DEPARTMENT OF NATURAL RESOURCES

Preliminary Engineer's Report for the Impoundment of Branch 5 of County Ditch 33 in Vesta Township, Redwood County, Minnesota

February 2025

WMA 01866.00.33.09/8W240

Certification

Preliminary Engineer's Report
for the
Impoundment of Branch 5
of County Ditch 33 in
Vesta Township, Redwood County, Minnesota

February 2025

8W240

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.

Digitally signed by
William Douglass, P.E.
Date: 2025.02.24
16:07:52 -06'00'

By: _____
William Douglass, P.E.
License No. 18240

Date: February 24, 2025

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APPENDIX

STATE OF MINNESOTA
COTTONWOOD COUNTY

IN THE MATTER OF THE FOLLOWING PETITION:
FOR AN IMPOUNDMENT BRANCH 5 IN COUNTY DITCH NO 33 IN REDWOOD COUNTY, MINNEOSTA

On _____, the County Board, acting as the Drainage Authority for County Ditch No. 33 (CD 33) in accordance with Minnesota Statutes 103E.227 accepted a petition for the Impoundment of Branch 5 and the Partial Abandonment of the south lateral of Branch 5 in Vesta Township, Redwood County, Minnesota. This report summarizes the findings of the associated research and analysis of the effects of these petitioned changes on the remaining ditch system and is submitted for consideration by the drainage authority.

I. LOCATION AND SCOPE OF IMPROVEMENTS

The petitioned area for the Branch 5 Impoundment in the County Ditch No. 33 watershed lies within Section 20 (112-38-20) of Vesta Township in Redwood County. Except for the crossing of 300th Street, all the proposed impoundment and rerouting work is on land owned by the State of Minnesota and is currently a Wildlife Management Area (State WMA) within Sections 19 and 20 of Vesta Township. Figure 1 shows the watershed and existing pipe network of Branch 5.

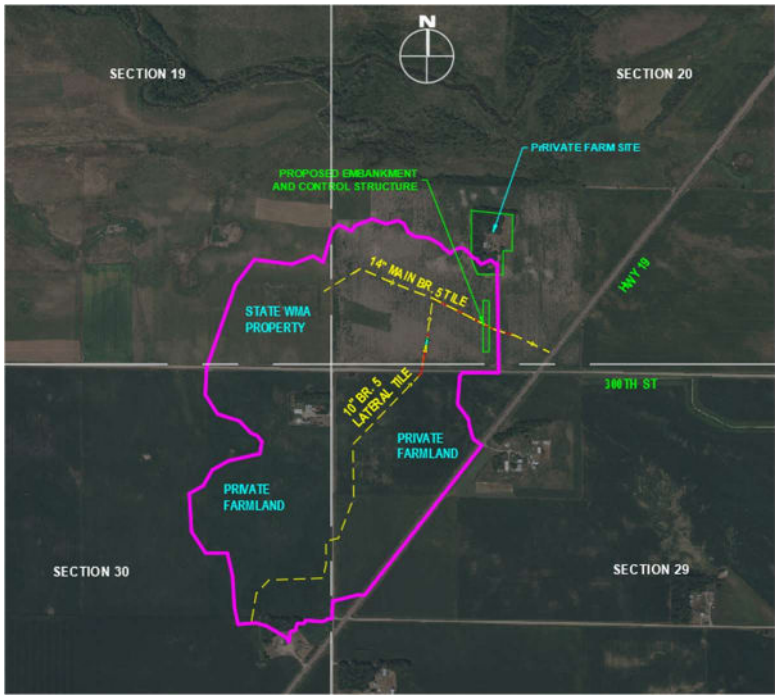

Figure 1

It should be noted that there is a privately owned farm site within the southwest quarter of Section 20 that has a driveway easement across the State WMA property. The proposed impoundment and rerouting will be coordinated with the private property owner to maintain access during the construction. The proposed impoundment berm is separate and upstream of the private driveway, which is by design to help maintain continuous access to the private farm site.

A. Branch 5 Lateral Tile

The Branch 5 Lateral tile appears to have been originally called Branch 16A, which included a 10" concrete tile that had a steeper slope in Section 20 near the lowlands and a milder, 0.2% slope near 300th Street. This branch extends to the south across 300th Street into the northwest quarter of Section 29 and the northeast quarter of Section 30 (See Figure 1).

The proposed plan is to intercept the existing 10-inch Branch 5 lateral tile from its upstream inlet in the south ditch of 300th Street, between Sections 29 and 20; and replace it with a 12" smooth interior PVC pipe at a 0.4% slope until daylighting at elevation 1055.35 into an open ditch near the original tile alignment in Section 20. The proposed open ditch will have a 4-foot bottom and 5:1 (H:V) side slopes. The ditch will also have a longitudinal slope of 0.46% until daylighting approximately 150 -feet north of the new 12" tile outlet. The open ditch is anticipated to daylight at an approximate elevation of 1054.60.

B. Impoundment Berm

An impoundment berm is proposed immediately west (upstream) of the driveway to the farm site in Section 20 (see Proposed Embankment in Figure 1). The top of this berm is proposed to be 1051.50 with an overflow spillway that is designed to allow a protected alternative flow option at elevation 1050.50. The modeled 1% event (100-yr) peak wetland elevation is 1050.72.

C. Water Control Structure and Outlet Piping

The upstream face of the proposed berm includes a 48" diameter drop inlet with a 12" PVC outlet pipe. Figure 2 is a detail of the Water Control Structure.

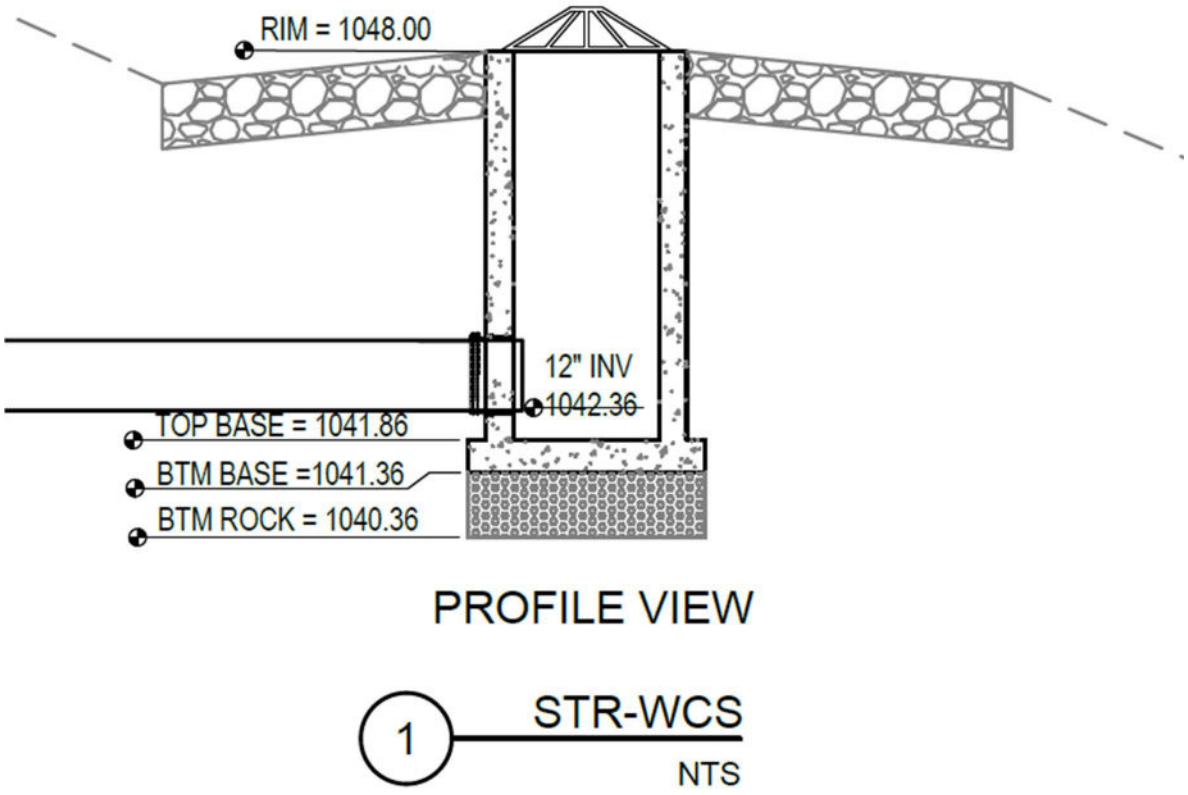

Figure 2 - 48" Outlet Structure

The 12" proposed outlet pipe extends 75-feet across the berm and terminates in Inlet-1, between the new berm and the existing driveway. Inlet-1 is a PVC Tee and riser pipe with a beehive inlet grate. Inlet-1 replaces an existing inlet in the same location. New 12"PVC pipe is proposed as the outlet from Inlet-1 and flows across the existing driveway to the east side where new Inlet-2 is proposed to replace an existing inlet before connecting to the existing 14" downstream tile. The 12" PVC pipe is proposed across the new berm and existing driveway for the following reasons:

1. To properly throttle the flow across the new system to ensure that the downstream flows do not exceed the existing flows.
2. 14" PVC pipe size is not available.
3. PVC pipe has a smooth interior with only slightly decreased flows compared to the existing 14" concrete tile.

A new 15" corrugated metal pipe culvert is also proposed to cross the private driveway to serve runoff that may pass through the emergency overflow. This culvert will ensure that the driveway does not overtop for the 1% event (100-yr rainfall).

II. Watershed Analysis

A. Existing Watershed Characteristics

Generally, the watershed for the proposed impoundment lies upstream of the private driveway in Section 20. The Branch 5 watershed at this driveway crossing was delineated using LiDAR contour mapping. The watershed was determined to be 225 acres in size.

With the exception of a small part of the single farm site served by the driveway in Section 20, the land to the north of 300th Street is State Wildlife Management Area (WMA). The remaining watershed, lying south of 300th Street, is privately owned and in agricultural production.

B. Flow Pattern

Figure 1 shows the Branch 5 tile system layout and the watershed lying upstream of the proposed impoundment. The upstream part of the Branch 5 Main tile in Section 19 was previously abandoned. A wetland has been restored in the southeast quarter of Section 19 where the tile was abandoned. Any overflow runoff coming from the Section 19 wetland flows into the southwest quarter of Section 20 where this new impoundment is proposed.

The south lateral of Branch 5 (previously known as Branch 16A) serves the remaining 121.8-acre agricultural watershed south of 300th Street (see Figure 1). All of the agricultural area to the south of 300th Street is above elevation 1061.00. The original tile drawings show this tile falls approximately 14-feet from its invert in the south ditch of 300th Street to the Main Branch 5 tile in Section 20. The existing junction between the south lateral and the main tile is estimated to have an approximate invert of 1042.40, which is approximately 4.5-feet below the ground at the junction. This is consistent with the surveyed elevation of the downstream inlet invert on the west side of the private driveway, which was at elevation 1041.91.

All of the watershed and Branch 5 tile systems upstream of the Phyllis Voosen WMA are significantly above the proposed impounded wetland normal water elevation of 1048.00. In fact, the invert elevation of the existing inlet in the south 300th Street ditch is 1056.40, which is 8.4 feet above the proposed wetland.

C. Branch 5 South Lateral Pipe Replacement Analysis

The existing Branch 5, south Lateral serving the area to the south of 300th Street as shown on the original tile map (originally known as the 16A tile) is a 10" concrete tile having a pipe slope of 1.33 percent. The replacement pipe is proposed to be a 12" smooth walled PVC pipe having a pipe slope of 0.4 percent.

The following table shows the estimated full pipe flow capacities of the original and proposed replacement tile.

Table 1: Existing and Proposed Branch 5 South Lateral Tile Capacities

Description	Location	Tile Size	Avg. Pipe Slope	Manning's Tile Capacity
Existing South Br. B5 Lateral	Flowing North from South 300th St. Inlet	10" Concrete	1.33%	2.53 cfs
Proposed South Br. B5 Lateral	Flowing North from South 300th St. Inlet	12" PVC	0.40%	2.93 cfs

The proposed 12" PVC replacement tile has a greater flow capacity and is proposed to daylight at elevation 1055.35, which is 7.35-feet above the proposed normal wetland water level and 4.85-feet above the overflow spillway at the proposed new embankment. As such, the proposed impoundment and water control structure will have no negative impacts on the upstream tile system.

D. Existing and Proposed Downstream Conditions

The Storm and Sanitary Analysis modeling software by Autodesk was used to analyze the existing and proposed storage and flow conditions. The modeling uses the NRCS (formerly SCS) Technical Release 20 (TR-20) techniques to analyze the watershed, runoff and flow through ponded areas. TR-20 techniques are generally accepted for analyzing agricultural flow conditions associated with pond storage.

The existing system has a recurrent ponding condition on the upstream side of the existing private driveway. Under the existing condition, the upstream flows overwhelm the tile under the existing driveway and ponds on the upstream side of the driveway. This driveway overtops for a 5.8-inch 24-hour rainfall event, which corresponds to a 2% (or 50-year) rainfall event. A 50-year rainfall event has a 2% chance of occurring in any given year. This means that a 50-year event could happen in back-to-back years.

The low area on the upstream side of this private driveway is approximately 1046.0. A new impoundment berm is proposed immediately upstream from the existing driveway. The design includes the creation of a wetland with a controlled outlet elevation of 1048.00. The resulting permanent wetland at this level will be approximately 7.9-acres in size. The new berm will hold additional water up to 2.5-feet above the controlled elevation before reaching the overflow spillway at elevation 1050.50. The overflow spillway is designed to protect the berm from erosion problems in the event a more significant flood occurs. The proposed berm is not tall enough to require a dam permit.

The upstream area at the emergency overflow elevation (1050.50) is approximately 16.4-acres in size. This enlarged storage area creates sufficient storage to hold the 1% rainfall event (100-yr storm) with only a minor amount of flow using the protective emergency overflow spillway. This design ensures that the proposed outlet structure and pipe network will adequately regulate the downstream flows so that they do not exceed the existing flows for the same rainfall events. The following table shows the existing and proposed downstream flows for several rainfall events.

Recurrence Probability Per year	**Probable Recurrence Interval**	**24-hour Rainfall Amount (Inches)**	**Existing Condition Downstream Flow (cfs)**	**Proposed Condition Downstream Flow (cfs)**
50%	2-year	2.72”	7.0	4.3
10%	10-year	4.01”	7.7	4.8
1%	100-year	6.74”	24.9	12.9

It should be noted that the downstream flow is a combination of the primary culvert flow plus any overtopping flows. For example, the existing condition driveway overtops for events larger than a 5.8-inch, 24-hour rainfall, which corresponds to a 50-year storm. The 100-year *existing* downstream flow cited above includes approximately 8.9 cfs through the 14” tile and 16 cfs overtopping the driveway.

Similarly, the overflow spillway becomes active under the proposed condition for events larger than a 50-year event. However, the overtopping elevation of the pond is only 0.01-feet above the spillway for a 50-year event (5.8-inch rainfall). For the 100-year event, the pond elevation is only 0.22-feet (less than 3-inches above the spillway.

The modeling was further used to determine the impact of the proposed impoundment and water control structure on the downstream system.

The modeling of the existing conditions included:

1. A geographic analysis of the area soils map to determine appropriate runoff curve numbers used in NRCS (formerly SCS) TR-20 hydrologic analyses.
2. Measurements of the flow path lengths and slopes using LiDAR contours and CAD measurements to determine flow lengths and slopes needed to determine the times of concentration associated with each watershed.
3. Measuring the contour areas in ponding areas for the development of a depth vs storage curve to enable the analysis of runoff storage (ponding) when the inflows exceed the downstream pipe capacity.

The contour areas of the proposed system were also analyzed to enable the development of a depth vs storage curve for the proposed new impoundment system.

These watershed and storage parameters were used in the SCS TR-20 analysis of the watershed, tile system and storage to evaluate and compare the existing and proposed flow conditions associated with multiple rainfall events, including the 50%, 10% and 1% annual chance rainfall events (a.k.a., 2-year, 10-year and 100-year rainfall events respectively).

The following shows the input parameters for the existing and proposed impoundment conditions.

	Existing Conditions	Proposed Conditions
South Lateral Watershed Area	121.8 acres	121.8 acres
So. Lateral Time of Concentration	120 minutes	120 Minutes
West Lateral Watershed Area	40.5 acres	40.5 acres
West Lateral Time of Concentration	150 minutes	150 minutes
Proposed Pond Direct Watershed Area	62.6 acres	62.6 acres
Proposed Pond Time of Concentration	21.2 Minutes	21.2 Minutes

This table shows that area upstream from the private driveway remains unchanged in the modeling of the proposed berm. That is, the same service area and the same amount of water drains to the site as it has since the tile system was originally constructed. The only thing that changes is the construction of an embankment and outlet system on the upstream side of the existing private driveway.

The proposed construction is designed to create a 7.9-acre wetland storage area by building a berm. Since the proposed wetland will have a controlled outlet elevation that is roughly 2-feet higher than the existing ground, a berm is required to ensure that the ponded water and the upstream runoff are contained and metered out at the same or lesser flows than under the existing condition.

III. DISCUSSION OF IMPOUNDMENT AND REROUTING

A. Properties Affected

The Minnesota DNR (State or DNR) owns all the property within the County Ditch 33 watershed **in** Sections 19 and 20 (See Figure 1). The exceptions are:

1. The private farm site in Section 20 and their associated driveway easement.
2. The proposed work associated with the crossing of 300th Street,

Since the DNR property is currently a Wildlife Management Area, it is desired to reestablish a wetland basin that can contain elevated storage on the property without adversely affecting the upstream or downstream property owners within the existing system and currently benefitted by the County Tile system.

B. Impoundment Size and Outlet Control Structure

Minor scraping of the proposed wetland bottom is proposed to enhance viability of the reestablished wetland area. The spoil is proposed to be placed and compacted over the proposed berm. The berm and the proposed Impoundment are shown in Figure 3.

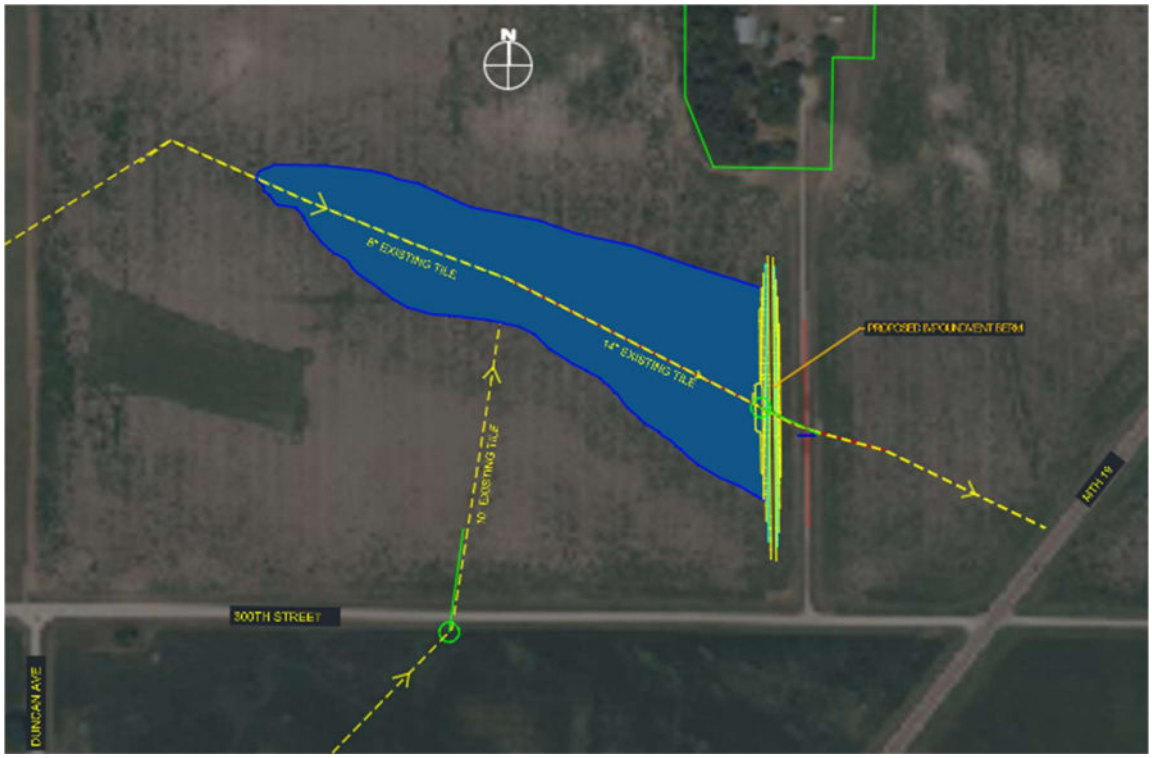

Figure 3

A grated 48-inch manhole style drop outlet control structure is proposed to control the normal water elevation of the impounded wetland. The existing 14-inch tile under the berm and driveway is proposed to be removed and replaced with a gasketed, smooth interior, solid walled 12-inch PVC pipe with antiseepage collars to prevent leaking through the berm. In addition, approximately 100-feet of the existing upstream 14-inch tile is proposed to be removed from the proposed wetland basin. This removal is possible because the upstream Branch 5 lateral tile is proposed to be daylighted above the proposed wetland as described earlier. The westerly tile was abandoned in a previous wetland enhancement project in Section 19.

C. Wetland to Watershed Ratio

The Wetland to Watershed ratio is provided to help in checking whether the wetland can be sustained throughout a normal rainfall year. Typically, a 6:1 ratio means that the wetland has a reasonable chance of being sustained through a normal summer dry spell. However, watershed and wetland soils are also significant factors affecting the sustainability of a wetland. More porous soils can create greater infiltration loss prior to runoff. Similarly, porous soils at the wetland bottom also release the stored water from under the wetland. As such, these ratios are only shown to provide a feel for the type of wetlands that may be created. The wetland to watershed ratio for the proposed wetland is 28:1, which suggests that this wetland should be sustainable.

Even if the proposed wetland should become intermittent under severe drought conditions, intermittent wetlands (wetlands that may evaporate to dry levels) are also invaluable in their unique contribution to the diversity of the flora and fauna that can be sustained within the WMA.

IV. ALTERNATIVE SOLUTIONS

A. Do Nothing

The "do nothing" alternative would maintain the existing condition, which includes drained wetlands that utilize the existing tile system. The State of Minnesota DNR desires to reestablish the wetland drained by the tile under it, as long as the only area impacted is the State WMA property. The proposed daylighting of the upstream tile along with the replacement of the drain through the impoundment with smooth interior non-perforated plastic pipe is designed to maintain the existing drainage outlet for the upstream property owner while ensuring that the downstream landowners within County Ditch 33 are unaffected by the proposed Rerouting and Impoundment.

B. Daylighting the Branch 5 Lateral (a.k.a., 16A) tile

Many times, it is desired to outlet the existing upstream tile above the proposed new wetland surface. This solution not only allows for unhindered flow from the upstream tile, but also ensures that the drainage area remains unchanged for the reestablished wetland. This is a viable alternative for the Branch 5 (a.k.a., 16A Tile) because the tile elevation is perched sufficiently above the normal water level of the proposed wetland. In fact, it is perched above the top of the proposed containment berm. Hence, the Branch 5 lateral tile is proposed to be daylighted on State property above the proposed wetland.

V. OTHER CONSIDERATIONS

A. Permit Requirements

Permitting for the proposed improvements is predominately limited to:

1. The County Ditch permitting process as governed by Minnesota Statue 103E.
2. Minnesota and Federal Wetland permits are not anticipated to be needed, because the area is currently drained and has no current wetland characteristics. Also, the proposed rerouting is designed to reestablish wetlands.
3. The proposed rerouting and impoundment will most likely involve more than 1-acre of disturbance, which means that the DNR will need to apply for a Construction Stormwater Permit from the Minnesota Pollution Control Agency. However, it remains to be seen whether an agricultural exemption applies.

4. The DNR will work with Vesta Township to secure permission for work directly on 300th Street and its associated roadside ditches as needed to extend the lateral tile across the roadway as described herein.
5. The embankment height will be less than the 6-foot threshold criterion of the dam permit requirements. Hence, a Dam Permit will not be required.

B. Wetlands

1. No special wetland permit is anticipated for this project, since the general purpose of the work is to reestablish wetland conditions at the WMA, and since the existing conditions are best described as previously drained wetlands.

C. Public and Private Benefits and Cost

1. An Opinion of Probable Construction Cost of $275,000 for the proposed impoundment and tile replacement.
2. The benefit of the impoundment is to reestablish pre-existing wetlands, which will enhance the WMA.
3. The proposed pipe replacements are sized to ensure that there is no reduction in drainage capability for any property owners within the CD 33 system, other than property currently owned by the DNR.
4. The DNR proposes to fund the proposed impoundment and pipe replacement project in its entirety. No new benefits are anticipated, and no new assessment of benefits are anticipated in the CD 33 system.

D. Agricultural Effects

1. The proposed impoundment and tile replacement is not anticipated to have any impact on the existing drainage.
2. The life of the replacement pipe should be increased due to the new construction and the design life of the proposed plastic replacement pipe.

E. Alternative Measures

1. The proposed project is designed to conserve and use drainage waters, enhance infiltration and groundwater recharge.
2. The proposed new outlet and riprapping together with the impoundment and more gradual release of the impounded water will also reduce potential surface erosion at the existing ditch outlet.

F. Water Quality

1. The retention of water within the proposed wetland and the associated wetland exfiltration potential are known water quality enhancement techniques. Although impoundments are typically described as water quality improvements, little change in

measurable water quality of the downstream receiving waters is anticipated as a result of the proposed impoundment and pipe replacement.

G. Fish And Wildlife

1. A review of the Threatened and Endangered species database found no threatened or endangered species in the vicinity of the Phyllis Voosen WMA.

H. Groundwater

1. The purpose of this project is to impound and store more water on the site. As such, it is anticipated to improve the infiltration characteristics of the site.

I. Environmental Impact

1. Adverse impacts associated with the proposed Impoundment and pipe replacement project are temporary in nature and are as follows:
    a. Temporary noise and dust generation can be expected from construction operations. These impacts are not viewed as significant since there are few residences near the proposed construction site, and since the contract specifications will be written to limit dust generation and work during nonbusiness hours.
    b. Temporary erosion of soil may occur in the construction area until permanent ground cover and soil stabilization occurs. This improvement is anticipated to need an NPDES/SDS permit from the MPCA, which requires the successful contractor to incorporate soil stabilization and erosion control techniques throughout the construction process.

2. Numerous beneficial effects are anticipated from the proposed impoundment and pipe replacement. Most of these benefits are associated with the reestablishment of the previously drained wetland and/or the enhancement of the Wildlife Management Area for public recreational activities. Another benefit is associated with storing and metering flow from the 225-acre drainage area that is currently served by the Branch 5 system.

J. Land Use

1. The present use of the DNR owned land is a Wildlife Management Area. This use is expected to continue for the foreseeable future.

VI. ESTIMATED COST

The Opinion of Probable Construction Cost for the proposed Impoundment and Pipe Replacement, as described in this report is included in Exhibit 2. The total Opinion of the Probable Construction Cost is $275,000.

100 percent of this cost is proposed to be paid by the Minnesota DNR using Outdoor Heritage Funds.

No assessment of benefits is proposed or anticipated for the work associated with this proposed Impoundment and pipe replacement.

VII. GENERAL FINDINGS

The proposed project is not expected to cause any limitations on the flow characteristics of the upstream or downstream CD 33 system.

The proposed Impoundment, Reroute of CD 33, Branch 5 in Redwood County, as described in this report, is feasible, practical and necessary to provide the impoundment for the enhancement of the Wildlife Management Area for use by the general public. All costs associated with the proposed improvement will be paid by an Outdoor Heritage Grant secured by the Minnesota DNR for wetland restoration projects.

Because the DNR is fully funding all proposed work, including engineering and administrative costs; there will be no assessment of benefits to the CD 33 system for the costs associated with this project.

A viewers report to determine benefits and damages should not be necessary.

VIII. RECOMMENDATIONS

As a result of these findings, the engineering recommendation is that this Report be approved by the County Ditch Board, and that the Board call a Hearing on the proposed Impoundment and Rerouting project. Because this project is fully funded by the Minnesota DNR, Viewers should not be needed or appointed to determine benefits and damages.

Exhibits

Exhibit 1 – Petition to Impound, Reroute, and Divert CD 33, Branch 5 Drainage System Waters

Exhibit 2 – Opinion of Probable Construction Cost

Exhibit 1

STATE OF MINNESOTA
Before the
REDWOOD COUNTY BOARD
SITTING AS THE DRAINAGE AUTHORITY FOR
BRANCH 5 OF COUNTY DITCH 33

In the Matter of: **The Petition to Impound and Reroute Divert Branch 5 of County Ditch 33**	**PETITION TO IMPOUND AND REROUTE DIVERT BRANCH 5 OF THE COUNTY DITCH 33 DRAINAGE SYSTEM WATERS**

Pursuant to Minn. Stat. § 103E.227, Petitioners seek approval to impound and reroute drainage system waters on Branch 5 of the Redwood County Ditch 33 system for beneficial use. For their Petition, the undersigned Petitioners state and allege the following:

Findings:

1. Petitioner seeks approval to impound and reroute drainage system waters on Branch 5 of County Ditch 33 located in Vesta Township, in Redwood County for beneficial use.
2. The State of Minnesota DNR owns property within the County Ditch 33 system where Branch 5 crosses to the northwest side of Minnesota Trunk Highway 19 . The property is currently a Wildlife Management Area (WMA), which is available for public uses, such as hunting. The State of Minnesota (State) desires to restore previously drained wetlands on its property to enhance the public use.
3. To facilitate implementation of the Phyllis Voosen WMA Wetland Restoration project, Petitioner must impound and reroute divert portions of Branch 5 of the County Ditch 33 system located on or across the following properties:

Property Description	Property Owners	Address
West half of Section 20, Vesta Township, Redwood County (112-38-20) except 5.91 acre tract (farm site), including a driveway easement.	State of Minnesota DNR	500 Lafayette Road Saint Paul, MN 55155

4. William R. Douglass, a licensed engineer, has investigated the potential and feasibility of impounding and rerouting portions of Branch 5 of the County Ditch 33 system and has found that a feasible impounded and rerouted drainage system alternative will help to restore the wetlands on State owned property that are currently being drained by the system without reducing drainage efficiency to properties benefited by the drainage system. The proposed impoundment and reroute changes include new smooth interior, solid walled pipe having equal or greater diameter and greater flow capacity for the rerouted pipe entering the State Property and a smaller pipe for the pipe leaving the impounded wetland on State property. These pipe sizes will:

    a. Maintain or enhance the existing system flow capacity of the upstream tile entering the State Property from the South.
    b. Maintain or reduce the flow capacity of the pipe leaving the State Property to the East.

    The proposed solid walled pipe replacements will serve to impound more surface water on the State Property, thereby reducing the amount of surface water currently draining through the system outlet. The State may also perform shallow excavations in the vicinity of the restored wetlands to further enhance the restored wetland depth and vitality.

5. Attached to this Petition and labeled as **EXHIBIT A** is a drawing showing the proposed impoundment and reroute. The State of Minnesota proposes to use its own engineering staff to prepare final plans and move forward with the pipe replacements and wetland enhancements.

6. All of the proposed areas likely to be affected by the impoundment are on property owned by the State of Minnesota, except as described in paragraphs 6.a, and 6.b. herein. **EXHIBIT B** shows the Comprehensive existing County Ditch 33 system with existing pipe sizes and proposed impoundment (i.e., wetland restoration areas).

    a. The Petitioner will work with Vesta Township to obtain permission to work in the right-of-way of 300th Street.

7. Aside from the work in the right-of-way of 300th Street described in 6.a. above, the rerouting and impoundment work on Branch 5 of County Ditch 5 is entirely in the State of Minnesota WMA property.

8. Approximately 225 feet of existing 10" **Branch 5 Lateral** tile will be replaced and daylighted with 12" solid wall pipe from the point where it flows northerly across 300th Street right-of-way into DNR property. This is from the northern limits of Section 29 to the point where it daylights within DNR property in Section 20. The flow continues northerly into a proposed impoundment wetland with a design normal water level that is approximately 7.35-feet below the new tile outlet.

Exhibit 1

9. Approximately 100-feet of the 14" **Branch 5 Main** under the proposed impoundment wetland is proposed to be removed to enhance the wetland and eliminate potential wetland leaking.

10. A new embankment, designed to contain the proposed impoundment is proposed to be constructed immediately west of the existing private driveway easement serving a private residential site within the State WMA property.

    a. The low elevation of the existing private driveway is 1048.50.
    b. The top elevation of the proposed embankment is 1051.50.
    c. The proposed impoundment wetland normal water elevation is 1048.00.
    d. The area of the proposed wetland at elevation 1048.00 is 7.9 acres.

11. A new 48" Manhole style drop outlet control structure with approximately 140-feet of 12" PVC outlet piping is proposed to replace the existing 14" **Branch 5 Main** tile crossing the impoundment berm and the existing private driveway. The 12" PVC pipe is sized to ensure that the downstream flows are less than or equal to the original flows for the same rainfall events.

12. Petitioners agree to be responsible for the cost of installation and construction of the structures, township road repairs and private driveway repairs as well as the engineering and legal costs associated with this Petition.

13. Petitioners have consulted with the Division of Waters, Department of Natural Resources, and determined that a public waters permit is not required for this impoundment and reroute.

14. Petitioner shall acquire, in writing, all property rights, rights-of-way, or flowage easements necessary before construction.

Respectfully submitted this 28th day of February, 2025 by:

Cheryl J. Kelley-Dobie Digitally signed by Cheryl J. Kelley-Dobie Date: 2025.02.28 15:31:43 -06'00'

Assistant Director
Lands and Minerals Division
Minnesota Department of Natural Resources
500 Lafayette Rd
St. Paul, MN 55155

DEPARTMENT OF NATURAL RESOURCES

Opinion of Probable Cost - Preliminary

Date:	**1/6/2025**	**Cost Code 2:**	**8W240**
Project:	Public Tile Rerouting & Impoundment	File:	WMA01866.00.33.09
Location:	Phyllis Voosen WMA	Sub Account #	C697
County:	Redwood		

ITEM NO.	SPEC. REF.	DESCRIPTION	UNIT	QTY	UNIT COST	COST
1	01 20 00	MOBILIZATION	LS	1	$ 20,000.00	$ 20,000.00
2	01 70 00	CONSTRUCTION SURVEYING AND STAKING	LS	1	$ 5,000.00	$ 5,000.00
3	02 41 18	REMOVE EXISTING TILE, 10" - 14"	LF	476	$ 9.00	$ 4,284.00
4	31 23 00	EXPLORATORY EXCAVATION	HR	10	$ 500.00	$ 5,000.00
5	31 23 00	EXCAVATION - COMMON (P)	CY	2,840	$ 11.00	$ 31,240.00
6	31 23 00	CLAY BORROW (CV) (P)	CY	4,602	$ 25.00	$ 115,050.00
7	31 23 00	SALVAGED TOPSOIL PLACEMENT (P)	CY	904	$ 12.00	$ 10,848.00
8	31 25 00	NPDES PERMIT COMPLIANCE	LS	1	$ 3,500.00	$ 3,500.00
9	31 25 00	SILT FENCE,TYPE MS	LS	1	$ 3,000.00	$ 3,000.00
10	31 25 00	SEDIMENT CONTROL LOG - NATURAL NET	LF	1,620	$ 5.00	$ 8,100.00
11	31 25 00	CONSTRUCTION EXIT	EA	1	$ 1,500.00	$ 1,500.00
12	31 25 00	ROCK CHECK DAM, CL III	EA	1	$ 1,250.00	$ 1,250.00
13	31 25 00	RIPRAP INLET PROTECTION	EA	3	$ 900.00	$ 2,700.00
14	31 25 00	EROSION CONTROL BLANKET - CAT. 3N NAT. NET	SY	2,200	$ 3.00	$ 6,600.00
15	31 37 00	RIPRAP, CLASS III	TON	50	$ 85.00	$ 4,250.00
16	32 11 23	AGGREGATE SURFACING, CLASS 2	TON	70	$ 30.00	$ 2,100.00
17	32 92 00	TURF ESTABLISHMENT, MULCH AND DISC	LS	1	$ 2,500.00	$ 2,500.00
18	33 41 00	12" PVC, SDR 35	LF	355	$ 60.00	$ 21,300.00
19	33 41 00	15" CMP	LF	60	$ 60.00	$ 3,600.00
20	33 50 00	CONDTRUCT 12"X12"PVC TEE AND RISER	EA	3	$ 1,250.00	$ 3,750.00
21	33 50 00	12" INLET BAR GUARD	EA	3	$ 250.00	$ 750.00
22	33 50 00	48" INLET BAR GUARD	EA	1	$ 400.00	$ 400.00
23	35 49 14	F&I 48" WATER MH WATER CONTROL STRUCTURE, INCLUDES CONCRETE, REBAR, BOOTED TILE CONNECTIONS AND DEWATERING	LS	1	$ 5,500.00	$ 5,500.00
		SUBTOTAL				**$ 262,222.00**

CONTINGENCIES (5%) $12,778.00

OPINION OF PROBABLE CONSTRUCTION COST $275,000.00

Prepared By: William Douglass, P.E.