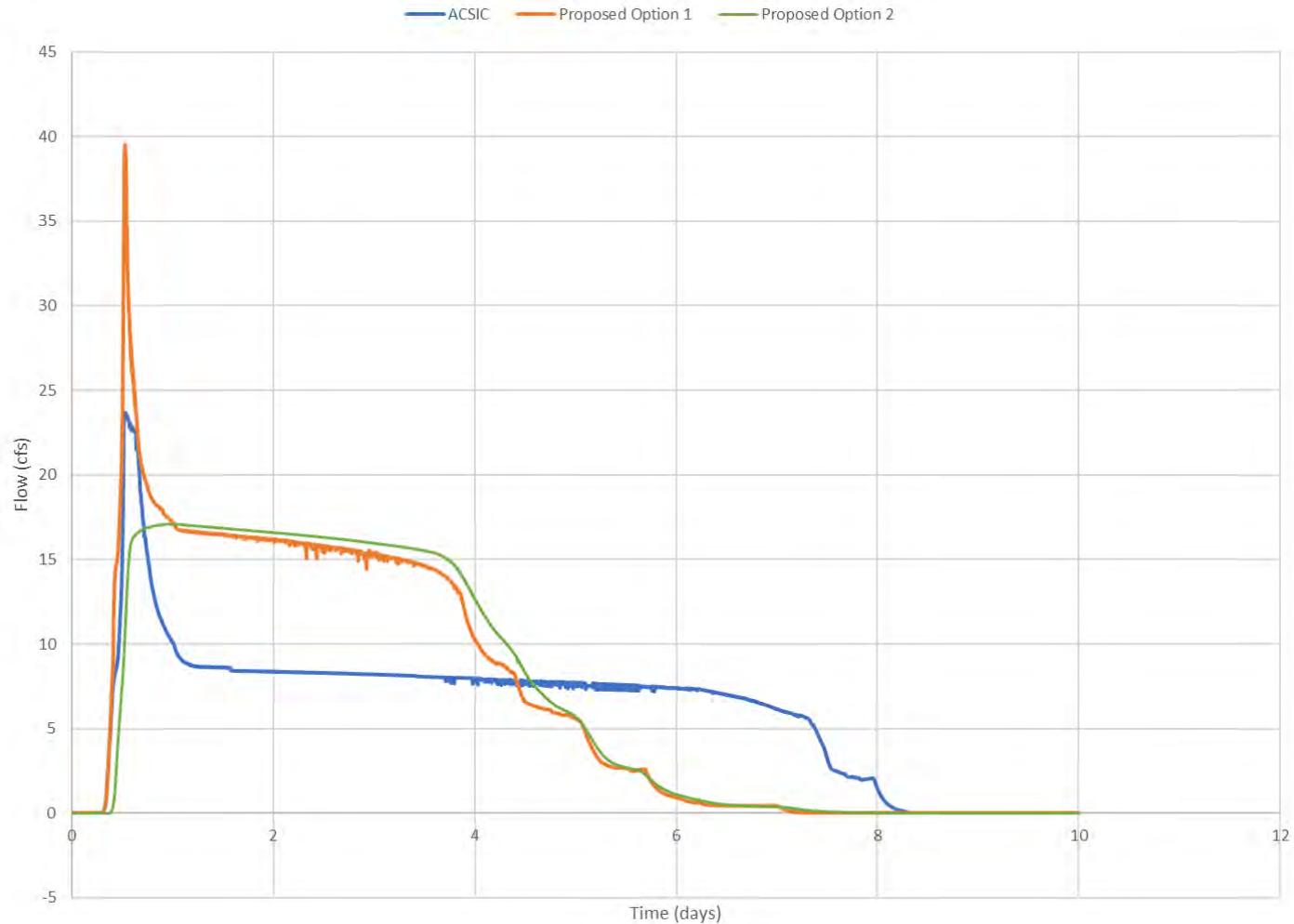


Figure 2. JD 15 Branch 56 Outlet 50-Year Peak Flow Hydrograph

## VOLUME BALANCE ERRORS

The volume balance error is calculated by comparing the initial water volume in the 2D model and conduits to infiltration, system outflows, and final water volume in the 2D system and conduits. Table 5 shows the volume balance error for each modeled storm event. The maximum absolute volume balance error was 0.20%, which was for the 50-year proposed Option 2 model. This is below ICM's 5% allowable percent volume balance error.

TABLE 5. MODELING VOLUME BALANCE ERRORS

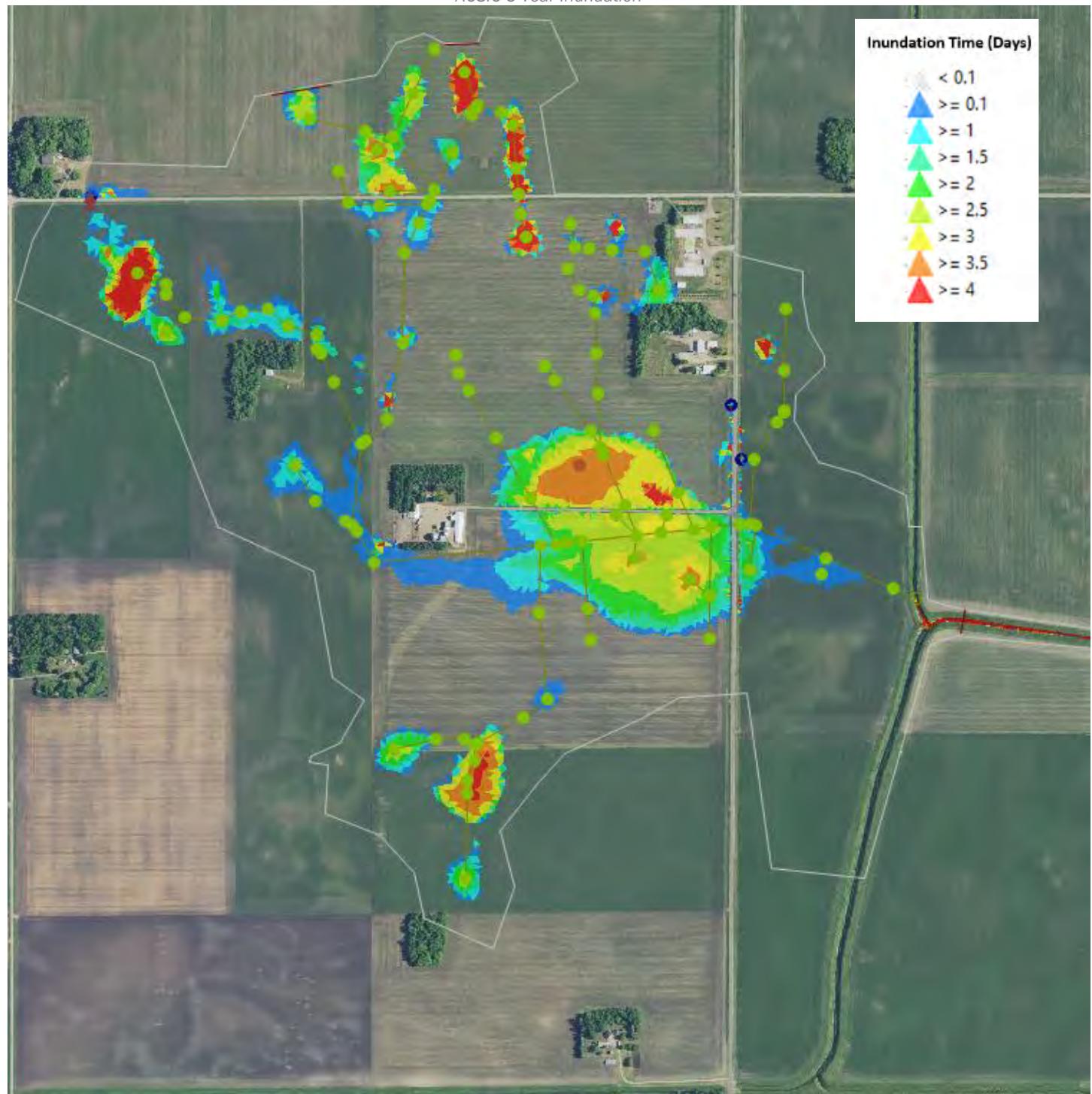
Rainfall Event	ACSC (% Error)	Proposed Option 1 (% Error)	Proposed Option 2 (% Error)
5-yr	0.03%	0.02%	0.06%
10-yr	0.00%	0.03%	0.07%
25-yr	0.14%	0.11%	0.16%
50-yr	0.11%	0.07%	0.20%

**PROJECT NAME:** Renville County Judicial Ditch No. 15 Branch 56

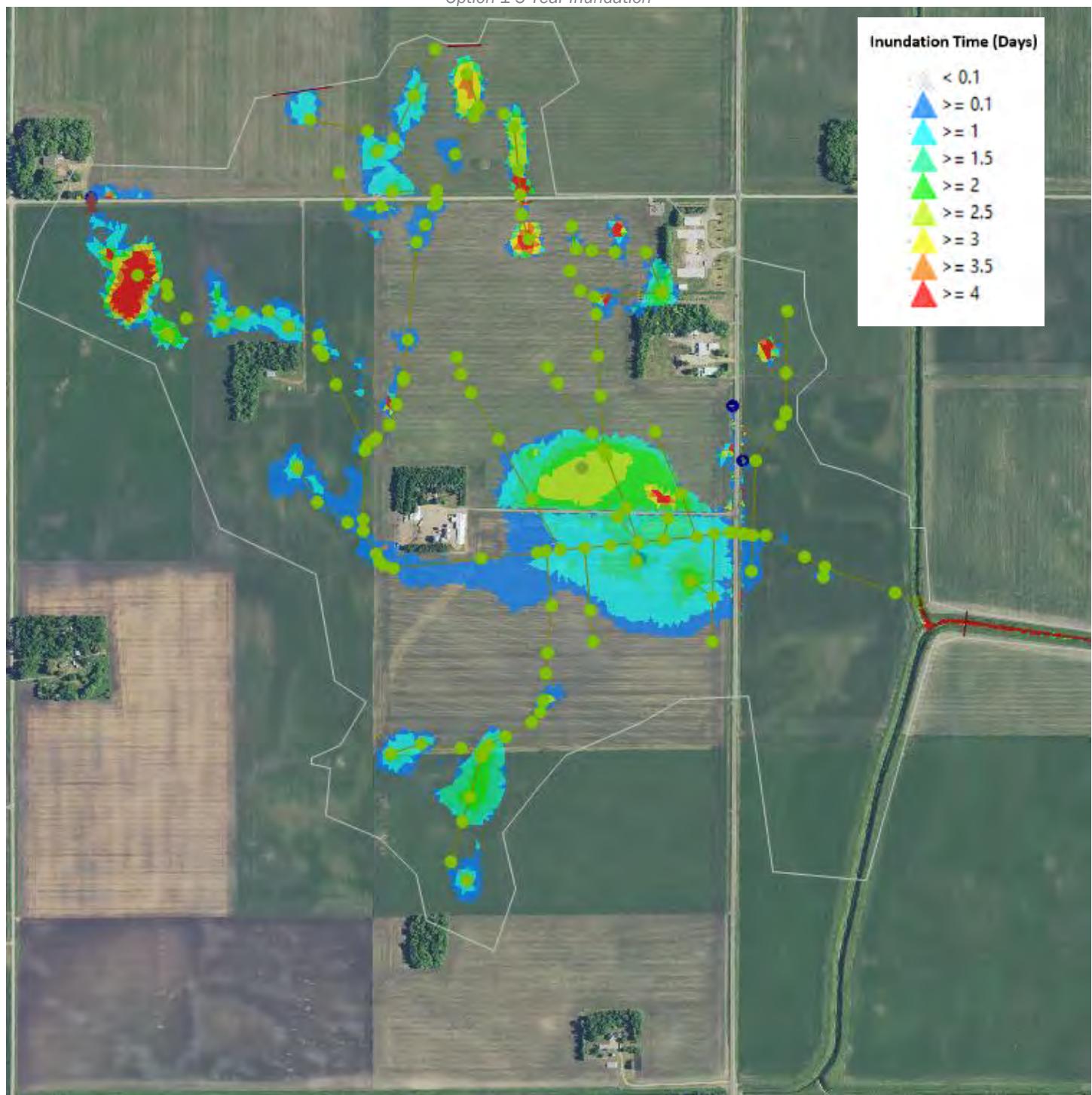
**PROJECT NO.** 29728

**ISG**

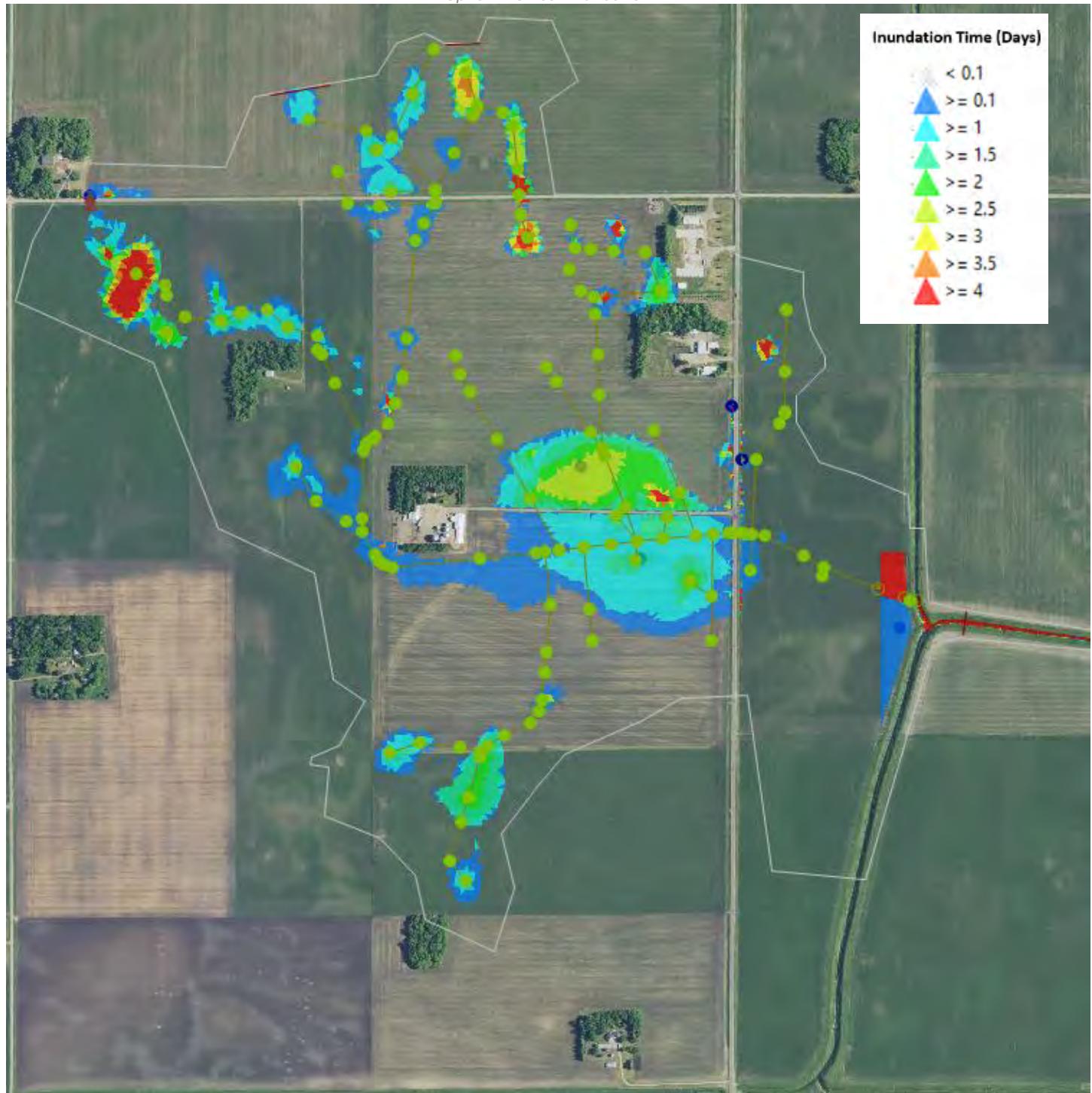
ACSC 5-Year Inundation



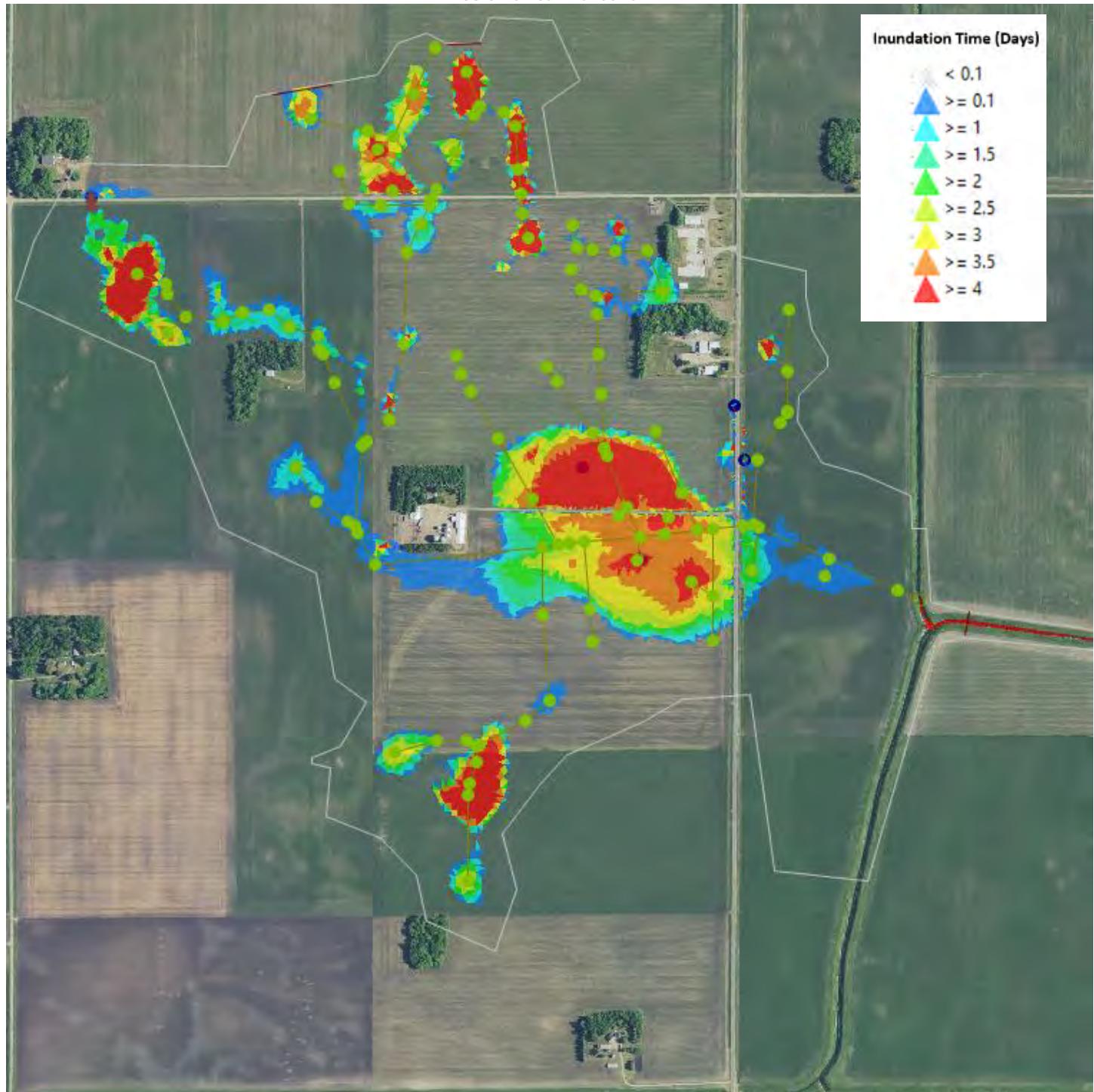
Option 1 5-Year Inundation



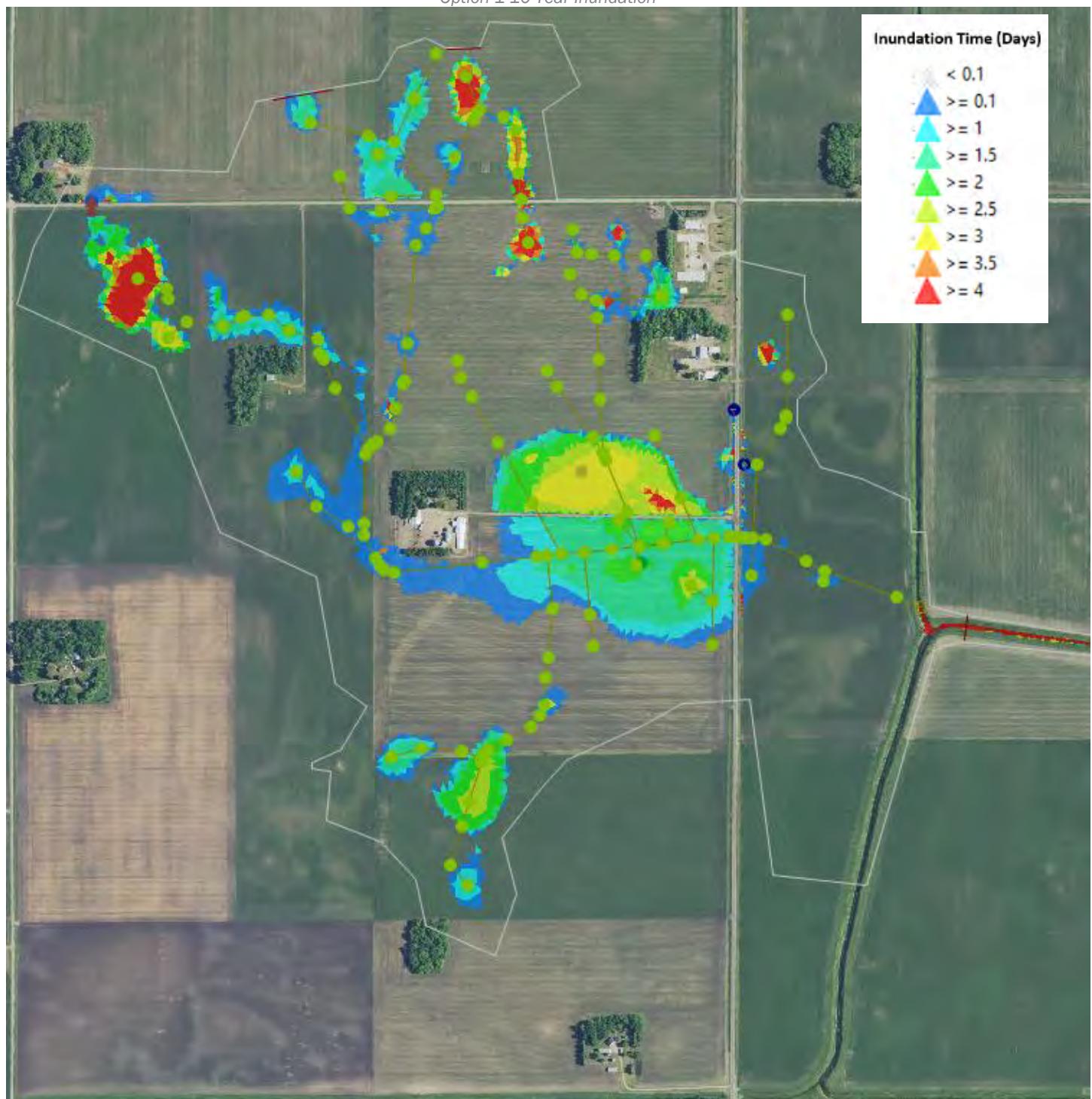
Option 2 5-Year Inundation



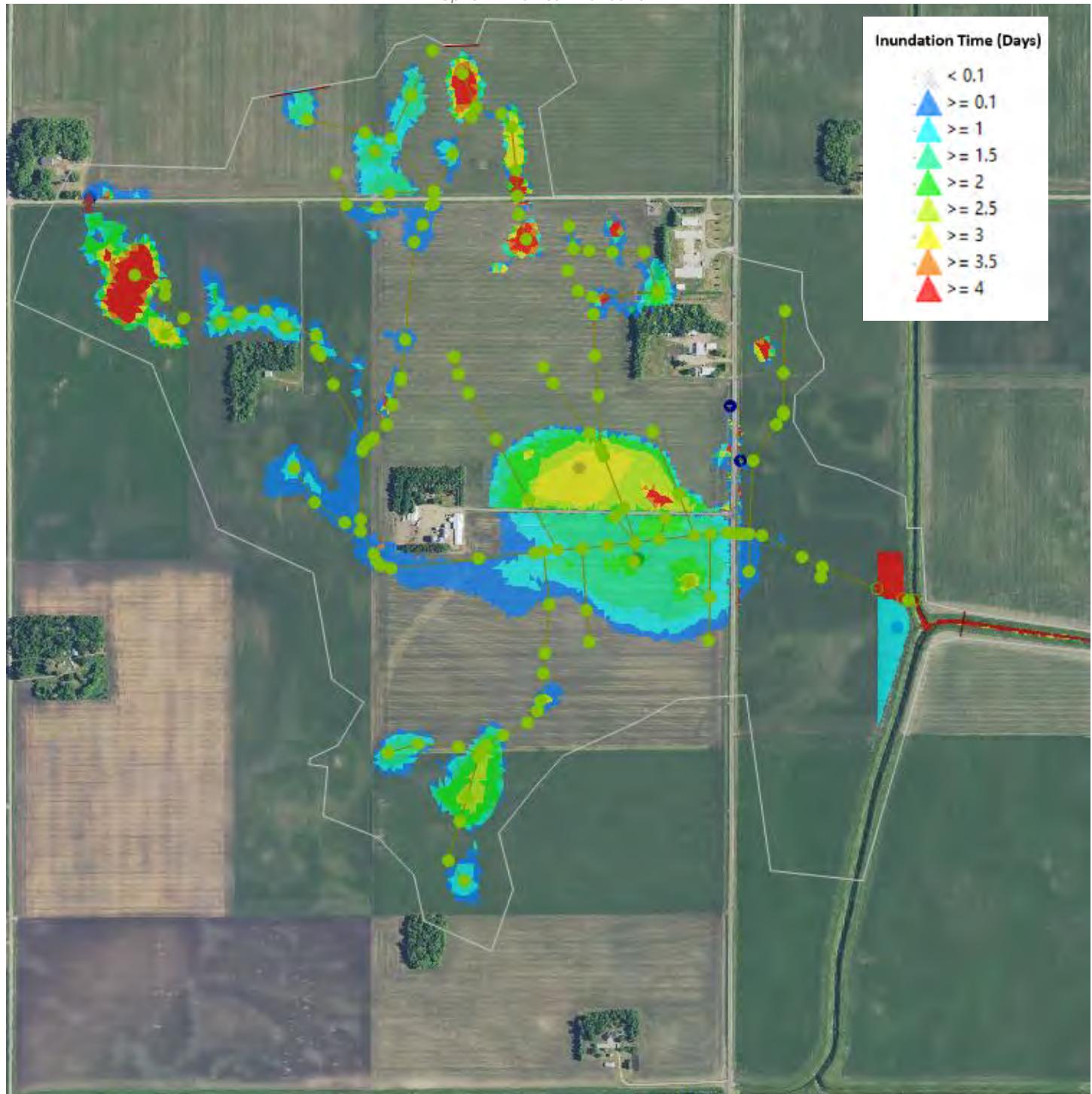
ACSC 10-Year Inundation



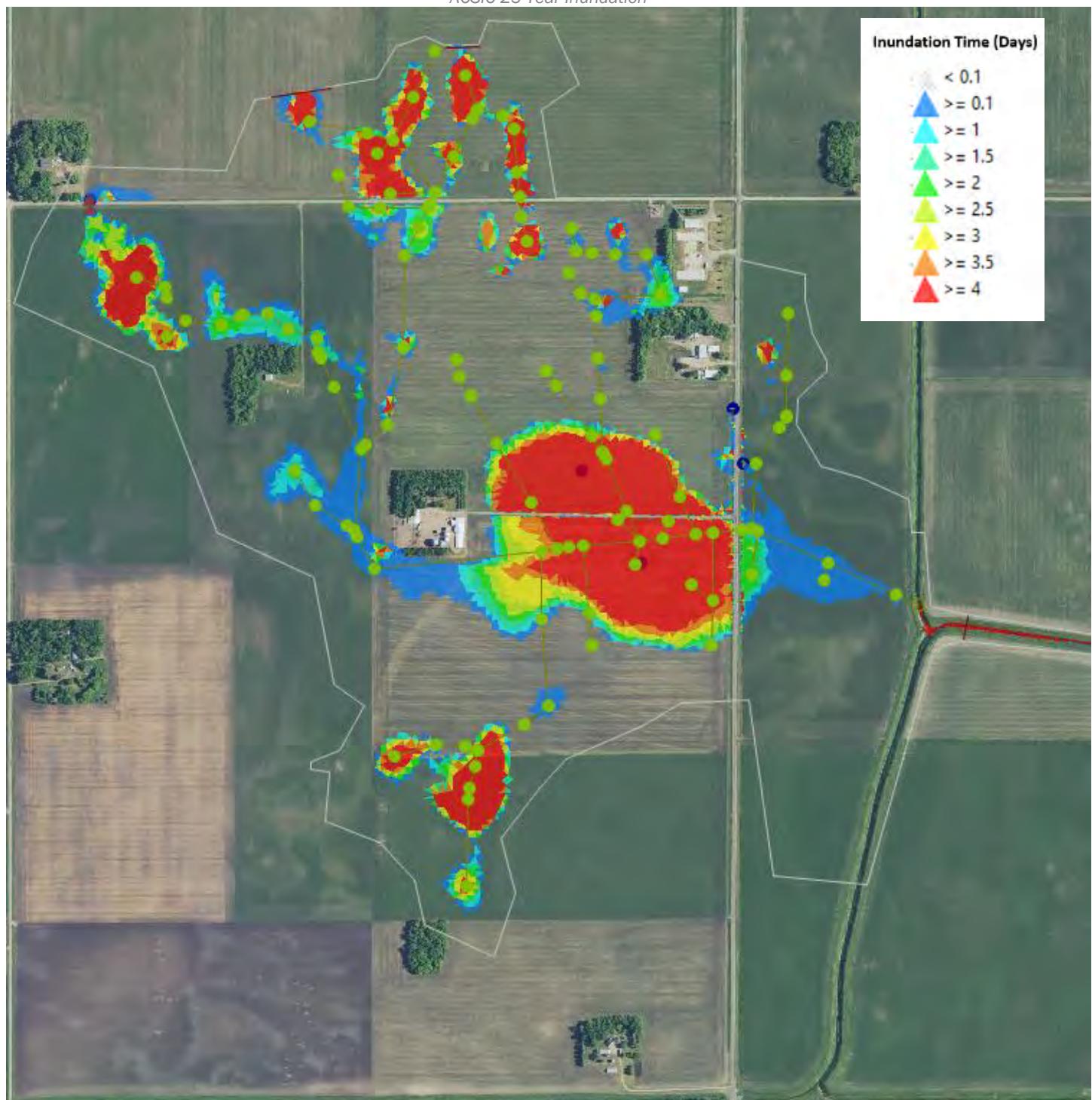
Option 1 10-Year Inundation



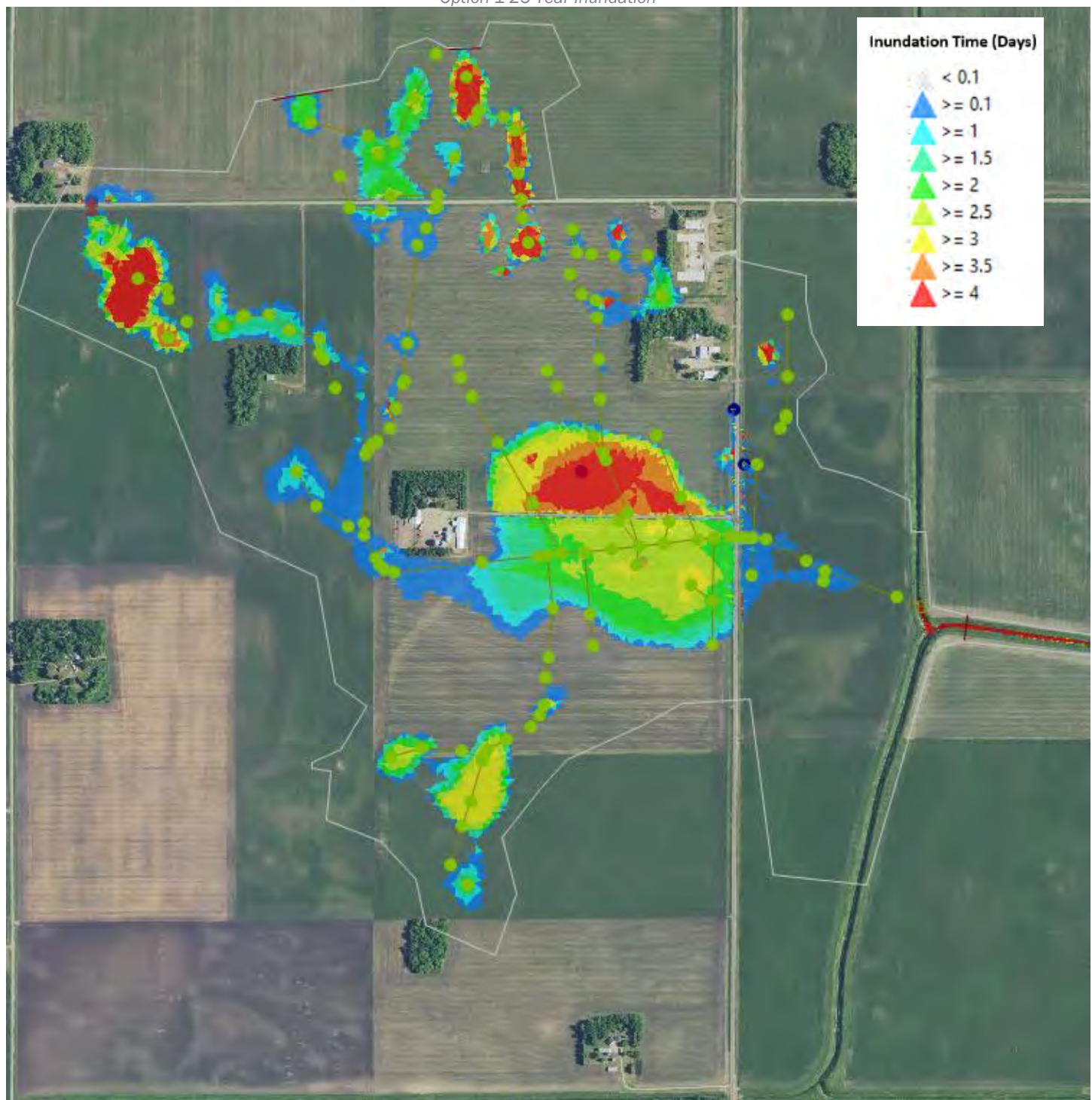
Option 2 10-Year Inundation



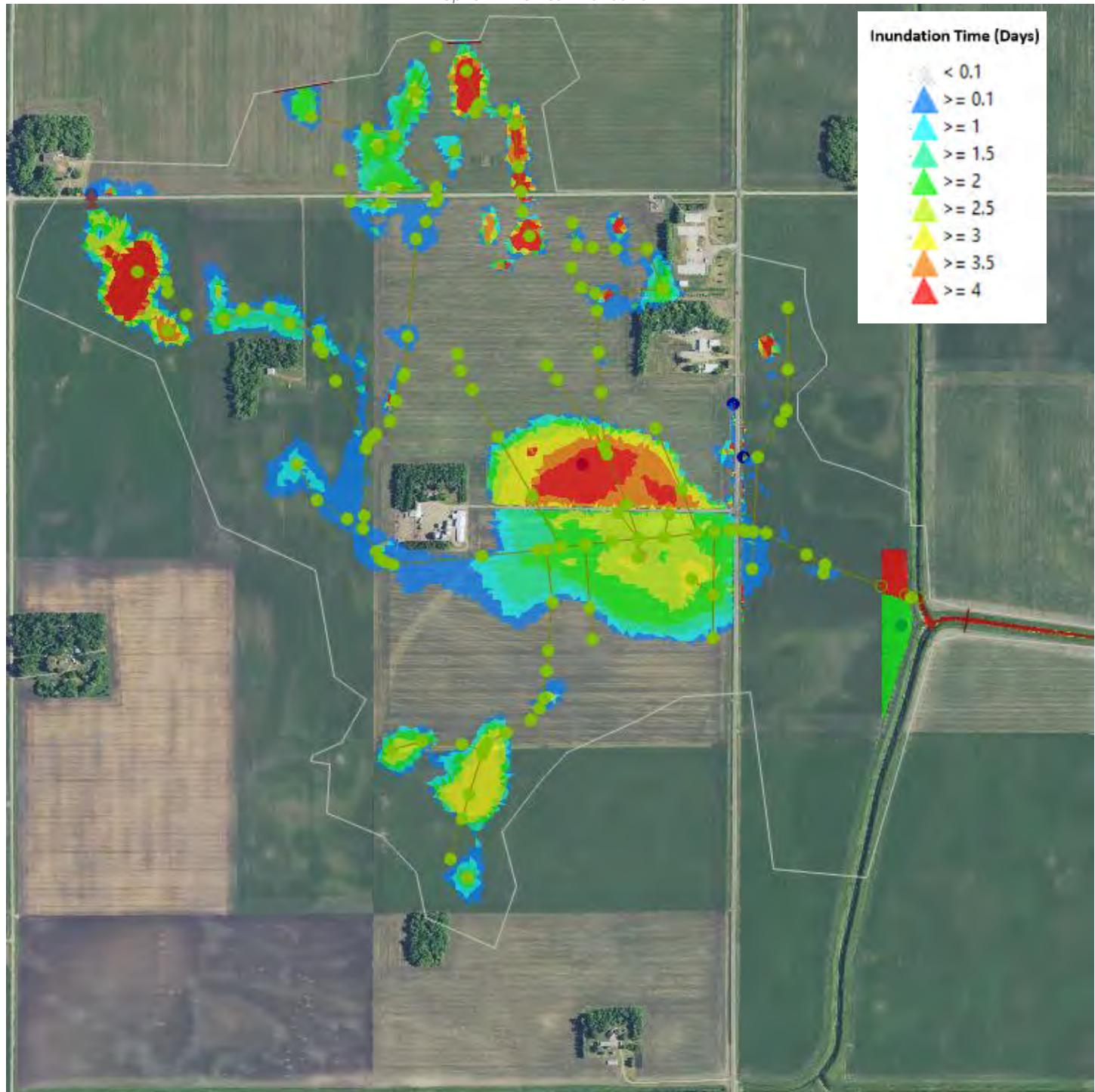
ACSC 25-Year Inundation



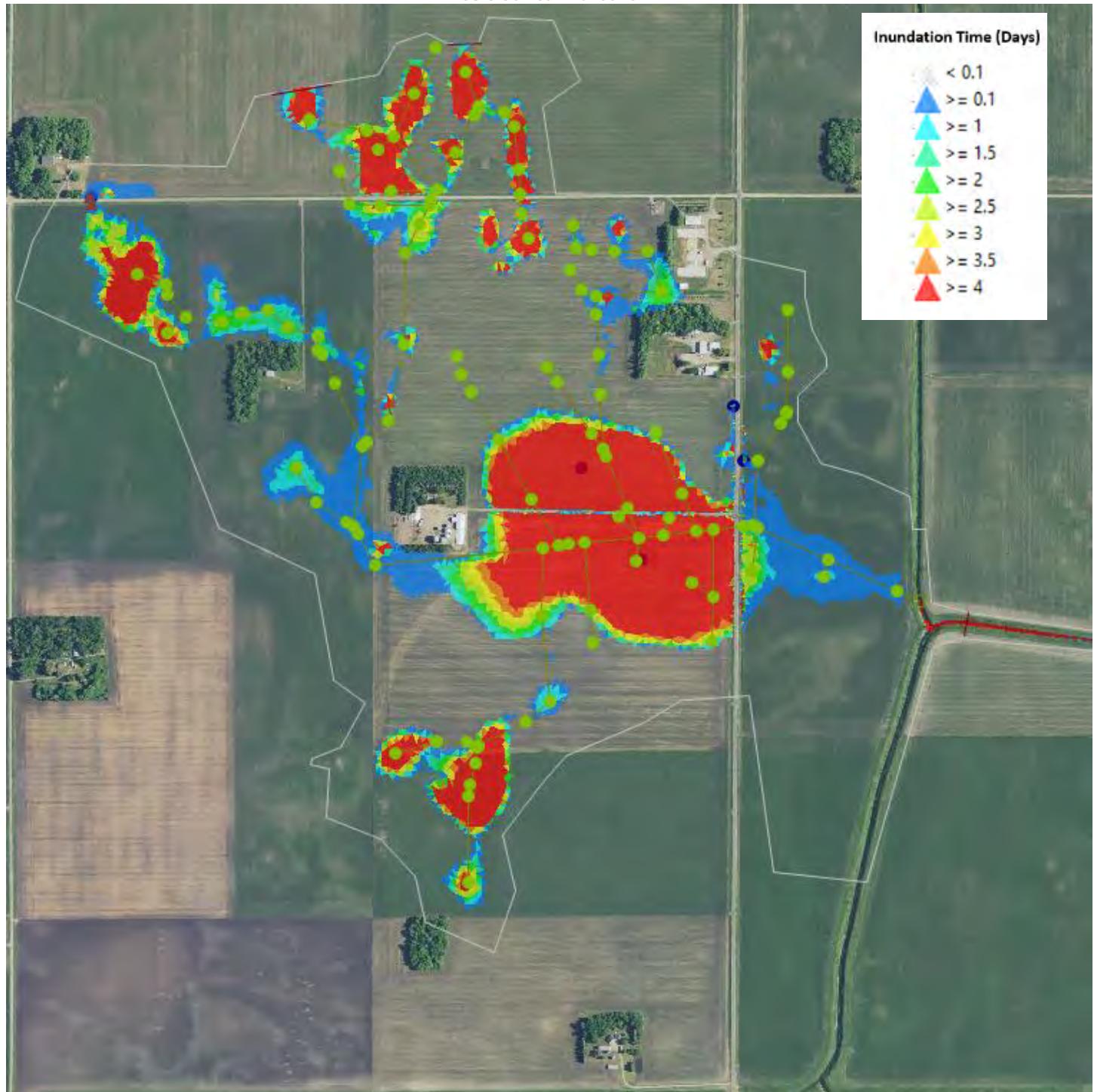
Option 1 25-Year Inundation



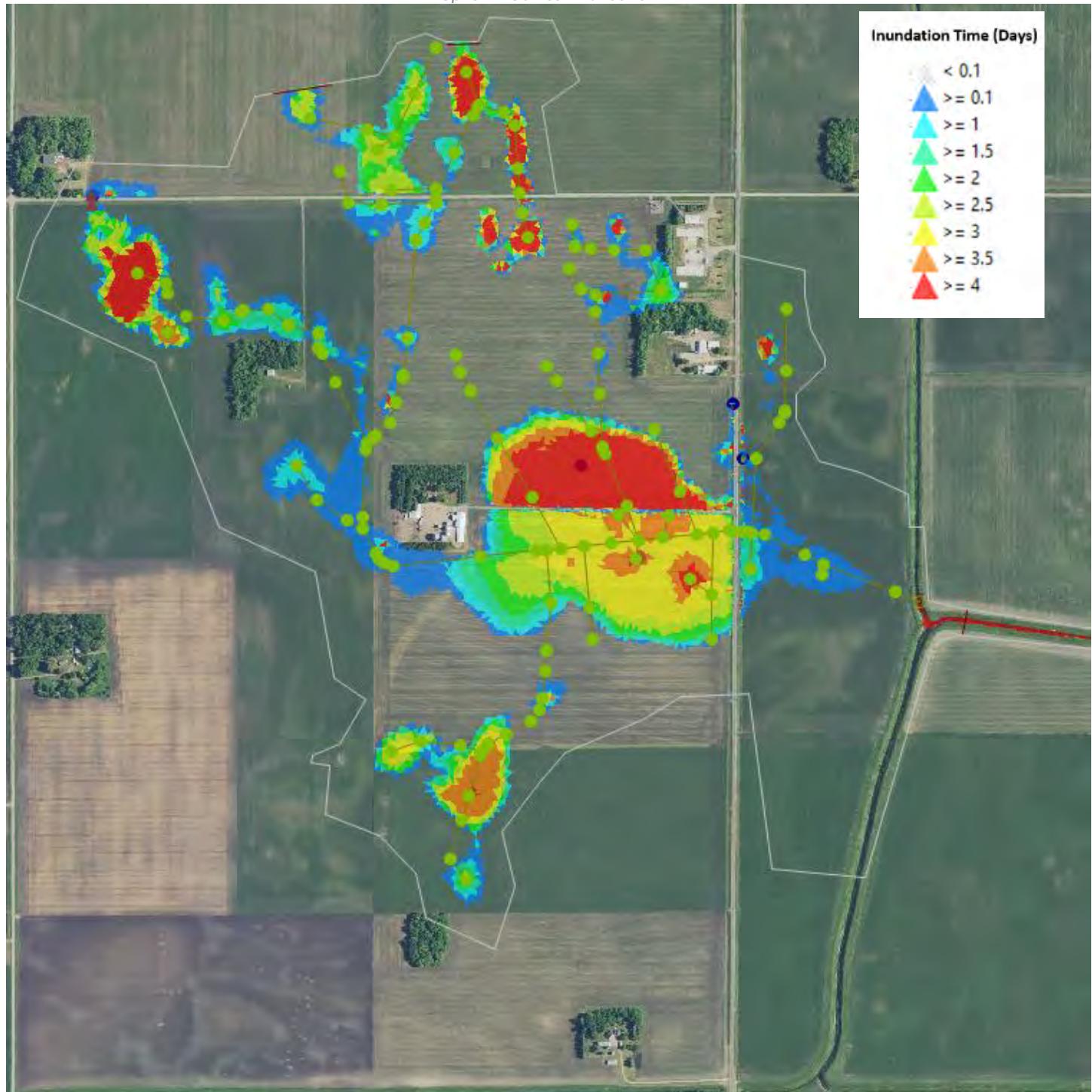
Option 2 25-Year Inundation



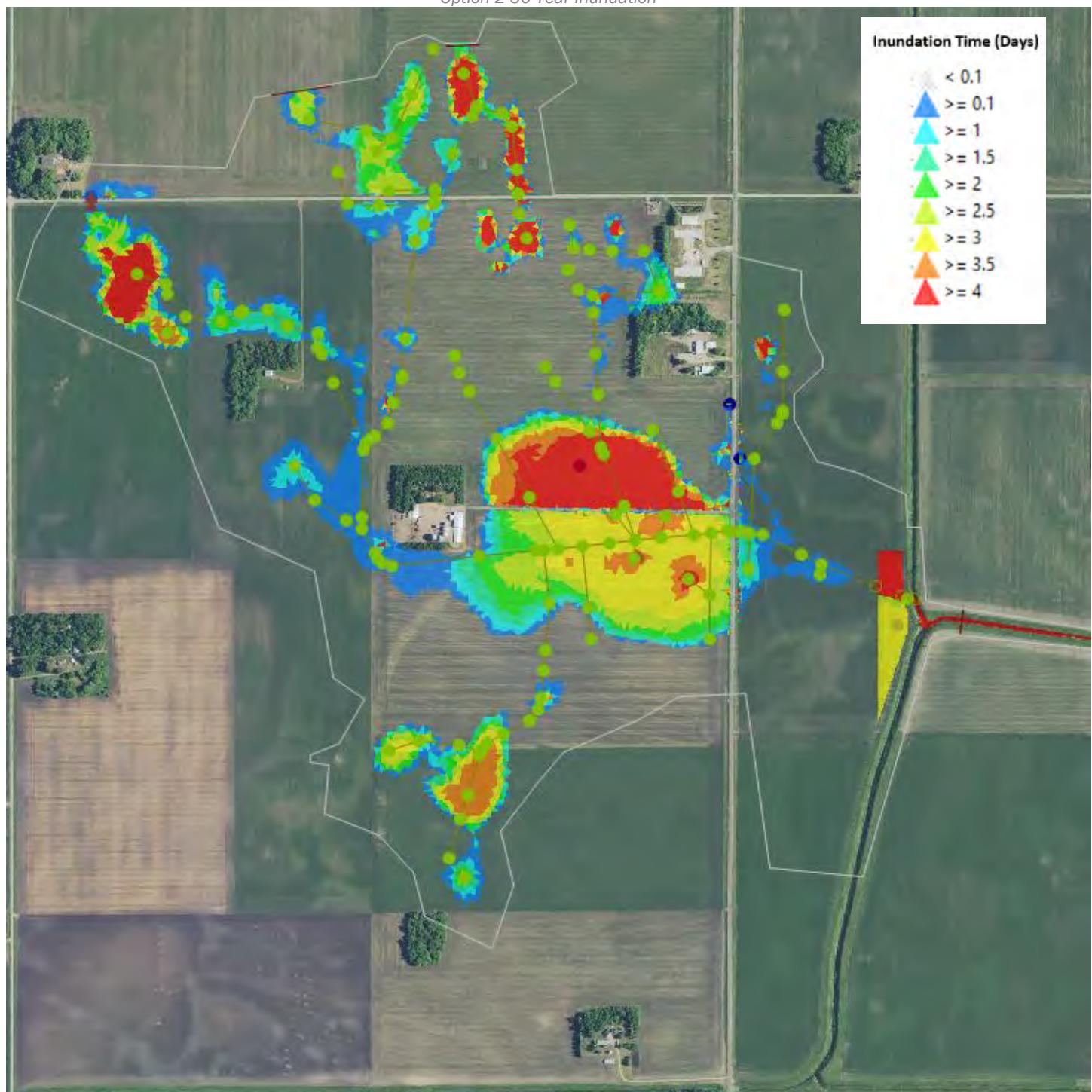
ACSC 50-Year Inundation



Option 1 50-Year Inundation



Option 2 50-Year Inundation



## ICM CUMULATIVE VOLUME TABLE

Location	Conveyance	5-yr			10-yr			25-yr			50-yr		
		ACSIC (Ac-Ft)	Proposed (Ac-Ft)	% Change	ACSIC (Ac-Ft)	Proposed (Ac-Ft)	% Change	ACSIC (Ac-Ft)	Proposed (Ac-Ft)	% Change	ACSIC (Ac-Ft)	Proposed (Ac-Ft)	% Change
Option 1 Outlet Volumes	Br 56 Outlet	58.50	66.20	13%	73.80	84.40	14%	98.20	112.70	15%	119.80	138.30	15%
	Br 59 Overland	0.90	1.00	11%	1.40	1.40	0%	2.20	2.10	-5%	3.80	2.80	-26%
	Branch 57 Overland	0.00	0.00	N/A	0.00	0.00	N/A	0.40	0.40	0%	1.60	1.00	-38%
	Cumulative	59.40	67.20	13%	75.20	85.80	14%	100.80	115.20	14%	125.20	142.10	13%
Option 2 Outlet Volumes	Br 56 Outlet	58.50	65.50	12%	73.80	83.30	13%	98.20	111.60	14%	119.80	137.00	14%
	Br 59 Overland	0.90	1.00	11%	1.40	1.40	0%	2.20	2.10	-5%	3.80	2.80	-26%
	Branch 57 Overland	0.00	0.00	N/A	0.00	0.00	N/A	0.40	0.30	-25%	1.60	1.00	-38%
	Cumulative	59.40	66.50	12%	75.20	84.70	13%	100.80	114.00	13%	125.20	140.80	12%

## Appendix F: Preliminary Cost Estimates

**Renville COUNTY  
JUDICIAL/COUNTY DITCH No. 15**

**ISG**

**PROPOSED IMPROVEMENT OPTION 1 COST SUMMARY**

Area	Separable Maintenance	Improvement Cost	Net Cost
Branch 56 Option 1	\$ 433,371	\$ 527,037	\$ 93,666
Branch 64 Option 1 & 2	\$ 110,853	\$ 122,510	\$ 11,657
Branch 37 Option 1 & 2	\$ 35,806	\$ 36,058	\$ 252
<b>Total Project Costs</b>	<b>\$ 580,030</b>	<b>\$ 685,605</b>	<b>\$ 105,575</b>
	Subtotal Separable Maintenance Costs		\$ 580,030
		Net Costs	\$ 105,575
		Viewing Costs	\$ 3,168
		<b>Total Project Costs for Landowners</b>	<b>\$ 688,773</b>

**PROPOSED IMPROVEMENT OPTION 2 COST SUMMARY**

Area	Separable	Improvement Cost	Net Cost
Branch 56 Option 2	\$ 433,371	\$ 507,069	\$ 73,698
Branch 64 Option 1 & 2	\$ 110,853	\$ 122,510	\$ 11,657
Branch 37 Option 1 & 2	\$ 35,806	\$ 36,058	\$ 252
Storage Option 2	\$ -	\$ 497,618	\$ 497,618
<b>Total Project Costs</b>	<b>\$ 580,030</b>	<b>\$ 1,163,254</b>	<b>\$ 583,224</b>
	Subtotal Separable Maintenance Costs		\$ 580,030
		Net Costs	\$ 583,224
		Viewing Costs	\$ 3,168
		<b>Total Project Costs for Landowners</b>	<b>\$ 1,166,422</b>
		Potential Grant Funding	\$ 447,856
		<b>Total Project Costs for Landowners (Pending Grant Funding)</b>	<b>\$ 718,566</b>

**Renville COUNTY  
JUDICIAL/COUNTY DITCH No. 15**



**SEPARABLE MAINTENANCE (REPAIR)**

**Branch 56**

<b>Item No.</b>	<b>Item</b>	<b>Unit</b>	<b>Quantity</b>	<b>Unit Price</b>	<b>Amount</b>
101	MOBILIZATION	LS	1	\$ 13,610.00	\$ 13,610
102	TILE INVESTIGATION	HR	15	\$ 225.00	\$ 3,375
103	18-INCH AGRICULTURAL TILE	LF	2929	\$ 31.00	\$ 90,799
104	12-INCH AGRICULTURAL TILE	LF	1548	\$ 21.00	\$ 32,508
105	10-INCH AGRICULTURAL TILE	LF	600	\$ 20.00	\$ 12,000
106	8-INCH AGRICULTURAL TILE	LF	1977	\$ 18.50	\$ 36,575
107	BORE 18-INCH TILE	LF	65	\$ 378.50	\$ 24,603
108	CONNECT EXISTING TILE (SIZE & MATERIAL MAY VARY)	EA	29	\$ 575.00	\$ 16,675
109	CONNECT EXISTING 12-INCH TILE	EA	1	\$ 930.00	\$ 930
110	CONNECT EXISTING 8-INCH TILE	EA	2	\$ 590.00	\$ 1,180
111	CONNECT EXISTING 6-INCH TILE	EA	2	\$ 510.00	\$ 1,020
112	18-INCH CROSS-CONNECT W/40 LF OF SPECIFIED PIPE	EA	5	\$ 2,480.00	\$ 12,400
113	12-INCH CROSS-CONNECT W/40 LF OF SPECIFIED PIPE	EA	3	\$ 1,580.00	\$ 4,740
114	10-INCH CROSS-CONNECT W/40 LF OF SPECIFIED PIPE	EA	1	\$ 1,350.00	\$ 1,350
115	8-INCH CROSS-CONNECT W/40 LF OF SPECIFIED PIPE	EA	2	\$ 1,270.00	\$ 2,540
116	SAND OR CLSM FILL PIPE UNDER ROAD (18-INCH)	LF	100	\$ 24.00	\$ 2,400
117	GRANULAR PIPE FOUNDATION	CY	64	\$ 40.00	\$ 2,560
118	INSTALL DROP INTAKE (18-INCH)	EA	10	\$ 1,450.00	\$ 14,500
119	CAP DROP INTAKE (18-INCH)	EA	2	\$ 440.00	\$ 880
120	INSTALL BAR GUARD ASSEMBLY (18-INCH DROP INTAKES)	EA	8	\$ 350.00	\$ 2,800
121	18-INCH TILE OUTLET (20 LF OF PIPE & RIPRAP ON GEOTEXTILE FABRIC)	EA	1	\$ 1,560.00	\$ 1,560
122	OPEN CUT & RESTORE GRAVEL ROAD OR DRIVEWAY	EA	1	\$ 2,150.00	\$ 2,150
123	SEED MIX 25-142 W/MNDOT EROSION CONTROL BLANKET CATEGORY 3	SY	700	\$ 3.50	\$ 2,450
<b>SUBTOTAL CONSTRUCTION COST</b>					<b>\$ 283,604</b>
10% UNFORSEEN					\$ 28,360
<b>TOTAL CONSTRUCTION COST</b>					<b>\$ 311,964</b>
TEMPORARY DAMAGES		AC	19.56	\$ 850.00	\$ 16,622
TELEVISING (POST CONSTRUCTION)		LF	7054	\$ 1.00	\$ 7,054
COUNTY ADMINISTRATION COSTS					\$ 15,599
TOPOGRAPHIC SURVEY					\$ 8,818
REPORTS, PLANS AND SPECIFICATIONS					\$ 31,197
CONSTRUCTION STAKING & ADMINISTRATION					\$ 42,116
<b>TOTAL BRANCH 56 REPAIR COST</b>					<b>\$ 433,371</b>

**Renville COUNTY  
JUDICIAL/COUNTY DITCH No. 15**



**SEPARABLE MAINTENANCE (REPAIR)**

**Branch 64**

Item No.	Item	Unit	Quantity	Unit Price	Amount
101	MOBILIZATION	LS	1	\$ 3,540.00	\$ 3,540
102	TILE INVESTIGATION	HR	6	\$ 225.00	\$ 1,350
103	8-INCH AGRICULTURAL TILE	LF	900	\$ 18.50	\$ 16,650
104	6-INCH AGRICULTURAL TILE	LF	2078	\$ 18.50	\$ 38,443
105	CONNECT EXISTING TILE (SIZE & MATERIAL MAY VARY)	EA	12	\$ 575.00	\$ 6,900
106	CONNECT EXISTING 6-INCH TILE	EA	1	\$ 510.00	\$ 510
107	GRANULAR PIPE FOUNDATION	CY	20	\$ 40.00	\$ 800
108	INSTALL DROP INTAKE (18-INCH)	EA	3	\$ 1,450.00	\$ 4,350
109	CAP DROP INTAKE (18-INCH)	EA	1	\$ 440.00	\$ 440
110	INSTALL BAR GUARD ASSEMBLY (18-INCH DROP INTAKES)	EA	2	\$ 350.00	\$ 700
<b>SUBTOTAL CONSTRUCTION COST</b>					<b>\$ 73,683</b>
10% UNFORSEEN					\$ 7,368
<b>TOTAL CONSTRUCTION COST</b>					<b>\$ 81,051</b>
TEMPORARY DAMAGES		AC	0.00	\$ 850.00	\$ -
TELEVISING (POST CONSTRUCTION)		LF	2978	\$ 1.00	\$ 2,978
COUNTY ADMINISTRATION COSTS					\$ 4,053
TOPOGRAPHIC SURVEY					\$ 3,723
REPORTS, PLANS AND SPECIFICATIONS					\$ 8,106
CONSTRUCTION STAKING & ADMINISTRATION					\$ 10,942
<b>TOTAL BRANCH 64 REPAIR COST</b>					<b>\$ 110,853</b>

**Branch 37**

Item No.	Item	Unit	Quantity	Unit Price	Amount
101	MOBILIZATION	LS	1	\$ 1,100.00	\$ 1,100
102	TILE INVESTIGATION	HR	2	\$ 225.00	\$ 450
103	6-INCH AGRICULTURAL TILE	LF	822	\$ 18.50	\$ 15,207
104	CONNECT EXISTING TILE (SIZE & MATERIAL MAY VARY)	EA	4	\$ 575.00	\$ 2,300
105	CONNECT EXISTING 6-INCH TILE	EA	1	\$ 510.00	\$ 510
106	8-INCH CROSS-CONNECT W/40 LF OF SPECIFIED PIPE	EA	1	\$ 1,270.00	\$ 1,270
107	GRANULAR PIPE FOUNDATION	CY	4	\$ 40.00	\$ 160
108	INSTALL DROP INTAKE (18-INCH)	EA	1	\$ 1,450.00	\$ 1,450
109	CAP DROP INTAKE (18-INCH)	EA	1	\$ 440.00	\$ 440
<b>SUBTOTAL CONSTRUCTION COST</b>					<b>\$ 22,887</b>
10% UNFORSEEN					\$ 2,289
<b>TOTAL CONSTRUCTION COST</b>					<b>\$ 25,176</b>
TEMPORARY DAMAGES		AC	1.89	\$ 850.00	\$ 1,604
TELEVISING (POST CONSTRUCTION)		LF	822	\$ 1.00	\$ 822
COUNTY ADMINISTRATION COSTS					\$ 1,259
TOPOGRAPHIC SURVEY					\$ 1,028
REPORTS, PLANS AND SPECIFICATIONS					\$ 2,518
CONSTRUCTION STAKING & ADMINISTRATION					\$ 3,399
<b>TOTAL BRANCH 37 REPAIR COST</b>					<b>\$ 35,806</b>

**TOTAL REPAIR COST**

Branch 56	\$ 433,371
Branch 64	\$ 110,853
Branch 37	\$ 35,806

**COMPLETE REPAIR COST** \$ 580,030

**Renville COUNTY  
JUDICIAL/COUNTY DITCH No. 15**



**PROPOSED IMPROVEMENT - OPTION #1**

**Branch 56 Option 1**

Item No.	Item	Unit	Quantity	Unit Price	Amount
101	MOBILIZATION	LS	1	\$ 16,660.00	\$ 16,660
102	TILE INVESTIGATION	HR	15	\$ 225.00	\$ 3,375
103	24-INCH AGRICULTURAL TILE	LF	2885	\$ 39.50	\$ 113,958
104	18-INCH AGRICULTURAL TILE	LF	1570	\$ 31.00	\$ 48,670
105	15-INCH AGRICULTURAL TILE	LF	600	\$ 25.75	\$ 15,450
106	12-INCH AGRICULTURAL TILE	LF	1977	\$ 21.00	\$ 41,517
107	8-INCH AGRICULTURAL TILE	LF	20	\$ 18.50	\$ 370
108	BORE 24-INCH TILE	LF	65	\$ 462.50	\$ 30,063
109	CONNECT EXISTING TILE (SIZE & MATERIAL MAY VARY)	EA	29	\$ 575.00	\$ 16,675
110	CONNECT EXISTING 12-INCH TILE	EA	1	\$ 930.00	\$ 930
111	CONNECT EXISTING 8-INCH TILE	EA	2	\$ 590.00	\$ 1,180
112	CONNECT EXISTING 6-INCH TILE	EA	2	\$ 510.00	\$ 1,020
113	18-INCH CROSS-CONNECT W/40 LF OF SPECIFIED PIPE	EA	5	\$ 2,480.00	\$ 12,400
114	12-INCH CROSS-CONNECT W/40 LF OF SPECIFIED PIPE	EA	3	\$ 1,580.00	\$ 4,740
115	10-INCH CROSS-CONNECT W/40 LF OF SPECIFIED PIPE	EA	1	\$ 1,350.00	\$ 1,350
116	8-INCH CROSS-CONNECT W/40 LF OF SPECIFIED PIPE	EA	2	\$ 1,270.00	\$ 2,540
117	SAND OR CLSM FILL PIPE UNDER ROAD (18-INCH)	LF	100	\$ 24.00	\$ 2,400
118	GRANULAR PIPE FOUNDATION	CY	50	\$ 40.00	\$ 2,000
119	FURNISH & INSTALL WATER QUALITY INLET	EA	4	\$ 1,094.87	\$ 4,379
120	INSTALL 8-INCH PERFORATED TILE (WATER QUALITY INLET)	LF	130	\$ 21.45	\$ 2,789
121	INSTALL DROP INTAKE (18-INCH)	EA	10	\$ 1,450.00	\$ 14,500
122	CAP DROP INTAKE (18-INCH)	EA	2	\$ 440.00	\$ 880
123	INSTALL BAR GUARD ASSEMBLY (18-INCH DROP INTAKES)	EA	8	\$ 350.00	\$ 2,800
124	24-INCH TILE OUTLET (20 LF OF PIPE & RIPRAP ON GEOTEXTILE FABRIC)	EA	1	\$ 1,960.00	\$ 1,960
125	OPEN CUT & RESTORE GRAVEL ROAD OR DRIVEWAY	EA	1	\$ 2,150.00	\$ 2,150
126	SEED MIX 25-142 W/MNDOT EROSION CONTROL BLANKET CATEGORY 3	SY	700	\$ 3.50	\$ 2,450
<b>SUBTOTAL CONSTRUCTION COST</b>					<b>\$ 347,205</b>
10% UNFORSEEN					\$ 34,721
<b>TOTAL CONSTRUCTION COST</b>					<b>\$ 381,926</b>
TEMPORARY DAMAGES		AC	19.50	\$ 850.00	\$ 16,576
TELEVISING (POST CONSTRUCTION)		LF	7052	\$ 1.00	\$ 7,052
COUNTY ADMINISTRATION COSTS					\$ 19,097
TOPOGRAPHIC SURVEY					\$ 8,815
REPORTS, PLANS AND SPECIFICATIONS					\$ 42,012
CONSTRUCTION STAKING & ADMINISTRATION					\$ 51,560
<b>TOTAL BRANCH 56 OPTION 1 IMPROVEMENT COST</b>					<b>\$ 527,037</b>

**Renville COUNTY**  
**JUDICIAL/COUNTY DITCH No. 15**



**PROPOSED IMPROVEMENT - OPTION #1**

**Branch 64 Option 1 & 2**

Item No.	Item	Unit	Quantity	Unit Price	Amount
101	MOBILIZATION	LS	1	\$ 3,710.00	\$ 3,710
102	TILE INVESTIGATION	HR	6	\$ 225.00	\$ 1,350
103	12-INCH AGRICULTURAL TILE	LF	900	\$ 21.00	\$ 18,900
104	10-INCH AGRICULTURAL TILE	LF	850	\$ 20.00	\$ 17,000
105	8-INCH AGRICULTURAL TILE	LF	1228	\$ 18.50	\$ 22,718
106	CONNECT EXISTING TILE (SIZE & MATERIAL MAY VARY)	EA	12	\$ 575.00	\$ 6,900
107	CONNECT EXISTING 6-INCH TILE	EA	1	\$ 510.00	\$ 510
108	GRANULAR PIPE FOUNDATION	CY	16	\$ 40.00	\$ 640
109	INSTALL DROP INTAKE (18-INCH)	EA	3	\$ 1,450.00	\$ 4,350
110	CAP DROP INTAKE (18-INCH)	EA	1	\$ 440.00	\$ 440
111	INSTALL BAR GUARD ASSEMBLY (18-INCH DROP INTAKES)	EA	2	\$ 350.00	\$ 700
<b>SUBTOTAL CONSTRUCTION COST</b>					<b>\$ 77,218</b>
10% UNFORSEEN					\$ 7,722
<b>TOTAL CONSTRUCTION COST</b>					<b>\$ 84,940</b>
TEMPORARY DAMAGES					
TELEVISING (POST CONSTRUCTION)					
COUNTY ADMINISTRATION COSTS					
TOPOGRAPHIC SURVEY					
REPORTS, PLANS AND SPECIFICATIONS					
CONSTRUCTION STAKING & ADMINISTRATION					
<b>TOTAL BRANCH 64 OPTION 1 &amp; 2 IMPROVEMENT COST</b>					<b>\$ 122,510</b>

**Branch 37 Option 1 & 2**

Item No.	Item	Unit	Quantity	Unit Price	Amount
101	MOBILIZATION	LS	1	\$ 1,100.00	\$ 1,100
102	TILE INVESTIGATION	HR	2	\$ 225.00	\$ 450
103	8-INCH AGRICULTURAL TILE	LF	822	\$ 18.50	\$ 15,207
104	CONNECT EXISTING TILE (SIZE & MATERIAL MAY VARY)	EA	4	\$ 575.00	\$ 2,300
105	CONNECT EXISTING 6-INCH TILE	EA	1	\$ 510.00	\$ 510
106	8-INCH CROSS-CONNECT W/40 LF OF SPECIFIED PIPE	EA	1	\$ 1,270.00	\$ 1,270
107	GRANULAR PIPE FOUNDATION	CY	4	\$ 40.00	\$ 160
108	INSTALL DROP INTAKE (18-INCH)	EA	1	\$ 1,450.00	\$ 1,450
109	CAP DROP INTAKE (18-INCH)	EA	1	\$ 440.00	\$ 440
<b>SUBTOTAL CONSTRUCTION COST</b>					<b>\$ 22,887</b>
10% UNFORSEEN					\$ 2,289
<b>TOTAL CONSTRUCTION COST</b>					<b>\$ 25,176</b>
TEMPORARY DAMAGES					
TELEVISING (POST CONSTRUCTION)					
COUNTY ADMINISTRATION COSTS					
TOPOGRAPHIC SURVEY					
REPORTS, PLANS AND SPECIFICATIONS					
CONSTRUCTION STAKING & ADMINISTRATION					
<b>TOTAL BRANCH 37 OPTION 1 &amp; 2 IMPROVEMENT COST</b>					<b>\$ 36,058</b>

**TOTAL IMPROVEMENT COST**

Branch 56 Option 1	\$ 527,037
Branch 64 Option 1 & 2	\$ 122,510
Branch 37 Option 1 & 2	\$ 36,058
<b>COMPLETE IMPROVEMENT COST</b>	<b>\$ 685,605</b>

**Renville COUNTY  
JUDICIAL/COUNTY DITCH No. 15**



**PROPOSED IMPROVEMENT - OPTION #2**

**Branch 56 Option 2**

Item No.	Item	Unit	Quantity	Unit Price	Amount
101	MOBILIZATION	LS	1	\$ 16,030.00	\$ 16,030
102	TILE INVESTIGATION	HR	14	\$ 225.00	\$ 3,150
103	24-INCH AGRICULTURAL TILE	LF	2595	\$ 39.50	\$ 102,503
104	18-INCH AGRICULTURAL TILE	LF	1570	\$ 31.00	\$ 48,670
105	15-INCH AGRICULTURAL TILE	LF	600	\$ 25.75	\$ 15,450
106	12-INCH AGRICULTURAL TILE	LF	1977	\$ 21.00	\$ 41,517
107	8-INCH AGRICULTURAL TILE	LF	20	\$ 18.50	\$ 370
108	BORE 24-INCH TILE	LF	65	\$ 462.50	\$ 30,063
109	CONNECT EXISTING TILE (SIZE & MATERIAL MAY VARY)	EA	28	\$ 575.00	\$ 16,100
110	CONNECT EXISTING 12-INCH TILE	EA	1	\$ 930.00	\$ 930
111	CONNECT EXISTING 8-INCH TILE	EA	2	\$ 590.00	\$ 1,180
112	CONNECT EXISTING 6-INCH TILE	EA	2	\$ 510.00	\$ 1,020
113	18-INCH CROSS-CONNECT W/40 LF OF SPECIFIED PIPE	EA	5	\$ 2,480.00	\$ 12,400
114	12-INCH CROSS-CONNECT W/40 LF OF SPECIFIED PIPE	EA	3	\$ 1,580.00	\$ 4,740
115	10-INCH CROSS-CONNECT W/40 LF OF SPECIFIED PIPE	EA	1	\$ 1,350.00	\$ 1,350
116	8-INCH CROSS-CONNECT W/40 LF OF SPECIFIED PIPE	EA	2	\$ 1,270.00	\$ 2,540
117	SAND OR CLSM FILL PIPE UNDER ROAD (18-INCH)	LF	100	\$ 24.00	\$ 2,400
118	GRANULAR PIPE FOUNDATION	CY	48	\$ 40.00	\$ 1,920
119	FURNISH & INSTALL WATER QUALITY INLET	EA	4	\$ 1,094.87	\$ 4,379
120	INSTALL 8-INCH PERFORATED TILE (WATER QUALITY INLET)	LF	130	\$ 21.45	\$ 2,789
121	INSTALL DROP INTAKE (18-INCH)	EA	10	\$ 1,450.00	\$ 14,500
122	CAP DROP INTAKE (18-INCH)	EA	2	\$ 440.00	\$ 880
123	INSTALL BAR GUARD ASSEMBLY (18-INCH DROP INTAKES)	EA	8	\$ 350.00	\$ 2,800
124	24-INCH TILE OUTLET (20 LF OF PIPE & RIPRAP ON GEOTEXTILE FABRIC)	EA	1	\$ 1,960.00	\$ 1,960
125	OPEN CUT & RESTORE GRAVEL ROAD OR DRIVEWAY	EA	1	\$ 2,150.00	\$ 2,150
126	SEED MIX 25-142 W/MNDOT EROSION CONTROL BLANKET CATEGORY 3	SY	700	\$ 3.50	\$ 2,450
<b>SUBTOTAL CONSTRUCTION COST</b>					<b>\$ 334,240</b>
10% UNFORSEEN					\$ 33,424
<b>TOTAL CONSTRUCTION COST</b>					<b>\$ 367,664</b>
TEMPORARY DAMAGES		AC	18.50	\$ 850.00	\$ 15,727
TELEVISING (POST CONSTRUCTION)		LF	6762	\$ 1.00	\$ 6,762
COUNTY ADMINISTRATION COSTS					\$ 18,384
TOPOGRAPHIC SURVEY					\$ 8,453
REPORTS, PLANS AND SPECIFICATIONS					\$ 40,444
CONSTRUCTION STAKING & ADMINISTRATION					\$ 49,635
<b>TOTAL BRANCH 56 OPTION 2 IMPROVEMENT COST</b>					<b>\$ 507,069</b>

**Renville COUNTY**  
**JUDICIAL/COUNTY DITCH No. 15**



**PROPOSED IMPROVEMENT - OPTION #2**

**Branch 64 Option 1 & 2**

Item No.	Item	Unit	Quantity	Unit Price	Amount
101	MOBILIZATION	LS	1	\$ 3,710.00	\$ 3,710
102	TILE INVESTIGATION	HR	6	\$ 225.00	\$ 1,350
103	12-INCH AGRICULTURAL TILE	LF	900	\$ 21.00	\$ 18,900
104	10-INCH AGRICULTURAL TILE	LF	850	\$ 20.00	\$ 17,000
105	8-INCH AGRICULTURAL TILE	LF	1228	\$ 18.50	\$ 22,718
106	CONNECT EXISTING TILE (SIZE & MATERIAL MAY VARY)	EA	12	\$ 575.00	\$ 6,900
107	CONNECT EXISTING 6-INCH TILE	EA	1	\$ 510.00	\$ 510
108	GRANULAR PIPE FOUNDATION	CY	16	\$ 40.00	\$ 640
109	INSTALL DROP INTAKE (18-INCH)	EA	3	\$ 1,450.00	\$ 4,350
110	CAP DROP INTAKE (18-INCH)	EA	1	\$ 440.00	\$ 440
111	INSTALL BAR GUARD ASSEMBLY (18-INCH DROP INTAKES)	EA	2	\$ 350.00	\$ 700
<b>SUBTOTAL CONSTRUCTION COST</b>					<b>\$ 77,218</b>
10% UNFORSEEN					\$ 7,722
<b>TOTAL CONSTRUCTION COST</b>					<b>\$ 84,940</b>
TEMPORARY DAMAGES					
TELEVISING (POST CONSTRUCTION)					
COUNTY ADMINISTRATION COSTS					
TOPOGRAPHIC SURVEY					
REPORTS, PLANS AND SPECIFICATIONS					
CONSTRUCTION STAKING & ADMINISTRATION					
<b>TOTAL BRANCH 64 OPTION 1 &amp; 2 IMPROVEMENT COST</b>					<b>\$ 122,510</b>

**Branch 37 Option 1 & 2**

Item No.	Item	Unit	Quantity	Unit Price	Amount
101	MOBILIZATION	LS	1	\$ 1,100.00	\$ 1,100
102	TILE INVESTIGATION	HR	2	\$ 225.00	\$ 450
103	8-INCH AGRICULTURAL TILE	LF	822	\$ 18.50	\$ 15,207
104	CONNECT EXISTING TILE (SIZE & MATERIAL MAY VARY)	EA	4	\$ 575.00	\$ 2,300
105	CONNECT EXISTING 6-INCH TILE	EA	1	\$ 510.00	\$ 510
106	8-INCH CROSS-CONNECT W/40 LF OF SPECIFIED PIPE	EA	1	\$ 1,270.00	\$ 1,270
107	GRANULAR PIPE FOUNDATION	CY	4	\$ 40.00	\$ 160
108	INSTALL DROP INTAKE (18-INCH)	EA	1	\$ 1,450.00	\$ 1,450
109	CAP DROP INTAKE (18-INCH)	EA	1	\$ 440.00	\$ 440
<b>SUBTOTAL CONSTRUCTION COST</b>					<b>\$ 22,887</b>
10% UNFORSEEN					\$ 2,289
<b>TOTAL CONSTRUCTION COST</b>					<b>\$ 25,176</b>
TEMPORARY DAMAGES					
TELEVISING (POST CONSTRUCTION)					
COUNTY ADMINISTRATION COSTS					
TOPOGRAPHIC SURVEY					
REPORTS, PLANS AND SPECIFICATIONS					
CONSTRUCTION STAKING & ADMINISTRATION					
<b>TOTAL BRANCH 37 OPTION 1 &amp; 2 IMPROVEMENT COST</b>					<b>\$ 36,058</b>

**Renville COUNTY  
JUDICIAL/COUNTY DITCH No. 15**



**PROPOSED IMPROVEMENT - OPTION #2**

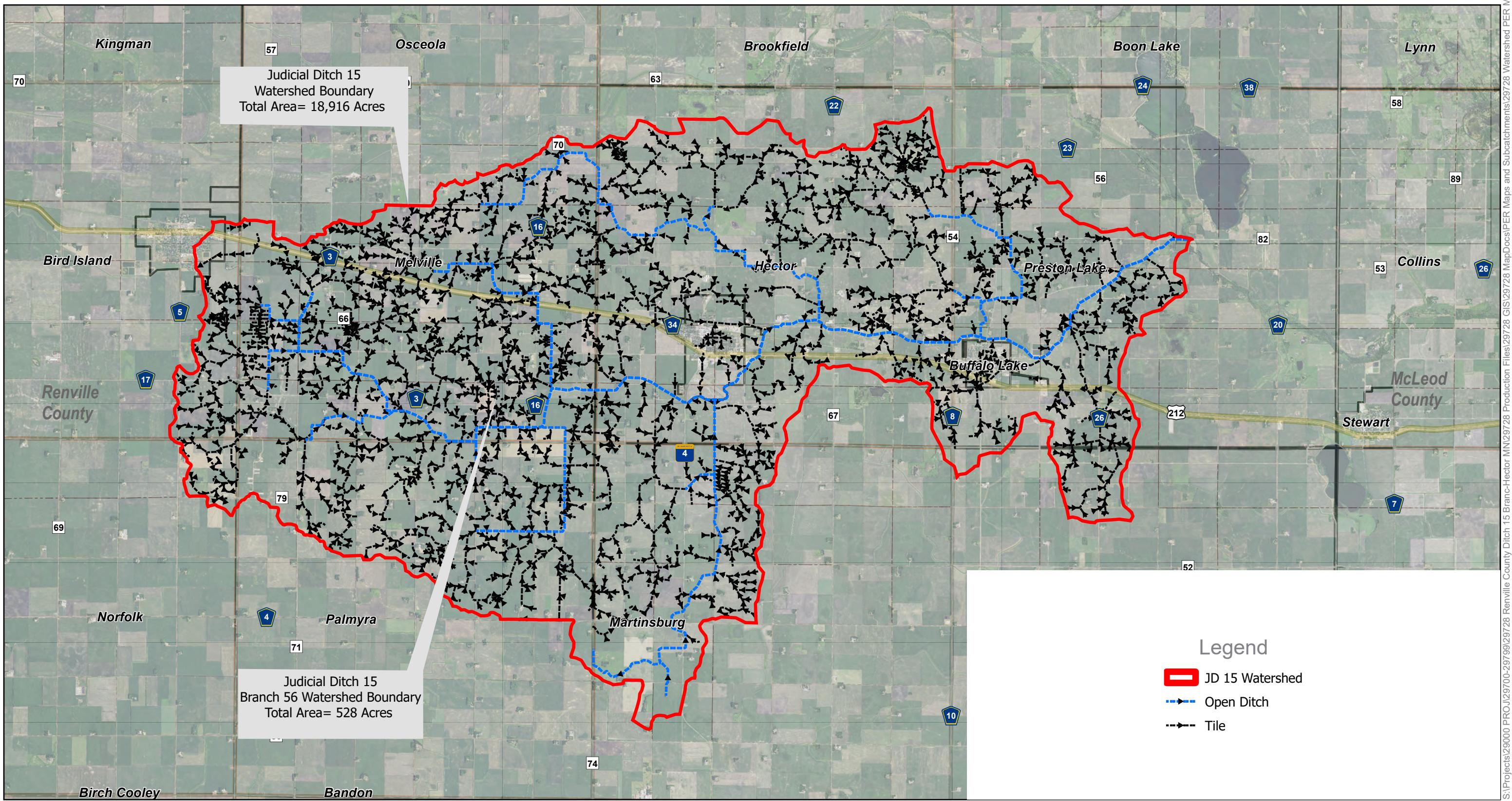
**Storage Option 2**

Item No.	Item	Unit	Quantity	Unit Price	Amount
101	MOBILIZATION	LS	1	\$ 14,310.00	\$ 14,310
102	COMMON EXCAVATION - POND (P) (EV)	CY	51750	\$ 3.50	\$ 181,125
103	TOP SOIL STRIP & PLACE SPOILS	AC	15	\$ 4,300.00	\$ 64,500
104	15-INCH CLASS III RCP PIPE	LF	16	\$ 80.00	\$ 1,280
105	24-INCH CLASS III RCP PIPE	LF	60	\$ 130.00	\$ 7,800
106	INSTALL STRUCTURE S-1 WITH GALVANIZED GRATE	EA	1	\$ 6,000.00	\$ 6,000
107	GRANULAR BEDDING MATERIAL	CY	7	\$ 45.15	\$ 316
108	16.5' BUFFER STRIP SEEDING (SEED MIX: BUFFER BLEND WITH TYPE 3 MULCH)	AC	1.1	\$ 1,500.00	\$ 1,650
109	SIDESLOPE SEEDING (SEED MIX: BUFFER BLEND WITH TYPE 8 MULCH)	AC	1.1	\$ 4,250.00	\$ 4,675
110	POND BOTTOM SEEDING (SEED MIX: 33-261 W/ TYPE 7 (BFM) MULCH)	AC	2.8	\$ 4,000.00	\$ 11,200
111	CLASS III RIPRAP WITH GEOTEXTILE FABRIC	CY	55	\$ 85.00	\$ 4,675
112	REMOVE EXISTING TILE (SIZE & MATERIAL MAY VARY)	LF	290	\$ 2.50	\$ 725
<b>SUBTOTAL CONSTRUCTION COST</b>					<b>\$ 298,256</b>
10% UNFORSEEN					\$ 29,826
<b>TOTAL CONSTRUCTION COST</b>					<b>\$ 328,082</b>
TEMPORARY DAMAGES		AC	15.00	\$ 850.00	\$ 12,750
LAND ACQUISITION/ PERMANENT DAMAGES		AC	5	\$ 12,000.00	\$ 60,000
COUNTY ADMINISTRATION COSTS					\$ 16,405
REPORTS, PLANS AND SPECIFICATIONS					\$ 36,089
CONSTRUCTION STAKING & ADMINISTRATION					\$ 44,292
<b>TOTAL STORAGE OPTION 2 IMPROVEMENT COST</b>					<b>\$ 497,618</b>

**TOTAL IMPROVEMENT COST**

Branch 56 Option 2	\$ 507,069
Branch 64 Option 1 & 2	\$ 122,510
Branch 37 Option 1 & 2	\$ 36,058
Storage Option 2	\$ 497,618
<b>COMPLETE IMPROVEMENT COST</b>	<b>\$ 1,163,254</b>

## Appendix G: Maps



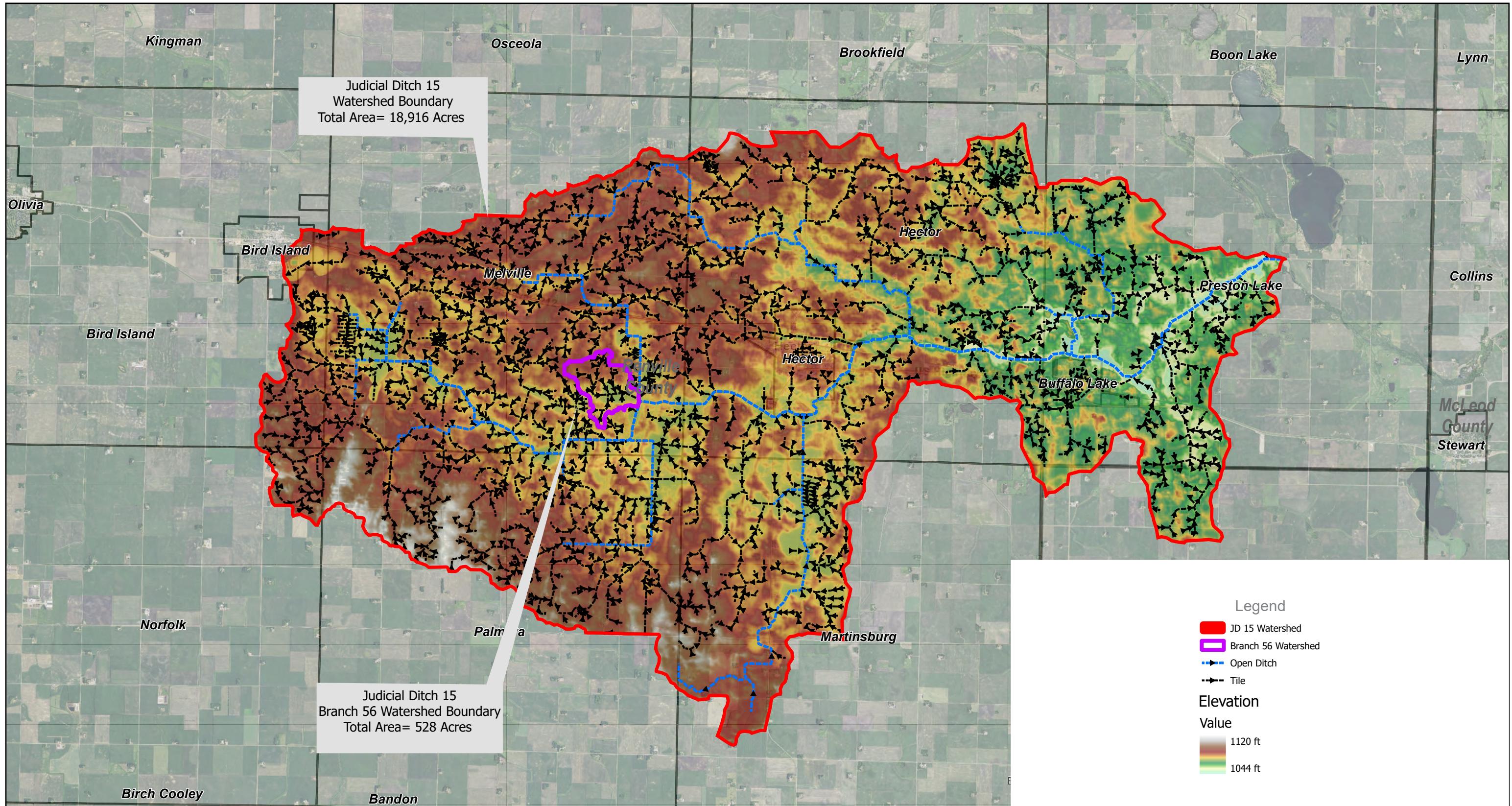
Existing Watershed Map  
**Judicial Ditch No 15**  
Renville County, Minnesota

0 3,750 7,500  
Feet  
1:100,000



**Source(s):**  
Orthophoto (Mn Geo WMS, 2021)  
Parcels (Renville County, 2024)  
Tile/Ditch (Renville County, 2013)

**ISG**



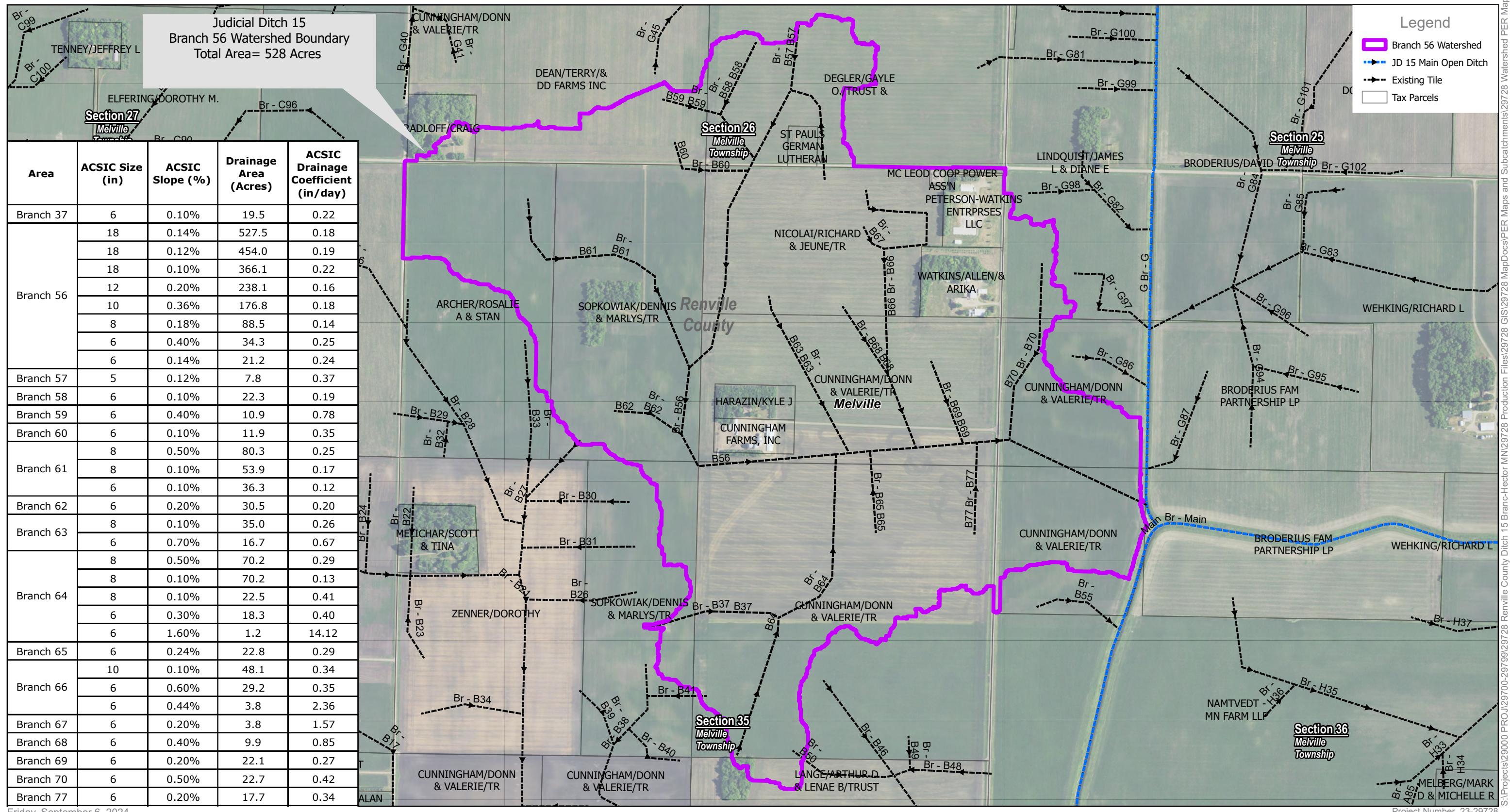
**Elevation Map**  
**Judicial Ditch No. 15**  
Renville County, Minnesota

0 4,000 8,000  
Feet  
1:100,000



**Source(s):**  
Orthophoto (Mn Geo WMS, 2021)  
Parcels (Renville County, 2024)  
Tile/Ditch (Renville County, 2013)





# Existing Branch 56 Watershed Map

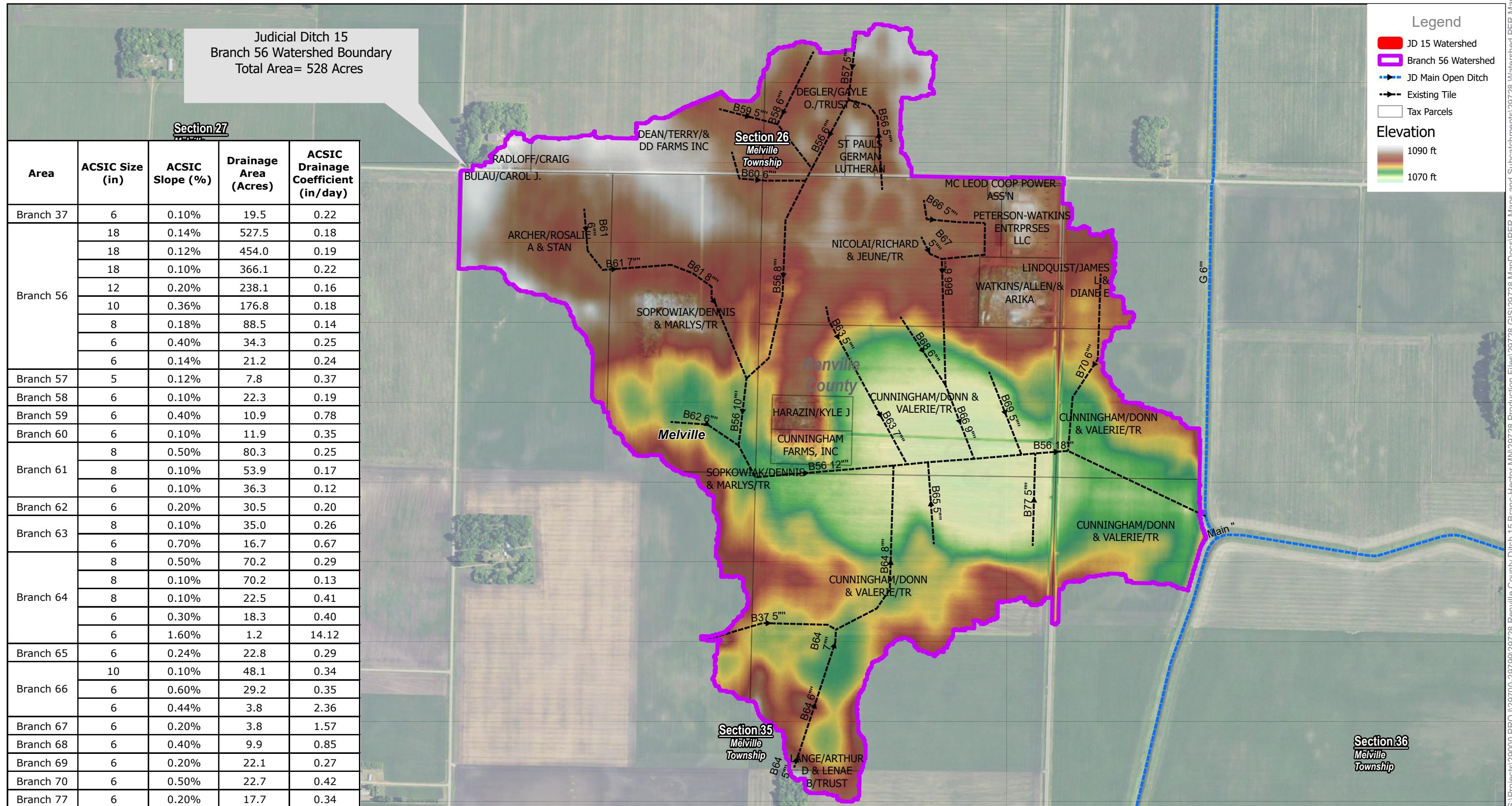
## Judicial Ditch No. 15

### Renville County, Minnesota

Source(s):  
Orthophoto Orthophoto (Mn Geo WMS, 2021)  
Parcels (Renville County, 2024)  
Tile/Ditch (Renville County, 2013)



A scale bar with markings at 0, 400, and 800 feet. Below the scale bar is the text "1:10,000".



Friday, September 6, 2024

Project Number 23-29728

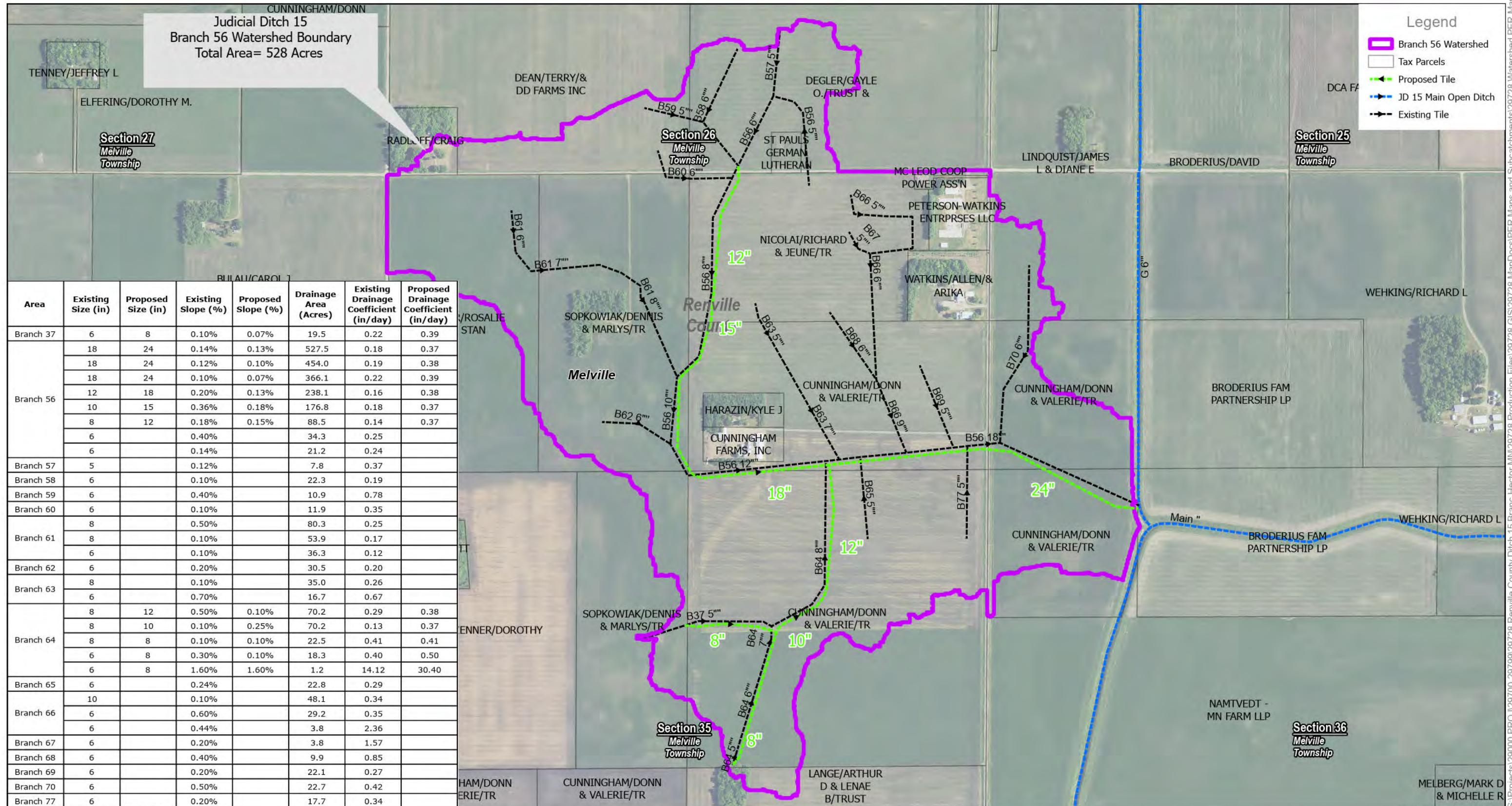
## Branch 56 Elevation Map Judicial Ditch No. 15 Renville County, Minnesota

0 400 800  
1:10,000  
Feet



Source(s):  
Orthophoto (Mn Geo WMS, 2021)  
Parcels (Renville County, 2024)  
Tile/Ditch (Renville County, 2013)

ISG

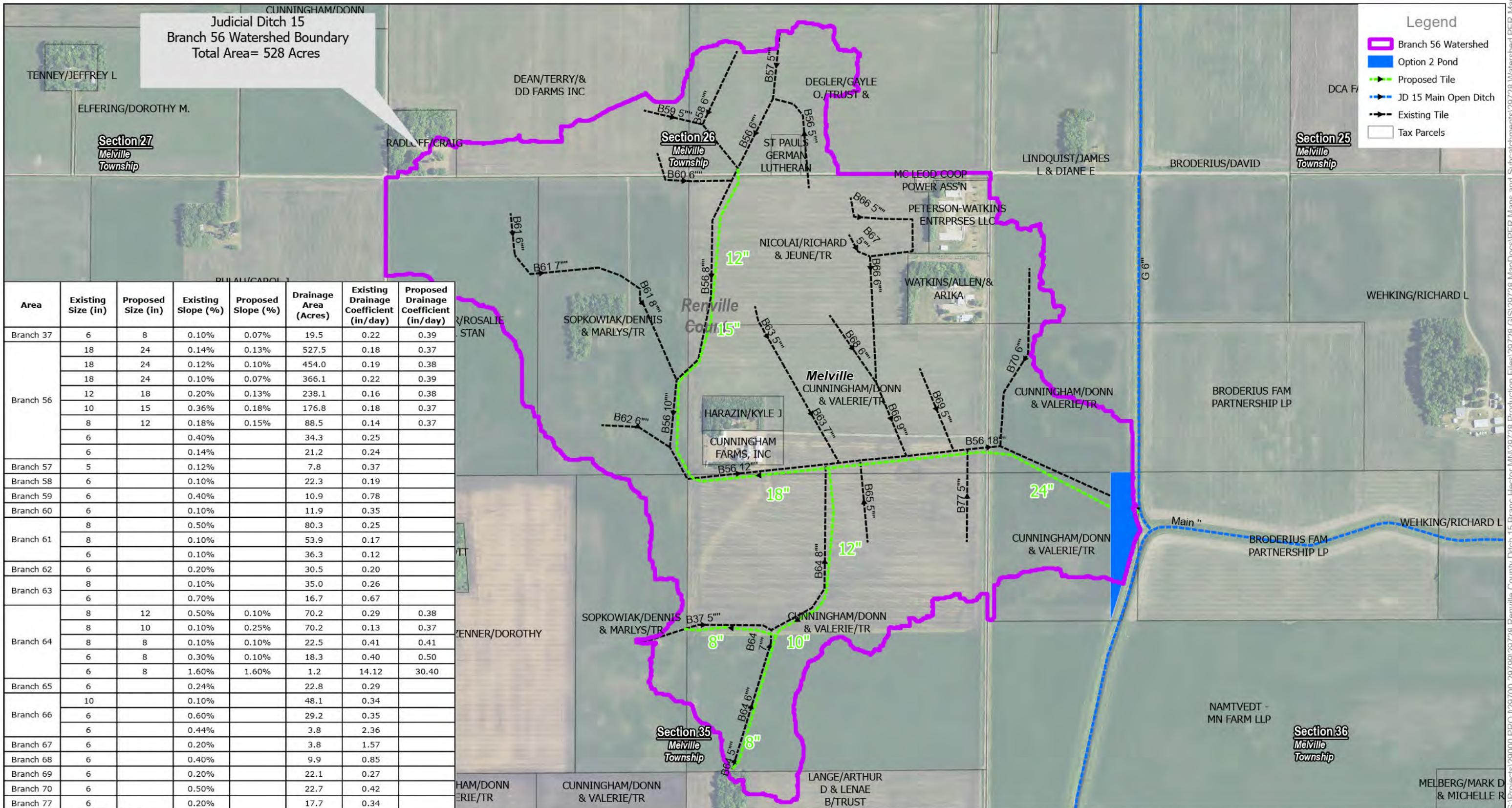


Proposed Option 1 Branch 56 Watershed Map  
Judicial Ditch No. 15  
Renville County, Minnesota

0 400 800  
Fees  
1:10,000

**Source(s):**  
Orthophoto Orthophoto (Mn Geo WMS, 2021)  
Parcels (Renville County, 2024)  
Tile/Ditch (Renville County, 2013)

**ISG**

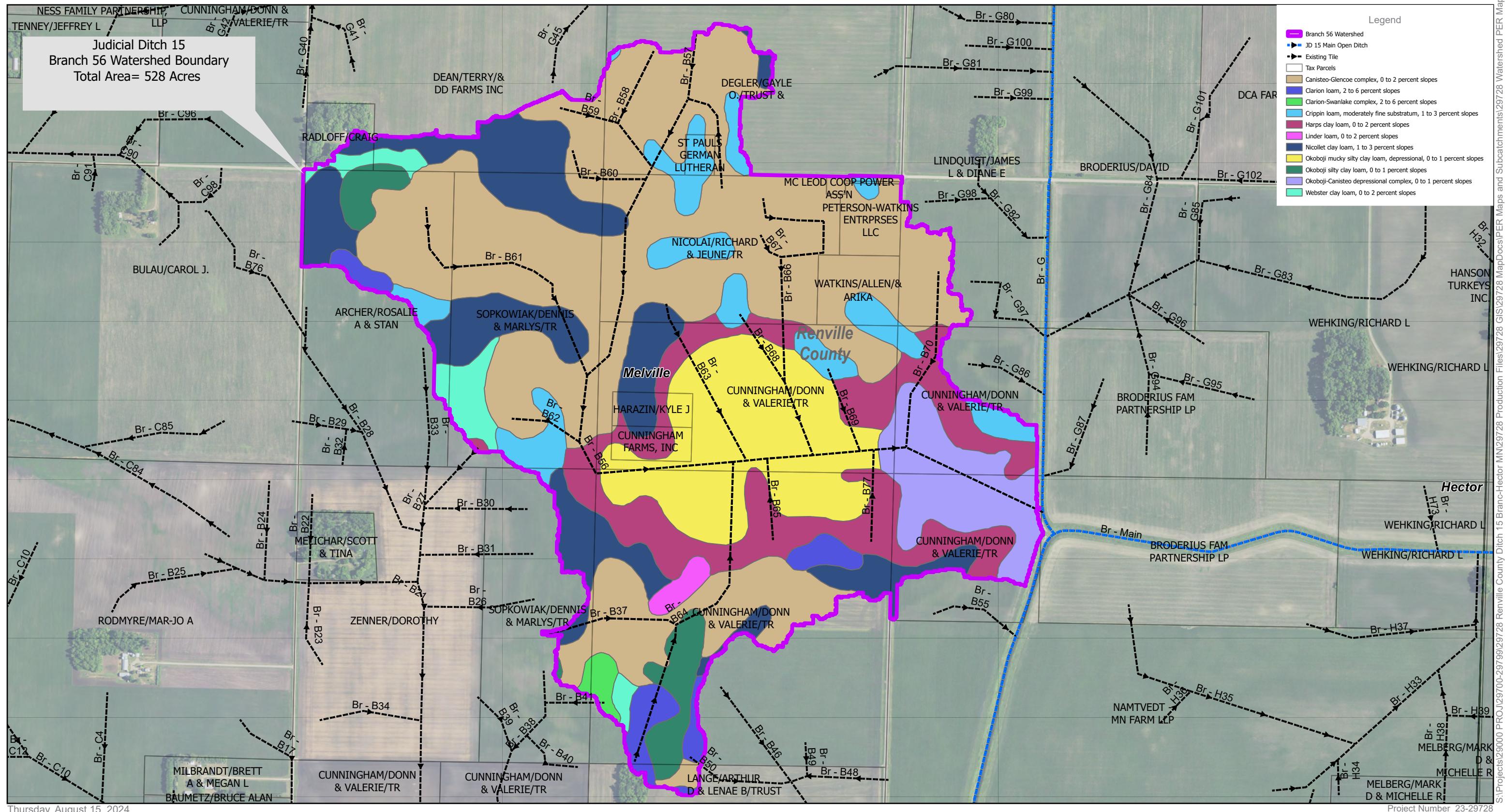


## Proposed Option 2 Branch 56 Watershed Map Judicial Ditch No. 15 Renville County, Minnesota

0 400 800  
Fees  
1:10,000

**Source(s):**  
Orthophoto Orthophoto (Mn Geo WMS, 2021)  
Parcels (Renville County, 2024)  
Tile/Ditch (Renville County, 2013)

**ISG**



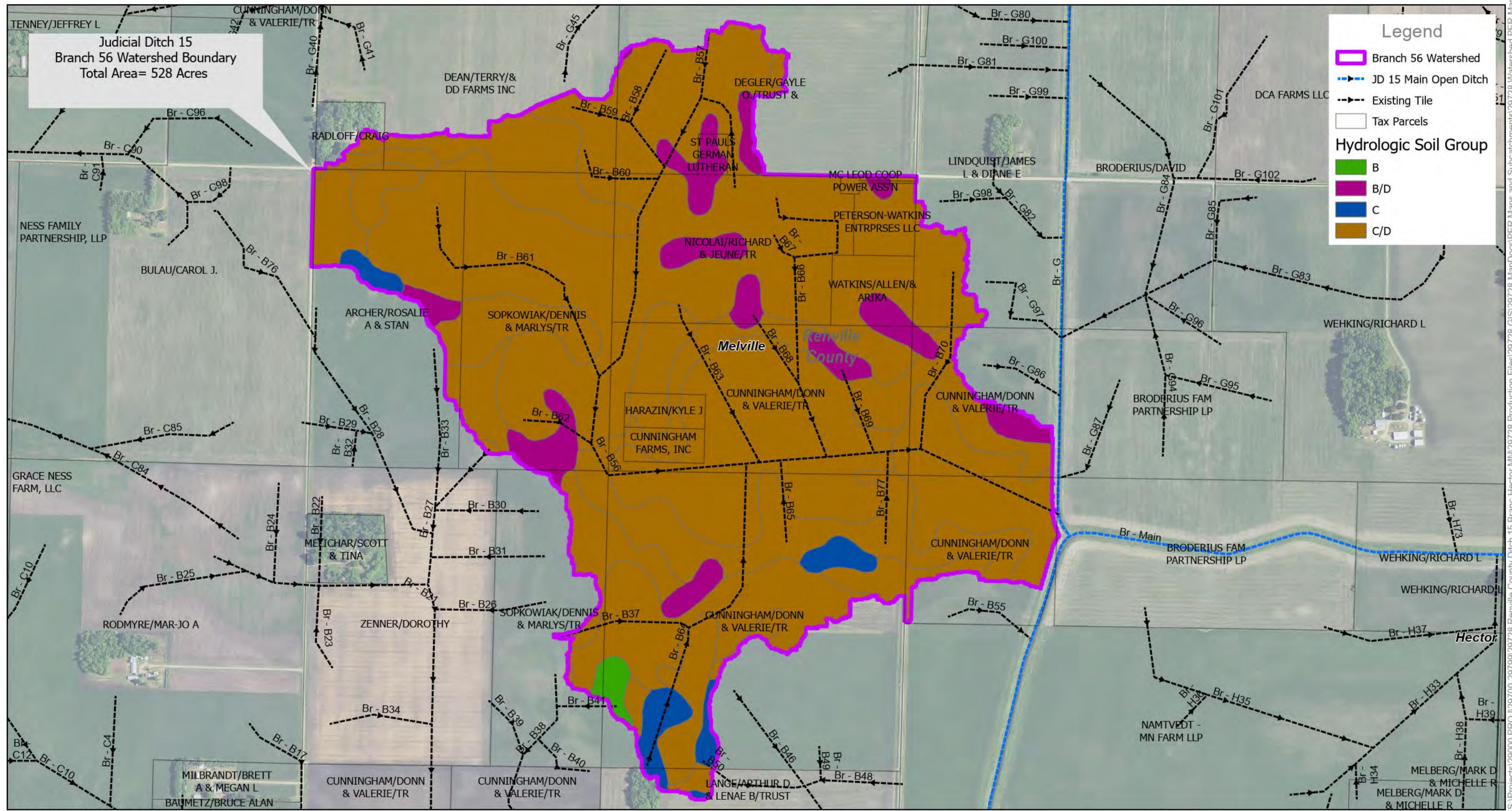
# Branch 56 Soils Map

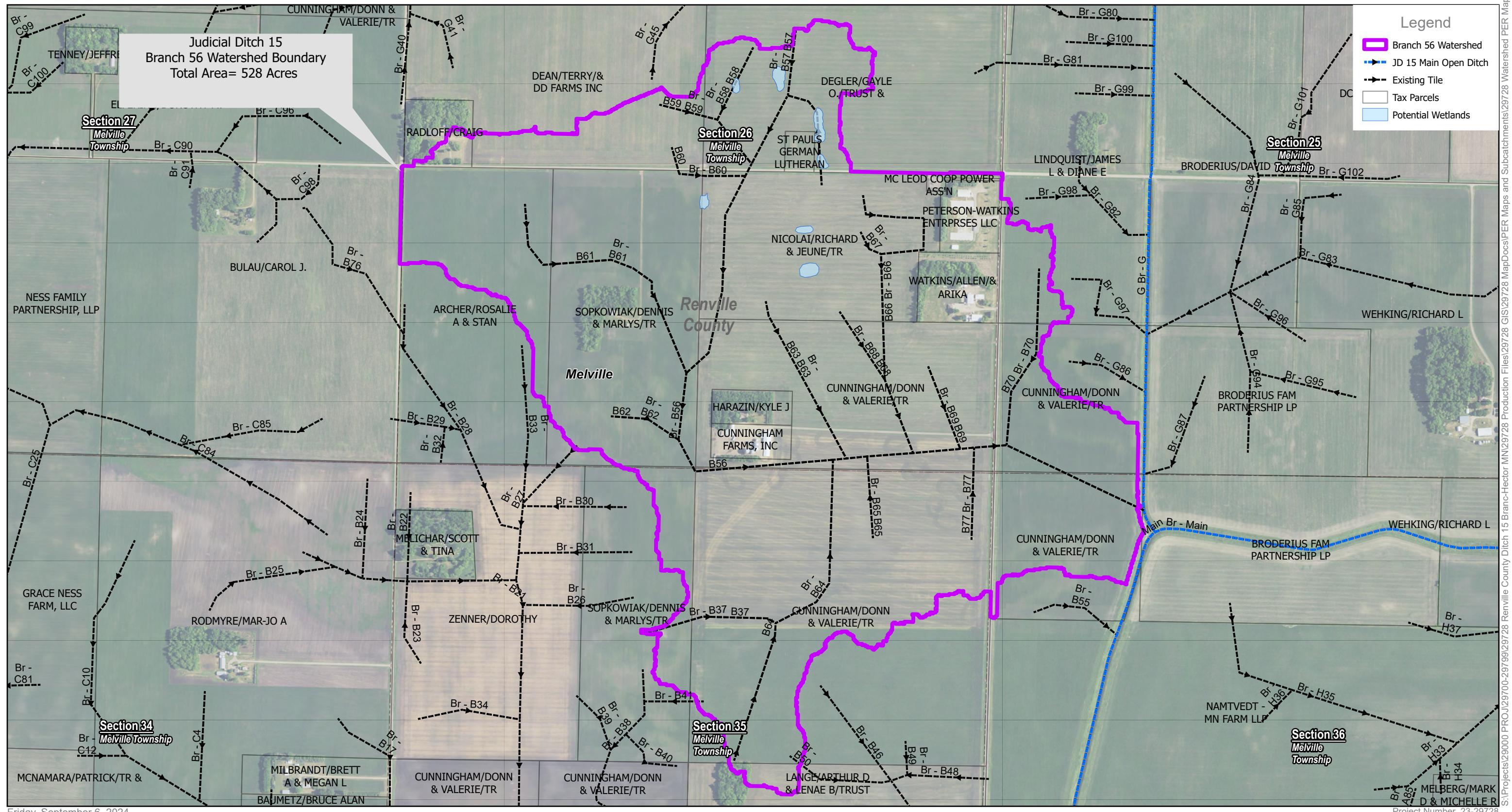
## Judicial Ditch No. 15

Renville County, Minnesota

Source(s):  
Orthophoto (Mn Geo WMS, 2021)  
Parcels (Renville County, 2024)  
Tile/Ditch (Renville County, 2013)







# Level 1 Wetland Delineation Map

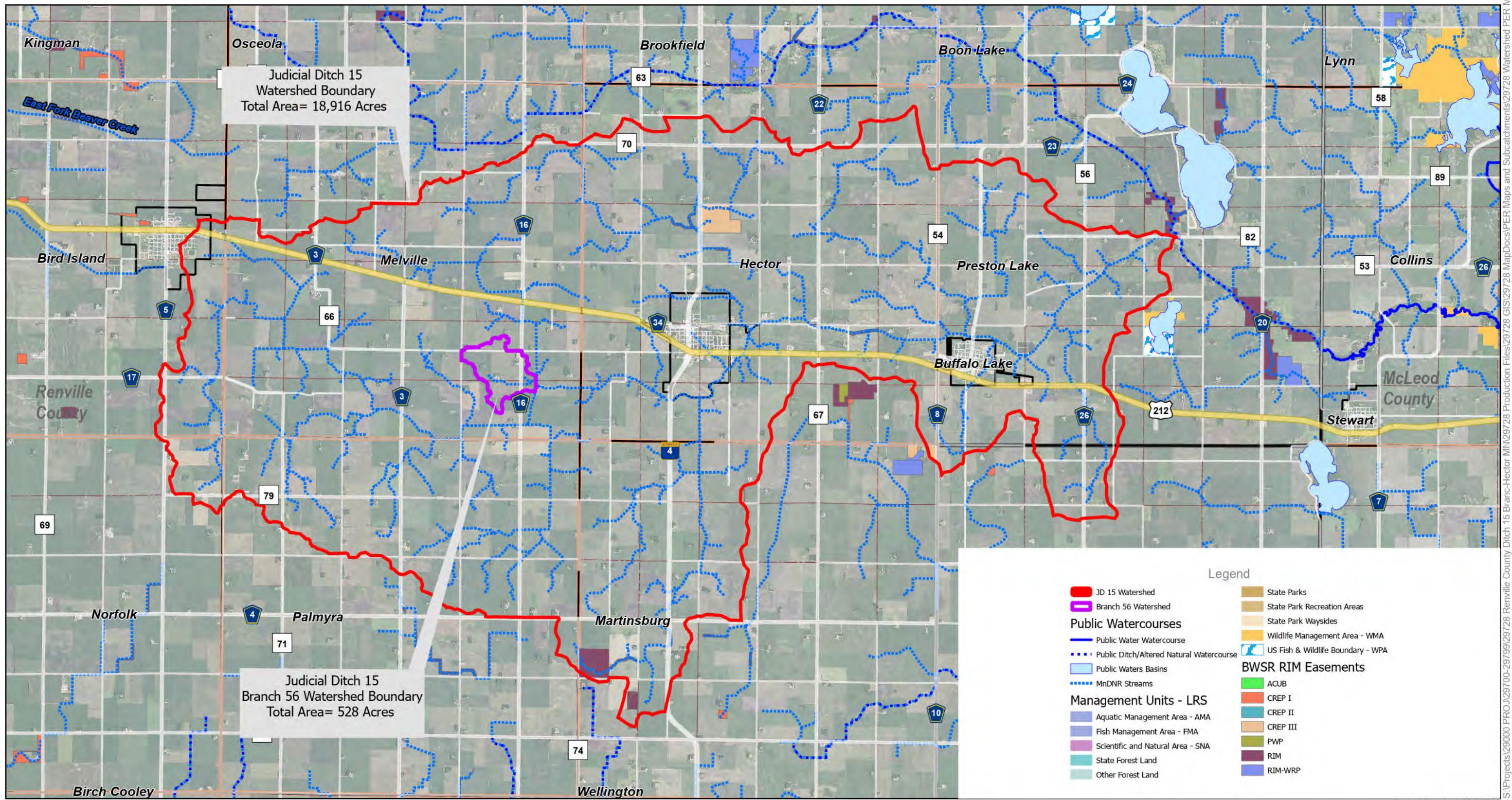
## **Judicial Ditch No. 15**

### Renville County, Minnesota

source(s):

Orthophoto Orthophoto (Mn Geo WMS, 2021)  
Parcels (Renville County, 2024)  
Tile/Ditch (Renville County, 2013)

ISG



Wednesday, September 11, 2024

0 3,750 7,500  
Feet  
1:100,000



## Public Waters and Public Lands Map Judicial Ditch No 15 Renville County, Minnesota

**Source(s):**  
Orthophoto (Mn Geo WMS, 2021)  
Parcels (Renville County, 2024)  
Tile/Ditch (Renville County, 2013)

