

Adequacy of Outlet Report

Petition for Outlet into County Ditch 52 Lateral 87

City of Redwood Falls

April 22, 2022

Submitted by:

Bolton & Menk, Inc.

1243 Cedar Street NE

Sleepy Eye MN 56085

P: 507-794-5541



**BOLTON
& MENK**

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Certification

Adequacy of Outlet Report

For

Petition for Outlet into County Ditch 52 Lateral 87
Reflection Prairie Addition
In
The City of Redwood Falls

City of Redwood Falls
S17.121459

April 22, 2022

PROFESSIONAL ENGINEER

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.

Signature: Shaun P. Luker

Typed or Printed Name: Shaun P. Luker

Date: 4-22-2022 License Number: 48756

Table of Contents

I. BACKGROUND INFORMATION.....	1
II. HYDRAULIC MODELING	1
III. EXISTING CONDITIONS.....	1
IV. PROPOSED CONDITIONS.....	1
V. CONCLUSION.....	2

Tables

Table 1 – Outlet Peak Discharge Analysis	2
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Appendix

Appendix A: Figure

I. BACKGROUND INFORMATION

The City of Redwood Falls is constructing a residential development, Reflection Prairie Addition, within the Northwest quarter of Section 8 in Paxton Township. The site currently drains to two separate County Ditch (CD) systems. Generally speaking, the westerly and southerly portion of the site currently drains via private tiles to the west to the County Ditch 52 Lateral 87 open ditch. Approximately 138.7 acres currently drain to the CD 52 Lateral 87 system. The easterly portion of the site drains via private tiles into the County Ditch 22A tile system that then drains to the east. Approximately 65.5 acres currently drain to CD 22A.

As a part of the current development project the City of Redwood Falls will construct a storm sewer system and two stormwater detention ponds. In order to provide the required treatment of runoff from the new development it is proposed to redirect 20.8 acres that currently drain to the CD 22A system to the west through the new city storm sewer system, into the main centralized pond, and then into CD 52 Lateral 87.

Since the City of Redwood Falls is proposing to add additional acres to drain to the CD 52 Lat 87 system, they have petitioned the Drainage Authority to use CD 52 Lat 87 as an outlet.

II. HYDRAULIC MODELING

To validate the adequacy of CD 52 Lat 87 as an outlet for the Reflection Prairie Addition project a hydrologic and hydraulic model was developed using HydroCAD modeling software. The model used Soil Conservation Service (SCS) Technical Release (TR-20) methodology to route the watershed runoff through the existing system and the proposed system. The Atlas 14 rainfall depths were used along with the NRCS's MSE 3, 24-hour rainfall distribution. The portion included in the modeling is the combined contributing watersheds as seen in Appendix A.

III. EXISTING CONDITIONS

The proposed Reflection Prairie Addition site is currently in agricultural use. The existing site was modeled to determine the peak discharge rates of runoff for various storm events. The existing depressional areas were modeled to mimic the natural storage that occurs on the land, with the existing private tile system as an outlet into CD 52 Lat 87. In Appendix A, the existing conditions drainage area map can be viewed. Table 1 shows the existing peak discharge rates into CD 52 Lat 87.

IV. PROPOSED CONDITIONS

The proposed development is within the northern portion of the site. As a part of the construction a new storm sewer system with catch basins will collect the runoff from the development area. A majority of the runoff from the development site, along with some of the remaining agricultural ground will be routed through a main centralized pond. A small portion of the site will be routed through a smaller pond on the northwest portion of the site. The ponds have been designed to meet MPCA standards for treating runoff. Again, as a part of the development, 20.8 acres that currently drain to CD 22A will be routed through this new system to the west. The proposed development will discharge into CD 52 Lat 87.

The proposed north pond controls 12.7 Acres of the existing watershed to CD52 Lat 87. The north pond has a 12" storm sewer outlet. The proposed north pond is designed to provide a storage volume of 1.8 acre-feet (586,532 gallons) and manage the 100-year rainfall event (6.61").

The proposed main centralized pond also helps to mitigate a portion of the peak flow. The main

pond's watershed area includes 112.4 acres of the existing CD 52 Lat 87 watershed along with 20.8 acres of the existing CD 22A watershed. The proposed main pond is designed to provide a storage volume of 26.2 acre-feet (8,537,295 gallons) and manage the 100-year rainfall event (6.61").

In Appendix A, the proposed conditions drainage area map can be viewed. Peak discharge rates into CD 52 Lat 87 from the proposed site's watershed as analyzed for the proposed conditions are presented below in Table 1.

Table 1 – Outlet Peak Discharge Analysis					
Rainfall Event	Existing Peak Discharge to CD 52 Lat 87 (CFS)	Proposed Peak Discharge to CD 52 Lat 87 (CFS)	Change in Peak Discharge to CD 52 Lat 87 (CFS)	Change in Peak Discharge to CD 52 Lat 87 (GPM)	Change in Peak Discharge to CD 52 Lat 87 (%)
2-Year (2.70")	17.8	6.8	-11.0	-4,937	-61.8%
5-Year (3.34")	18.4	11.1	-7.3	-3,276	-39.7%
10-Year (3.95")	22.1	15.2	-6.9	-3,097	-31.2%
25-Year (4.90")	59.7	26.9	-32.8	-14,722	-54.9%
50-Year (5.72")	97.6	58.6	-39.0	-17,504	-40.0%
100-Year (6.61")	142.1	106.4	-35.7	-16,023	-25.1%

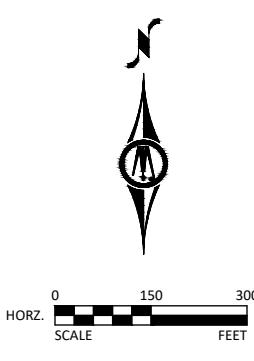
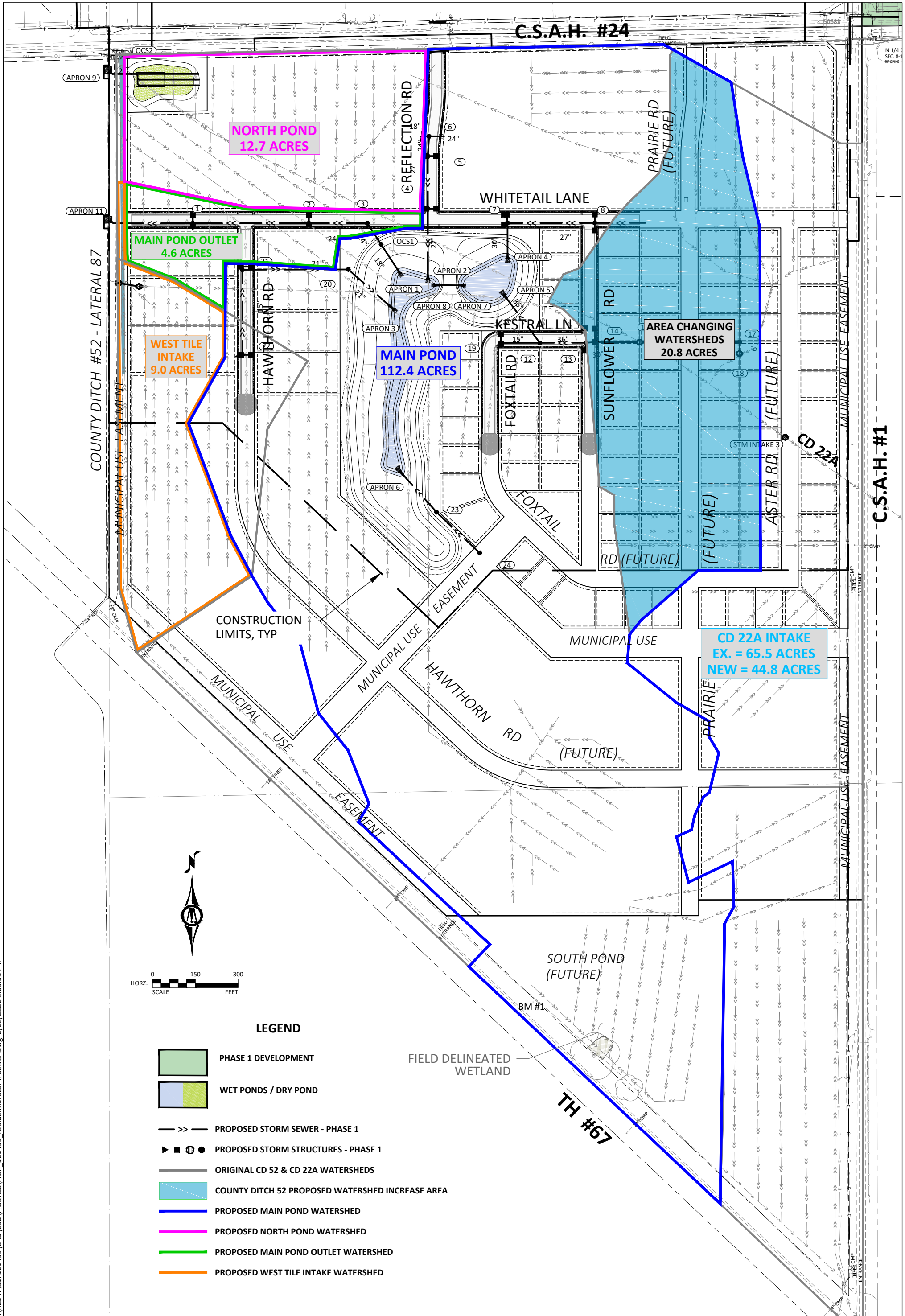
Table 1 shows that the proposed improvements and additional watershed will not have a negative impact on the overall CD 52 Lat 87 open ditch. The compensatory storage provided by the proposed detention basins will mitigate peak discharges to the CD 52 Lat 87 open ditch, as well as provide added benefits of reducing pollutant and nutrient loading to the CD 52 Lat 87 drainage system.

V. CONCLUSION



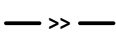







The City of Redwood Falls needs an outlet for the storm sewer system in the proposed Reflection Prairie Addition within Section 8 of Paxton Township. The existing drainage is served by private tile to the CD 52 Lat 87 open ditch and the existing CD 22A drain tile system within the proposed site. In order to meet MPCA water quality treatment requirements, and to reduce the peak flows into CD 52 Lat 87, two storm ponds will be constructed. The additional water from the east side of the site of 20.8 acres that currently drains to CD 22A, along with the existing watershed that drains to CD 52 Lat 87, when routed through the proposed ponds will result in a reduction of the overall peak discharge rate to the CD 52 Lat 87 open ditch as currently exists.

It is our professional engineering opinion that the inclusion of the ponds and the proposed storm sewer outlets into the CD 52 Lat 87 open ditch, mitigates the impact of the development and the 20.8 acres petitioned to be added to the CD 52 Lat 87 system and is expected to be of a nature similar or better to the conditions that currently exist on the CD 52 Lat 87 open ditch.

Appendix A: Figure



LEGEND

-  PHASE 1 DEVELOPMENT
-  WET PONDS / DRY POND
-  PROPOSED STORM SEWER - PHASE 1
-  PROPOSED STORM STRUCTURES - PHASE 1
-  ORIGINAL CD 52 & CD 22A WATERSHEDS
-  COUNTY DITCH 52 PROPOSED WATERSHED INCREASE AREA
-  PROPOSED MAIN POND WATERSHED
-  PROPOSED NORTH POND WATERSHED
-  PROPOSED MAIN POND OUTLET WATERSHED
-  PROPOSED WEST TILE INTAKE WATERSHED