August 2022 Drainage Work Group Meeting

Early Coordination with Landowners

Feasibility Study Process

Chuck Brandel, PE
ISG Vice President

Landowners and the Importance of Drainage

Importance of Drainage to Landowners

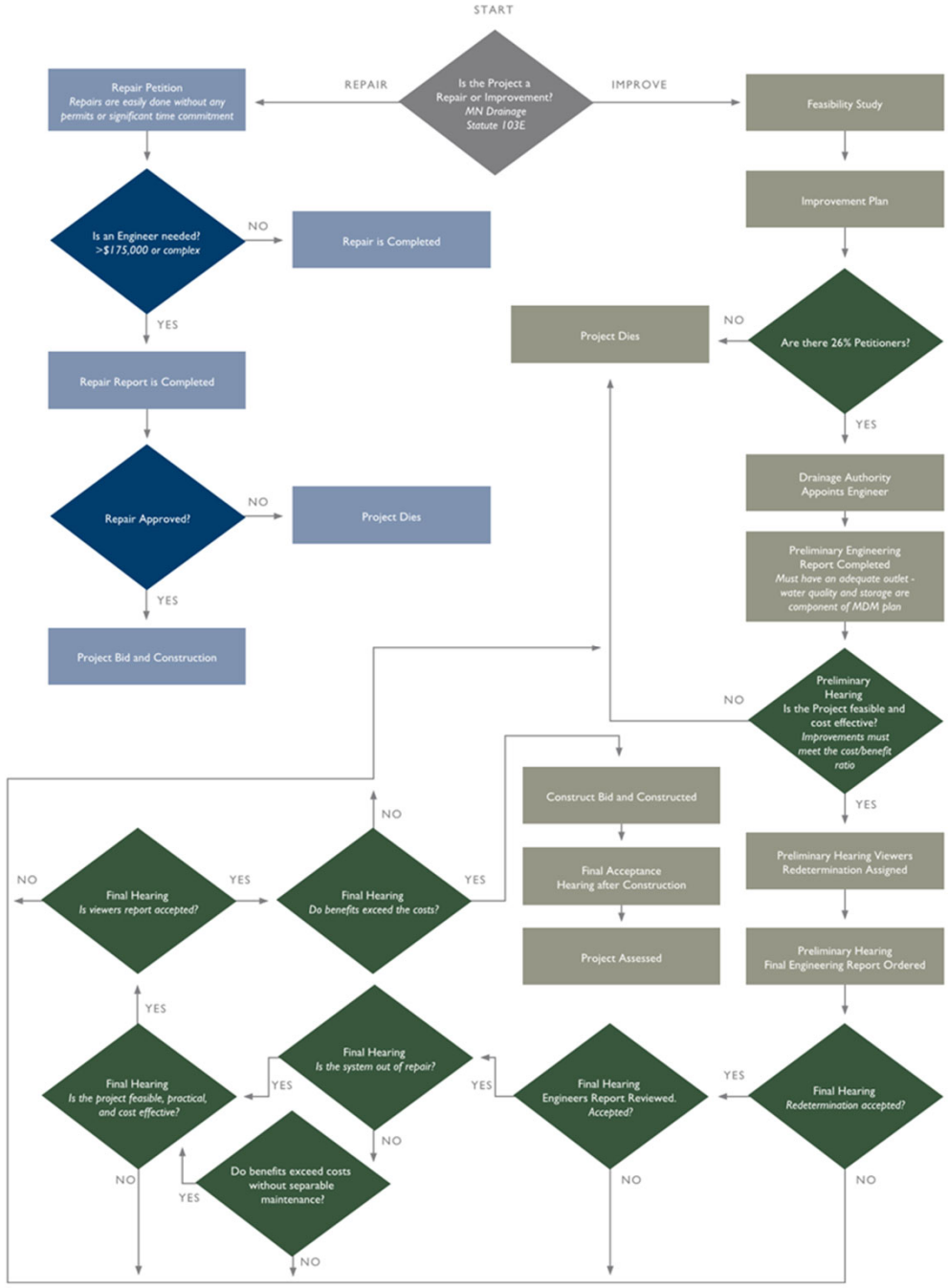
All Costs on a 103E System are Paid for by Landowners within that System

ISG's Drainage Process

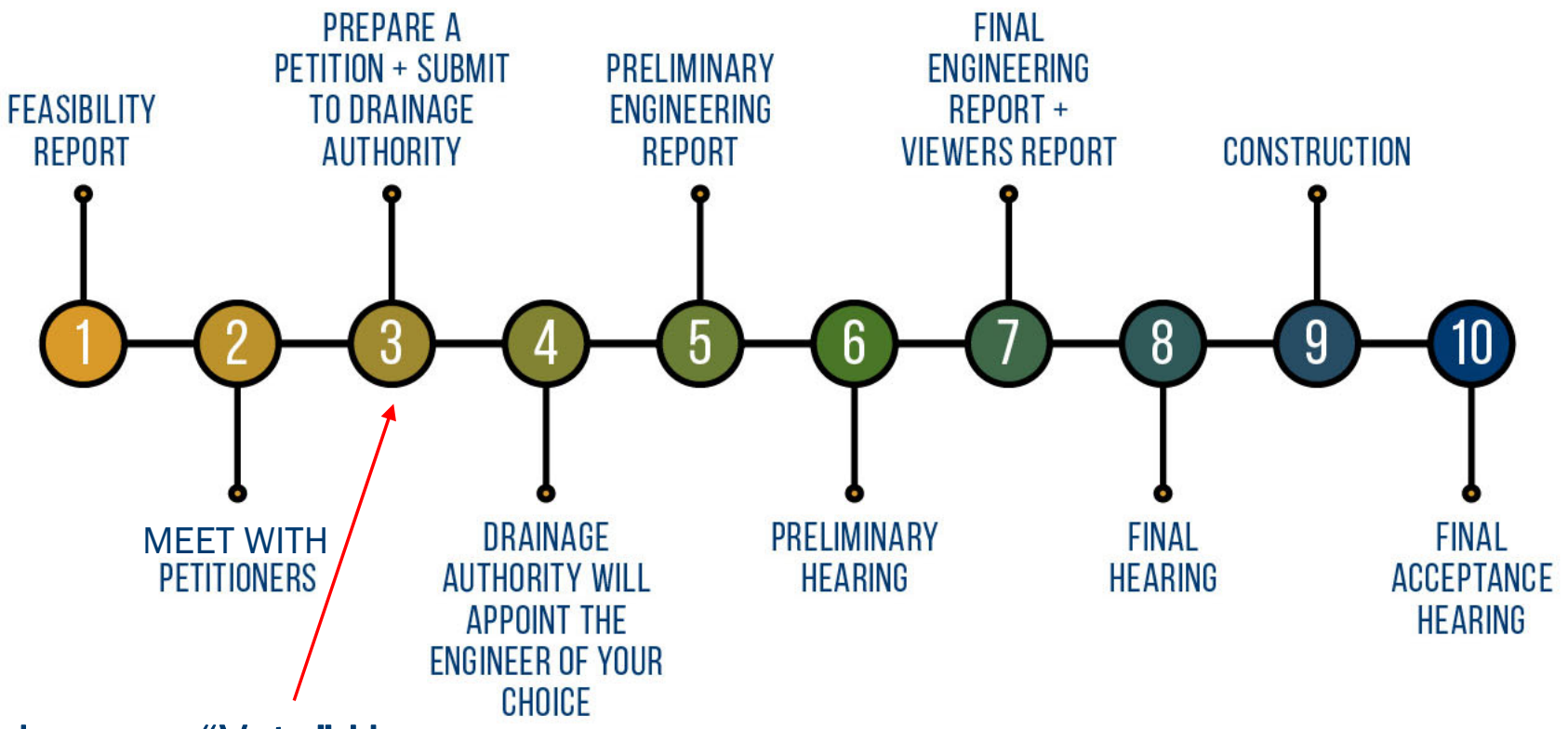
MN 103E Process

REPAIR OR IMPROVEMENT?

- Repairs – Same Hydraulic Capacity – ACSI
- Improvements/Projects Change Capacity/Depth/Require Petition
- Legal Process Starts with the Petition – Feasibility Studies are a way to get alternative options including water quality added to projects.



ISG's Drainage Process - Improvements



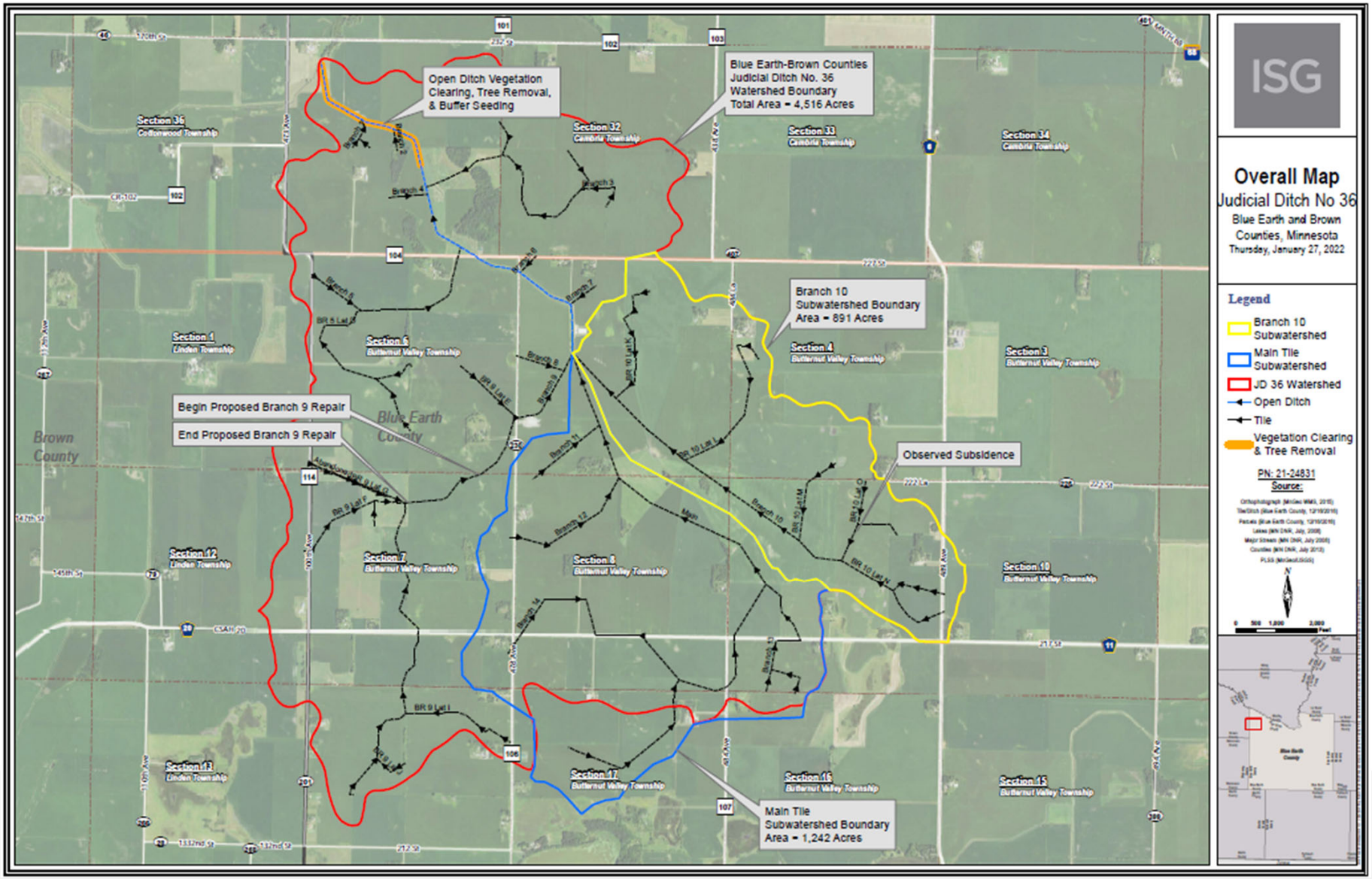
Landowners "Vote" Here

Getting Started: The Feasibility Process

1. PERFORM A FEASIBILITY STUDY
2. MEET WITH LANDOWNERS ON SITE
3. LOOK AT OPTIONS
   Repair costs vs. improvement costs
4. INFORMATIONAL MEETING
   with landowners + drainage authority
5. MEET WITH AGENCIES IF NECESSARY
6. DISCUSS WATER QUALITY
7. START A PETITION

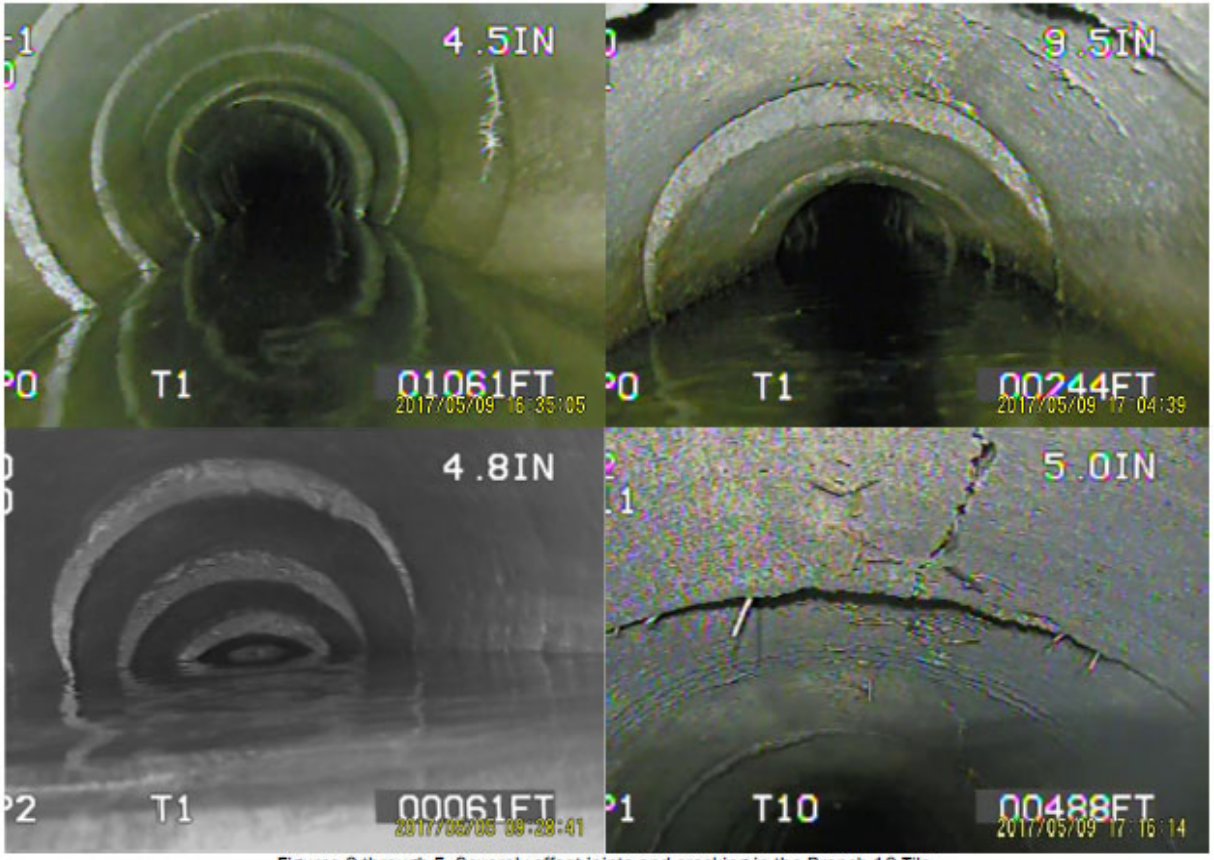
Discuss Water Quality and Storage at Every Meeting

Feasibility Example – Blue Earth/Brown JD 36



Landowners Report an Issue or Inspector Finds an Issue

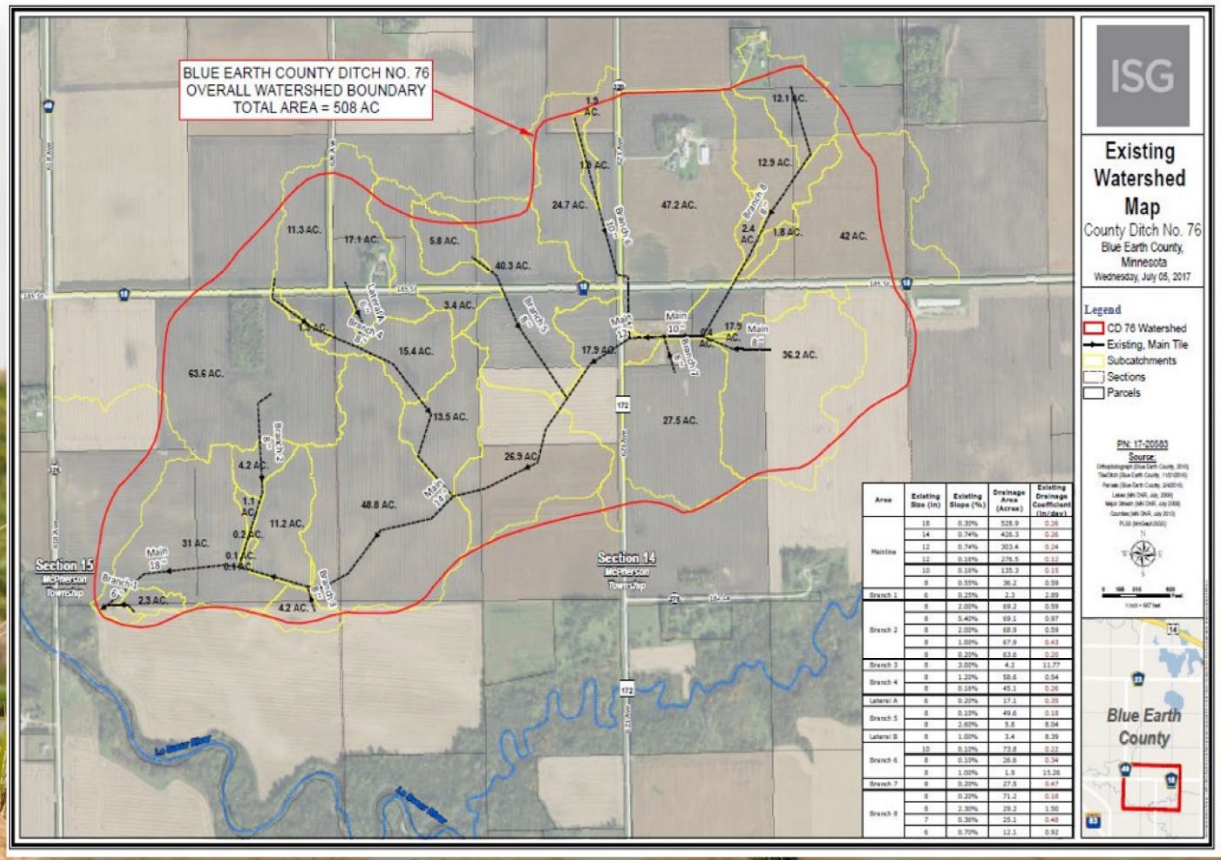
- Tile was Blowing out, shallow and exposed at the surface due to Subsidence – Landowner Brings Up issue
- System Televised to See extent of the issues – Drainage Authority Investigates
- Feasibility Report Ordered by Drainage Authority to address repairs needed



Figures 2 through 5. Severely offset joints and cracking in the Branch 10 Tile.

FEASIBILITY STUDY

- Describes system history
- Defines existing capacity of both ditches and tiles
- Considers multiple options for repairs and improvements
- Compares repair costs versus improvement costs
- Includes adequacy of the outlet, opinion of cost benefit ratio, and potential benefits

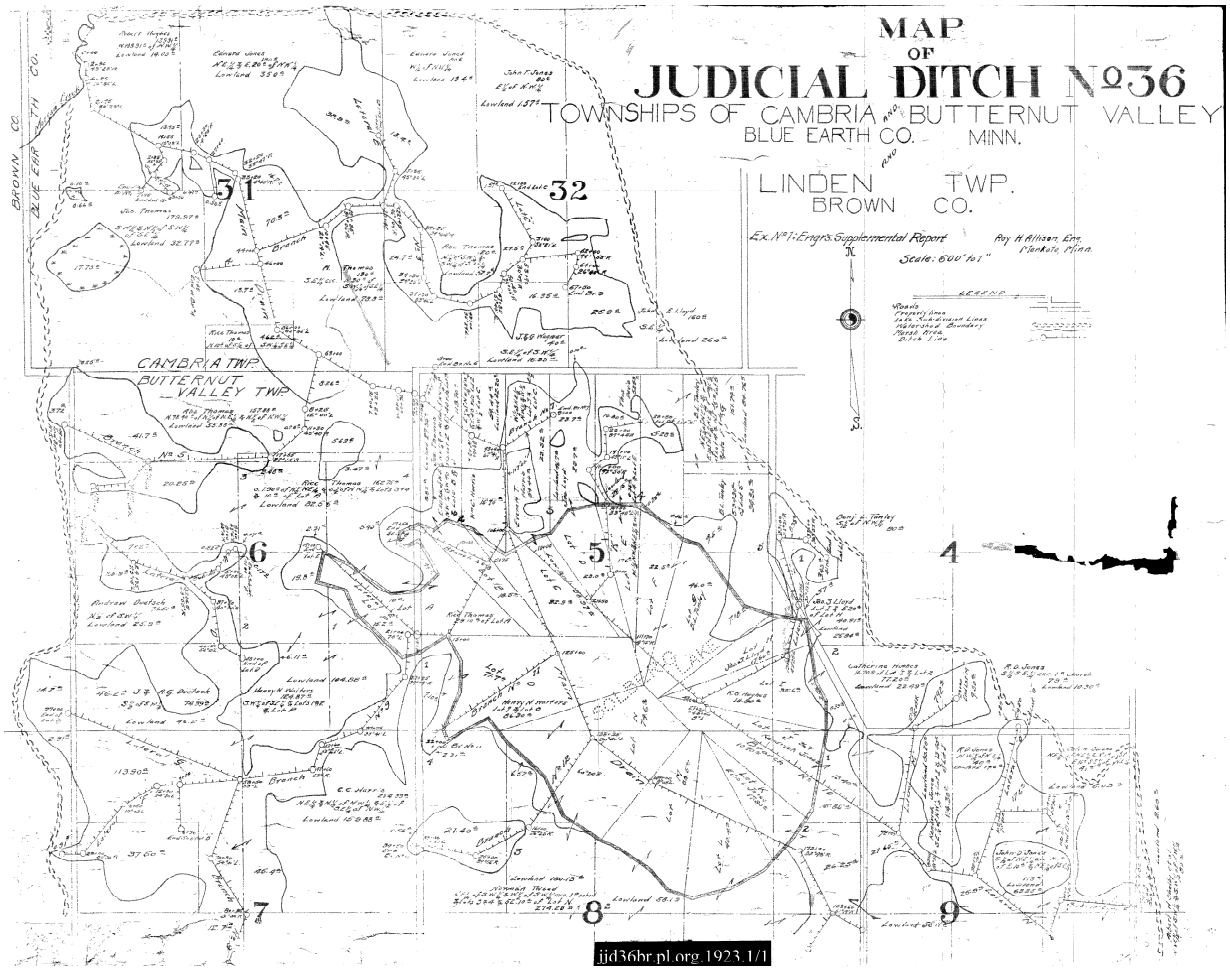


Watershed History

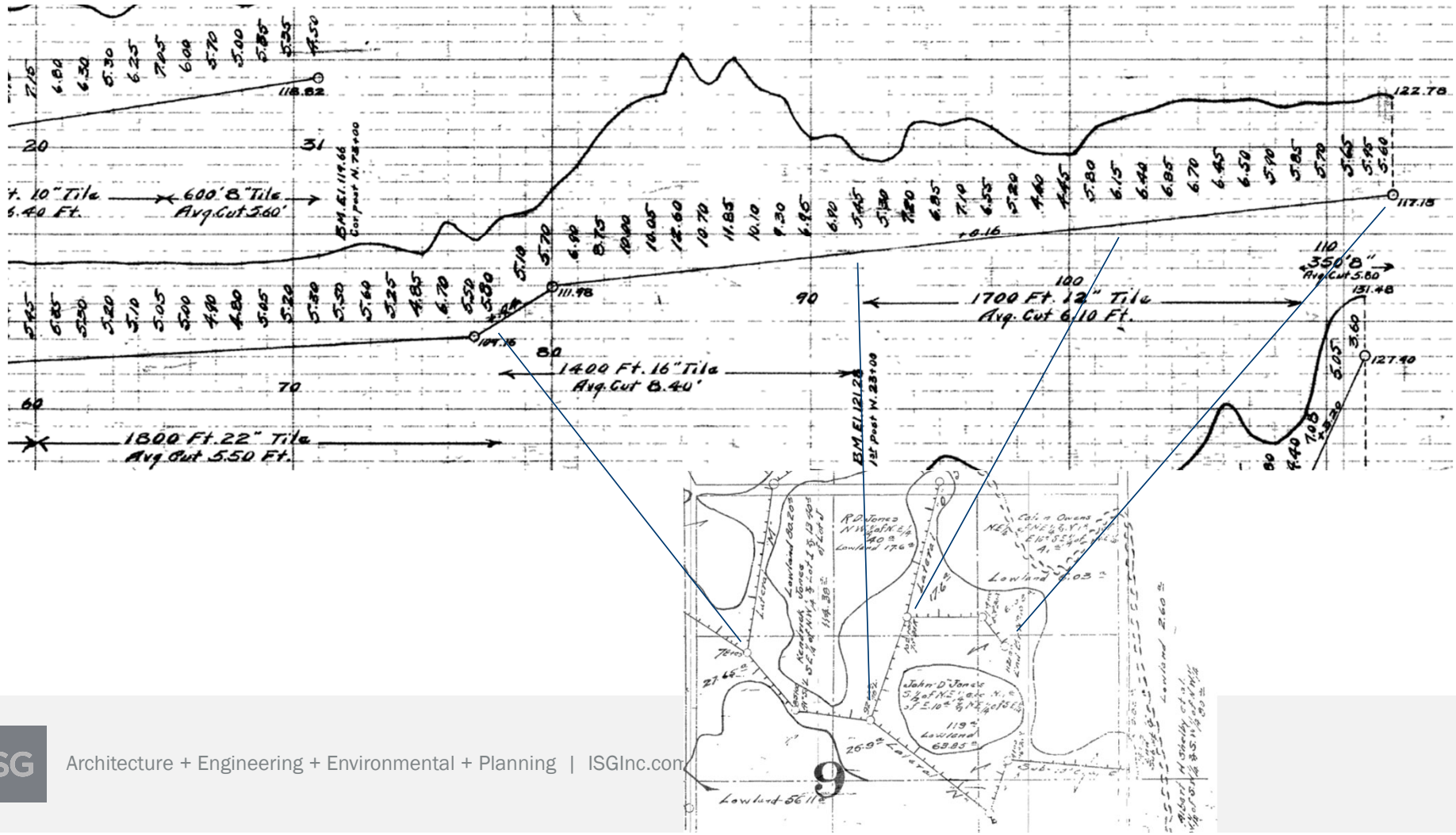
1923 expansion as JD 36

2001 repair (Branch 9)

No known improvements



Branch 10 As-Constructed Profile (1923)



Feasibility Study- Review Capacities and Depths

Area	ACSIC Size (in)	Proposed Size (in)	ACSIC Slope (%)	Proposed Slope (%)	Drainage Area (Acres)	ACSIC Drainage Coefficient (in/day)	Proposed Drainage Coefficient (in/day)
Branch 10	22	24	0.94%	0.16%	362.1	1.15	0.60
Branch 10	16	18	0.94%	0.16%	224.9	0.79	0.45
Branch 10	16	18	0.16%	0.16%	211.0	0.35	0.48
Branch 10	12	12	0.16%	0.16%	79.0	0.43	0.43
Branch 10	8	8	0.16%	0.16%	31.1	0.37	0.37
Lateral M	12	12	0.10%	0.10%	137.2	0.20	0.20
Lateral M	10	10	0.10%	0.10%	98.3	0.17	0.17
Lateral M	8	8	0.10%	0.10%	92.2	0.10	0.10
Lateral O	10	10	0.20%	0.20%	18.0	1.30	1.30
Lateral O	8	8	0.60%	0.60%	7.1	3.15	3.15

Feasibility Study-Review Repair Capacities and Depths

Area	ACSIC Size (in)	Proposed Size (in)	ACSIC Minimum Cover (ft)	Assumed Minimum Cover After 1.9 ft Subsidence (ft)	Proposed Minimum Cover (ft)	Depth Gained (ft)
Branch 10	22	24	3.6	1.7	1.5	-0.2
Branch 10	16	18	3.7	1.8	3.9	2.2
Branch 10	16	18	4.0	2.1	4.3	2.2
Branch 10	12	12	3.4	1.5	3.8	2.3
Branch 10	8	8	4.8	2.9	5.3	2.3
Lateral M	12	12	2.4	0.5	1.3	0.8
Lateral M	10	10	4.8	2.9	3.7	0.8
Lateral M	8	8	2.9	1.0	1.8	0.8
Lateral O	10	10	3.1	1.2	3.6	2.3
Lateral O	8	8	3.6	1.7	4.1	2.3

Repair Does not Solve Cover Issues on Portions of the System

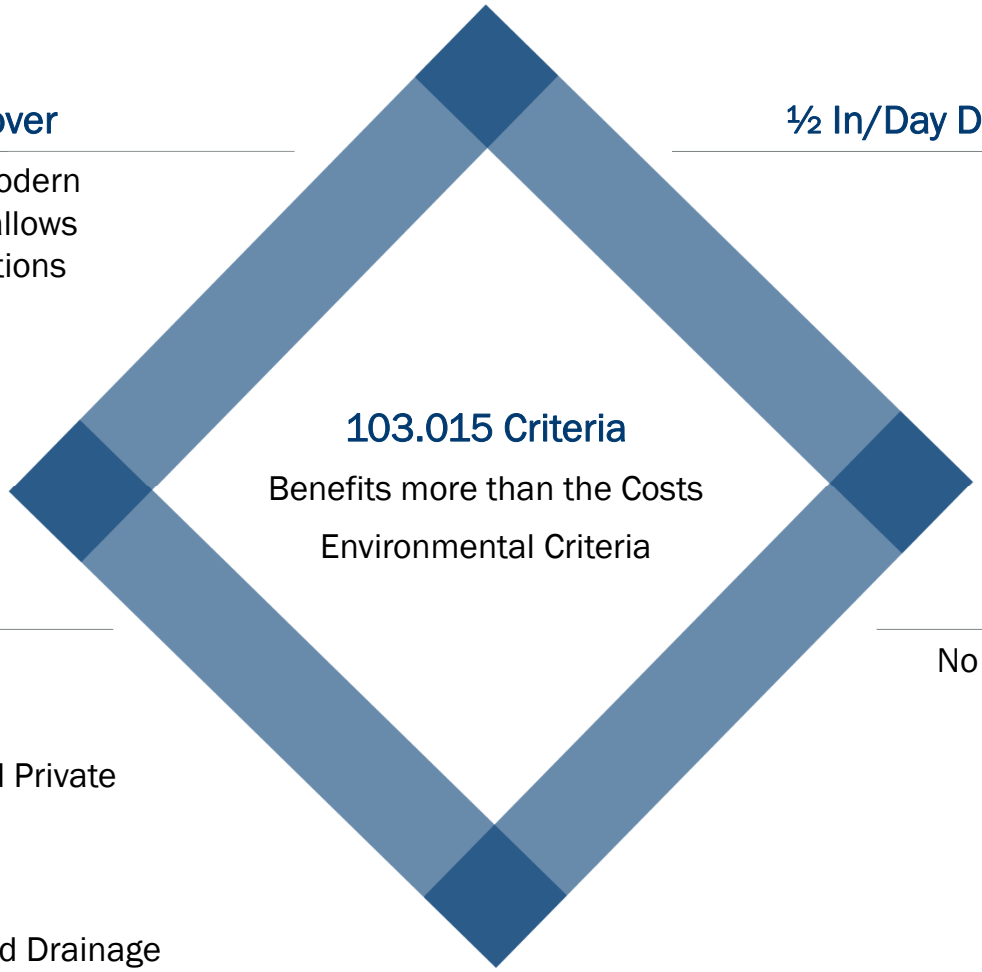
Project Improvement Design Criteria – Public Tile

Minimum 5 Feet Cover

Adequate depth for modern farm equipment and allows for private tile connections

½ In/Day Drainage Coefficient

Industry Standard



Alternative BMP's

Water Quality Inlets

Storage

Wetlands – Public and Private

Two-stage Ditches

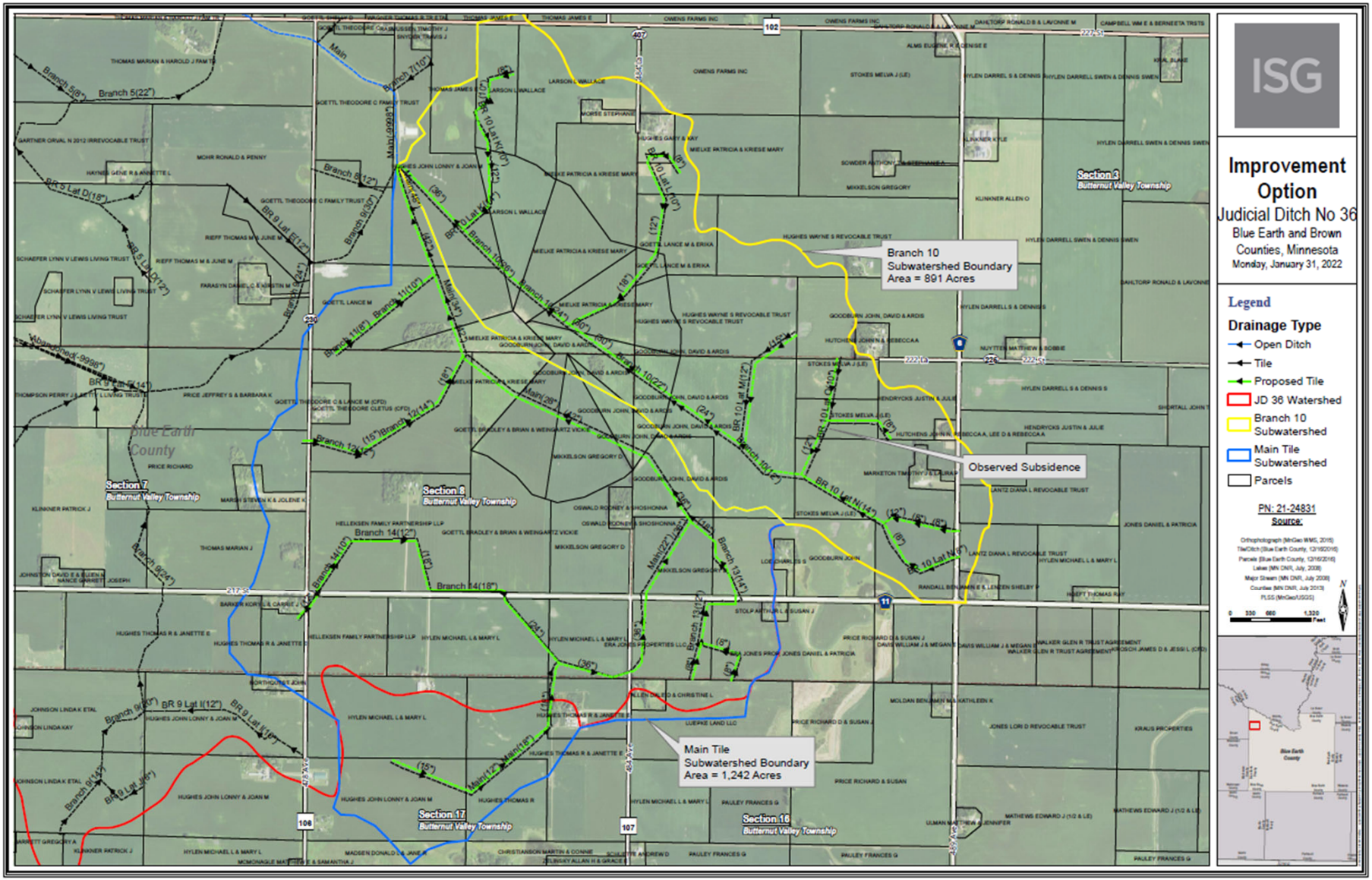
Alternate Side Inlets

Cover Crops/Controlled Drainage

Adequate Outlet

No Increase in discharge at outlet

Feasibility Study-Review Capacities, Depths and Alignment

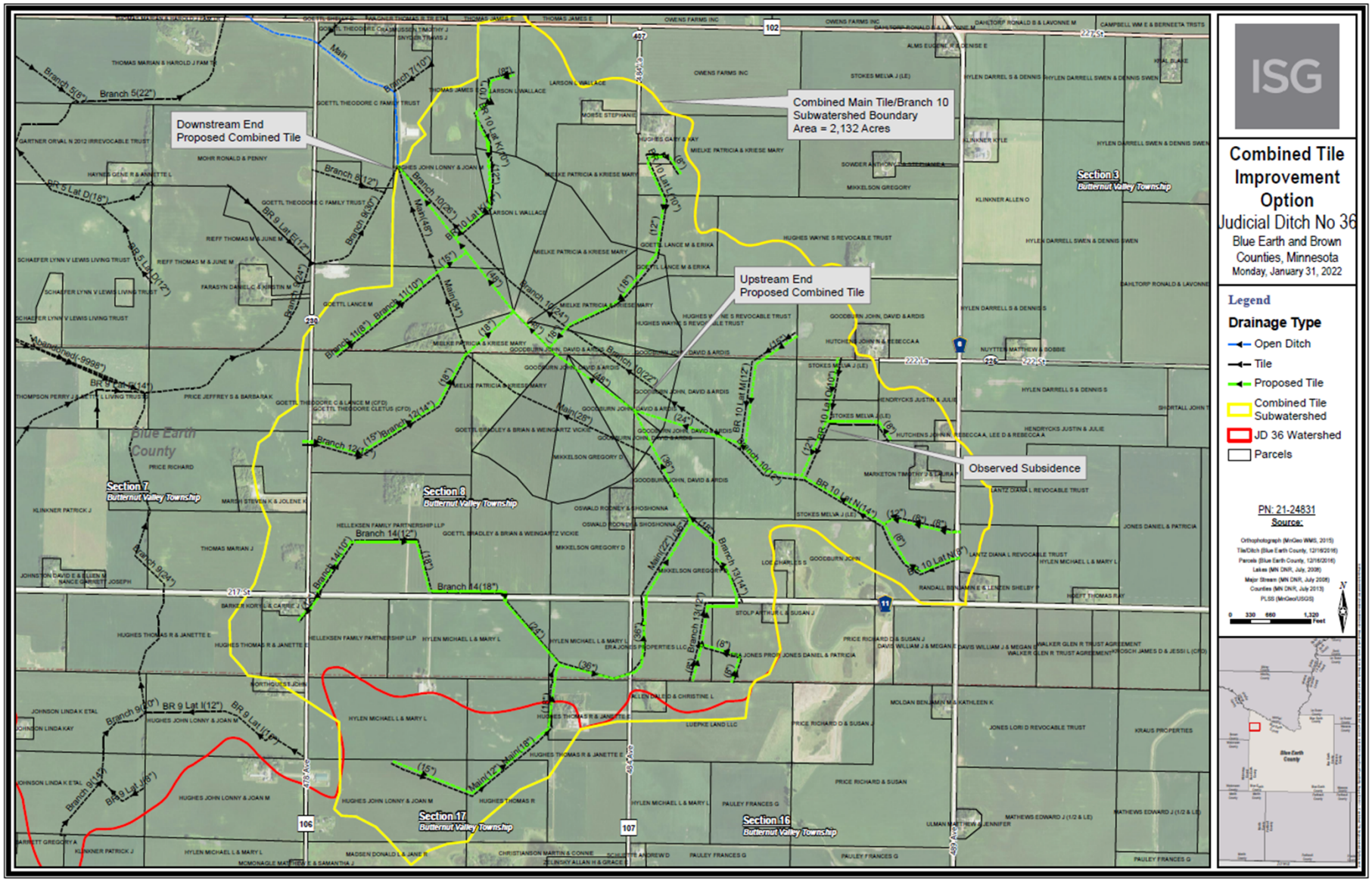


Feasibility Study-Review Capacities and Alignment

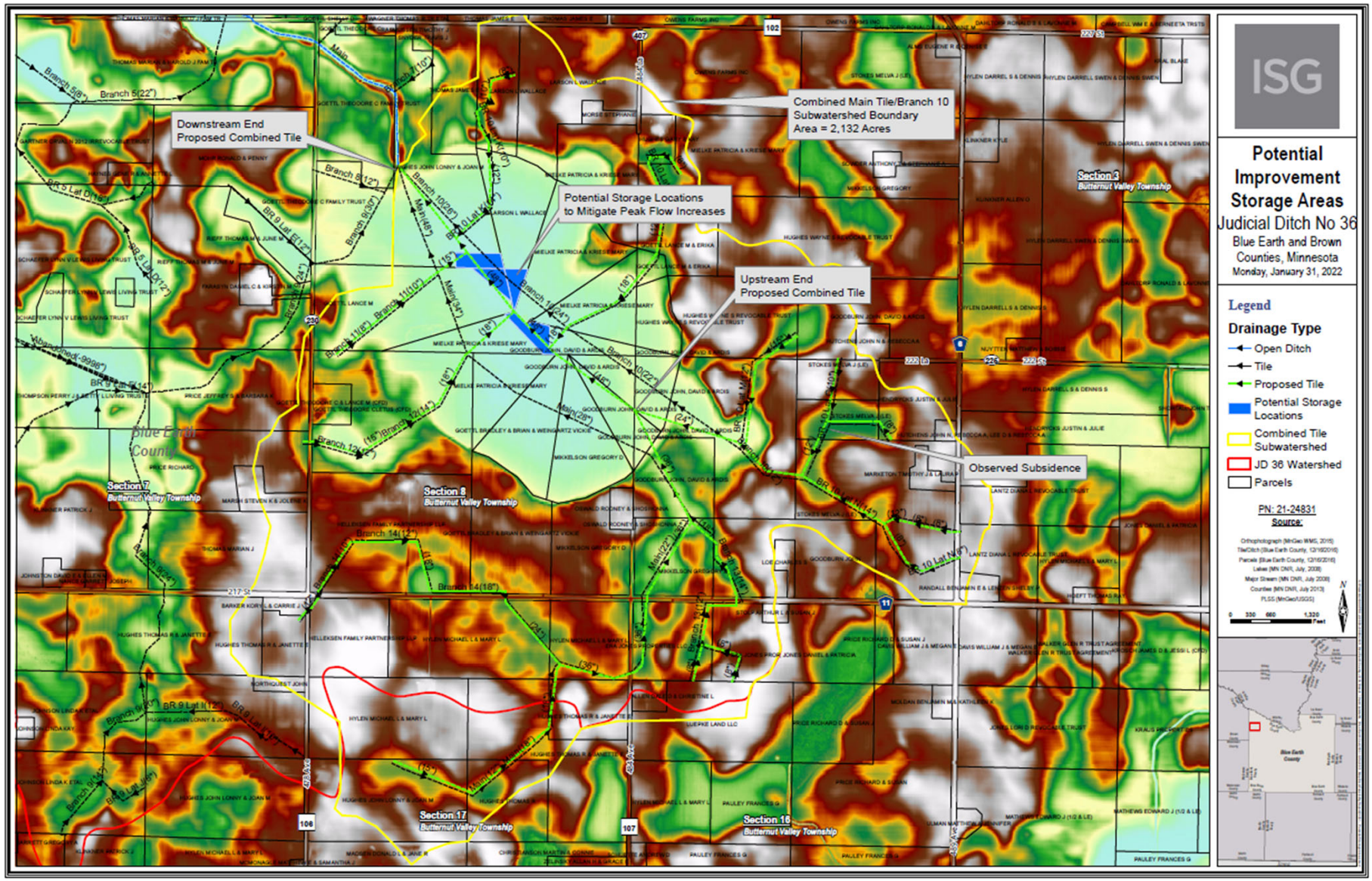
IMPROVEMENT TILE SUMMARY - BRANCH 10 SUBWATERSHED

Area	ACSIC Size (in)	Proposed Size (in)	ACSIC Slope (%)	Proposed Slope (%)	Drainage Area (Acres)	ACSIC Drainage Coefficient (in/day)	Proposed Drainage Coefficient (in/day)
Branch 10	26	36	0.08%	0.08%	890.5	0.21	0.51
Branch 10	24	30	0.08%	0.10%	614.1	0.25	0.50
Branch 10	22	30	0.08%	0.06%	464.1	0.26	0.52
Branch 10	22	24	0.94%	0.12%	362.1	1.15	0.52
Branch 10	16	18	0.94%	0.21%	224.9	0.79	0.51
Branch 10	16	18	0.16%	0.18%	211.0	0.35	0.50
Branch 10	12	12	0.16%	0.22%	79.0	0.43	0.50
Branch 10	8	8	0.16%	0.30%	31.1	0.37	0.51
Lateral K	14	24	0.20%	0.05%	221.0	0.26	0.55
Lateral K	10	12	0.44%	0.28%	88.3	0.39	0.51
Lateral K	8	10	0.44%	0.30%	56.0	0.34	0.51
Lateral K	8	8	1.00%	0.70%	47.7	0.60	0.51
Lateral L	12	18	0.24%	0.05%	109.4	0.38	0.51
Lateral L	10	12	0.24%	0.11%	54.6	0.47	0.52
Lateral L	8	8	0.60%	0.28%	30.0	0.75	0.51
Lateral M	12	18	0.10%	0.08%	137.2	0.20	0.52
Lateral M	10	15	0.10%	0.11%	98.3	0.17	0.52
Lateral M	8	15	0.10%	0.09%	92.2	0.10	0.50
Lateral N	14	18	0.16%	0.06%	118.3	0.43	0.52
Lateral N	8	8	0.80%	0.50%	19.6	1.31	1.04
Lateral N Sublateral C	10	12	0.20%	0.06%	41.8	0.56	0.50
Lateral N Sublateral C	8	8	2.00%	0.44%	37.8	1.08	0.51
Lateral N Sublateral C	8	8	0.20%	0.30%	31.7	0.41	0.50
Lateral O	10	8	0.20%	0.10%	18.0	1.30	0.51
Lateral O	8	8	0.60%	0.06%	7.1	3.15	0.99

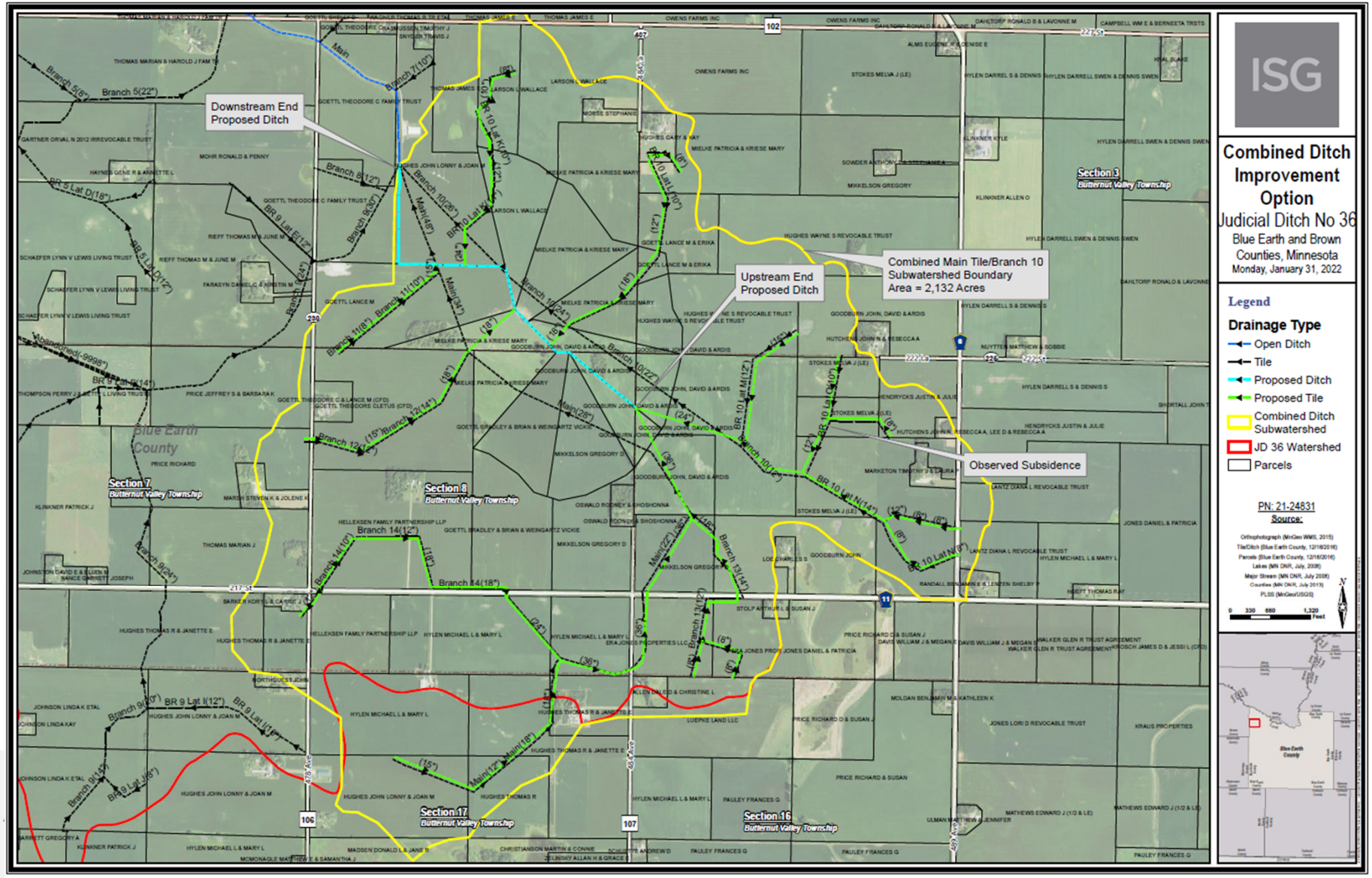
Feasibility Study-Alternative Options – Combine Tiles



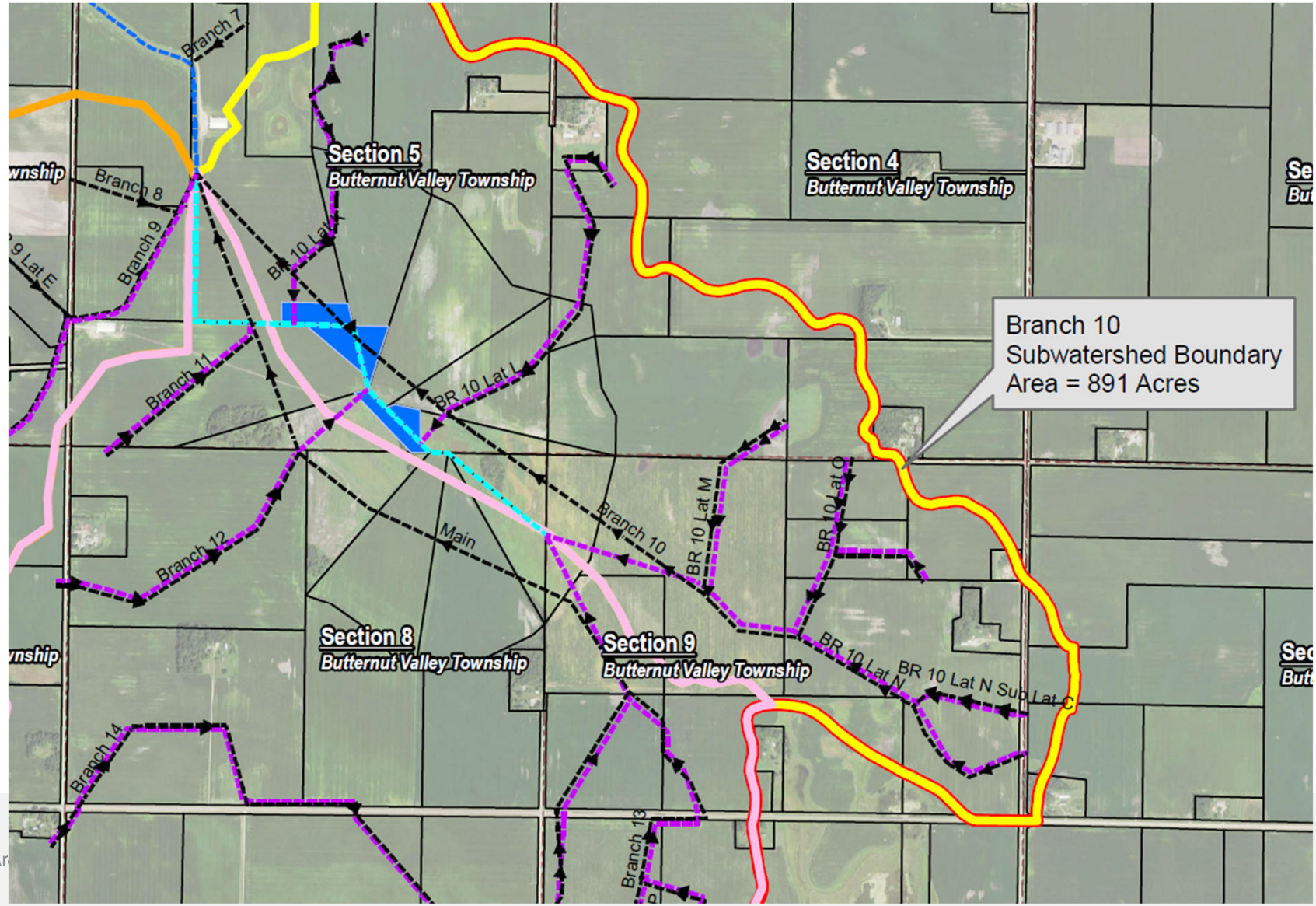
Feasibility Study-Review Storage and MDM



Feasibility Study-Alternative Options – Open Ditch



Feasibility Study-Alternative Options –Storage Again



Cost Benefit Review

Branch	Repair Cost	Improvement Cost	Combined Tile Improvement Cost	Combined Ditch Improvement Cost
Main Ditch	$ -	$ -	$ 56,836	$ 898,420
Main Tile	$ 1,572,738	$ 2,006,823	$ 2,087,409	$ 891,468
Branch 10 Tile	$ 882,396	$ 1,095,551	$ 321,293	$ 323,695
Lateral K Tile	$ 147,441	$ 165,405	$ 176,683	$ 205,989
Lateral L Tile	$ 212,337	$ 230,996	$ 256,898	$ 258,877
Lateral M Tile	$ 118,258	$ 133,948	$ 133,948	$ 133,948
Lateral N Tile	$ 193,470	$ 201,386	$ 201,386	$ 201,386
Sublateral C Tile	$ 82,906	$ 85,733	$ 85,733	$ 85,733
Lateral O Tile	$ 64,332	$ 63,767	$ 63,767	$ 63,767
Branch 11 Tile	$ 104,574	$ 113,055	$ 147,771	$ 124,719
Branch 12 Tile	$ 187,989	$ 197,458	$ 256,830	$ 258,809
Branch 13 Tile	$ 266,390	$ 278,546	$ 278,546	$ 278,546
Lateral P Tile	$ 27,770	$ 28,336	$ 28,336	$ 28,336
Branch 14 Tile	$ 418,847	$ 478,843	$ 478,843	$ 478,843
Total	**$ 4,279,449**	**$ 5,079,847**	**$ 4,574,280**	**$ 4,232,536**
Redetermination of Benefits	$ -	$ 12,792	$ 12,792	$ 12,792
Total Project Costs for Landowners	**$ 4,279,449**	**$ 5,092,639**	**$ 4,587,072**	**$ 4,245,328**

Discuss Multi-Purpose Drainage Management

GRASSED WATERWAYS

SATURATED BUFFERS

NATIVE FILTER STRIPS + CONTOUR BUFFER STRIPS

WETLAND RESTORATION

WOODCHIP BIOREACTOR

CONTROLLED DRAINAGE

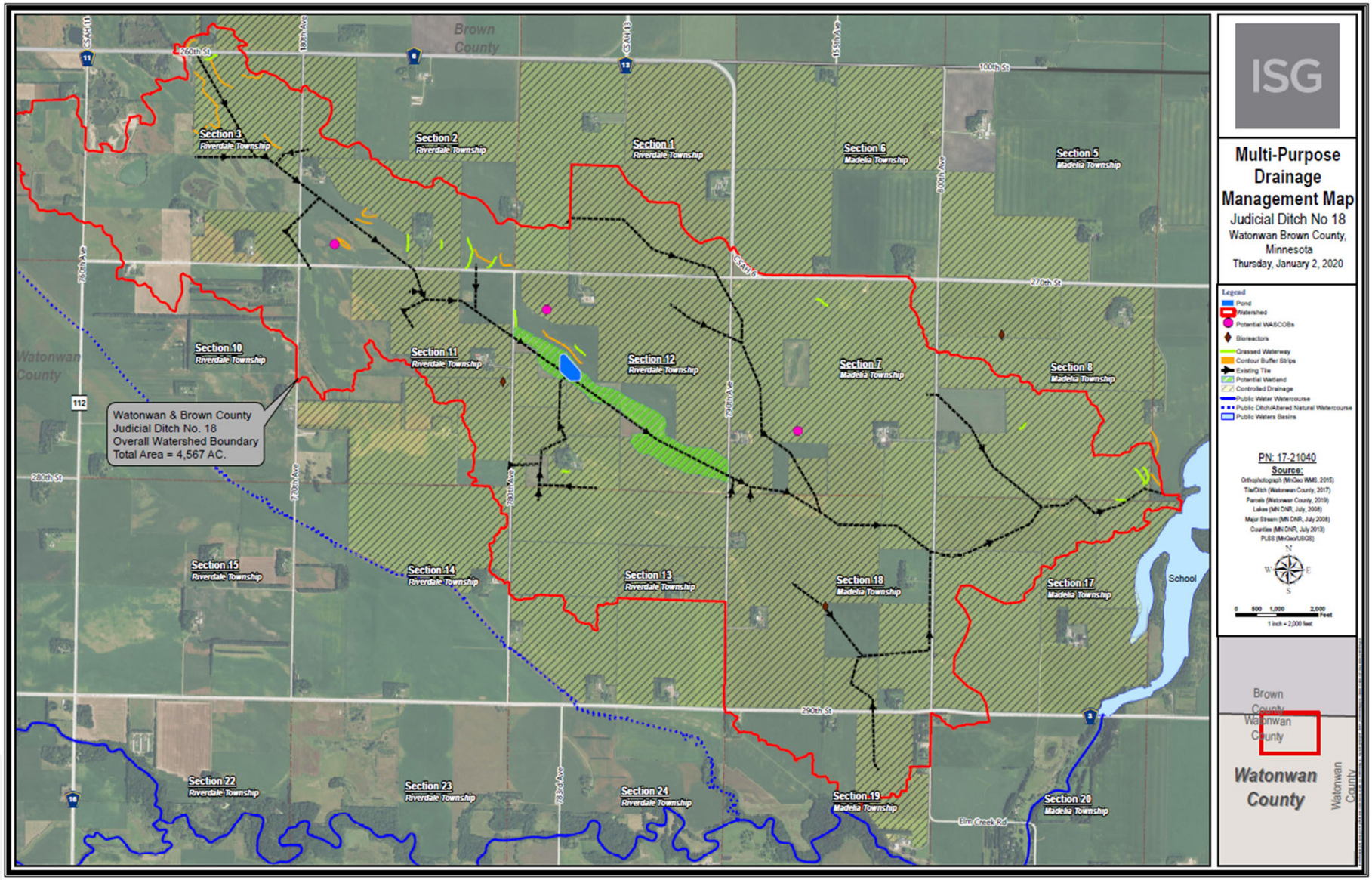
TWO STAGE DITCH

ALTERNATIVE INTAKES

WATER + SEDIMENT CONTROL BASINS

ALTERNATIVE SIDE INLET

MDM Plan for the Entire Watershed



Storage – Show Examples of what works

Martin CD 29

Storage – Show Examples

Blue Earth JD 34

Cost Options for Storage/Wetland Restorations

Storage Basin

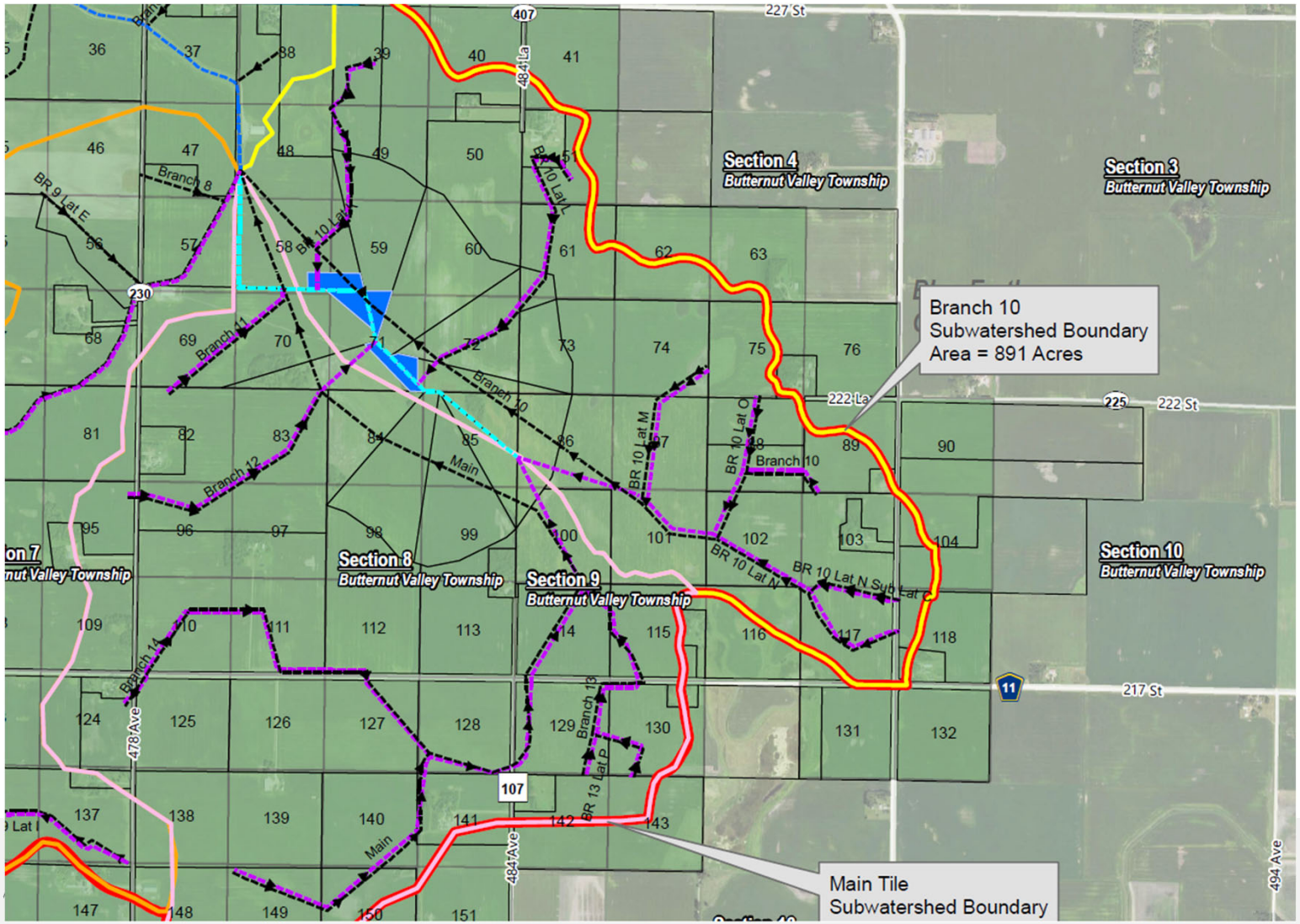
Item No.	Item	Unit	Quantity	Unit Price	Amount
101	MOBILIZATION	LS	1	$ 9,980.00	$ 9,980
102	COMMON EXCAVATION	CY	62405	$ 3.25	$ 202,816
103	TOP SOIL STRIP & PLACE SPOILS	AC	6.5	$ 4,000.00	$ 26,000
104	36-INCH TILE OUTLET (20 LF OF PIPE & RIPRAP ON GEOTEXTILE FABRIC)	EA	1	$ 1,433.50	$ 1,434
105	24-INCH TILE OUTLET (20 LF OF PIPE & RIPRAP ON GEOTEXTILE FABRIC)	EA	1	$ 1,150.30	$ 1,150
106	INSTALL STRUCTURE S-1 WITH GALVINIZED GRATE	LS	1	$ 15,000.00	$ 15,000
107	16.5' BUFFER STRIP SEEDING (SEED MIX: BUFFER BLEND WITH TYPE 3 MULCH)	AC	0.75	$ 1,060.20	$ 795
108	STANDARD SIDESLOPE SEEDING	AC	0.5	$ 3,450.40	$ 1,725
109	BUFFER STRIP MOWING	AC	1.5	$ 80.50	$ 121
110	WEED SPRAYING	AC	2	$ 157.30	$ 315
				TOTAL	**$ 259,336**
				10% UNFORSEEN	$ 25,934
				SUBTOTAL	**$ 285,269**
LAND ACQUISTION/ PERMANENT DAMAGES		AC	6.36	$ 6,000.00	$ 38,160
TEMPORARY DAMAGES		AC	12.72	$ 650.00	$ 8,268
				COUNTY ADMINISTRATION COSTS	$ 11,411
				REPORTS, PLANS AND SPECIFICATIONS	$ 19,969
				CONSTRUCTION STAKING & ADMINISTRATION	$ 22,822
				TOTAL STORAGE BASIN IMPROVEMENT COST	**$ 385,899**

Meet with Agencies

1. PERFORM A FEASIBILITY STUDY
2. MEET WITH LANDOWNERS ON SITE
3. LOOK AT OPTIONS
   Repair costs vs. improvement costs
4. INFORMATIONAL MEETING
   with landowners + drainage authority
5. MEET WITH AGENCIES IF NECESSARY
6. DISCUSS WATER QUALITY
7. START A PETITION

Discuss Water Quality and Storage at Every Meeting
Invite SWCD to Meeting to Look at Funding/Programs

Final Landowner Meetings and Petition



Early Landowner Coordination - Summary

- Figure out Landowner Issues – Can Repairs Solve the Problem
- Develop Feasibility with Options Repairs, Storage, Improvement Options Before Legal Process Starts – Be Creative and include in the Petition
- Discuss Water Quality and Storage
- Review The Options and Costs – Some projects are not cost effective – Target Failing Areas Due to Costs
- Discuss Water Quality and Storage
- Communicate - Typically 2 to 3 meetings are needed for Large Projects
- Meet With Agencies, SWCD, Discuss Funding Options
- Feasibility Report Should be Ordered by Drainage Authority and Paid for by the System to address repairs needed, Allows Engineer to look at Options and review Storage – Landowners will not always look at all options on their own


QUESTIONS?

Thank You

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