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**RAMSEY COUNTY DITCH 1
DRAINAGE SYSTEM RECORD CORRECTION PUBLIC HEARING**

Wednesday, January 22, 2025, 6:00 p.m.

Mounds View City Hall Council Chambers
2401 County Road 10, Mounds View, Minnesota

or via Zoom Meeting:

<https://us06web.zoom.us/j/81450066679?pwd=VUSEmYP1btVZbHMBLfg5utWsm8UFWt.1>

Meeting ID: 814 5006 6679

Passcode: 084761

+1 312 626 6799 US (Chicago)

Meeting ID: 814 5006 6679

Passcode: 084761

Agenda

CALL TO ORDER

ROLL CALL

**PUBLIC HEARING: RAMSEY COUNTY DITCH 1 DRAINAGE SYSTEM RECORD
CORRECTION**

1. **WELCOME AND INTRODUCTIONS (BOARD PRESIDENT)**
2. **SUMMARY OF PROCEEDINGS (DISTRICT ATTORNEY)**
3. **REVIEW OF NOTICES (RCWD STAFF)**
4. **ENGINEER’S PRESENTATION (DISTRICT ENGINEER)**
5. **PUBLIC COMMENT**
6. **BOARD DISCUSSION/DELIBERATION/ACTION**
7. **ADJOURN/RECESS**



St. Paul Pioneer Press newspaper January 1, 8, and 15, 2025

Shoreview Press newspaper on January 6, 2025

RCWD postcard notice to the owners of property within the sub watershed of RCD1, mailed December 18, 2024

RCWD notice to Cities of Shoreview and Arden Hills, BWSR, DNR-Jack Gleason, MnDOT, Ramsey County Engineer, Ramsey Soil & Water Conservation Division; MN Army National Guard mailed December 19, 2024

Notice District website December 19, 2024 & email December 20, 2024, noticing

District notice posted at office December 19, 2024

RCWD notice and RCD1 Historical Review Technical Memo dated 4/10/2024 mailed to DNR and BWSR December 19, 2024

RCWD notice and RCD1 Historical Review Technical Memo dated 4/10/2024 emailed to DNR region3 and ACOE email address on December 31, 2024

Ramsey County Ditch 1 Drainage System Record Correction Public Hearing

The Rice Creek Watershed District (RCWD) will hold a Public Hearing on **Wednesday, January 22, 2025, at 6:00 p.m.** The RCWD established the option for the public to participate in its meetings either in person or virtually. The in-person public hearing will be at the Mounds View City Council Chambers, 2401 County Hwy 10, Mounds View, MN 55112. Public participation using interactive technology will also be possible using Zoom. See the instructions below. The district engineer will discuss recommended changes to correct the official record of Ramsey County Ditch 1 public drainage system, and the board will consider written and verbal testimony from the public. An engineer's report discussing the system's historic alignment, dimension, and grade can be found online at the following website address: www.ricecreek.org or at the District office at 4325 Pheasant Ridge Dr. NE, Suite 611, Blaine, MN 55449. 763-398-3070. Questions and comments on the system can be directed by email to Tom Schmidt [at tschmidt@ricecreek.org](mailto:tschmidt@ricecreek.org) (preferred), phone at 763-398-3076, or to the address above.

Join Zoom meeting instructions:

<https://us06web.zoom.us/j/81450066679?pwd=VUSEmYP1btVZbHMBLfg5utWsm8UFWt.1>

Meeting ID: 814 5006 6679

Passcode: 084761

+1 312 626 6799 US (Chicago)

Meeting ID: 814 5006 6679

Passcode: 084761

Find your local number: <https://us06web.zoom.us/j/81450066679>

4325 Pheasant Ridge Drive NE #611 | Blaine, MN 55449 | T: 763-398-3070 | F: 763-398-3088 | www.ricecreek.org

**BOARD OF
MANAGERS**

Jess Robertson
Anoka County

Steven P. Wagamon
Anoka County

Michael J. Bradley
Ramsey County

Marcie Weinandt
Ramsey County

John J. Waller
Washington County

Technical Memorandum

To: Nick Tomczik
Administrator, RCWD

Cc: Tom Schmidt, RCWD
John Kolb, Rinke-Noonan

From: Adam N. Nies, PE CFM

Through: Chris Otterness, PE

Subject: Ramsey County Ditch 1 – Historical Review

Date: April 10, 2024

Project #: 5555-0345

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am duly Licensed Professional Engineer under the laws of the State of Minnesota.



Adam N. Nies
Reg. No. 53358

Date: 4/10/2024

INTRODUCTION

The purpose of this memorandum is to provide the Rice Creek Watershed District (RCWD) with a historical review of the Ramsey County Ditch 1 (RCD 1) system, to describe the components of the current system necessary to maintain the historic function, and to determine the “As Constructed and Subsequently Improved Condition” (ACSIC¹). Determination of the ACSIC is necessary for future repairs and/or maintenance of the RCD 1 system and for use in drainage proceedings to correct the public drainage system record. Documented and undocumented modifications to the RCD 1 system have affected the alignment and function of the public drainage system since its construction in 1901, resulting in the current public drainage system. No other historical reviews of the official profile of this system previously completed by the Rice Creek Watershed District (RCWD) are known to exist.

This memorandum is prepared pursuant to MS 103E.101, Subd. 4a which allows the Drainage Authority to initiate proceedings to reestablish records defining the alignment; cross-section; profile; hydraulic structure locations, materials, dimensions, and elevations; or right-of-way of a drainage system as originally constructed or subsequently improved.

¹ Note: The U.S. Army Corps of Engineers uses the term “as-built” to describe the originally constructed condition of the public drainage system. The terms as-built and ACSIC are synonymous (see definitions).

RELATIONSHIP TO DRAINAGE SYSTEM MAINTENANCE AND REPAIR

The ACSIC is the basis for future maintenance and repair of the public drainage system. A future repair report or similar document is expected to include the evaluation of alternatives relative to this system serving as an outlet for stormwater management needs, and address issues related to the volume of runoff, water quality, and flooding. Typically, the repair report may include alternatives that adjust the elevation of the open channel and culverts, realign or abandon portions of the public system, or evaluate similar modifications as authorized by MS 103E and consistent with the ACSIC. The range of alternatives evaluated within the repair report is based in part on discussions with landowners, the municipalities served by the public drainage system and other interested parties.

DEFINITIONS

This memorandum defines the condition² and therefore by inference the capacity (i.e. the existing flow rate in cubic feet per second) of the public drainage system using three definitions:

As-Designed / Established Condition: The geometry of the public drainage systems as designed in 1901 including all subsequent designs for legal³ repairs and alterations. A repair or alteration is considered legal if formally authorized in some legal proceedings. The details of the As-designed / Established condition are limited to historic documentation available, which are included within this study and may have limited information regarding original constructed ditch dimensions, lengths and grade elevations. The As-Designed / Established Condition may or may not reflect the As-Constructed and Subsequently Improved Condition and is generally shown on construction plans and engineering drawings.

As-Constructed and Subsequently Improved Condition (ACSIC): The geometry of the RCD¹ public drainage system as constructed in 1901 including all subsequent legal repairs and alterations as well as other actions which maintain and are consistent with the general character and efficiency of the drainage systems. Often, survey data (and only rarely as-built drawings) show that the alignment, profile and geometry (i.e., cross sectional area) of the existing public drainage system is altered from

² "Condition" includes the alignment; cross-section; profile; and hydraulic structure locations, materials, dimensions, and elevations.

³ Documentation may not always be available to determine whether a repair is legal. Circumstances may exist where natural events or unknown human activities, including undocumented drainage authority activities or activities verbally authorized by the drainage authority, have created changed conditions lasting a sufficient period of time such that people or entities have relied on them when making decisions about the public drainage system. Reasonable discretion on the part of the drainage authority, combined with engineering analysis, is then used to define the as-constructed and subsequently improved condition as well as the "repaired condition."

the As-Designed / Established Condition. The definition of ACSIC is intended to establish the condition to which the system can legally be repaired consistent with the definition in MS 103E.701, which states:

The term, "repair" means to restore all or a part of a drainage system, as nearly as practicable to the same condition as originally constructed, and subsequently improved, including re-sloping of ditches and leveling of waste banks if necessary to prevent further deterioration, realignment to original construction if necessary to restore the effectiveness of the drainage system, and routine operations that may be required to remove obstructions and maintain the efficiency of the drainage system. "Repair" also includes:

- (1) incidental straightening of a tile system resulting from the tile-laying technology used to replace tiles; and
- (2) replacement of tiles with the next larger size that is readily available, if the original size is not readily available.

Original establishment documents of RCD 1 are not known to currently exist. However, recent survey data in conjunction with historic aerial photos indicate that the alignment of the existing public drainage system generally follows the historic alignment as far back as 1938, accounting for the change in roadway alignment of Lexington Avenue, which resulted in minor changes to ditch alignment, and the culvert crossing shifted further west (downstream) along the ditch. As a standard of practice, any alterations to the public drainage system that were not performed per the requirements of MS 103E (i.e., ditch law) or its predecessors are typically not considered part of the ACSIC. However, non-procedure alterations necessary to the core function of the system, maintained by the public drainage authority and relied upon by benefitted landowners, may be considered part of the ACSIC, where that alteration has been maintained for a sufficient period of time (15 years) to create rights in the benefitted landowners.

Repaired Condition: The condition to which the RCWD Board of Managers repairs the public drainage system. If the capacity of the Repaired Condition exceeds the ACSIC, the work is considered an Improvement under MS 103E and its predecessors. The Board may decide for a variety of reasons to repair the public drainage system to some condition less than the ACSIC.

Maintenance: There is no statutory distinction between the terms maintenance and repair. However, historically, the RCWD Board of Managers has drawn a distinction between the two terms as a function of the scope of work performed for each. The primary difference between maintenance and repair is that maintenance activities are generally completed at a select or isolated location(s) along a portion(s) of the public drainage system, while a formal repair proceeding is considered for a drainage system-wide assessment, analysis, recommendation or alteration.

Maintenance generally includes activities such as vegetation management, the removal of open channel and tile blockages (e.g., beaver dams, sediment), the replacement of tile ruptures, the installation of tile inlets

and access manholes, the replacement of portions of a tile system, the stabilization and repair of slopes and spoil material, and the removal of sediment up to the repair condition. Maintenance activities are usually exempt from wetland permitting requirements under the Wetland Conservation Act and Section 404 of the Clean Water Act.

DESCRIPTION AND HISTORY OF THE PUBLIC DRAINAGE SYSTEM

LOCATION

The RCD 1 public drainage system consists solely of a Main Trunk open channel approximately 1.1 miles in length and is located within Section 3 T30N, R23W within the city of Shoreview, Ramsey County. RCD 1 generally flows north and west from the Patrol Road at the Twin City Army Ammunition Plant; and terminates at the confluence with Rice Creek east of Lexington Avenue as displayed in **Figure 1**. The land that contributes runoff (i.e. drainage area) to RCD 1 is approximately 3,000 acres (or 4.7 square miles) in Sections 1-4, 9-16, 22, and 23 of T30N, R23W and flows through Marsden Lake, Public Waters Inventory Number 62-59P as displayed on **Figure 2**. The drainage area is predominantly developed for residential, commercial, and military land uses with no agricultural lands served by this public drainage system. The surrounding area is fully urbanized with some low lying areas and several lakes, including Turtle Lake, which occasionally overflows into a private ditch, flows through Marsden Lake and then connects to RCD 1.

EXISTING / CURRENT ALIGNMENT

The stationing used to describe the alignment is derived from the existing alignment and proceeds from downstream to upstream. Neither construction records (as-builts) nor detailed design plans were found.

Beginning at its downstream end, the current RCD 1 system originates at its confluence with Rice Creek east of Lexington Ave at Sta 0+00. Continuing south (up-station), the ditch passes through Lexington Ave at Sta 4+00. After a brief southeasterly bend in the alignment, RCD 1 traverses south to approximate Sta 26+50 where a private lateral ditch connects, and the alignment turns in a southeasterly direction. At Sta 31+50, a pedestrian crossing now exists, connecting two residential housing developments across what used to be Kettle River and Moundsview Road. Continuing southeasterly, RCD 1 crosses Hamline Ave at Sta 49+00. Upstream of Hamline Ave, the ditch crosses two water supply pipelines owned by St. Paul Water Utility at approximate Stas 51+50 and 54+00, with the upstream terminus at the Patrol Road crossing at Sta 55+00 which is the outlet for Marsden Lake. The public drainage system is conveyed entirely through open channel ditch, and culverts under road or trail crossings.

AVAILABLE INFORMATION / HISTORICAL RECORDS

Historic records for the RCD 1 public drainage systems are available on the District website at the following location: <http://rcwd.houstoneng.net/ditchportal/drainagesystemportal.html>

The following documents have been specifically utilized and/or referenced for this report:

- Location Map (unknown date, assume 1900)
- 1914 Tabular Auditors Assessment for Repair
- 1938 Historic Aerial Imagery
- 1944 Inspection Profile
- 1953 Auditor's Record
- 1960 St. Paul Water Pipeline Profile As-built
- 1980's (unconfirmed date) plan and profile
- 1985 Inspection Report Notes
- 1993 MnDOT Bridge Summary Report at Lexington Ave and Rice Creek
- 1995 Inspection Report by Montgomery Watson

HISTORICAL REVIEW OF THE PUBLIC DRAINAGE SYSTEM

1901

The RCD 1 public drainage system was established in 1901, originally called the Marsden Lake Ditch, as the upstream terminus of RCD 1 is located at the Patrol Road at the northwesternmost corner of Marsden Lake, which is an approximately 286-acre wetland lake. The historical record investigation did not discover a petition for establishment of the public ditch; however, the auditor's assessment does include benefitted acres of the ditch, which is presumed to have been associated with a petition. The original plan view is undated but is presumed to have been drawn in 1900 with RCD 1 labeled "Line of Proposed Ditch". In that original plan view, the only road crossing the ditch was the Kettle River & Moundsview Road, which is now a pedestrian crossing connecting two housing developments. At the time, Lexington Ave, Hamline Ave, and County Road I did not cross the ditch.

1914

Repairs to the ditch in 1914 are documented through an auditor's tabular assessment statement, including costs that were assessed to benefitting acres presented visually in **Figure 3**. Charges were split up into equal installments for a 10-year pay back period.

1938

Historic aerial imagery is captured in 1938, 1940, 1953, 1957, 1960, and 1964 and is stored digitally at the University of Minnesota's web portal MHAPO <https://apps.lib.umn.edu/mhapo/>. These historic images help defined when and where the different roadways traversed adjacent to and across the ditch. They aid in the understanding of the landuse in the watershed, and the extents of development at different times in the history of RCD 1. **Figure 4** displays the landuse adjacent to the ditch in 1938.

1944

An alignment plan and profile of the public drainage system is documented in a 1944 inspection. Although there are no major alignment changes to the ditch, there do appear to be minor adjustments in the ditch alignment with the introduction of several road crossings, including Lexington Ave, Hamline Ave, and the first St. Paul water utility pipeline.

1960

The St. Paul water utility pipeline as-built documents assist in the understanding of the location and schematic of both water pipelines in relation to RCD 1. Pipeline #1 is upstream (south) of pipeline #2, both are situated upstream of Hamline Ave, and downstream of the Patrol Road. Pipeline #1 has a unique structure for the ditch crossing as the pipeline itself is approximately level with the ditch elevation. As displayed on the plans, and also on several of the historic documents, the culvert utilizes a “siphon” to convey ditch water underneath the water utility pipeline.

1985

A plan view from a 1985 inspection report show no major modifications to the ditch alignment as compared to the 1944 plan and profile. The inspection report includes valuable information regarding ditch typical section and capacity as well as confirming the structures crossing the ditch and their locations.

1995

An inspection report from 1995 by Montgomery Watson display a plan view with a significant change to the alignment of Lexington Avenue, although the RCD 1 alignment appears relatively unchanged. The location where the ditch crosses under Lexington Ave is shifted further west, resulting in the Lexington Ave culvert crossing located further downstream along the RCD 1 profile approximately 400 feet. Although records for a culvert analysis at Lexington Ave ditch crossing were not discover, MnDOT online data confirm a new bridge construction over Rice Creek was built in 1993, which is presumed to correspond to the timing of the alignment shift to Lexington Ave. This inspection report includes valuable information regarding the ditch profile and structures, as well as some ditch history.

ANALYSIS OF CURRENT FUNCTION WITHIN A HISTORICAL CONTEXT

SYSTEM MODIFICATIONS AFFECTING FUNCTION

In general, the RCD 1 public drainage system open channel alignment has remained largely unchanged as determined through review of available historic records, field survey, aerial imagery, city infrastructure databases, and other available evidence. The most significant changes to the system appear to have been locations of roadway alignments and associated crossings. Documentation for roadway alignment changes over the ditch were not found during this study. These roadway alignment changes are assumed to have maintained the function of the ditch, though it is unknown if hydraulic analyses were completed at the time of modification.

FIELD REVIEW AND SYSTEM DEFICIENCIES

Portions of the RCD 1 system experience recurring flooding. Although a detailed hydraulic analysis of the system is not within the scope of this memorandum, many locations along RCD 1 are at risk for frequent flooding based on RCWD's floodplain maps. However, a majority of parcels along this system remain outside of the FEMA defined floodplain.

In addition to flooding concerns, some areas of the public drainage system are subject to erosion and sedimentation. Deadfalls from trees growing near or on the slopes of the open channel have decreased the function of the public drainage system and require costly maintenance. Due to the urbanization within the contributing drainage area of RCD 1, debris and refuse collecting in the system have also led to reduced drainage function at times. Also, due to sedimentation in the ditch, culverts under roadway and private crossings have been placed above the ACSIC grade. The following is a summary of known problem areas within the drainage system from visual observations in the field, previous and current studies, or firsthand accounts from the RCWD Drainage Inspector:

- 1) Significant deadfall and brush within the channel have created restricted conveyance segments scattered along the length of the ditch.
- 2) Lexington Avenue culvert is approximately 2.5 feet above the ACSIC grade.
- 3) A culvert for a pedestrian trail crossing at STA 31+50 is approximately 3.75 feet above the ACSIC grade.
- 4) The culvert under Hamline Ave. is approximately 1.5 feet above the ACSIC grade.
- 5) The culvert under the Patrol Road is approximately 3 feet above the ACSIC grade.
- 6) There are two crossings of St. Paul Water Utility lines. The northernmost crossing goes under the RCD 1 open channel. The southernmost crossing, located under a trail, appears to vertically intersect the ACSIC grade. To enable RCD 1 water to cross the water utility pipeline, a 30" inverted siphon pipe was constructed under the pipeline. Although documentation of the construction of the inverted siphon was not discovered during this historical review, it likely occurred during or shortly after the construction of the St. Paul Water Utility Pipeline, as it is labeled (but not detailed) on the St. Paul Water Utility Plan and Profile. The inverted siphon appears to adequately convey flow from RCD 1, though regular inspection is required to ensure that debris is kept away from the intake to prevent clogging.

Although there is significant sediment accumulation along RCD 1, the scope of the conditions observed do not suggest a need for systematic reconstruction of the public drainage system. We recommend the District continue regular inspection and address maintenance issues when they are observed to cause drainage impacts to adjacent properties. We recommend RCWD staff coordinate with the road authorities (Shoreview and Ramsey County) to replace/lower culverts in conjunction with road rehabilitation projects.

SOURCE OF SURVEY DATA USED IN THIS ASSESSMENT

Survey data was collected to determine the existing condition of the public drainage systems in the spring and summer of 2023. All survey data collected utilizes the NAD 83 Minnesota State Plane Coordinate System, South Zone (U.S. feet) and North American Vertical Datum 1988. (Note: Unless otherwise noted, all elevations provided herein are based on NAVD 88 vertical datum). Survey data were placed in the RCWD survey geodatabase maintained by the District Engineer.

RIGHT-OF-WAY

Legal ditch proceedings for the original establishment or subsequent improvement of the drainage system awarded damages for the areas physically occupied by the drainage system along with an easement for the area required for construction, land clearing, and spoil disposal. This combination of areas constitutes the right-of-way for the drainage system and is often described as the area reasonably necessary for the drainage authority to perform its repair, maintenance, and inspection obligations, along with an area of reasonable set-back to protect the drainage system. Portions of the drainage system are located within municipal, county or state right-of-way for existing roads or highways. Where the drainage system is not located within existing right-of-way, a right-of-way is proposed along the alignment to allow for maintenance of the system. The right-of-way width for open channel segments of the public drainage system were calculated as the channel width at top of bank plus 50 feet (25 feet on either side of the channel). The width of the public drainage system right-of-way is shown in **Appendix A**.

Occasionally, easements with an interest over the drainage system alignment have been conveyed from landowners to municipalities, counties or watershed district as properties develop or redevelop. The easement usually allows for the access to utilities for inspection and maintenance purposes. No formal easement documents were discovered during this historical review, however it is likely that easements exist along RCD 1 but the RCWD is unaware of them or does not have documentation readily available. Regardless of the existence of those easements, the RCWD maintains the right to access the public drainage system in the locations shown in **Appendix A** for the purposes of inspection and maintenance of the drainage system.

USE OF THE PUBLIC DRAINAGE SYSTEM AS AN OUTLET BY A MUNICIPALITY

The As-Designed RCD 1 system served agricultural lands in 1901 that have since been converted to residential, commercial and industrial uses. Minnesota Statute 103E.411 identifies the procedure required for municipalities to obtain permission from the ditch authority to use a public drainage system as an outlet. The process involves a petition by the municipality and a requirement to show a public benefit, utility, and promote public health. In addition, the amount the municipality must pay for the privilege of using the drainage system as an outlet must be determined. No such record of permission being granted or payment was discovered.

AS CONSTRUCTED AND SUBSEQUENTLY IMPROVED GRADE AND CROSS-SECTION

Ideally, the grade (profile) of the ACSIC would be determined through the use of as-built drawings that identify the constructed alignment, profile, and cross sectional area. However, since as-built plans were rarely recorded for public drainage systems in the early 20th century, engineers have frequently utilized the profiles from the original designs along with test pits and borings to determine and corroborate the ACSIC.

The hierarchy of records in which the RCD 1 ACSIC is established from are:

- 1) Documented legal modifications to the public ditch system;
- 2) Original historic as-built or construction drawings;
- 3) Test pits or soil borings; and
- 4) Field survey data of existing conditions.

Pertinent documents for determining the as-constructed ditch grade and cross section include inspection reports and profiles previously referenced in this report, and briefly summarized here. A surveyed profile from 1944 displays an existing ditch grade of 0.1%. The St. Paul Water pipeline profiles from 1960 add some information regarding crossings on the upstream end of the ditch. An inspection report from 1985 claims the original design was completed in 1898 with a 2-foot ditch bottom width, 0.5:1 ditch side slopes, average depth of 2.5 feet, and an average design slope of 0.15%. This same report also documents the condition of the ditch at time of inspection having a bottom width of 4 feet, side slopes of 1.5:1, average depth of 3 feet, and an average slope of 0.1%. A historical plan and profile drawing of RCD 1 assumed to be from the mid-1980's shows the as-constructed ditch slope of 0.114%. An inspection report from 1995 shows an existing profile of 0.1%. All of this information is utilized to corroborate the ACSIC ditch grade and cross section of RCD 1.

Within this historic review, field survey of the ditch and drainage structures are utilized to assist in the establishment of the ACSIC grade and cross section. The survey confirms the current conditions of the ditch cross section and profile, and confirms the as-constructed profile through the use of soil borings, which determine the “hard” clay elevation of the true ditch bottom. In the absence of design profiles, it is assumed that the elevation of bottom of organic sediments indicates the historical channel bottom. A “best-fit” line through the soil boring data is utilized to determine the as-constructed profile and has a slope of 0.114% and is the ACSIC determination of ditch grade for RCD 1 as displayed in **Appendix B**. Surveyed cross sections along the ditch are utilized to establish the ACSIC ditch cross section for RCD 1 with a 5-foot average bottom width, and 1.5:1 average ditch side slopes. This compares well with the cross section geometry listed in the 1985 inspection report.

Drainage systems constructed during this time period typically were designed to carry runoff from the watershed resulting from roughly a 2-year to 5-year rainfall event. Note that the design event for the system was based on watershed conditions from the time of construction and not the current fully developed land

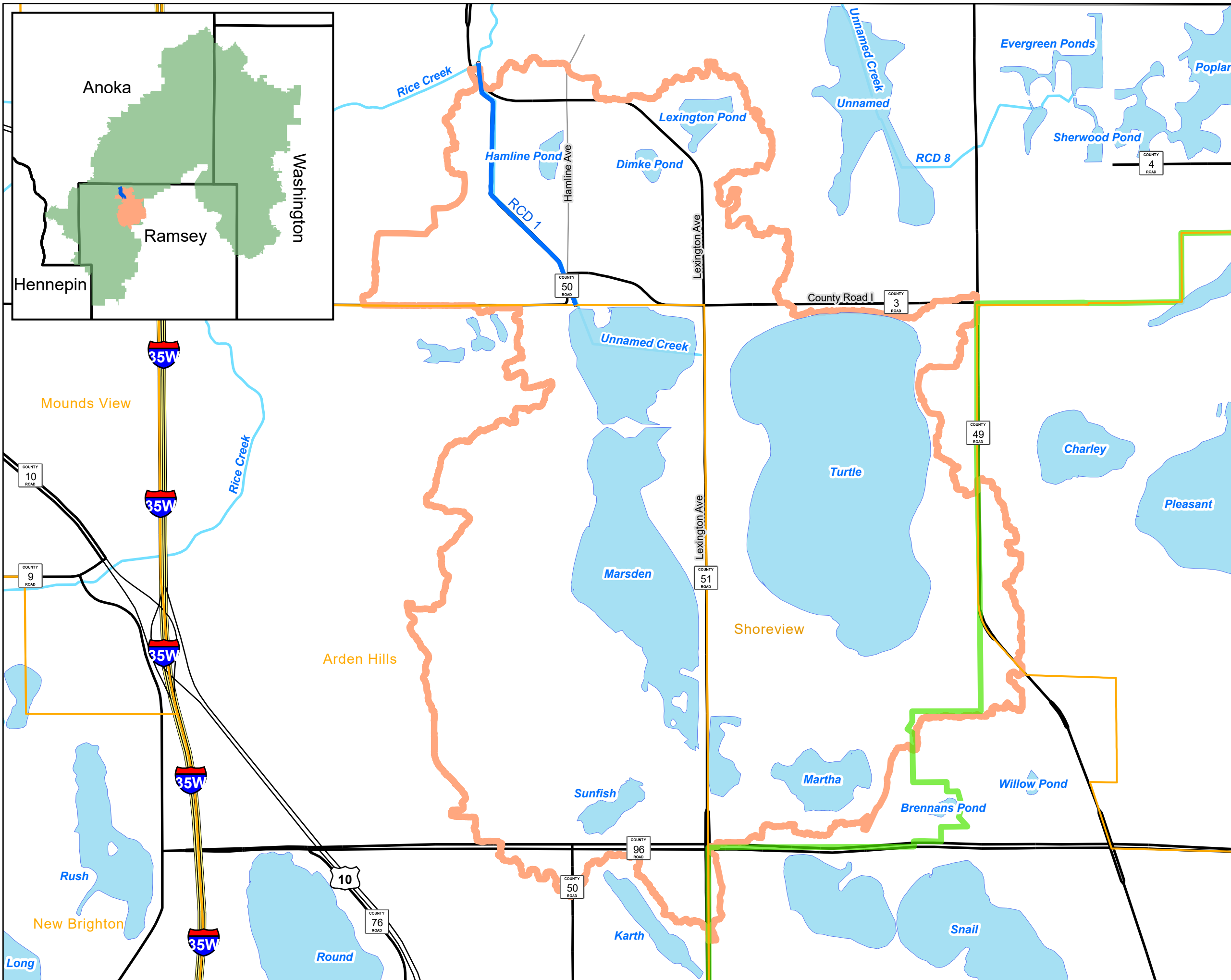
use condition. A detailed analysis was not completed to assess whether or not the current system can adequately carry these flows. However, the system as it currently exists and as represented by the ACSIC is believed to adequately convey the original drainage design flows. Therefore, the ACSIC will be used to establish the maximum extent of repair. This is a belief that can be substantiated during future analysis.






RECOMMENDATIONS

We recommend the Board of Managers initiate a legal proceeding to correct the drainage system record for RCD 1. The corrected drainage system records should be based on the alignment and profile described within this historical review and in **Appendix B**. The proposed profile for the recommended alignment is, in the Opinion of the Engineer, necessary to reestablish the historic function of the legal drainage system to be the basis for maintenance and repair of the public drainage systems. We further recommend that the District submit the alignment and profile of the ACSIC to the Minnesota Department of Natural Resources and the Ramsey County Soil and Water Conservation Division for their review and concurrence.

Typically, a repair report for a public drainage system may include alternatives that adjust the elevation of the open channel and culverts, realign or abandon portions of the public system, or evaluate similar modifications as authorized by MS 103E and consistent with the ACSIC. The range of alternatives evaluated within the repair report is based in part on discussions with landowners, the municipalities served by the public drainage system, and other interested parties. A comprehensive hydrologic and hydraulic analysis would be needed to identify and develop stormwater management and flood damage reduction and resiliency alternatives that can be implemented as a basic water management project. It is important to consider the needs of the municipalities when managing the public drainage system. The increase in runoff volumes and peak rates from a conversion from agricultural to developed land use can be substantial. In addition, the As-Designed system in 1901 was likely designed to carry the runoff from agricultural land uses from a relatively small precipitation event such as a 2-year, 24-hour storm while modern municipal stormwater systems are often designed to a 10-year, 24-hour storm. A portion of the RCD 1 watershed is drained by municipal stormwater systems that use the public drainage system as an outlet and these municipal systems are designed for larger events (e.g., 10-year rather than 2-year). Ancillary water quality benefits provided by these alternatives should also be considered. This criterion would be evaluated in a repair report or similar document.

Rice Creek Watershed District Ramsey County Ditch 1



	RCD1 Current Alignment
	RCD1 Watershed
	RCWD Boundary
	County Boundary
	City Boundary

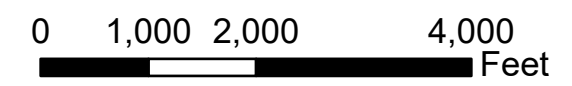

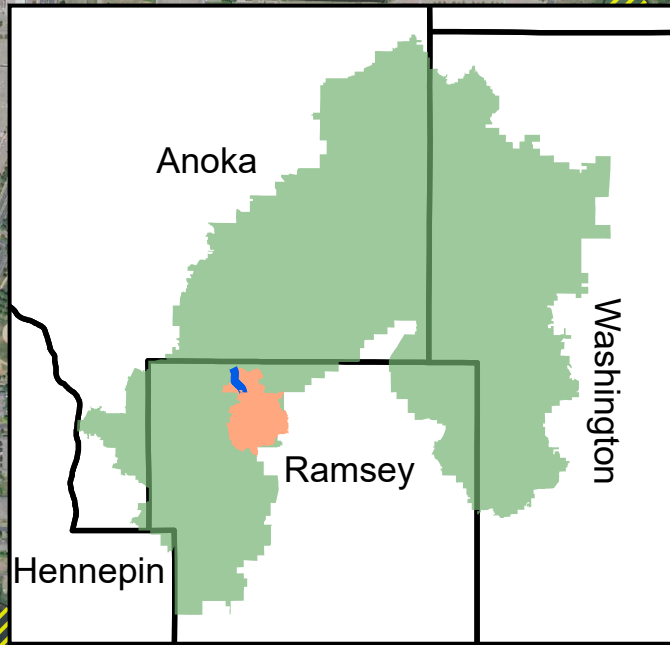
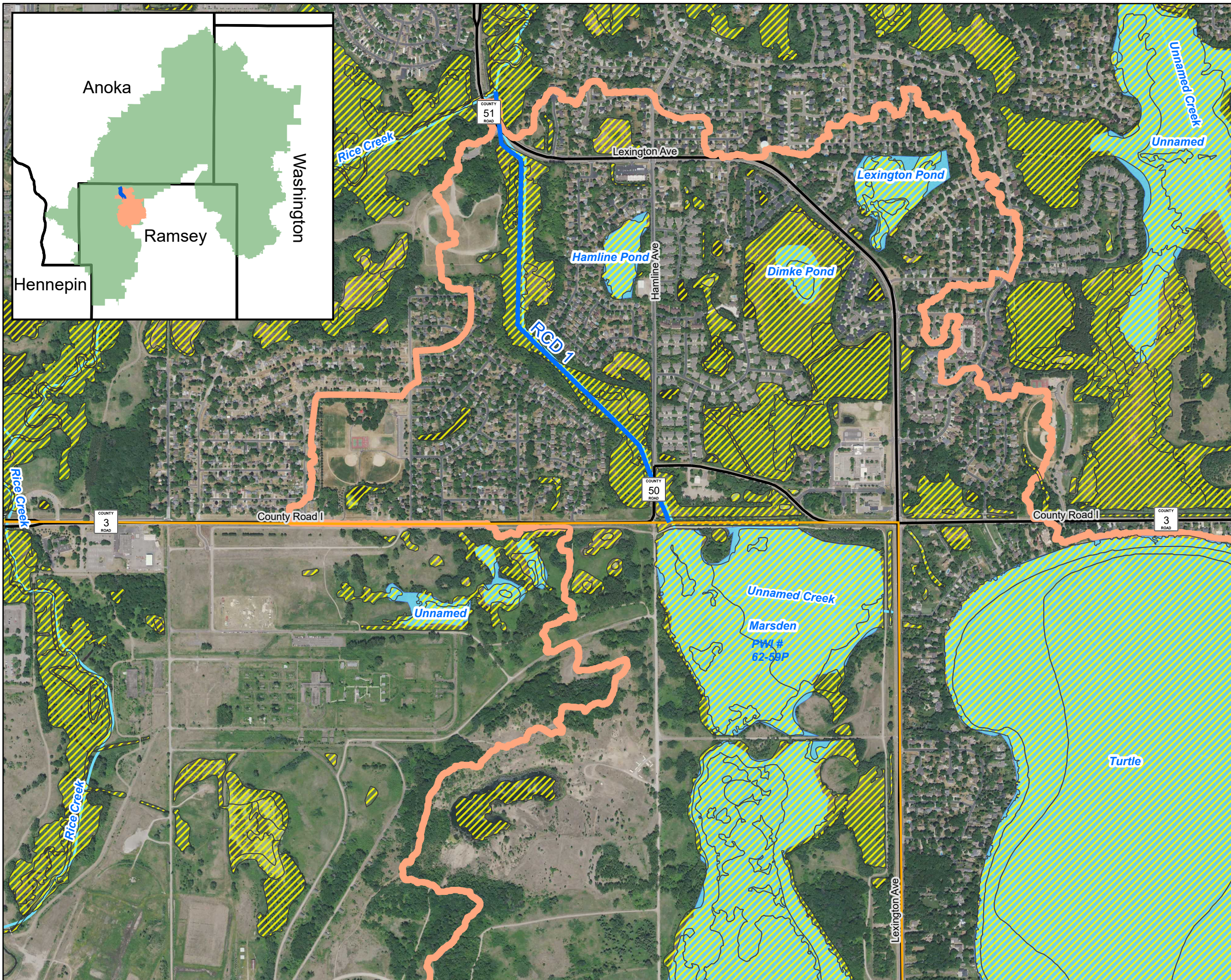









Figure 1: Hydrologic Boundary RCD 1

Scale: AS SHOWN	Drawn by: KRB	Checked by: ANN	Project No.: 5555-345	Date: 12/15/2023	Sheet:
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Rice Creek Watershed District Ramsey County Ditch 1



-  RCD1 Current Allignment
-  RCD1 Watershed
-  RCWD Boundary
-  County Boundary
-  City Boundary
-  NWI Wetlands
-  Public Waters

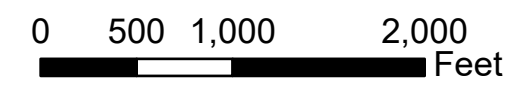
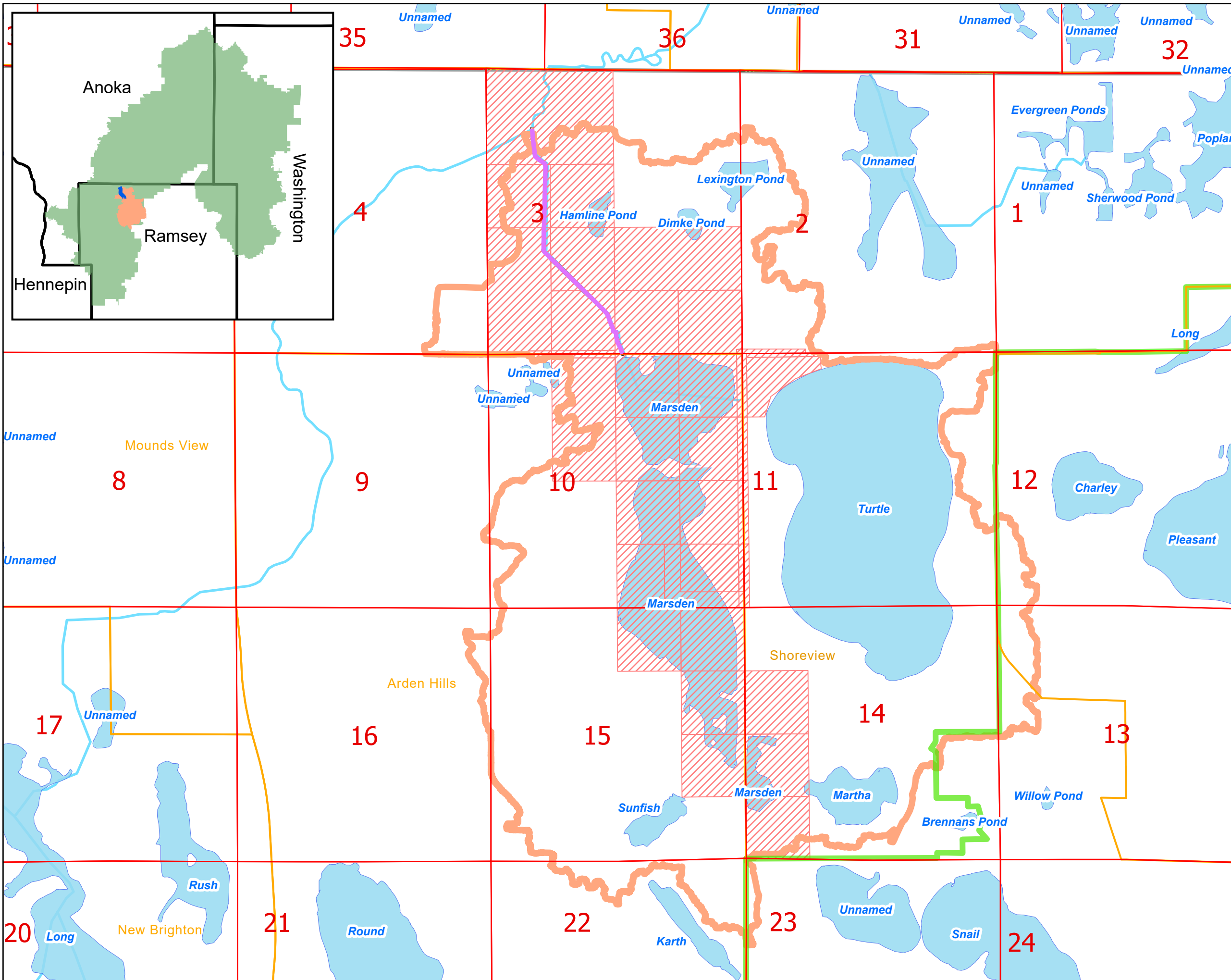


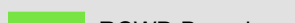
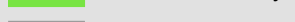
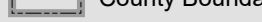




Figure 2: Public Water Inventory & National Wetland Inventory

Scale: AS SHOWN	Drawn by: KRB	Checked by: ANN	Project No.: 5555-345	Date: 12/15/2023	Sheet:
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Rice Creek Watershed District Ramsey County Ditch 1




-  RCD1 Current Alignment
-  RCD1 Watershed
-  RCWD Boundary
-  County Boundary
-  City Boundary
-  Section Line
-  RCD 1 Benefiting Lands*

*As defined in the 1914 Assessment for Repair



Figure 3: RCD 1 Benefiting Lands

Scale: AS SHOWN	Drawn by: KRB	Checked by: ANN	Project No.: 5555-345	Date: 12/14/2023	Sheet:
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Rice Creek
Watershed District
Ramsey County
Ditch 1

Yellow Highlights
Added to Show RCD 1
Alignment

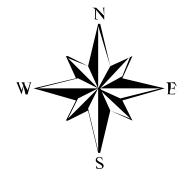



Figure 4: Historic Aerial 1938

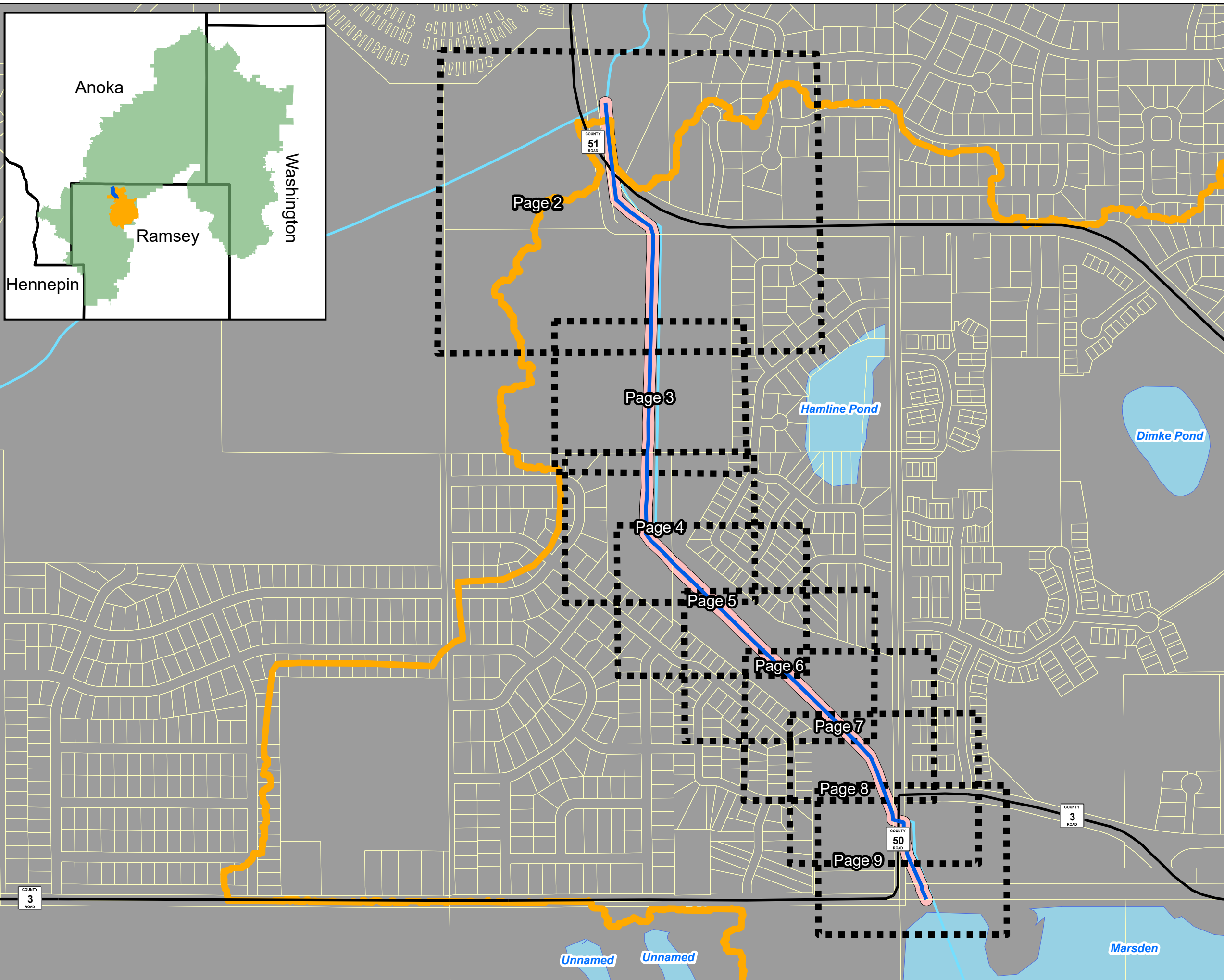
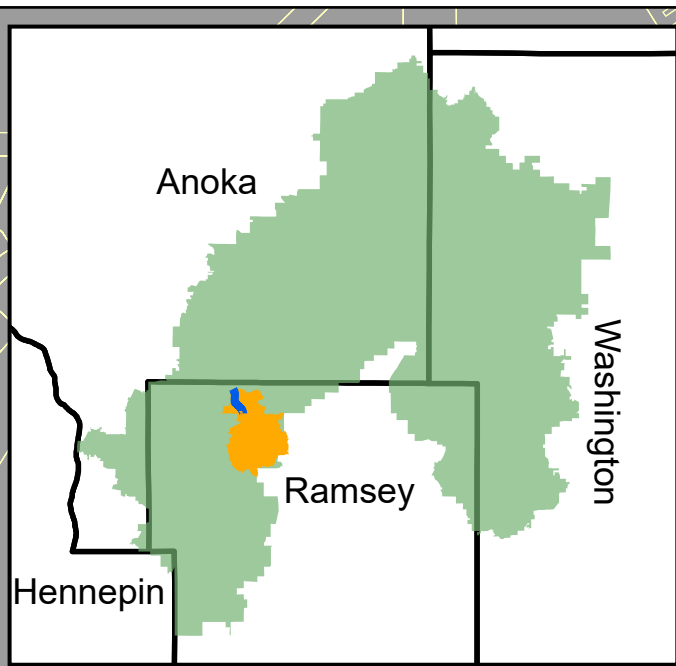
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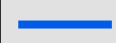

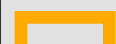
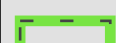
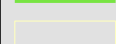
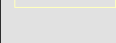


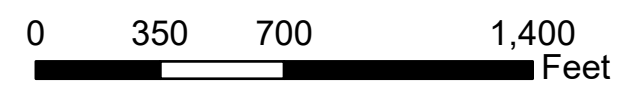
APPENDIX A

RCD 1 Right of Way

Rice Creek Watershed District Ramsey County Ditch 1 Right of Way




	RCD1 Current Alignment
	Map Pages
	RCD1 Watershed
	RCWD Boundary
	Ramsey County Parcels
	County Roads



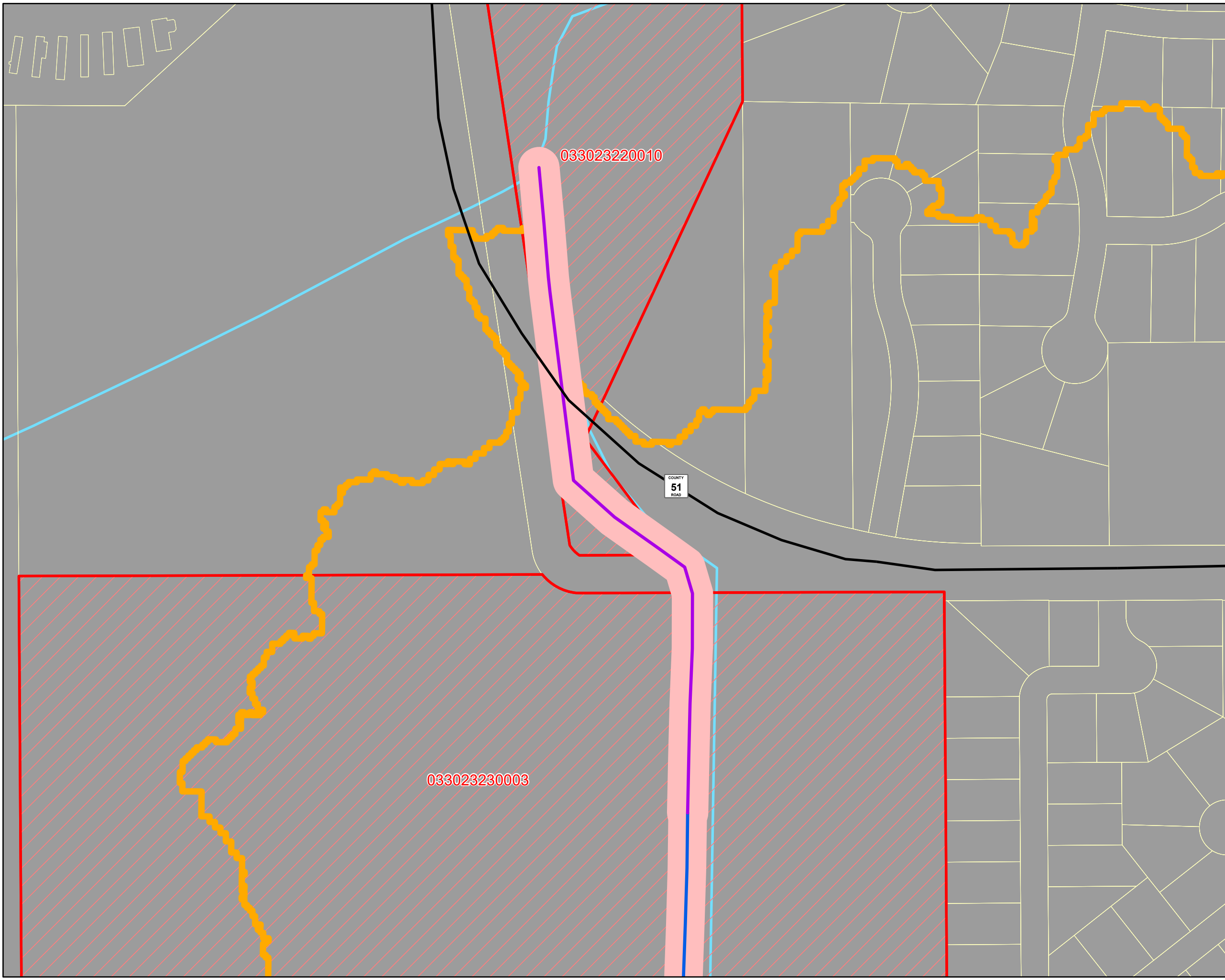
Page 1 of 9: Location Map











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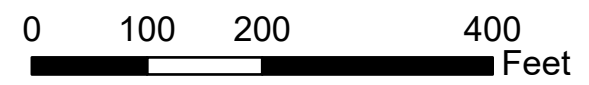
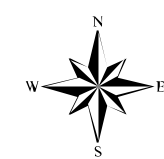


HOUSTON
engineering, inc.











Rice Creek Watershed District Ramsey County Ditch 1 Right of Way

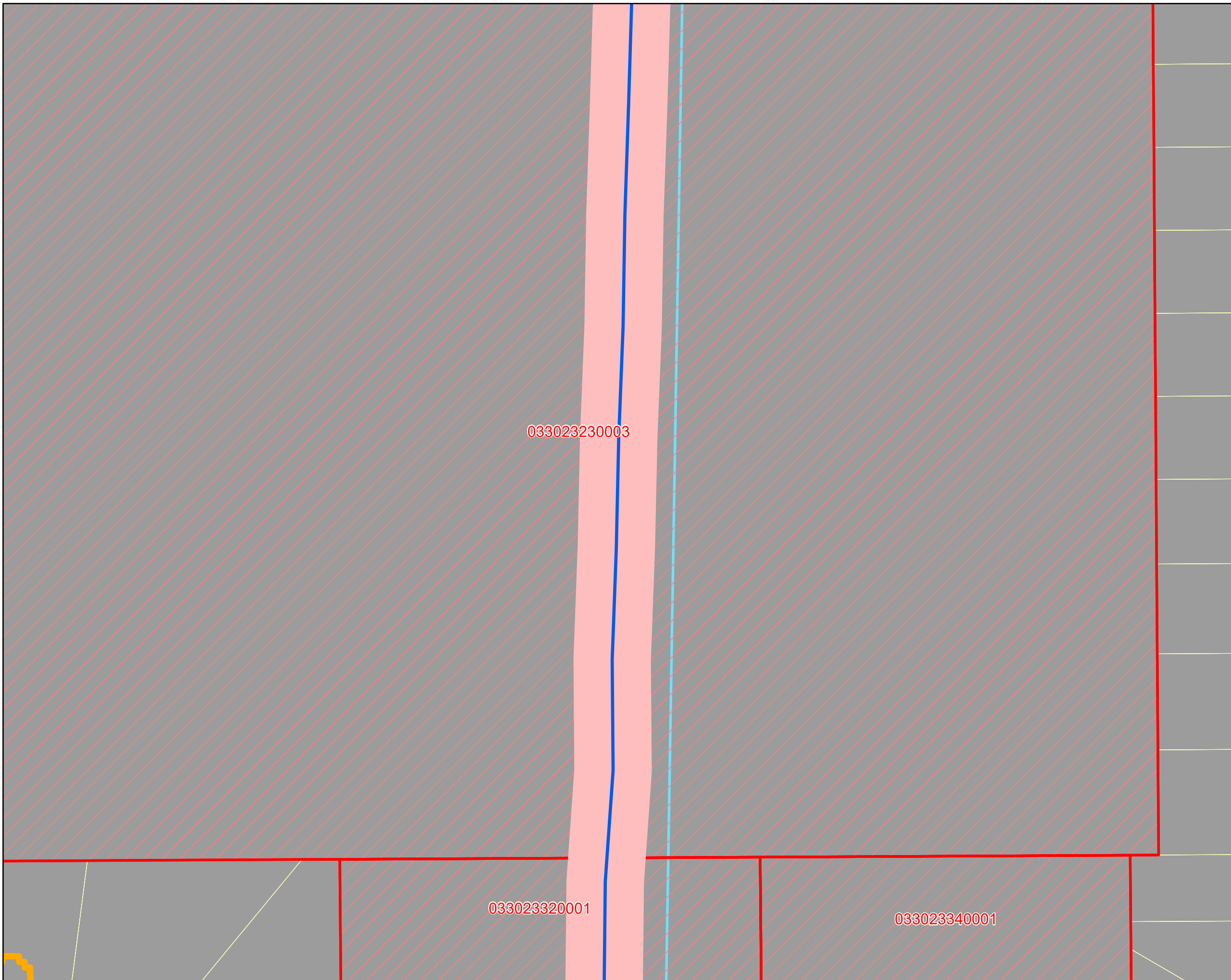
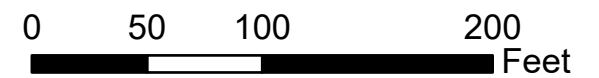


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	RCWD Boundary
	RCD1 Watershed
	RCD1 Intersecting Parcels
	Ramsey County Parcels
	County Roads
RCD1 ROW Width (ft)	
	70
	75
	80
	85

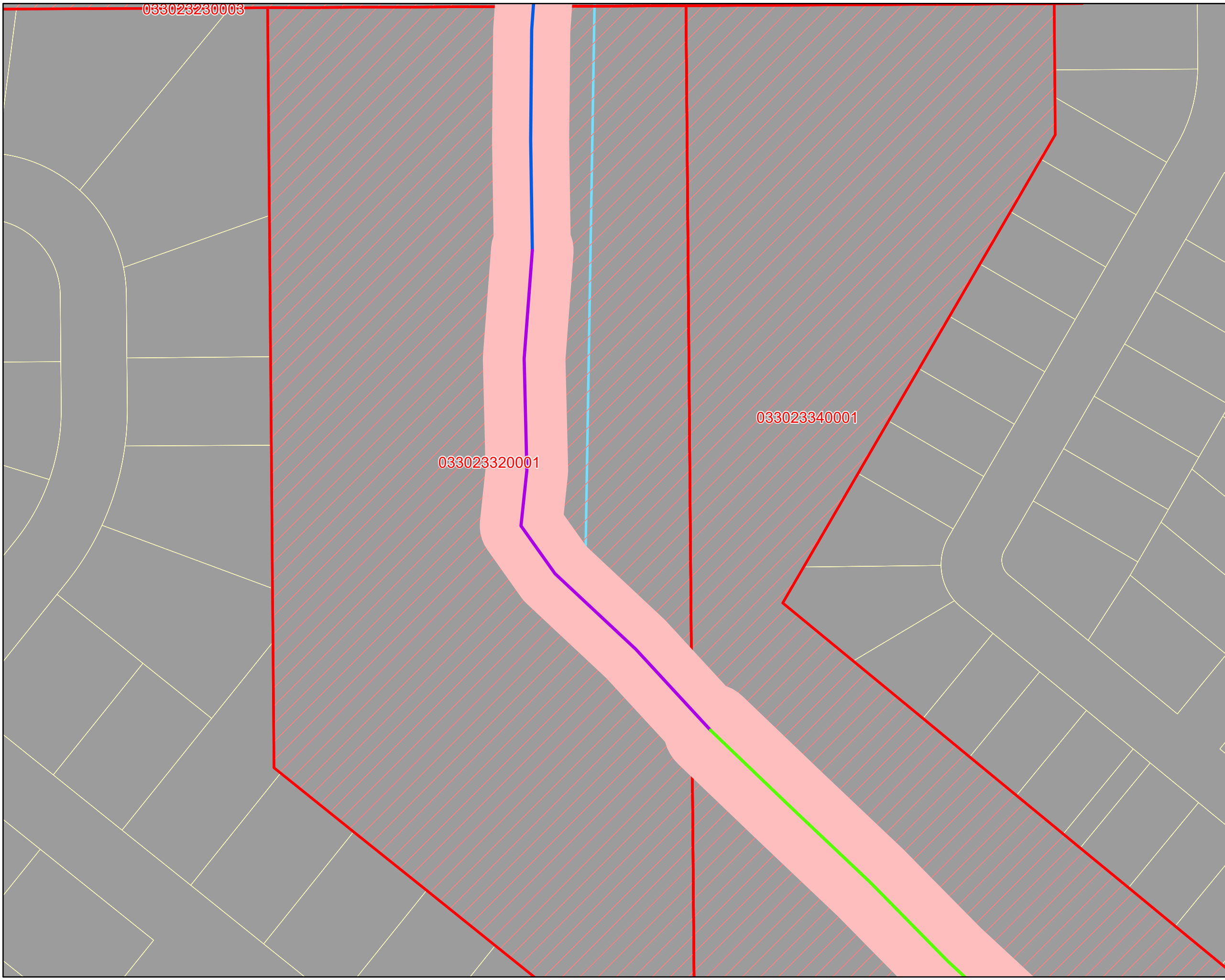


Rice Creek
Watershed District
Ramsey County
Ditch 1
Right of Way

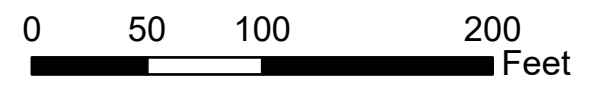
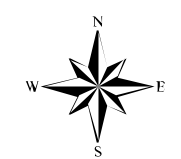
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	RCWD Boundary
	RCD1 Watershed
	RCD1 Intersecting Parcels
	Ramsey County Parcels
	County Roads
RCD1 ROW Width (ft)	
	70
	75
	80
	85



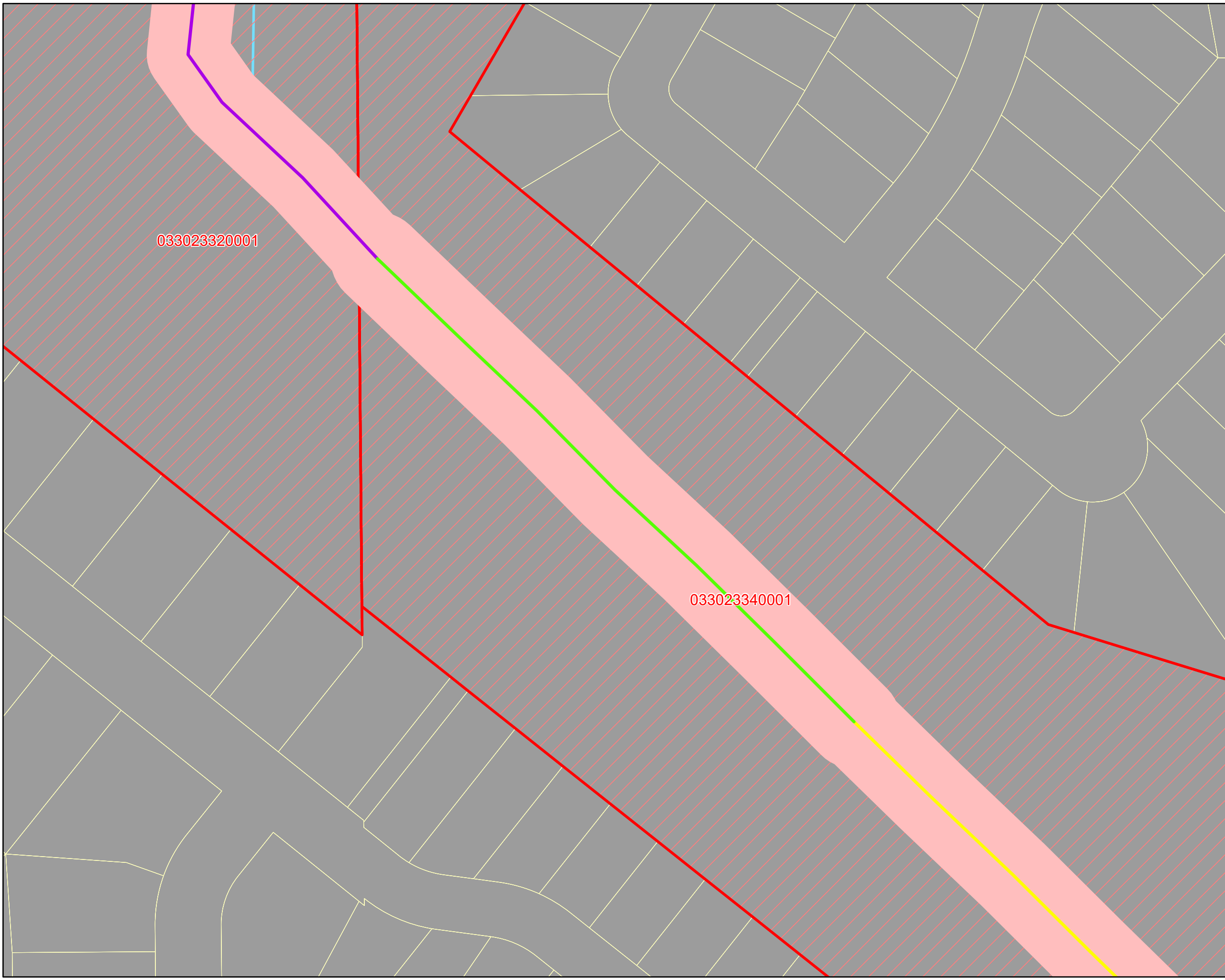
Rice Creek Watershed District Ramsey County Ditch 1 Right of Way













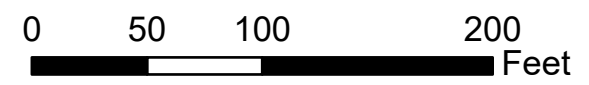
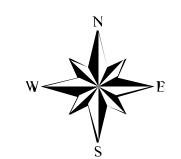
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	RCWD Boundary
	RCD1 Watershed
	RCD1 Intersecting Parcels
	Ramsey County Parcels
	County Roads
RCD1 ROW Width (ft)	
	70
	75
	80
	85



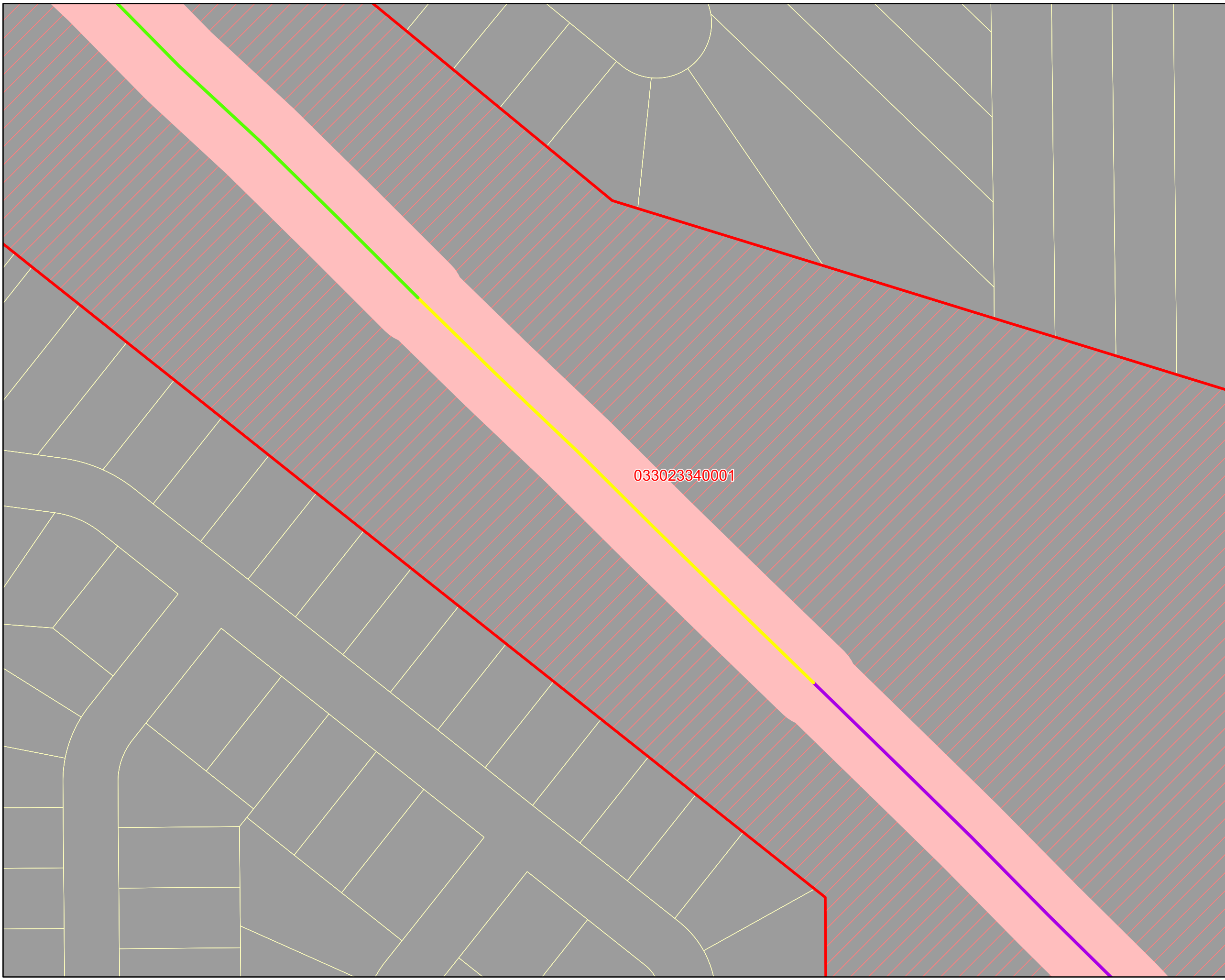
Rice Creek
Watershed District
Ramsey County
Ditch 1
Right of Way













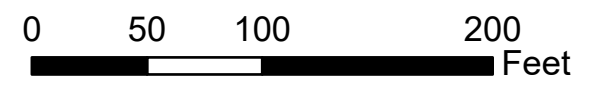
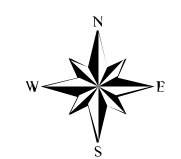
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	RCWD Boundary
	RCD1 Watershed
	RCD1 Intersecting Parcels
	Ramsey County Parcels
	County Roads
RCD1 ROW Width (ft)	
	70
	75
	80
	85



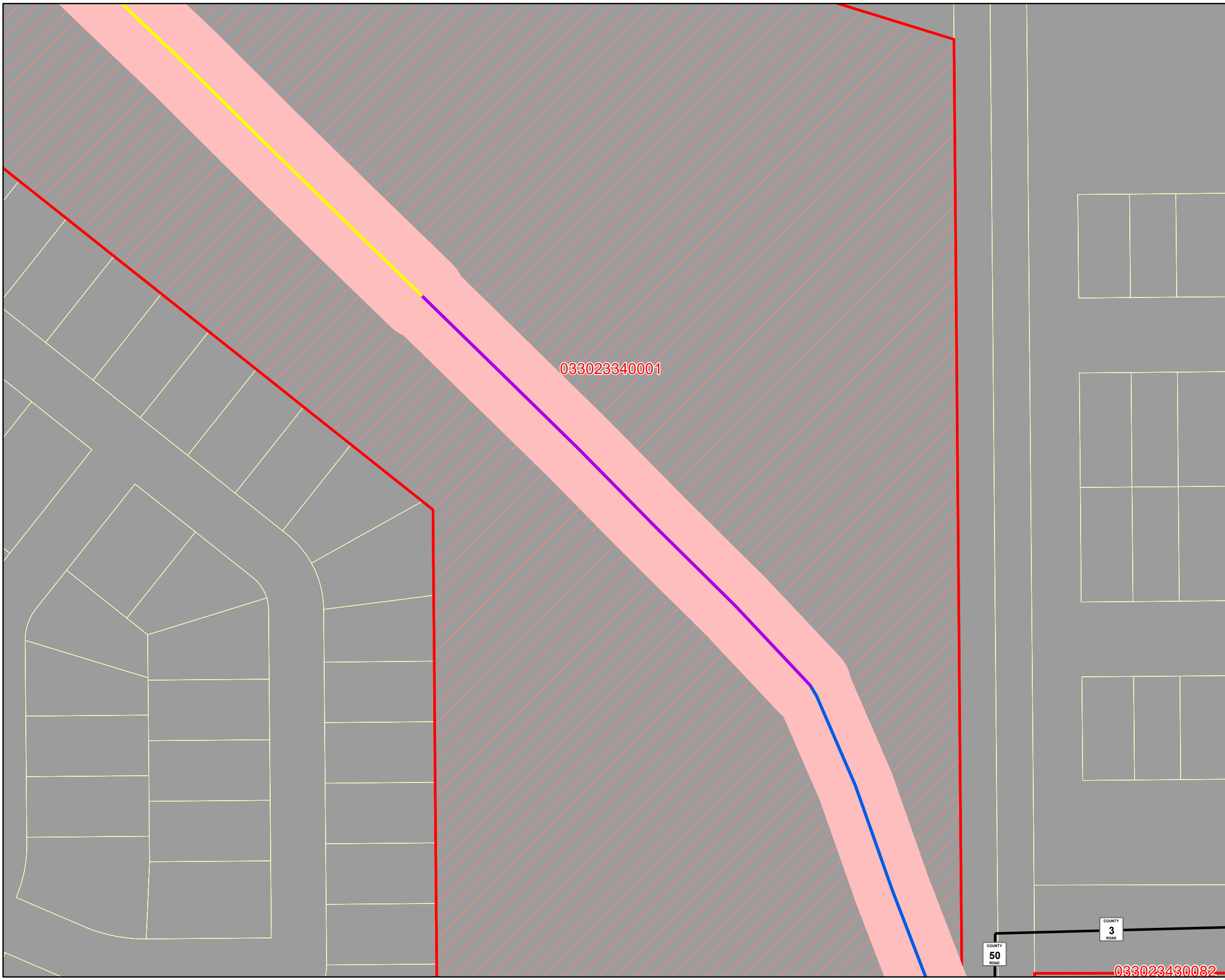
Rice Creek
Watershed District
Ramsey County
Ditch 1
Right of Way













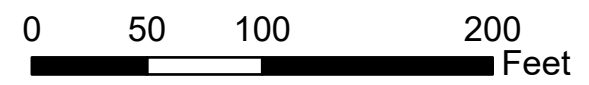
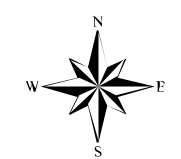
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	RCWD Boundary
	RCD1 Watershed
	RCD1 Intersecting Parcels
	Ramsey County Parcels
	County Roads
RCD1 ROW Width (ft)	
	70
	75
	80
	85



Rice Creek
Watershed District
Ramsey County
Ditch 1
Right of Way




	RCD1 ROW
	RCWD Boundary
	RCD1 Watershed
	RCD1 Intersecting Parcels
	Ramsey County Parcels
	County Roads
RCD1 ROW Width (ft)	
	70
	75
	80
	85



Page 7 of 9

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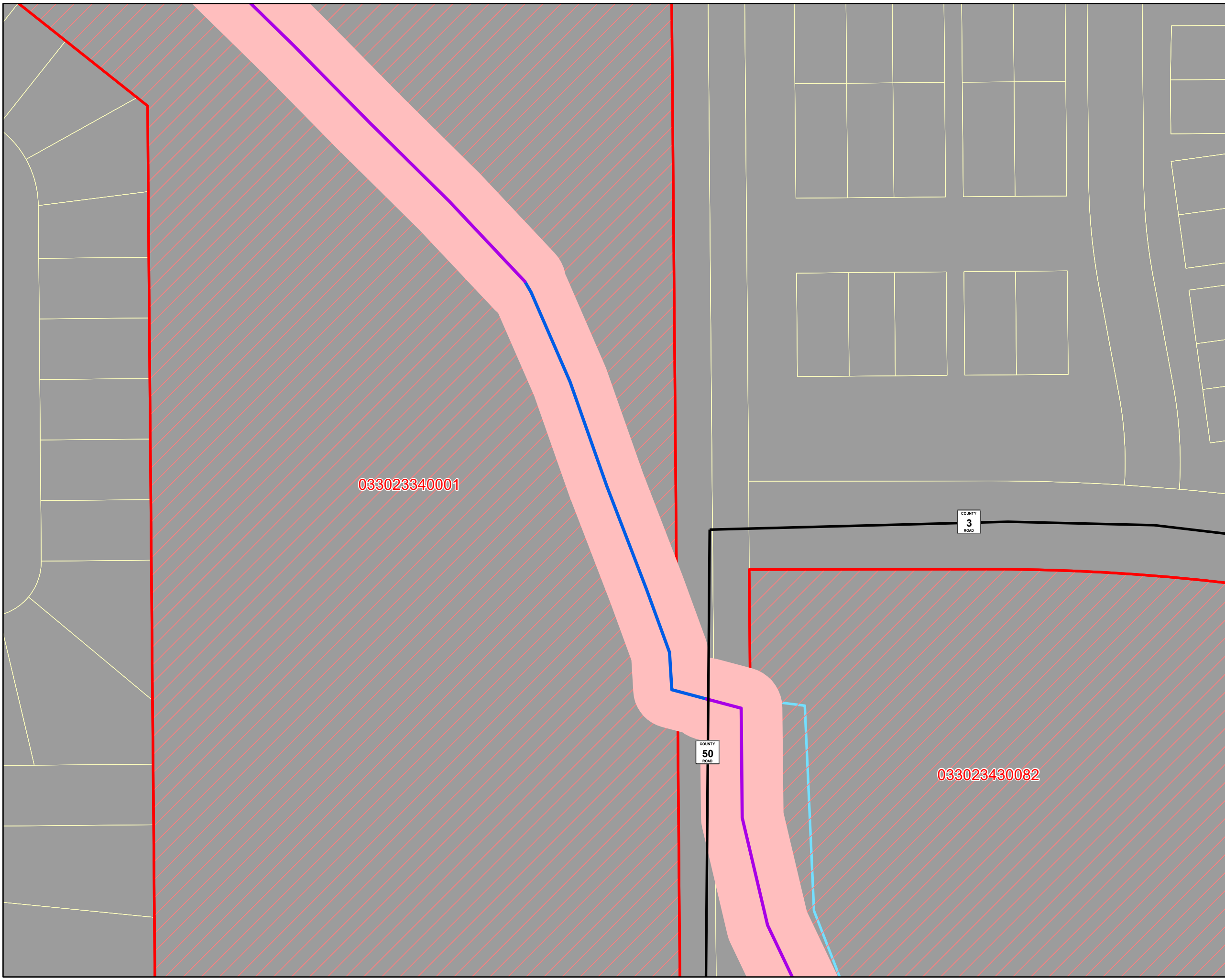
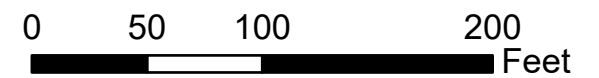
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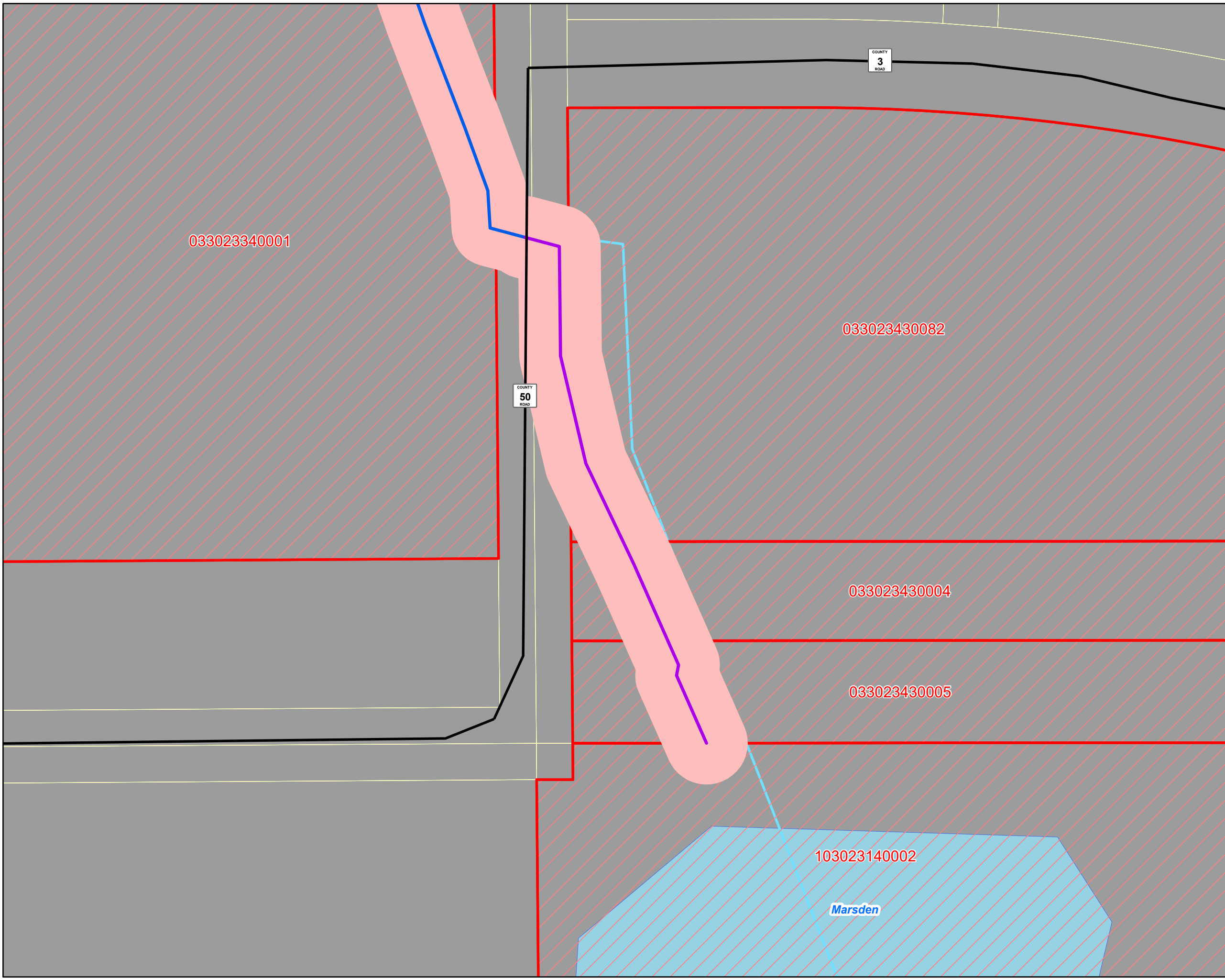
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







Rice Creek
Watershed District
Ramsey County
Ditch 1
Right of Way

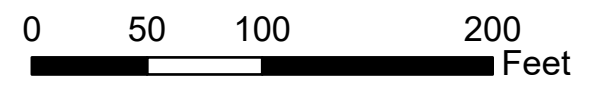
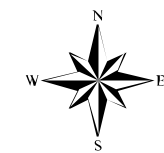
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	RCWD Boundary
	RCD1 Watershed
	RCD1 Intersecting Parcels
	Ramsey County Parcels
	County Roads
RCD1 ROW Width (ft)	
	70
	75
	80
	85



Rice Creek Watershed District Ramsey County Ditch 1 Right of Way



	RCD1 ROW
	RCWD Boundary
	RCD1 Watershed
	RCD1 Intersecting Parcels
	Ramsey County Parcels
	County Roads
RCD1 ROW Width (ft)	
	70
	75
	80
	85



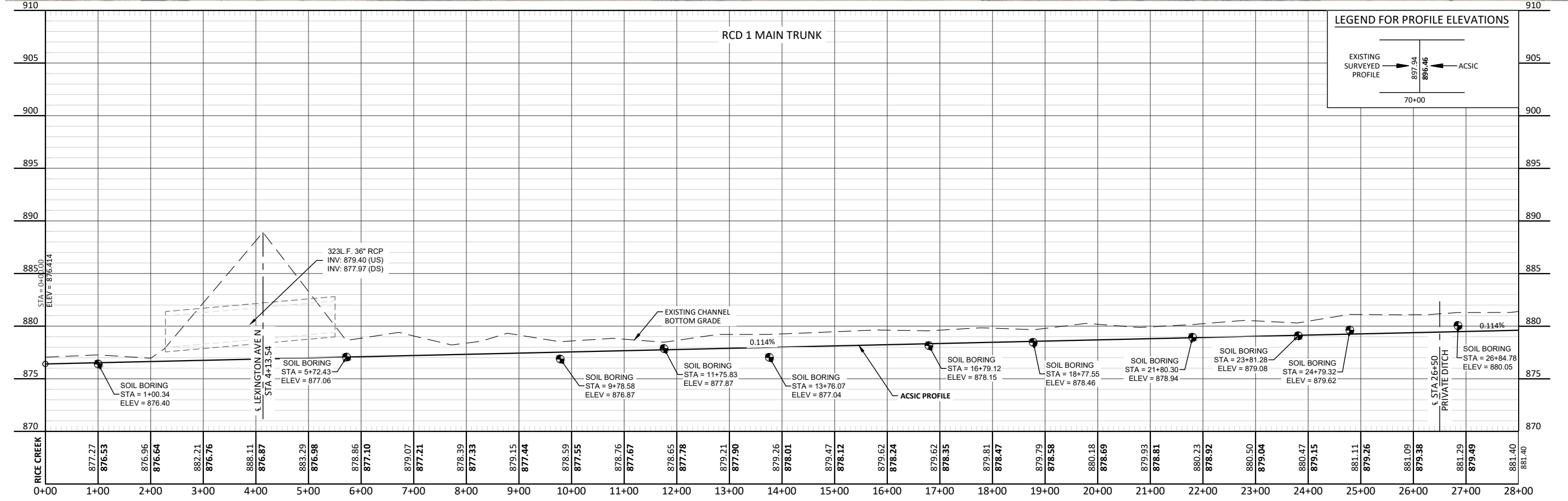
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033023430005	BOARD OF WATER COMM ST PAUL
033023430004	CITY OF ST PAUL
033023340001	RAMSEY COUNTY PARKS AND REC
033023320001	RAMSEY COUNTY PARKS AND REC
033023230003	RAMSEY COUNTY PARKS AND REC
033023220010	RAMSEY COUNTY PARKS AND REC
103023140002	UNITED STATES OF AMERICA
033023430082	C W HOULE INC
033023430005	BOARD OF WATER COMM ST PAUL
033023430004	CITY OF ST PAUL
033023340001	RAMSEY COUNTY PARKS AND REC
033023320001	RAMSEY COUNTY PARKS AND REC
033023230003	RAMSEY COUNTY PARKS AND REC
033023220010	RAMSEY COUNTY PARKS AND REC

APPENDIX B

Plan and Profile – ACSIC Determination

NOTES:
 1. **HORIZONTAL CONTROL:** ANY COORDINATES LISTED IN THIS PLAN ARE MINNESOTA STATE PLANE, SOUTH ZONE, US FOOT.
 2. **VERTICAL CONTROL:** ALL ELEVATIONS ARE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).



LEGEND FOR PROFILE ELEVATIONS

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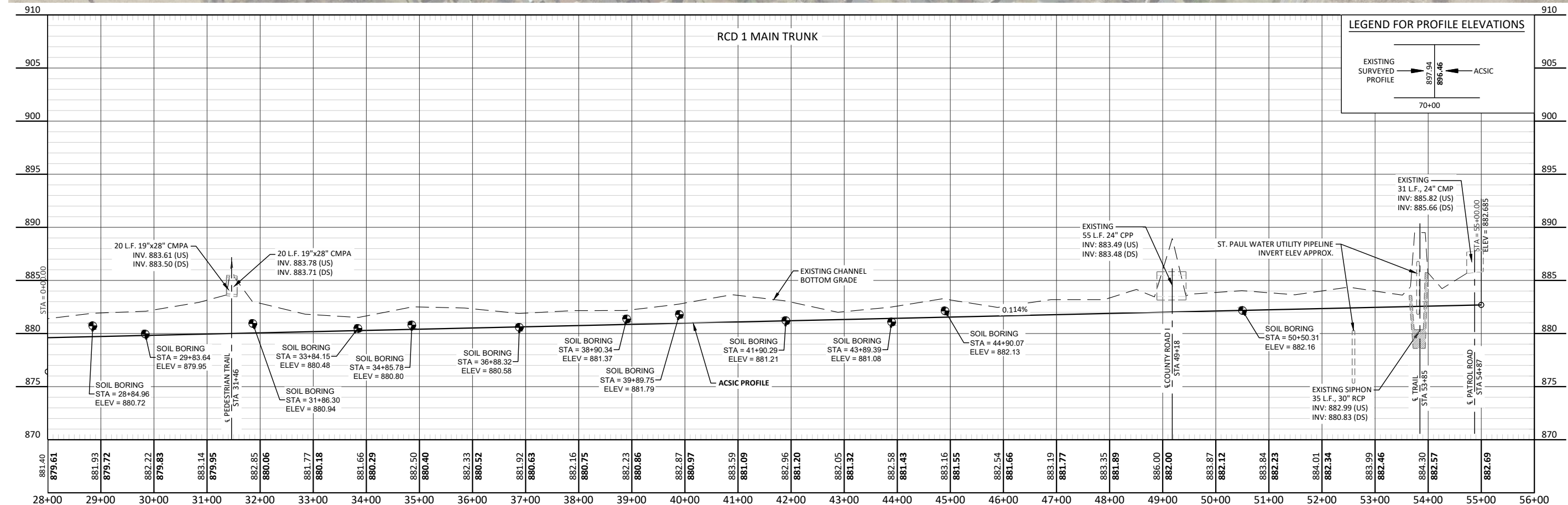
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By	
Date	
Revision	
No.	
RAMSEY COUNTY DITCH 1 HISTORIC REVIEW RICE CREEK WATERSHED DISTRICT PLAN AND PROFILE (1 OF 2)	
Drawn By	APD
Checked By	ANN
Date	TBD
Scale	As Shown
Project No.	5555-0345
SHEET	1

NOTES:
 1. **HORIZONTAL CONTROL:** ANY COORDINATES LISTED IN THIS PLAN ARE MINNESOTA STATE PLANE, SOUTH ZONE, US FOOT.
 2. **VERTICAL CONTROL:** ALL ELEVATIONS ARE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).



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By	
Date	
Revision	
No.	
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Drawn By	APD
Checked By	ANN
Date	TBD
Scale	As Shown
Project No.	5555-0345
SHEET	2