elm creek
Watershed Management Commission

ADMINISTRATIVE OFFICE
3235 Fernbrook Lane ● Plymouth, MN 55447
PH: 763.553.1144 ● email: judie@jass.biz
www.elmcreekwatershed.org

April 6, 2022

Members
Technical Advisory Committee
Elm Creek Watershed Management
Commission Hennepin County, MN

Dear Members:

A meeting of the Technical Advisory Committee of the Elm Creek Watershed Management Commission will be held on **Wednesday, April 13, 2022, at 10:00 a.m.** This will be a virtual meeting.

The second 2022-2023 WBIF Convene Meeting will take place during the TAC meeting.

To join the meeting, click https://zoom.us/j/990970201 or go to www.zoom.us and click **Join A Meeting**. The meeting ID is **990-970-201**. The password is **water.**

If your computer is not equipped with audio capability, you need to dial into one of these numbers:

+1 929 205 6099 US (New York)
+1 669 900 6833 US (San Jose)
+1 253 215 8782 US
+1 312 626 6799 US (Chicago)
+1 346 248 7799 US (Houston)
+1 301 715 8592 US

Meeting ID: 990 970 201. Passcode: 579973

The meeting is open to the public via the instructions above.

Thank you.

Judie A. Anderson
Administrator
JAA:tim
Encls:

Z:\Elm Creek\TAC\2022\April 13, 2022 TAC Notice.docx

elm creek
Watershed Management Commission

ADMINISTRATIVE OFFICE
3235 Fernbrook Lane ● Plymouth, MN 55447
PH: 763.553.1144 ● email: judie@jass.biz
www.elmcreekwatershed.org

AGENDA
Technical Advisory Committee
April 13, 2022 | 10:00 a.m.

To join the meeting, click https://zoom.us/j/990970201 or go to www.zoom.us and click Join A Meeting. The meeting ID is 990-970-201. The password is water.

If your computer is not equipped with audio capability, you need to dial into one of these numbers:

+1 929 205 6099 US (New York)
+1 669 900 6833 US (San Jose)
+1 253 215 8782 US
+1 312 626 6799 US (Chicago)
+1 346 248 7799 US (Houston)
+1 301 715 8592 US

Meeting ID: 990 970 201. Passcode: 579973

---

1. Call to Order.
   a. Approve agenda.*
   b. Approve Minutes of March 9, 2022, meeting.*
2. HUC 8 Model.
   a. Asche April 11, 2022 memo.*
   b. RFP.*
   c. DNR February 14, 2022 memo.*
   d. Third Party Review.*
   e. Consider Third Party Review.*
   f. Barr December 7, 2021 memo.*
3. Commission Rules.
   a. Stantec March 22, 2022 memo.*
   b. 2022 Rules and Standards MPA.*
   c. 2022 CIP MPA.*
   d. JASS Memo.*
   e. Table 4.5.*
4. Convene Meeting. #2.*
5. Other Business.
6. Next TAC meeting – May 11, 2022, prior to regular meeting.
7. Adjournment.

*in meeting packet
**available at meeting

elm creek
Watershed Management Commission

ADMINISTRATIVE OFFICE
3235 Fernbrook Lane ● Plymouth, MN 55447
PH: 763.553.1144 ● email: judie@jass.biz
www.elmcreekwatershed.org

Technical Advisory Committee Meeting
Minutes - March 9, 2022

I. A virtual meeting of the **Technical Advisory Committee (TAC)** of the Elm Creek Watershed Management Commission was convened at 9:02 a.m., Wednesday, March 9, 2022.

In attendance: Heather Nelson, Champlin; Kevin Mattson, Corcoran; Nico Cantarero, Stantec, Dayton; Derek Asche, Maple Grove; Matt Danzl, Hakanson-Anderson, Medina; Ben Scharenbroich, Plymouth; Andrew Simmons, Rogers; Diane Spector, Ross Mullen, and Erik Megow, Stantec; James Kujawa, Surface Water Solutions; Rebecca Carlson, Resilience Resources; Kris Guentzel and Kevin Ellis, Hennepin County Dept. of Environment and Energy (HCEE); Brian Vlach, Three Rivers Park District; and Amy Juntunen and Judie Anderson, JASS.

Also in attendance: Doug Baines, Dayton; Nathan Campeau, Joe Waln, and Heather Lau, Barr Engineering; Jeff Weiss, Minnesota Department of Natural Resources (MNDNR); Steve Christopher, Board of Water and Soil Resources.

II. Motion by Scharenbroich, second by Cantarero to approve the **agenda.*** *Motion carried unanimously.*

III. Motion by Danzl, second by Scharenbroich to approve the **minutes*** of the February 9, 2022, meeting. *Motion carried unanimously.*

IV. Proposed Rules Revisions – Low Floor/Freeboard.*

A. Background. The Commission's technical staff and TAC have been discussing revisions for the low floor rules based on the risk to structures. Staff and TAC members have also reviewed freeboard rules required by state agencies, member cities, and adjacent watershed organizations. *Freeboard* is the technical term applied to the vertical height between the 100 Year event peak flood stage and the lowest regulatory height that a structure must be built to. Minnehaha Creek Watershed District is the only jurisdiction that uses the low opening as the regulatory height instead of the low floor used by all the other nearby entities reviewed.

Together the staff and TAC have drafted preliminary rule revisions that transition to a three-tiered approach based on the unique flood risk posed to structures based on the flooding source without over complication of the Commission's rules. They recommend the tiered approach to recognize the differences in flood risk from large waterbodies that may have flood stages that last weeks or months from those of small stormwater ponds and waterbodies where the flood stages last hours or days. The flood risk, especially that caused by groundwater sources, is significantly lower to structures surrounding these small stormwater ponds and waterbodies. Exhibit A of Staff's February 18, 2022, memo shows a diagram of the proposed freeboard requirements. The memo outlines the proposed revisions to the existing rules. The revisions would go into effect as soon as approved by the Commission and a Minor Plan Amendment is approved by the Minnesota Board of Water and Soil Resources.

B. Discussion. The members discussed the use of the term *hydraulically connected waterbodies* and agreed that its definition should be included in the revised rules, along with the definition

for *emergency overflow.* It was also agreed that *hydraulically connected waterbodies* may still be too ambiguous and not achieve the desired outcome to remove indeterminate terminology in the existing rules (such as "nearby" and "adjacent"). Staff agreed to draft a definition for *hydraulically connected waterbodies* to address potential surficial and groundwater sources.

V. Revisions to Rules.*

A. Background. In 2021, the Minnesota Pollution Control Agency (MPCA) issued a new Municipal Separate Storm Sewer System (MS4) Phase II general permit to Minnesota cities. An individual MS4 Phase II permit requires a city to develop and implement a stormwater pollution prevention program to reduce the discharge of pollutants from their storm sewer systems. All member communities in the Elm Creek Watershed Management Commission are MS4 Phase II permit holders.

The revised MS4 Phase II permit requires:

1. For non-linear projects, treatment of the amount of 1.0-inches of runoff from new and fully reconstructed impervious surfaces.

2. For linear projects, treatment of (a) 1.0-inches of runoff from the new impervious surface or (b) 0.50-inches of runoff from new and fully reconstructed impervious surfaces, whichever is greater.

The 2015 Third Generation Elm Creek Watershed Management Commission Plan rules require applicants to provide treatment in the amount of 1.1-inches of runoff from the net, new impervious areas for projects with construction disturbance of more than one acre. The revisions to the MS4 Phase II permit create inconsistencies between the Third Generation Plan rules and the rules of its member cities as required by the newest MS4 Phase II permit. Staff propose to revise the Commission's rules to align with the MS4 Phase II permit requirements. These proposed revisions will have the greatest impact to redevelopment, including public works projects (i.e., road projects) and will have negligible impact to new construction projects on greenfield sites. It is important to the Commission's member cities that its rules be aligned with their MS4 Phase II permit requirements so as to be at least as stringent as those of its member cities and to create consistency in the project review process.

B. Timeline. The MPCA updated MS4 discharge permits to the Commission's member cities in October and November 2021. The member cities have one year to come into compliance with the new MS4 Phase II permit requirements. Project reviews submitted to the Commission after November 30, 2022, shall be required to follow the revised requirements. This rule shall go into effect as soon as a member city fully implements its new MS4 Phase II permit and a Minor Plan Amendment is approved by the Minnesota Board of Water and Soil Resources, no later than November 30, 2022.

C. Discussion.

In response to discussion at the February TAC meeting, the following language regarding linear project was supplemented:

> Linear projects that create one acre or more of new or fully reconstructed impervious surfaces must meet all Commission requirements for 1.1-inches of runoff from the new impervious surface or 0.55-inches from the combination of new and fully reconstructed impervious surfaces, whichever is greater. *When this volume cannot be treated within the existing right-of-way, a reasonable attempt to obtain additional right-of-way, easement, or other permission to treat the stormwater during the project planning process must be made. Volume reduction practices must be considered first.*

**included in meeting packet*

Volume reduction practices are not required if the practices cannot be provided cost effectively. If additional right-of-way, easements, or other permission cannot be obtained, owners of construction activity must maximize the treatment of the water quality volume.

Definitions from the MS4 rules for the terms *fully reconstructed impervious* and *linear projects* will also be added to the revised rules.

VI. 2022 Capital Improvement Program.

A. Staff's March 2, 2022, memo* outlined the potential projects for the 2022 CIP. As shown in Table 4.5* of the Third Generation Plan, they are:

Project	City	Comm Share	Levy
Ranchview Wetland Restoration	Maple Grove	$250,000	$265,125
Fox Creek, South Pointe Restoration	Rogers	22,500	23,861
Downtown Pond Expansion & Reuse	Rogers	101,500	107,641
Lowell Pond Raingarden	Champlin	100,000	106,500
Tower Drive West Stormwater Improvement	Medina	67,813	71,916
S Fork Rush Creek Stream Restoration**	Maple Grove	270,834	287,219
City Cost Share*		100,000	106,500
Partnership Cost Share*		50,000	53,250
TOTAL		$962,647	$1,022,012

*New projects in 2022 **the proposed amount is 1/3 the total requested Commission share

If all projects proceed as proposed the Commission would exceed the voluntary levy cap of $500,000 as stated in the Plan or as revised to $750,000 as recently discussed.

Two of the projects, the City Cost Share and Partnership Cost Share programs, were approved by the Commission in August 2021. Other projects on the potential CIP were previously added to the CIP for 2022 or were rescheduled to 2022. One project, the South Fork Rush Creek Restoration project, is new and was submitted by Maple Grove for consideration. Those three projects would have to be added to the CIP via Minor Plan Amendment (MPA) to be further considered. That MPA is scheduled to be initiated at the April meeting and finalized at the May meeting so that a maximum 2022 levy can be conveyed to Hennepin County by June 1. Brief descriptions of all of the projects were provided in Staff's memo.

B. Discussion. Nelson, Danzl, and Simmons indicated their cities' projects should be moved to future years; Asche stated that the Ranchview Wetland project requires more discussion and should be moved out two-three years. With removal of the Champlin, Medina, Rogers and Ranchview projects to future years, it was suggested to increase the South Fork Rush Creek project share to 50% in 2022. With these adjustments, the 2022 CIP would look like this:

Project	City	Comm Share	Levy
S Fork Rush Creek Stream Restoration***	Maple Grove	$406,250	$430,828
City Cost Share		100,000	106,500
Partnership Cost Share		50,000	53,250
TOTAL		$556,250	$590,578

*** the proposed amount is 1/2 the total requested Commission share

Motion by Cantarero, second by Scharenbroich to recommend to the Commission approval of this proposed 2022 CIP. *Motion carried unanimously.*

**included in meeting packet*

VII. RFPs – Revisions to HUC 8 Model.

A. Background. On February 18, 2022, TAC Chairman Asche transmitted an RFP requesting a scope of work to revise the HUC-8 model provided by the MN DNR to the Commission on January 24, 2022, based on Stantec's Third-Party Review. The Third Party Review identified several reasons the HUC-8 base flood elevations were significantly different than the 2016 FIS. The RFP was sent to Barr Engineering, the firm that performed the initial HUC 8 Study, and Stantec Consulting Services.

Responses were received from each firm on March 2, 2022, and were included in the meeting packet. As stated in their proposal, Barr anticipates a proposed budget of $25,940. Including optional tasks, Barr proposes a total budget of $30,740. Stantec proposes a budget of $65,875 to perform the work outlined in their RFP.

B. Discussion.

Asche reviewed the work the MN DNR still has to complete including cleaning up floodway and floodplain boundaries and double checking flood elevation to ensure no downstream flood elevations are higher than upstream flood elevations.

Calibration was not conducted in the upstream watershed or in the middle of the watershed with the initial work completed.

Weiss indicated the DNR performed a conservative analysis. Looked closely at what structures are in the floodplain.

Are out-buildings considered in the floodplain? Yes, but to a lower standard.

Campeau: Barr team will be the same group that conducted the initial modeling, plus Brandon Barnes.

Regarding floodway differences. Almost no structures allowed in floodway. Controversial. Make sure we get floodways right.

Weiss: Other watersheds have submitted rough drafts of their floodways, then work is done by the DNR.

The RFP included one meeting with communities followed by a meeting with DNR. At the time of the meeting with the DNR our goal is to have the model nearly finalized.

Different reservoir routing methods. 52 vs. total of 77. Is it worth the money to do them all?

Vlach: Make sure that model calibration results are a deliverable. Barr, it's in. Stantec it's in the memorandum.

Asche: The goal of this project is a more accurate model, more reflective of real life conditions the communities are comfortable with.

Nelson: Is Barr submittal complete? How does it fit in?

Asche: DNR has indicated the model is in a good enough place to go forward with their final revisions and submittal to FEMA. This RFP is additional and separate work to improve model accuracy via additional calibration and to provide work products to each community for review and comment as well as compare the model outputs with real life experience.

Vlach: Floodway analysis is important.

If [go with] Stantec, eliminate subtask 7. Always to be done by DNR.

**included in meeting packet*

Motion by Simmons, second by Scharenbroich to recommend to the Commission to select Stantec minus Task 2, subtask 7. Motion carried, Dayton abstaining.

VIII. West Metro Water Alliance (WMWA).

WMWA is considering creating a part-time employee position to conduct regular outreach including providing workshops and trainings for citizens, city staff and elected officials and help public partners to meet federal, state, and local rules and MS4 requirements. This position will coordinate other outreach activities, promote cost-share grants, and maintain a higher level of communications between the member watersheds and cities. This position is modeled after the very successful East Metro Water Resources Education Program (EMWREP) which began in 2006 with a single full-time employee and the goal of raising public awareness and inspiring behavior change to protect and improve water quality.

IX. 2022-2023 Watershed-Based Implementation Funding (WBIF) Convene Meeting.

A. Present were Nelson and Cantarero representing the member cities, Baines, representing the Commission, Guentzel, representing Hennepin County as the Soil and Water Conservation District, Christopher as the BWSR Board Conservationist, and Spector, serving as the facilitator.

It was agreed that members would use "consensus" as its decision-making process.

B. Members agreed to review existing subwatershed assessments to identify projects and to also consider undertaking additional SWAs if they can be identified in time for WBIF funding. They would also look at the CIP to identify other projects and to reach out to cities to determine if local projects can be expanded for water quality if the money is not initially available.

The watershed-wide TMDL should also be reviewed to identify places where projects can be developed to help meet load reductions.

The members queried Christopher on what over activities, such as studies, would be eligible for the WBIF funds. Spector will send out a spreadsheet of projects for consideration at the next meeting.

Funding is available July 1, 2022; the grant expires December 31, 2025. Funds allotted to the Elm Creek Partnership total $297,774. One or several projects can be chosen for funding. The deadline to complete eLINK work plans for approval by BWSR is March 30, 2023.

C. The **next Convene meeting** will be held during the April 13, 2022, TAC meeting and will begin at 10:45 a.m.

X. The **next Technical Advisory Committee meeting** will begin at 9:00. ***NOTE**: The times of these meetings may be adjusted to accommodate the number of items on their agendas.*

There being no further business, the meeting was adjourned at 11:25 a.m.

Respectfully submitted,

Judie A. Anderson
Recording Secretary
JAA:tim

Z:\Elm Creek\TAC\2022\March 9 2022 TAC meeting minutes.da.docx

**included in meeting packet*

elm creek
Watershed Management Commission

DATE: April 11, 2022

TO: Elm Creek Watershed Management Commission (Commission)

FROM: Derek Asche, City of Maple Grove

SUBJECT: HUC 8 WATERSHED FLOODPLAIN MODELING AND MAPPING UPDATE

Previous FEMA-approved modeling for Elm Creek was completed in the 1970s. Ever changing storm events and development within the watershed necessitated an update to the existing modeling. Project milestones included:

- March 2018 – The Commission entered into an agreement with Hennepin County at a cost of $92,772.45 and a due date of February 2020 to update hydrologic and hydraulic modeling for Elm Creek for the purpose of updating FEMA Floodplain mapping.
- May 2018 – The Commission entered into a grant agreement with the DNR at a not to exceed grant of $92,773.00 and deadline of April 30, 2020 to fund the cost of the hydrologic and hydraulic modeling.
- March 2020 – Staffing changes in 2019 at Hennepin County necessitated a change in contractor for updating the hydrologic and hydraulic modeling and the Commission entered into a contract with Barr Engineering Co. (Barr) to complete the modeling at a cost of $90,945.00 with the understanding that some work has already been completed, additional assumptions on the process were being made by Barr, and Barr could create some efficiencies with the process.
- August 2020 – Interagency Hydrology Review Committee (IAHRC?) of the DNR verbally approves the (hydrology?) modeling, methodology, and results completed by Barr and indicates modeling will be acceptable for FEMA floodplain modeling.
- September 2020 – Barr submits a request to increase the project budget by $25,000 and push the schedule out to May 2021 due to out of scope work requested by the DNR. This work was completed without authorization by the Commission.
- October 2020 – Chair Baines provides letter to DNR regarding the Barr request for modifications to the budget and timeline and requests the funds from the DNR.
- October 2020 – DNR provides written confirmation to the Commission of IAHRC approval of the modeling methodology and results.
- December 2020 – Barr provides additional detail to the DNR regarding their request for modifications to the budget and timeline.
- January 2021 – DNR agrees to an increase of $16,000 to the project budget for work determined to be requested by the DNR and outside of the contract for work between the Commission and Barr.
- March 2021 – Barr provides the required Narrative and Quality Assurance/Quality Control (QAQC) documentation to the DNR. This work product documented, among other items, a comparison in peak flows between “approved (draft) and revised hydrology model” at key locations. No issues were noted as this appears to be a comparison from first draft to second draft. Problems with this approach will become apparent with the Third Party Review.
- May 2021 – Member cities are concerned with model outputs and the possibility of significant differences (7-8 feet) between existing modeling and the HUC-8 model. The Commission

authorizes $4,800 to fund Stantec to review the model as a "third party" including a comparison of the existing model flows to the HUC-8 model flows.

- January 2022 – The Commission and the DNR are provided the Third-Party Review. This review identifies a number of issues with the model that, if resolved, would result in more accurate modeling and mapping.
- February 9, 2022 – Based on the Third-Party Review at the TAC meeting, the member communities agree there are issues with the model that need further resolution and desire to proceed with revisions. TAC proposes to move forward with an RFP process.
- February 14, 2022 - The DNR confirms they would move forward with the modeling and mapping as-is with some "cosmetic clean-up" confirming the need for the communities to move forward with revisions and an RFP process. The DNR acknowledges the Commission has fulfilled its obligations and, if the Commission wants to revise the model, it will be at the Commission's discretion and cost. The DNR advises they have no additional funding.
- February 15, 2022 – The DNR provides responses/comments to the Third-Party Review. TAC Chair Asche provides comments to Ross Mullen at Stantec for review of DNR responses/comments and consideration of DNR comments for inclusion in RFP.
- February 16, 2022 – TAC provides comments/email discussion on RFP.
- February 18, 2022 – RFP is issued to Barr and Stantec.
- March 2022 – Proposals received are reviewed by the TAC with a recommendation to move forward with Stantec. Recommendation is provided to the Commission who authorizes Stantec to proceed with revisions to the HUC-8 model.
- April 7, 2022 – At the request of the DNR, a Teams Meeting was held to discuss the responses/comments provided by the DNR regarding the Third Party Review. Jeff Weiss, reiterated that Comment "5", subdivision of watersheds, should be included in the Commissions work to revise the model as the DNR expects this to only take a ½ day. After discussion with Ross Mullen at Stantec at the time the DNR comments were initially submitted, this comment was not included in the RFP out of concern for cost. In fact, the comment refers to 9 example watersheds recommended for subdivision as examples but is open ended and is not necessarily limited to 9. In addition, the DNR made a similar request of Barr regarding subdivision of watersheds. According to Barr's calculations they spent 95 hours and $9,500 on this similar request. The DNR subsequently funded $5000 of the requested $9,500 for this work. While likely not apples to apples, there was enough cause for concern to leave sub-division of watersheds out of the RFP. Also of note, all TAC requests for the RFP could not be included, again, out of concern for cost.

ATTACHMENTS: Request for Proposal (RFP) – Revisions to HUC-8 Model
DNR Comments – Third Party Review of Elm Creek Preliminary HUC-8 Model
DNR Responses to Barr Request for budget increase

Z:\Elm Creek\Grant Opportunities\Floodplain modeling 2018\Asche 04112022 Memo to Commission - HUC 8 Update.docx

REQUEST FOR PROPOSAL (RFP)
REVISIONS TO HUC-8 MODEL
ELM CREEK WATERSHED MANAGEMENT COMMISSION

Introduction

The Minnesota Department of Natural Resources (MNDNR) is partnering with the Federal Emergency Management Agency to update the base flood elevation across the watershed for a future Flood Insurance Study (FIS). The base flood elevation published in current and any future FIS sets the floodplain inundation extents and is particularly important as there are local, state, and federal regulations governing work or other such impacts within the floodplain. Reasonable accuracy is paramount with floodplain modeling as homeowners may be required to buy flood insurance, construction costs can increase for work in the floodplain, and local, regional, and state agencies rely on the base flood elevation for planning efforts.

On March 11, 2020 the ECWMC accepted a consultant proposal to provide FEMA floodplain modeling and mapping for the Elm Creek Watershed. On October 13, 2020, the MNDNR inter-agency review accepted the modeling methodology and results, however, cities of the Elm Creek Watershed Management Commission (ECWMC) noted significant differences between the flood elevations in the current 2016 FIS when compared to the Elm Creek Floodplain Modeling and Mapping HUC-8 study (HUC-8 Study). Subsequently, in May 2021 the ECWMC authorized a "third-party" review of the HUC-8 study to understand unreasonable outputs of the HUC-8 model.

The purpose of this RFP is to request a scope of work to make revisions to the HUC-8 model provided by the MN DNR to the Commission on January 24, 2022 based on the Third-Party Review, which identified several reasons the HUC-8 base flood elevations were significantly different than the 2016 FIS.

Tasks

1. Hydrologic Revisions
    a. Replace the Muskingham-Cunge shortened simplified trapezoidal bank-width cross sections with reservoir routing, to account for full storage and attenuation of the floodplain for up to 55 watersheds (identified in yellow on Figure 1 of the Third-Party Review)
    b. Add Three Rivers Park District monitoring sites "ECER" & "RT" as additional calibration sites in the upper watershed (see Figure 1). Revise and rerun calibration to verify model is valid.
2. Hydraulic Revisions
    a. Revise hydraulic model with updated flows from the hydrologic model for the 10%, 2%, 1% and 0.2% annual exceedance events.
    b. Update 52 bridges, culverts, weirs, and dams based on construction drawings, survey, and as-built data shown in Table 3 of the Third-Party Review.
    c. Add the Elm Creek Dam (Mill Pond Dam) to the model based on City of Champlin as-builts.
    d. Revise stream alignments at:
        i. County Ditch 16 east of Brockton Lane (County Road 101). This watercourse should be shown to be piped beneath Vagabond Lane to the north.
        ii. Unnamed Tributary to Elm Creek (HEC-RAS Reach ElmCreek_BR4) just southeast of the intersection of Hackamore Road (County Road 47) and Brockton Lane (County Road 101) in Plymouth. The model should show the permanent alignment of the watercourse.
    e. If necessary and with direction from the MN DNR, recombine model reaches that were split at stream confluences or update boundary conditions of the existing severed reaches.

f. Run the updated hydraulic model with updated flows from the hydrologic model for the 10%, 2%, 1% and 0.2% annual exceedance events.

3. Meetings
    a. Stakeholder Meeting - provide for one stakeholder meeting to update member communities on the revised model outcomes and receive any additional feedback to help refine the model.
4. Memorandum of Revisions
    a. Provide a memorandum of revisions describing updates to both the hydrologic and hydraulic models including a discussion on the revised model results for the calibration events.
    b. Provide a table documenting current 2016 FIS flood elevations and draft HUC-8 flood elevations for the 10%, 2%, 1% and 0.2% annual exceedance events at each road crossing.
    c. Provide figures in pdf format documenting current 2016 FIS flood elevations and draft HUC-8 flood elevations for the 10%, 2%, 1% and 0.2% annual exceedance events for the floodway, floodplain and cross sections at a scale of 1:10,000 for:
        i. Elm Creek
        ii. Diamond Creek
        iii. North Fork Rush Creek
        iv. South Fork Rush Creek

Timeline

1. Preliminary draft of Tasks 1, 2 & 4 are due to the Commission no later than April 22, 2022
2. Stakeholder Meeting shall be May 11, 2022 during regularly scheduled Elm Creek Technical Advisory Committee meeting.
3. Final draft of Tasks 1, 2, & 4 are due no later than June 24, 2022

Deliverables

1. Revised hydrologic (HEC-HMS) model in version 4.3
2. Revised hydraulic (HEC-RAS) model in version 5.07
3. Memorandum of Revisions

Communications and Contact Information

1. All communications on this RFP shall be directed to Judie Anderson, Administrator, Elm Creek Watershed Management Commission at judie@jass.biz

Submission Requirements

1. Scope shall be submitted electronically to the Elm Creek Watershed Management Commission, c/o Judie Anderson, JASS at judie@jass.biz
2. Scope is due no later than March 2, 2022 at 4:30pm.
3. Minimum information required in scope:
    a. A narrative of project understanding
    b. Itemized costs for each Task 1-4
    c. Information on the Project Team
    d. Acknowledgment that all work projects may not be distributed or disseminated in any form without written permission from the Elm Creek Watershed Management Commission.
    e. Acknowledgement the Commission reserves the right to enter into an agreement with a consultant for any or all of Tasks 1-4.

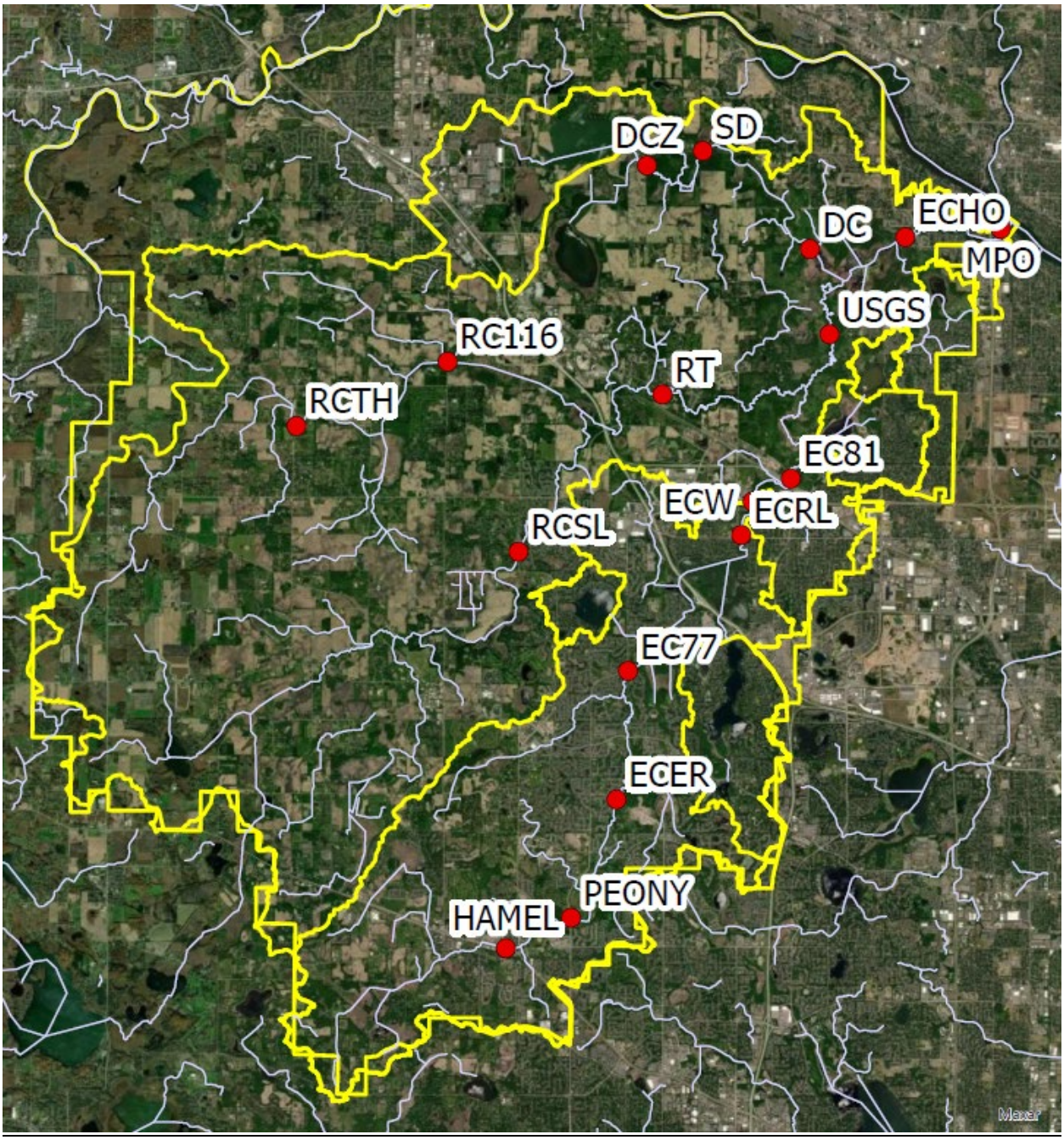
Assumptions

1. HUC-8 model provided to successful consultant shall be the same as was provided to the Commission on January 24, 2022 by the MN DNR.

Attachments

1. Third Party Review of the Preliminary HUC-8 Model of the Elm Creek Watershed by Stantec dated January 22, 2021

Figure 1: Three Rivers Park District Monitoring Sites



To: Minnesota Department of Natural Resources

From: ECWMC Technical Staff

cc: Ross Mullen, PE, CFM

Date: January 22, 2021

Subject: Third Party Review of the Preliminary HUC-8 Model of the Elm Creek Watershed

INTRODUCTION AND PURPOSE

Member cities of the Elm Creek Watershed Management Commission (ECWMC) have noted significant differences between the flood elevations in their community hydrologic and hydraulic (e.g., XPSMWM) models and the 2016 Federal Emergency Management Agency (FEMA) Hennepin County Flood Insurance Study (FIS) verses those included in the preliminary Elm Creek Floodplain Modeling and Mapping HUC-8 study (Preliminary HUC-8 Study). In some instances, especially in the upper watershed, the Preliminary HUC-8 model simulates a base flood elevation (100-year or 1%-annual-exceedance-probability event) that is seven (7) to eight (8) feet higher than the 2016 FIS.

The hydrologic and hydraulic analyses used to create the 2016 FIS were created, with modifications submitted as FEMA Letters of Map Revision, are dated:

- Champlin 1975-1977
- Corcoran: 1980-1981
- Dayton: 1976-1977
- Maple Grove:1976-1977
- Medina:1978-1980
- Plymouth: 1977-1982
- Rogers: 1990-1993.

Significant development has occurred in these member cities of the Elm Creek Watershed Management Commission since the publication of the above studies, using the results of those studies to limit flood risk in the watershed (e.g., land use planning and requiring structures to be elevated). Such significant increases in the base flood elevation will place numerous structures in the regulatory floodplain and are cause for concern as the communities continue to develop using best practices to reduce flood risk.

The MNDNR provided ECWMC technical staff the Preliminary HUC-8 hydrologic and hydraulic models to review and the memorandum documenting the methodology used to create the hydrologic and hydraulic models, "*Elm Creek Narrative and QAQC Documentation*" (Barr Engineering Co., 2021). ECWMC technical staff also reviewed the web-based interactive map published by the MNDNR titled "*Elm Creek Watershed District Draft Flood Risk Review Map"*.

HYDROLOGY

A hydrologic analysis (e.g., model) calculates the water cycle process that occur, including infiltration, evaporation, transpiration (plant absorption), and runoff. Hydrologic analyses are then used to estimate the peak streamflow in a watercourse, which can be used for planning and infrastructure design.

Peak Streamflow Review

A comparison of the peak streamflow rates between the 2016 FIS and Preliminary HUC-8 is included in Table 1. The percent changes are symbolized with arrow markers indicating a greater than 10% increase, within 10% (approximately unchanged), and a 10% or greater decrease in peak streamflow. A general discussion of the peak streamflow rates is discussed below.

- **Elm Creek:** At the upper end of Elm Creek, near the Medina-Plymouth city limits, the Preliminary HUC-8 model peak discharge rates are approximately 43-72% higher than the 2016 FIS. Farther downstream, the peak discharge rates in the Preliminary HUC-8 model vary between 3-36% lower than the 2016 FIS. Because it is the policy of the ECWMC to require all culvert and bridge crossings to show no-rise for the base flood event, the floodplain for the downstream portions is expected to be lower than that shown in the 2016 FIS due to the decrease in estimated peak discharge.

- **North Fork Rush Creek:** The peak discharge rates in the Preliminary HUC-8 model on North Fork Rush Creek are approximately 20-35% lower than the 2016 FIS. Because it is the policy of the ECWMC to require all culvert and bridge crossings to show no-rise for the base flood event, the floodplain is expected to be lower for the entirety of North Fork Rush Creek than that shown in the 2016 FIS due to the decrease in estimated peak discharge.

- **Rush Creek:** Upstream of County Road 116 on Rush Creek, peak discharge rates published in the Preliminary HUC-8 model are generally lower the 2016 FIS by 15-61%. The estimated discharge at the outlet of Jupert Lake during the 10-year increases by 22%; however, the absolute amount is only 11-cfs. Downstream the Preliminary HUC-8 model peak discharge rates are approximately 31-40% higher than the 2016 FIS.

Based on several conversations ECMWC technical staff have had with MNDNR floodplain group staff, we understand that the 2016 FIS model of Elm Creek reflects republished 1970's and 1980's analyses discussed in the *Introduction and Purpose* Section. It is also our understanding that those analyses were based on fully developed planned use in the watershed, as expected in the 1970's and 1980's using Technical Paper 40 hydrology (statistically derived design storm depths based on the period of record from late 1800's to 1961).

The fully developed planned use of the 2016 FIS (1970's and 1980's analyses) hydrologic models was expected to generate extremely conservative peak streamflows. The increase in peak streamflows is surprising because of the land use assumption in combination with the policy of the ECWMC that new and re-development of more than 1-acre must not increase the site peak runoff rates for the 2-, 10-, and 100-year events. While design rainfall depths have increased as published in Atlas 14 Volume 8 (reflecting statistically derived design storm depths based on the late 1800's to 2013), the land use assumptions used in the 2016 FIS in combination with the Commission's policy limiting rate control from developed site, should limit the increases in peak streamflow rates.

Hydrologic Model Review

The Preliminary HUC-8 hydrologic model uses the Muskingham-Cunge hydrologic routing method across the entirety of the watershed. The Muskingham-Cunge hydrologic routing method simulates the channel as a simplified trapezoidal cross section and routes a hydrograph through a watercourse (reach). The simplified trapezoidal cross section used throughout the model reflects the apparent channel width (i.e., distance between the banks). All modeled storage is accounted for using these shortened simplified trapezoidal cross sections except the most upstream watershed within a reach and at major named lakes (i.e., Rice Lake, Mud Lake, and Fish Lake) are modeled as *Reservoirs.*

This hydrologic routing method may be appropriate for the downstream channelized reaches of Elm Creek, Rush Creek, and North Fork Rush Creek or for modeling low flows; however, the upper watershed consists of series of large ponds, wetlands, and lakes connected by ephemeral streams, culverts, and bridges with appreciable flood storage outside of the channel banks. In these locations there is significant flood storage outside of the channel that is not included using the Muskingham-Cunge routing method with a shortened simplified trapezoidal cross section. Instead, the HEC-HMS model simulates a channel that is analogous to an incised channel without floodplain connectivity, which produces large peak flood flows with a faster time of concentration. In some cases, the Preliminary HUC-8 model simulates a several thousand-foot-wide floodplain as a channel with a width of ten to twenty feet. For example, Lake Medina is simulated as 10-foot-wide trapezoidal channel when the apparent floodplain width approaches 2,400-feet.

Table 2 highlights a few locations where the modeled approach is significantly undercounting for a significant flood storage volume as it only simulates on-channel storage for most of the watershed. The locations identified in Table 2 are not meant to be exclusive and are provided for illustrative purposes only. An annotated figure showing the locations where the Preliminary HUC-8 uses only channel storage or does not reflect any modeled storage is included as Figure 1.

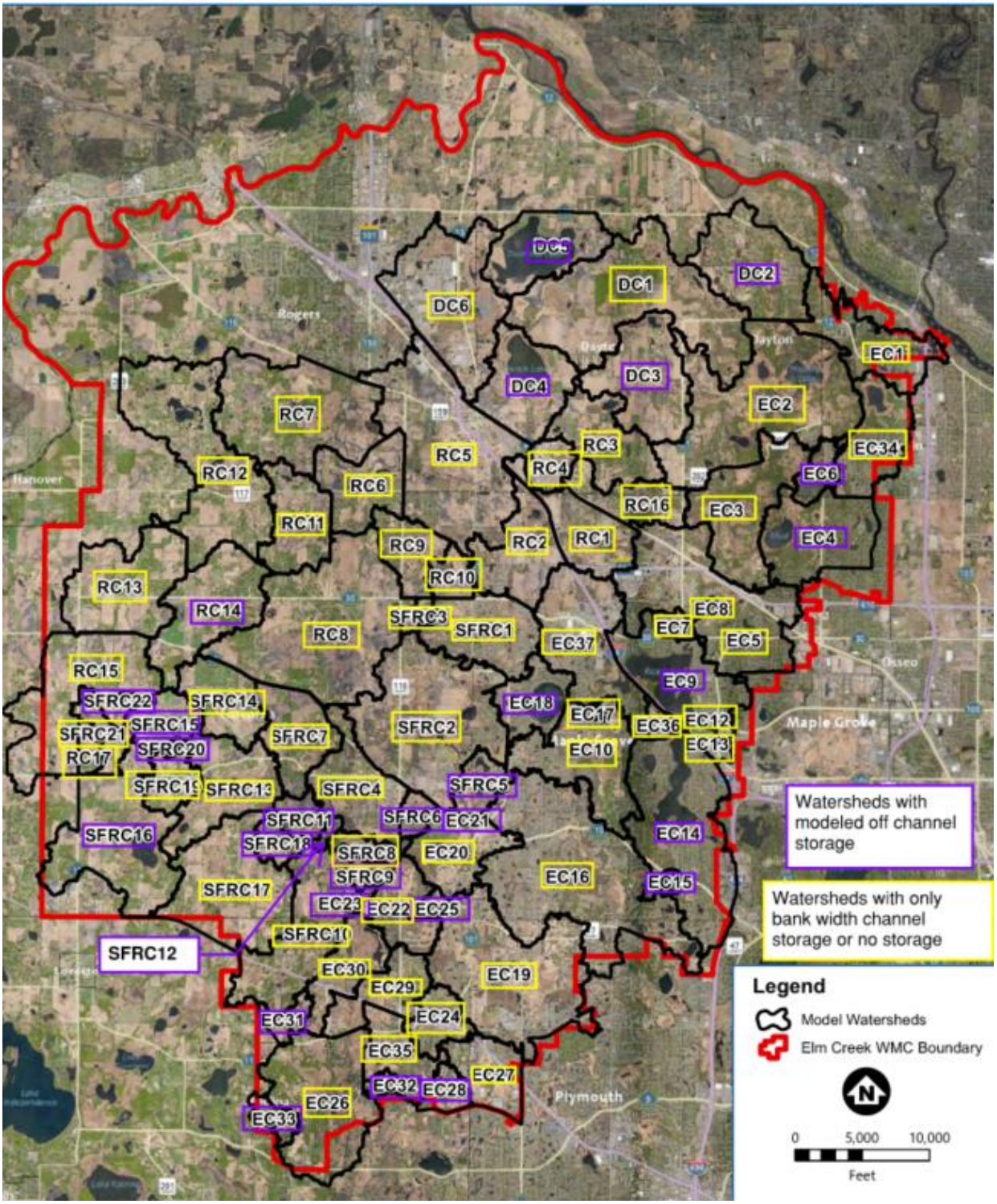
Table 1 Difference in Peak Streamflow between the 2016 FIS and the Preliminary HUC-8 at Key Locations

Location	10% Annual Chance Exceedance Probability			2% Annual Chance Exceedance Probability			1% Annual Chance Exceedance Probability			0.2% Annual Chance Exceedance Probability		
	Preliminary HUC-8	2016 Effective	Difference (%)	Preliminary HUC-8	2016 Effective	% Difference	Preliminary HUC-8	2016 Effective	% Difference	Preliminary HUC-8	2016 Effective	% Difference
Elm Creek												
Conf. with Mississippi River	1,099	1,380	-20%	1,700	2,300	-26%	1,999	2,780	-28%	2,790	4,350	-36%
Elm Creek Above Rush Creek	429	450	-5%	666	690	-3%	783	860	-9%	1086	1345	-19%
Elm Creek Medina-Plymouth Limits	201	185	9%	329	230	43%	394	245	61%	568	330	72%
North Fork Rush Creek												
N. Fork Rush Creek Cain Road	219	340	-36%	333	485	-31%	391	530	-26%	542	700	-23%
N. Fork Rush Creek Trail Haven Road	193	280	-31%	295	435	-32%	347	495	-30%	482	700	-31%
Rush Creek												
Rush Creek Conf. with Elm Creek	1,010	770	31%	1,575	1,170	35%	1,857	1,330	40%	2,587	2,000	29%
Rush Creek Downstream of Co. Rd 116	185	285	-35%	285	420	-32%	336	470	-29%	465	680	-32%
Rush Creek at Jubert Lake Outlet	34	40	-15%	61	50	22%	76	150	-49%	118	300	-61%

Table 2 Non-exclusive List of Locations where the Muskingham-Cunge Shortened Simplified Trapezoidal Cross Sections Significantly Undercount Floodplain Storage

Elm Creek HEC-HMS Model Feature Name	Common Name	Location Description	City	Preliminary HUC-8			Apparent Floodplain Width (feet) as Measured in Aerial Imagery
				Simplified Shape	Bottom Width (feet)	Side Slopes (H:1V)	
EC30R	Lake Medina	Medina North of Highway 55	Medina	Trapezoid	10	2	300-2,400
EC26R & EC26R22	Elm Creek Pond	Elm Creek Headwaters & Elm Creek floodplain upstream of Hamel Road	Medina	Trapezoid	10	2	50-1,500 (with significant offline storage)
EC19R & EC19R2	Elm Creek Greenway	Elm Creek floodplain downstream (east) of Peonly Lane	Plymouth	Trapezoid	20	2	200-2,700
EC16R	Elm Creek floodplain	Elm Creek floodplain in Nottingham Park	Maple Grove	Trapezoid	30	2	500-2,000
EC22R	County Ditch 16	Upstream (west) of Brockton Lane	Corcoran	Trapezoid	0	2	100-2,000
EC2R & EC3R	Elm Creek Park Reserve	---	Maple Grove/Dayton	Trapezoid	40	2	500-1,000
DC1R & DC1R2	Diamond Creek	Diamond Creek Downstream of French and Diamond Lakes to the Confluence with Elm Creek	Dayton	Trapezoid	20	2	150-2,000
RC1R & EC3R2	Rush Creek	Rush Creek between County Road 81 and its confluence with Elm Creek	Dayton	Trapezoid	40	2	25-600
RC5R	North Fork Rush Creek	North Fork Rush Creek downstream of Fletcher Lane	Dayton & Corcoran	Trapezoid	30	2	2100
RC13R, RC12R2, RC12R, RC11R, RC8	North Fork Rush Creek	North Fork Rush Creek between County Road 10 and Fletcher Lane	Corcoran	Trapezoid	10-25	2	100-3,800
SFRC1R	Rush Creek	Rush Creek between Brockton Lane and 97th Avenue	Maple Grove	Trapezoid	20	2	100-2,000
SFRC1R2	Rush Creek	Rush Creek between County Road 10 and Schutte Road	Corcoran	Trapezoid	20 - 30	2	300-6,500
SFRC14	County Ditch 7	Upstream of Trail Haven Road	Corcoran	Trapezoid	15	2	50-2,000
RSRC13R3, SFRC13R2, RSRC13R	County Ditch 3 (Rush Creek downstream of Jupert Lake)	Between Jupert Lake and Kalk Road	Corcoran	Trapezoid	15 - 20	2	40-2,000

Figure 1 Annotated Subwatershed Figure Reflecting Subwatersheds with No Modeled Storage or Only On-Channel Storage



HYDRAULICS

The Minnesota Department of Natural Resources (MNDNR) proposed to complete extensive surveys of all hydraulic structures (bridges, culverts, and weirs) within the effective (FEMA mapped) floodplain as part of the Twin Cities HUC-8 pass-through FEMA grant; however, the MNDNR was unable to complete these surveys with limited budgets.

Approximately 80 hydraulic structures, representing approximately half of the total hydraulic structures in the Elm Creek Preliminary HUC-8 model, were simulated based on assumptions made from review of aerial imagery as shown in Table 3 of the *Elm Creek Narrative and QAQC Documentation (Barr Engineering Co., 2021).*

To ensure that the Preliminary HUC-8 Study reflects the best available data, ECWMC technical staff reviewed:

1. Publicly available data sources, such as the Minnesota Department of Transportation's (MNDOT) *BridgeInfo3* map, which was developed by MNDOT to assist local Staite Aid agencies, to complete bridge and culvert inspections. This application includes bridge and culvert dimensions for many county roads.
2. The cities of Corcoran, Champlin, Plymouth, and Maple Grove provided ECWMC technical staff data for this review, including existing hydrologic and hydraulic models, construction plans, as-builts, and survey information.
3. Technical staff consulted with the city of Medina, who provided ECWMC technical staff references to FEMA Letters of Map Revision based on survey and as-builts.
4. The cities of Dayton and Rogers did not provide updated data to ECWMC technical staff and indicated the proposed base flood elevations shown in the Preliminary HUC-8 model were not concerning to their communities.
    a. Note that Stantec staff reviewed the city of Dayton's utility network as part of this review, which was provided to Stantec as part of other project work.

The review is summarized in Table 3. Based on a conversation with MNDNR staff in December 2021 we understand that concurrent to this review, the MNDNR has completed a thorough review of the road overflows in the hydraulic model, so this review focuses on the culverts and bridge openings.

MAPPING

We understand that as part of the mapping process, the MNDNR staff are completing a review of the inundation maps that includes processes such as removing mapped islands within the base floodplain extents where the LiDAR data erroneously reflects that reflect vegetation (e.g., cattails) in large wetland complexes.

Exhibit A includes example figures from the *Elm Creek Watershed District Draft Flood Risk Review Map* showing the Preliminary HUC-8 floodplain and locations where Elm Creek technical staff identified mapping irregularities that may be caused by the hydrologic or hydraulic issues identified above. These locations should be reviewed closely in both the modeling and mapping. At some streamflow confluences, the base flood elevation differs by up to several feet. The MNDNR should review these locations to ensure that appropriate boundary conditions were chosen for the model.

RECOMMENDATIONS

Following the above review, we recommend the MNDNR make the following revisions to the Preliminary HUC-8 models:

1. We recommend the MNDNR update the hydrologic HEC-HMS model with an alternative modeling approach, such as *Reservoir Routing*, in the upper watershed to account for all the off-channel flood storage on the landscape.

2. We recommend the MNDNR update the hydraulic HEC-RAS model with the best available information for each of the hydraulic structures in the model.

3. We recommend the MNDNR review the boundary conditions for each of the stream sections as the mapped base flood elevations differ at stream confluences.

4. We recommend the MNDNR remap the floodplain after the above changes are made to the hydrologic and hydraulic models.

Table 3

			Preliminary HUC-8 HEC-RAS Model									Data Review				
Municipality	Name	FEMA ZONE	River	Reach	HEC-RAS XS	HEC-RAS XS Structure Size and Shape	Bridge Opening Area (sq ft)	U/S Invert (feet)	D/S Invert (feet)	Road Overflow (feet)	Structure Data Source	Structure Size and Shape	U/S Invert (feet)	D/S Invert (feet)	Road Overflow (feet)	Structure Data Source
Dayton	Zanzibar Lane	A	DiamondCreek	DiamondCreek	25012	Bridge	173	896.0	896.2	906.6	Assumed from aerial imagery	No Additional Information Available				
Dayton	Diamond Lake Road	A	DiamondCreek	DiamondCreek	16591	4' Circular		882.4	882.5	897.8	Assumed from aerial imagery	No Additional Information Available				
Dayton	Diamond Lake Road	A	DiamondCreek	DiamondCreek	13849	4' Circular		877.0	876.9	882.4	Assumed from aerial imagery	No Additional Information Available				
Dayton	129th Aven N	A	DiamondCreek	DiamondCreek	7018	4' Circular		866.8	866.1	872.8	Assumed from aerial imagery	No Additional Information Available				
Dayton	Trail Crossing	A	DiamondCreek	DiamondCreek	721	1' Circular		854.4	854.3	856.8	Assumed from aerial imagery	No Additional Information Available				
Medina	Prairie Drive	A	Elm Creek	ElmCreek	130575	3' Circular		995.2	993.7	1003.5	Assumed from aerial imagery	No Additional Information Available				
Medina	Hwy 55	A	Elm Creek	ElmCreek	129606	4' Circular		987.4	986.5	996.3	Assumed from aerial imagery	No Additional Information Available				
Medina	Arrowhead Drive	A	Elm Creek	ElmCreek	129406	4' Circular		986.4	985.1	994.8	Assumed from aerial imagery	No Additional Information Available				
Medina	Meander Road	A	Elm Creek	ElmCreek	128820	2' Circular		983.7	982.2	985.0	Assumed from aerial imagery	No Additional Information Available				
Medina	Shorewood Trail	A	Elm Creek	ElmCreek	123228	Double 5' Circular		979.5	978.9	989.0	Assumed from aerial imagery	No Additional Information Available				
Medina	Meander Road	A	Elm Creek	ElmCreek	122340	6' Circular		976.6	976.0	985.9	Assumed from aerial imagery	No Additional Information Available				
Medina	Hwy 55	AE	Elm Creek	ElmCreek	120239	3.5' Circular		972.4	972.4	983.1	Effective Model MapleGrv-7 Bridge #19 and assumed from aerial imagery	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Medina	CP RR	AE	Elm Creek	ElmCreek	120115	4' Circular		972.4	972.4	983.3	Effective Model MapleGrv-7 Bridge #18 and assumed from aerial imagery	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Medina	Hamel Road	AE	Elm Creek	ElmCreek	118483	5' x 6.5' Box		973.9	973.9	987.7	DNR 2020 Survey - ELM_101	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Medina	Private Road	AE	Elm Creek	ElmCreek	116126	3' Circular		970.4	970.4	975.2	Effective Model MapleGrv-7 Bridge #16	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Medina	Elm Creek Drive	AE	Elm Creek	ElmCreek	114930	3.5' Circular		968.7	967.5	975.4	DNR 2020 Survey - ELM_394	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Medina	Hamel Road	AE	Elm Creek	ElmCreek	114599	5' x 7' Box		967.0	967.3	976.2	DNR 2020 Survey - ELM 390	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Medina	CP RR	AE	Elm Creek	ElmCreek	113790	5.5' Circular		965.4	965.1	982.9	Effective Model MapleGrv-7	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Medina	Private Road	AE	Elm Creek	ElmCreek	113604	5' Circular		963.6	963.6	970.6	Medina Plan Sheet	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Medina	Private Road	AE	Elm Creek	ElmCreek	112622	4.5' Circular		960.8	960.8	973.7	Medina Plan Sheet	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Medina	Co. Rd. 101	AE	Elm Creek	ElmCreek	111746	6' x 7.5' Box		958.6	958.0	972.1	DNR 2020 Survey - ELM_391	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Plymouth	Hwy 55	AE	Elm Creek	ElmCreek	110895	8' x 10' Box		956.3	956.3	973.3	DNR 2020 Survey - Elm_07	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Plymouth	Peony Lane	A	Elm Creek	ElmCreek	101787	Bridge	34	930.0	930.0	938.6	Effective Model MapleGrv-7 Bridge #8	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Plymouth	Co. Rd. 47	A	Elm Creek	ElmCreek	94969	Double Box	228	914.0	914.0	924.2	Effective Model MapleGrv-1 Bridge #7. Side slopes from aerial imagery.	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Maple Grove	Elm Road	AE	Elm Creek	ElmCreek	90404	Double 8' x 8' Box		912.7	912.5	923.5	DNR 2020 Survey - ELM_381	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Maple Grove	Private Road	AE	Elm Creek	ElmCreek	86376	Bridge	198	906.6	904.6	916.4	DNR 2020 Survey - ELM_15	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Maple Grove	Bass Lake Road	AE	Elm Creek	ElmCreek	82661	Double 10' x 10' Box		902.4	902.0	931.8	DNR 2020 Survey - ELM_393	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Maple Grove	Trail Crossing	AE	Elm Creek	ElmCreek	78645	Bridge	761	899.0	898.8	914.1	EN0_(S_ELM_CREEK_TRAIL_BRIDGE)_P0 .PDF	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Maple Grove	Nottingham Parkway	AE	Elm Creek	ElmCreek	74483	Bridge	534	896.1	895.4	917.8	DNR 2020 Survey - ELM_400 MapleGrv-7 Bridge #3	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Maple Grove	Trail Crossing	AE	Elm Creek	ElmCreek	74162	Bridge	365	895.0	894.0	906.3	DNR 2020 Survey - Elm_62	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Maple Grove	Weaver Lake Rd	AE	Elm Creek	ElmCreek	68167	Double 8' x 10' Ellipse		889.0	888.7	903.3	DNR 2020 Survey - ELM_385 Maple Grv-7 Bridge #2	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				

Table 3

			Preliminary HUC-8 HEC-RAS Model									Data Review				
Municipality	Name	FEMA ZONE	River	Reach	HEC-RAS XS	HEC-RAS XS Structure Size and Shape	Bridge Opening Area (sq ft)	U/S Invert (feet)	D/S Invert (feet)	Road Overflow (feet)	Structure Data Source	Structure Size and Shape	U/S Invert (feet)	D/S Invert (feet)	Road Overflow (feet)	Structure Data Source
Maple Grove	Trail Crossing	AE	Elm Creek	ElmCreek	66093	Bridge	468	886.6	886.5	897.5	Effective Model Maple Grv-7 Bridge #1	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Maple Grove	I-94	AE	Elm Creek	ElmCreek	63269	Bridge	1119	886.4	884.8	908.0	DNR 2020 Survey - Elm_63	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Maple Grove	93rd Ave N	AE	Elm Creek	ElmCreek	55968	Bridge	1170	884.5	884.6	906.4	DNR 2020 Survey - ELM_380	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Maple Grove	Rice Lake Dam	AE	Elm Creek	ElmCreek	53103	60ft wide spillway Dam		N/A	N/A	N/A	DNR 2020 Survey	60 ft wide spillway at 891.0'				As-Built
Maple Grove	Trail Crossing	AE	Elm Creek	ElmCreek	52158	Bridge	2100	877.3	877.5	884.3	DNR 2020 Survey - Elm_64	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Maple Grove	Regional Trail	AE	Elm Creek	ElmCreek	49922	Bridge	7083	873.0	872.7	908.5	Assumed from aerial imagery	80' Span Length				MNDOT-BridgeInfo3 App. ID R1024
Maple Grove	BNSF RR	AE	Elm Creek	ElmCreek	49134	Bridge	210	871.3	871.3	886.5	DNR 2020 Survey - ELM_66	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Maple Grove	Co. Rd. 81	AE	Elm Creek	ElmCreek	49010	Bridge	436	872.0	872.7	886.6	DNR 2020 Survey - ELM_382	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Maple Grove	Hwy 610	AE	Elm Creek	ElmCreek	48906	Bridge	376	872.5	872.4	885.0	Assumed from upstream bridge configuration	No Additional Information Available				
Maple Grove	Hwy 610	AE	Elm Creek	ElmCreek	48820	Bridge	403	873.2	872.2	884.8	Assumed from upstream bridge configuration	No Additional Information Available				
Maple Grove	Co. Rd. 81	AE	Elm Creek	ElmCreek	48703	Bridge	441	871.9	872.4	885.3	DNR 2020 Survey - ELM_389	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Maple Grove	Private Road	AE	Elm Creek	ElmCreek	48346	Bridge	163	869.1	869.0	881.4	DNR 2020 Survey - ELM_69	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Maple Grove	Trail Crossing	AE	Elm Creek	ElmCreek	46341	Bridge	1731	868.6	868.6	881.0	DNR 2020 Survey - ELM_70	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Maple Grove	Trail Crossing	AE	Elm Creek	ElmCreek	42894	Bridge	145	866.1	866.1	875.5	DNR 2020 Survey - ELM_71	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Dayton	Private Road	AE	Elm Creek	ElmCreek	33604	Bridge	1279	855.3	855.3	868.4	Champlin effective model Bridge 5	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Dayton	Elm Creek Road	AE	Elm Creek	ElmCreek	25578	Bridge	236	851.6	853.0	862.6	DNR 2020 Survey - ELM_397 Dayton-2 Bridge #1	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Champlin	French Lake Road	AE	Elm Creek	ElmCreek	9161	Bridge	3348	846.4	847.3	865.2	LOMR Case 13-05-8011R	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Champlin	Cartway Road	AE	Elm Creek	ElmCreek	4072	15' x 24' CMP Arch		839.0	839.0	856.2	DNR 2020 Survey - ELM_396 LOMR Case 13-05-8011R	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Champlin	US Hwy 169	AE	Elm Creek	ElmCreek	1044	Bridge	517	838.5	838.5	856.2	LOMR Case 13-05-8011R	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Champlin	Osseo Road	AE	Elm Creek	ElmCreek	650	Dam		N/A	N/A	N/A	Dam is Not Modeled	Dam- see as-builts	N/A	N/A	N/A	Record Plans
Medina	Medina Road	A	Elm Creek	ElmCreek_BR1	4766	3' Circular		981.5	981.4	986.3	Assumed from aerial imagery	No Additional Information Available				
Medina	Blackfoot Trail	A	Elm Creek	ElmCreek_BR2	4121	3' Circular		977.5	977.1	980.6	Assumed from aerial imagery	No Additional Information Available				
Medina	Private Road	AE	Elm Creek	ElmCreek_BR2	215	3' Circular		973.9	973.6	976.7	Assumed from aerial imagery	No Additional Information Available				
Plymouth	Hwy 55	AE	Elm Creek	ElmCreek_BR3	939	4' Circular		965.8	965.5	974.7	Assumed from aerial imagery	No Additional Information Available				
Plymouth	CP RR	AE	Elm Creek	ElmCreek_BR3	741	4' Circular		966.2	963.4	992.8	Assumed from aerial imagery	3' (Material Not Listed)	Not Listed	962.9		Record Plans
Plymouth	Trojan Trail/ Wayzata High	A	Elm Creek	ElmCreek_BR3	226	6' Circular		960.5	955.4	975.2	Assumed from aerial imagery	5' RCP	962.15	957.05		Record Plans
Corcoran	Private Road	A	Elm Creek	ElmCreek_BR4	11620	2' Circular		980.4	979.9	987.1	Assumed from aerial imagery	No Additional Information Available				
Corcoran/ Medina	Hackamore Road	A	Elm Creek	ElmCreek_BR4	10363	3' Circular		971.7	970.6	977.6	Assumed from aerial imagery	2' Circular RCP	970.96	970.11	977.48	City of Corcoran Survey 2021
Corcoran/ Medina	Hackamore Road	A	Elm Creek	ElmCreek_BR4	9555	3' Circular		964.6	964.0	974.1	Assumed from aerial imagery	2' Circular RCP	964.05	963.37	973.76	City of Corcoran Survey 2021
Maple Grove/ Corcoran	Brockton Ln	A	Elm Creek	ElmCreek_BR4	9394	3' Circular		964.0	961.4	974.4	Assumed from aerial imagery	OCS draining to Pond to the SE	956.00	Not Listed		Record Plans
Maple Grove/ Plymouth	Hackamore Road	A	Elm Creek	ElmCreek_BR4	8966	3' Circular		959.6	958.3	965.7	Assumed from aerial imagery	3' RCP	Not Listd	Not Listed		Record Plans
Plymouth	Troy Ln	A	Elm Creek	ElmCreek_BR4	4858	Double 3' x 6' Box		940.7	938.3	944.4	Assumed from aerial imagery	Double 3' x 6' Box Culvert	940.37	939.79		Record Drawing
Plymouth	58th Circle	A	Elm Creek	ElmCreek_BR4	3392	Double 5' Circular		934.9	934.1	942.5	Assumed from aerial imagery	Twin 54x88" Arch Pipes	934.45	933.61		City of Plymouth GIS

Table 3

			Preliminary HUC-8 HEC-RAS Model										Data Review				
Municipality	Name	FEMA ZONE	River	Reach	HEC-RAS XS	HEC-RAS XS Structure Size and Shape	Bridge Opening Area (sq ft)	U/S Invert (feet)	D/S Invert (feet)	Road Overflow (feet)	Structure Data Source	Structure Size and Shape	U/S Invert (feet)	D/S Invert (feet)	Road Overflow (feet)	Structure Data Source
Plymouth	Peony Ln	AE	Elm Creek	ElmCreek_BR4	1891	6' x 6' Box		926.0	927.3	938.1	Assumed from aerial imagery	6' x 5' Box Culvert	926.96	925.69		Record Drawing
Maple Grove/ Corcoran	Co. Rd. 101	A	Elm Creek	ElmCreek_BR5	11191	4' Circular		958.9	957.9	968.1	Assumed from aerial imagery	4.5' Circular CSP	957.84	957.84		Construction Drawings
Maple Grove	Private Road	A	Elm Creek	ElmCreek_BR5	10648	7' Circular		957.2	957.2	972.0	Assumed from aerial imagery	5' Circular RCP	957.7	957.4		Record Drawing
Maple Grove	Vagabond Court	A	Elm Creek	ElmCreek_BR5	9049	6' Circular		955.5	955.5	967.4	Assumed from aerial imagery	5' Diameter RCP . The routing of this is under the Vagabond Court not through the pond	954.93	954.67		Construction Drawings
Maple Grove	Co. Rd. 10	A	Elm Creek	ElmCreek_BR5	8529	5' Circular		960.0	956.0	966.3	Assumed from aerial imagery	Does not exist, the creek is not routed in this direction.	N/A	N/A		Maple Grove GIS
Maple Grove	Private Road	A	Elm Creek	ElmCreek_BR5	8223	5' Circular		953.4	951.6	966.8	Assumed from aerial imagery	6' Circular RCP	951.83	950.48		Construction Drawings
Maple Grove	Trail Crossing	A	Elm Creek	ElmCreek_BR5	6707	5' Circular		941.5	941.1	947.2	Assumed from aerial imagery	1.25' RCP beneath recreational trail	Not Listd	Not Listed		Maple Grove GIS
Maple Grove	74th Ave N	A	Elm Creek	ElmCreek_BR5	5192	6' Circular		929.6	927.4	942.0	Assumed from aerial imagery	10x6' Precast Concrete Box	929.41	927.93		Construction Drawings
Maple Grove	Lawndale Ln	A	Elm Creek	ElmCreek_BR5	3072	6' Circular		919.6	918.1	927.4	Assumed from aerial imagery	10x6' Precast Concrete Box	Approx 917.5	Approx 917.5		As-Built
Maple Grove	Inland Ln	A	Elm Creek	ElmCreek_BR5	2092	6' Circular		911.6	911.4	920.9	Assumed from aerial imagery	10' x 6' Box Culvert	909.64	909.01	Approx. 921.5'	As-Built
Maple Grove	Private Road	A	Elm Creek	ElmCreek_BR5	1422	10' x 4' Box		908.9	908.8	913.1	Assumed from aerial imagery	No Additional Information Available				
Corcoran	Co. Rd. 116	A	NFRushCreek	NFRushCreek_BR1	5112	5' Circular		914.7	914.7	920.8	Assumed from aerial imagery	3' Circular CMP	913.04	912.96	921.15	City of Corcoran Survey 2021
Rogers	Trail Haven Lane	AE	NFRushCreek	NFRushCreek_BR2	17732	3' Circular		935.5	935.4	940.9	Assumed from aerial imagery	No Additional Information Available				
Rogers	Tucker Road	AE	NFRushCreek	NFRushCreek_BR2	16178	4' Circular		934.4	934.3	940.0	Assumed from aerial imagery	No Additional Information Available				
Rogers	Tilton Trail	AE	NFRushCreek	NFRushCreek_BR2	9928	Double 6' Circular		925.0	925.0	933.3	Assumed from aerial imagery	No Additional Information Available				
Rogers	Private Road	AE	NFRushCreek	NFRushCreek_BR2	4022	4' Circular		922.1	922.1	928.6	Assumed from aerial imagery	No Additional Information Available				
Rogers	Private Road	AE	NFRushCreek	NFRushCreek_BR2	3658	4' Circular		921.9	921.8	926.4	Assumed from aerial imagery	No Additional Information Available				
Rogers	Valley Drive	AE	NFRushCreek	NFRushCreek_BR2	3558	5' Circular		921.5	920.8	932.8	Assumed from aerial imagery	No Additional Information Available				
Rogers	Private Road	AE	NFRushCreek	NFRushCreek_BR2	3017	3' Circular		920.2	919.7	923.5	Assumed from aerial imagery	No Additional Information Available				
Corcoran	Co. Rd. 50	AE	NFRushCreek	NorthFrkRushCrk	73093	2.5' Circular		1001.9	1001.2	1009.0	Assumed from aerial imagery	2.5' Circular CMP	1000.53	1000.18	1009.29	City of Corcoran Survey 2021
Corcoran	Strehler Road	AE	NFRushCreek	NorthFrkRushCrk	67362	2.5' Circular		996.3	996.1	1003.1	DNR 2020 Survey - ELM_473	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Corcoran	Co. Rd. 19	AE	NFRushCreek	NorthFrkRushCrk	64849	5' x 5' Box		992.2	992.2	1007.7	Effective Model Corcoran-2 Bridge #9 and aerial imagery	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Corcoran	Private Road	AE	NFRushCreek	NorthFrkRushCrk	60629	5' Circular		986.1	986.1	991.0	DNR 2020 Survey - ELM_55	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Corcoran	Co Rd. 10	AE	NFRushCreek	NorthFrkRushCrk	60324	10' x 5' Box		985.5	985.5	994.3	Effective Corcoran-2. Bridge #7	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Corcoran	Private Road	AE	NFRushCreek	NorthFrkRushCrk	59917	5' Circular		984.0	984.0	991.3	DNR Survey 2020 - ELM_92	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Corcoran	Co. Rd. 30	AE	NFRushCreek	NorthFrkRushCrk	55164	7' x 7' Box		968.6	968.3	979.6	DNR 2020 Survey - ELM_476	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Corcoran	Rush Creek Blvd	AE	NFRushCreek	NorthFrkRushCrk	53017	4' Circular		962.7	962.5	970.7	DNR 2020 Survey - ELM_477	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Corcoran	Sundance Road	AE	NFRushCreek	NorthFrkRushCrk	49447	4' Circular		955.4	955.4	962.0	DNR 2020 Survey - ELM_93	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Corcoran	Oakdale Drive	AE	NFRushCreek	NorthFrkRushCrk	41884	5' Circular		938.8	938.3	946.0	DNR 2020 Survey - ELM_468	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Corcoran	Bechtold Rd.	AE	NFRushCreek	NorthFrkRushCrk	38901	6' x 8' Box		932.0	931.9	940.5	DNR 2020 Survey - ELM_469	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Corcoran/ Rogers	Co. Rd 117	AE	NFRushCreek	NorthFrkRushCrk	35228	6' x 8' Box		921.9	921.5	934.4	DNR 2020 Survey - ELM_570	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Corcoran	Co. Rd 117	AE	NFRushCreek	NorthFrkRushCrk	31427	6.5' x 8' Ellipse		918.8	918.7	930.0	DNR 2020 Survey - ELM_571	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Corcoran	Trail Haven Road	AE	NFRushCreek	NorthFrkRushCrk	27701	84" x 132" Arch		918.4	917.9	927.6	DNR 2020 Survey - ELM_474	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Corcoran	Cain Road	AE	NFRushCreek	NorthFrkRushCrk	19638	7' x 10.5' Box		905.6	905.1	914.9	DNR 2020 Survey - ELM_475	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Corcoran	Private Road	AE	NFRushCreek	NorthFrkRushCrk	18133	Double 4' Circular		907.4	907.4	912.7	DNR 2020 Survey - ELM_94	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Corcoran/ Rogers	109th Ave N	AE	NFRushCreek	NorthFrkRushCrk	14546	8' Circular		902.6	902.5	913.0	DNR 2020 Survey - ELM_471	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Rogers	Fletcher Lane	A	NFRushCreek	NorthFrkRushCrk	10707	15' x 6' Box		905.1	905.1	915.0	Assumed from aerial imagery	8x14' Precast Concrete Box				MNDOT- BridgeInfo3. App ID 27J52
Dayton/ Rogers	Brockton Lane	A	NFRushCreek	NorthFrkRushCrk	5258	Bridge	189	903.8	903.9	910.7	Assumed from aerial imagery	41.7' Span Bridge (207sq ft conveance)				MNDOT- BridgeInfo3. App ID 27B87

Table 3

			Preliminary HUC-8 HEC-RAS Model									Data Review				
Municipality	Name	FEMA ZONE	River	Reach	HEC-RAS XS	HEC-RAS XS Structure Size and Shape	Bridge Opening Area (sq ft)	U/S Invert (feet)	D/S Invert (feet)	Road Overflow (feet)	Structure Data Source	Structure Size and Shape	U/S Invert (feet)	D/S Invert (feet)	Road Overflow (feet)	Structure Data Source
Corcoran	Rolling Hills Rd	AE	RushCreek	RushCreek	101719	4.5' x 7' Box		962.0	961.7	967.8	DNR 2020 Survey - ELM_401	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Corcoran	Kalk Road	AE	RushCreek	RushCreek	94540	4.5' Circular		958.1	957.7	966.0	DNR 2020 Survey - ELM_402	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Corcoran	Co. Rd. 50	AE	RushCreek	RushCreek	91926	6' x 10' Box		954.6	954.9	966.1	DNR 2020 Survey - ELM_403	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Corcoran	Co. Rd. 10	AE	RushCreek	RushCreek	84354	102' x 88' Arch	66	939.0	939.0	949.7	DNR 2020 Survey - ELM_405	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Corcoran	Co. Rd. 116	AE	RushCreek	RushCreek	77126	88" Circular		930.9	930.7	938.2	DNR 2020 Survey - ELM_406	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Corcoran	Schutte Road	AE	RushCreek	RushCreek	66735	Bridge	83	926.5	926.0	933.3	DNR 2020 Survey - Elm_409	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Corcoran	Shannon Lane	AE	RushCreek	RushCreek	64465	7' x 10' Box		926.2	925.8	938.1	DNR 2020 Survey - ELM_407	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Maple Grove/ Corcoran	Brockton Lane	AE	RushCreek	RushCreek	63595	7.17' x 14' Box		926.2	925.9	935.6	DNR 2020 Survey - ELM_410	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Maple Grove	Co. Rd. 30	AE	RushCreek	RushCreek	54230	Double 8' x 8' Box		918.9	919.0	933.4	DNR 2020 Survey - ELM_408	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Maple Grove	101st Ave N	AE	RushCreek	RushCreek	46409	Double 7' x 7.5' Box		910.8	910.6	924.1	DNR 2020 Survey - ELM_404	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Maple Grove	I-94	AE	RushCreek	RushCreek	36608	Double 10' x 10' Box		900.2	899.7	920.9	Rush River CLOMR Model Bridge #8	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Maple Grove	105th Ave N	AE	RushCreek	RushCreek	36346	Bridge	787	899.2	899.0	919.0	Assumed from aerial imagery	379.3' Span Bridge over I-94 and Rush Creek				MNDOT- BridgeInfo3. App ID 27251
Maple Grove	Private Road	AE	RushCreek	RushCreek	36188	Bridge	276	897.5	897.5	910.9	Rush River CLOMR Model Bridge #7	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Maple Grove	105th Ave N	AE	RushCreek	RushCreek	34065	Double 8' x 10' Box		898.7	898.0	906.8	DNR 2020 Survey - ELM_483	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Maple Grove	Dunkirk Ln	AE	RushCreek	RushCreek	31456	Double 8' x 10' Box		899.5	899.3	912.0	DNR 2020 Survey - ELM_48	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Maple Grove	BNSF RR	AE	RushCreek	RushCreek	29989	Bridge	1918	898.3	897.0	924.5	DNR 2020 Survey - ELM_96	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Maple Grove	Co. Rd. 81	AE	RushCreek	RushCreek	29857	Triple 10' x 10' Box		898.4	898.4	920.5	DNR 2020 Survey - ELM_27	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Maple Grove	Territorial Road	AE	RushCreek	RushCreek	25437	Bridge	731	895.2	894.7	912.0	DNR 2020 Survey - ELM_480 Dayton-1 Bridge #2	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Maple Grove	Fernbrook Ln	AE	RushCreek	RushCreek	12903	Double 10' x 10' Box		876.2	876.1	890.2	DNR 2020 Survey - ELM_482 Dayton-1 Bridge #1	Preliminary HUC-8 Model Data Source Meets FEMA Data Capture Requirements (data check not completed)				
Maple Grove	Trail Crossing	AE	RushCreek	RushCreek	12657	Bridge	229	874.7	874.3	886.7	Assumed from aerial imagery	No Additional Information Available				
Corcoran	Horseshoe Trail	A	RushCreek	RushCreek_BR1	13676	3' Circular		974.3	973.1	975.1	Assumed from aerial imagery	Size Unspecified, CMP	972.63	972.62		City of Corcoran Survey 2021
Corcoran	Willow Drive	A	RushCreek	RushCreek_BR1	8595	3' Circular		966.4	966.7	973.2	Assumed from aerial imagery	2.5' Circular PVC	965.65	965.24		City of Corcoran Survey 2021
Corcoran	Horseshoe Trail	A	RushCreek	RushCreek_BR1	6626	2' Circular		965.5	965.4	966.9	Assumed from aerial imagery	1.25' Circular PVC	965.64	965.05		City of Corcoran Survey 2021
Corcoran	Private Road	A	RushCreek	RushCreek_BR1	4157	1.5' Circular		965.1	965.0	967.0	Assumed from aerial imagery	Two, 2.5' Circular RCP's	963.74, 963.46	963.37, 963.42	967.9	City of Corcoran Survey 2021
Corcoran	Homestead Trail	A	RushCreek	RushCreek_BR1	2142	4' x 3' Box		963.9	963.7	968.2	Assumed from aerial imagery	4.5' Circular CIP	963.63	963.56		City of Corcoran Survey 2021
Corcoran	Co. Rd. 50	A	RushCreek	RushCreek_BR2	4251	5' Circular		980.2	974.7	987.7	Assumed from aerial imagery	2' Circular CPP	986.89	986.46	993.79	City of Corcoran Survey 2021
Corcoran	Rolling HIlls Road	A	RushCreek	RushCreek_BR2	3066	4' Circular		964.2	964.2	966.4	Assumed from aerial imagery	2' Circular RCP	963.01	962.66	967.31	City of Corcoran Survey 2021
Corcoran	Private Road	A	RushCreek	RushCreek_BR2	1717	4' Circular		961.6	961.5	968.3	Assumed from aerial imagery	5' Circular CRP	961.35	961.05		City of Corcoran Survey 2021
Corcoran	Trail Haven Road	A	RushCreek	RushCreek_BR3	5809	6' Circular		969.3	970.5	979.9	Assumed from aerial imagery	24" Circular CMP	969.68	967.98	980.43	City of Corcoran Survey 2021
Corcoran	Settlers Road	A	RushCreek	RushCreek_BR4	9019	2' Circular		975.4	974.0	981.0	Assumed from aerial imagery	1.5' Circular PVC	974.21	973.83	981.59	City of Corcoran Survey 2021
Corcoran	Private Road	A	RushCreek	RushCreek_BR4	8256	2' Circular		973.1	972.9	978.7	Assumed from aerial imagery	3.5' Circular PVC	972.24	971.51	977.55	City of Corcoran Survey 2021
Corcoran	Larkin Road	A	RushCreek	RushCreek_BR4	6938	3' Circular		970.3	970.3	984.1	Assumed from aerial imagery	3.5' Circular RCP	969.83	968.56	984.49	City of Corcoran Survey 2021

Table 3

			Preliminary HUC-8 HEC-RAS Model									Data Review				
Municipality	Name	FEMA ZONE	River	Reach	HEC-RAS XS	HEC-RAS XS Structure Size and Shape	Bridge Opening Area (sq ft)	U/S Invert (feet)	D/S Invert (feet)	Road Overflow (feet)	Structure Data Source	Structure Size and Shape	U/S Invert (feet)	D/S Invert (feet)	Road Overflow (feet)	Structure Data Source
Corcoran	Private Road	A	RushCreek	RushCreek_BR4	4999	1.5' Circular		962.5	961.9	964.4	Assumed from aerial imagery	1.5' Circular PVC	961.86	961.34	964.68	City of Corcoran Survey 2021
Corcoran	Private Road	A	RushCreek	RushCreek_BR4	4523	2' Circular		962.1	962.0	964.7	Assumed from aerial imagery	2' Cicrular CMP	959.23	959.16	961.5	City of Corcoran Survey 2021
Corcoran	Co. Rd. 50	A	RushCreek	RushCreek_BR4	1774	5' Circular		946.0	946.0	952.7	Assumed from aerial imagery	4' Circular CMP	944.74	944.49	953.12	City of Corcoran Survey 2021
Medina	Pioneer Trail	A	RushCreek	RushCreek_BR5	32629	3' Circular		989.9	988.2	996.9	Assumed from aerial imagery	No Additional Information Available				
Medina	CP RR	A	RushCreek	RushCreek_BR5	28947	3' Circular		983.1	983.0	991.9	Assumed from aerial imagery	No Additional Information Available				
Medina	Hwy 55	A	RushCreek	RushCreek_BR5	28819	3' Circular		983.7	983.3	992.3	Assumed from aerial imagery	No Additional Information Available				
Medina	Mohawk Drive	A	RushCreek	RushCreek_BR5	27773	3' Circular		982.9	981.6	989.9	Assumed from aerial imagery	No Additional Information Available				
Corcoran	Horseshoe Trail	A	RushCreek	RushCreek_BR5	17557	5' Circular		973.2	973.0	979.7	Assumed from aerial imagery	No Additional Information Available				
Corcoran	Settlers Road	A	RushCreek	RushCreek_BR5	16293	5' Circular		973.7	974.1	981.4	Assumed from aerial imagery	3' Circular PVC	974.39	973.73		City of Corcoran Survey 2021
Corcoran	Private Road	A	RushCreek	RushCreek_BR5	13795	5' Circular		972.1	972.0	978.2	Assumed from aerial imagery	Two, 3' Circular PVC Pipes	974.33, 972.78	972.28, 972.72	978.31	City of Corcoran Survey 2021
Corcoran	Blue Bonnet Drive	A	RushCreek	RushCreek_BR5	12050	2' Circular		968.5	968.5	972.6	Assumed from aerial imagery	4' Circular CMP	968.55	967.52	973.45	City of Corcoran Survey 2021
Corcoran	Abilene Lane	A	RushCreek	RushCreek_BR5	9192	5' Circular		961.0	961.0	967.0	Assumed from aerial imagery	2.25' Circular PVC	961.74	961.55	967.48	City of Corcoran Survey 2021
Corcoran	Buckskin Trail	A	RushCreek	RushCreek_BR5	8494	5' Circular		959.8	959.7	966.1	Assumed from aerial imagery	3' Circular PVC	960.39, 960.45	960.07, 960.34	966.6	City of Corcoran Survey 2021
Corcoran	Larkin Road	A	RushCreek	RushCreek_BR5	8110	5' Circular		959.6	959.3	966.4	Assumed from aerial imagery	5' Circular CMP	959.25	958.72		City of Corcoran Survey 2021
Corcoran	Co. Rd. 50	A	RushCreek	RushCreek_BR5	5079	6' Circular		951.9	950.0	959.8	Assumed from aerial imagery	5' Circular CMP	951.58	950.26	960.11	City of Corcoran Survey 2021
Corcoran	Private Road	A	RushCreek	RushCreek_BR5	3967	3.5' Circular		948.2	947.9	953.6	Assumed from aerial imagery	5' Circular CPP	947.81	947.53	954.16	City of Corcoran Survey 2021
Corcoran	Co. Rd. 10	A	RushCreek	RushCreek_BR5	654	Bridge	101	938.4	938.6	947.8	Assumed from aerial imagery	10x6' Precast Concrete Box	938.98	938.79	947.98	City of Corcoran Survey 2021 & MNDOT- BridgeInfo3. App ID 90462
Dayton	Co. Rd. 81	A	RushCreek	RushCreek_BR6	2369	3.5' Circular		923.9	923.8	934.3	Assumed from aerial imagery	No Additional Information Available				
Dayton	BNSF RR	A	RushCreek	RushCreek_BR6	2214	3.5' Circular		923.8	921.9	931.7	Assumed from aerial imagery	No Additional Information Available				
Dayton	Holly Ln	A	RushCreek	RushCreek_BR6	1787	3' Circular		918.0	913.3	919.7	Assumed from aerial imagery	3' Culvert	917.75	911.65		Dayton Municiapl GIS
Dayton	Holly Ln	AE	RushCreek	RushCreek_BR6	768	3' Circular		909.6	907.5	914.4	Assumed from aerial imagery	3' Circular RCP	908.72	907.49		Dayton Municiapl GIS
Dayton	Territorial Road	A	RushCreek	RushCreek_BR7	355	6' Circular		898.1	898.0	911.2	Assumed from aerial imagery	2' Circular RCP	908.18	907.78		Dayton Municiapl GIS

EXHIBIT A

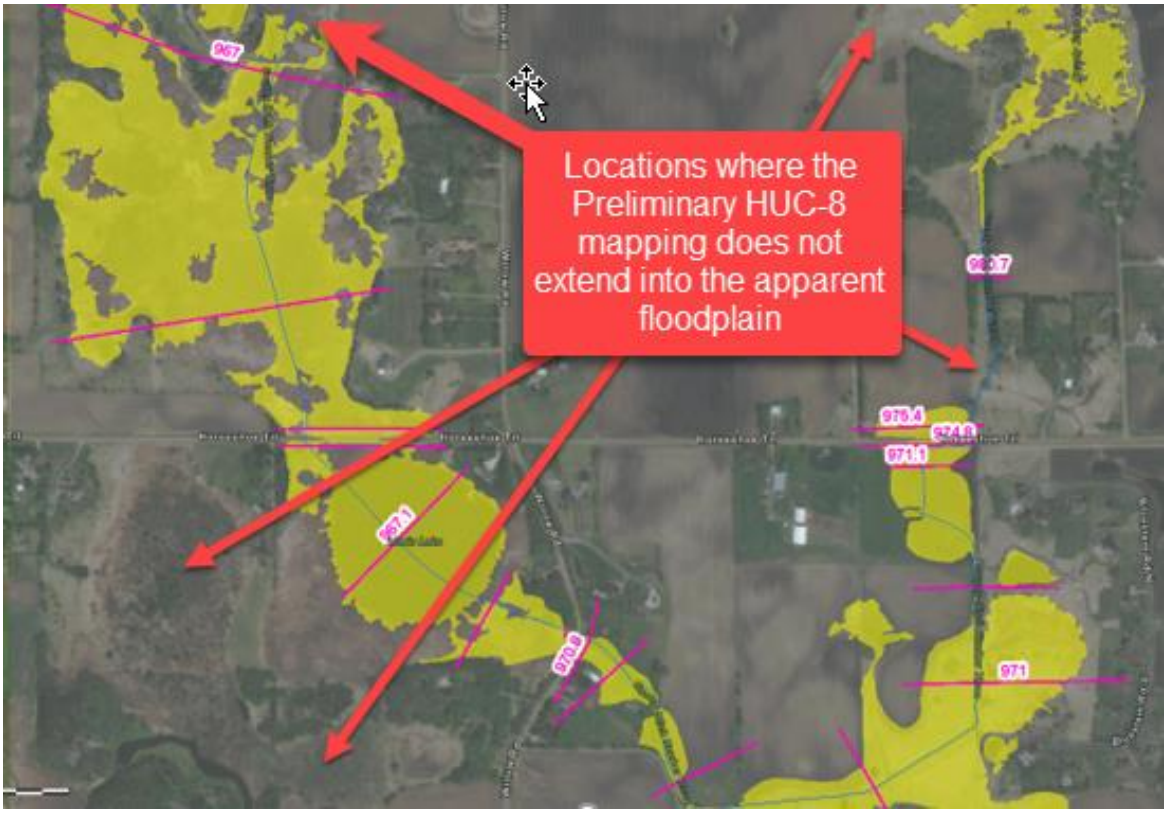


Figure 2 City of Corcoran just east of Jupert Lake and north of municipal boundary with city of Medina. Note how the Preliminary HUC-8 model floodplain does not extend into the apparent floodplain (wetlands) shown in the aerial imagery. (HEC-RAS Reach RushCreek_BR1)

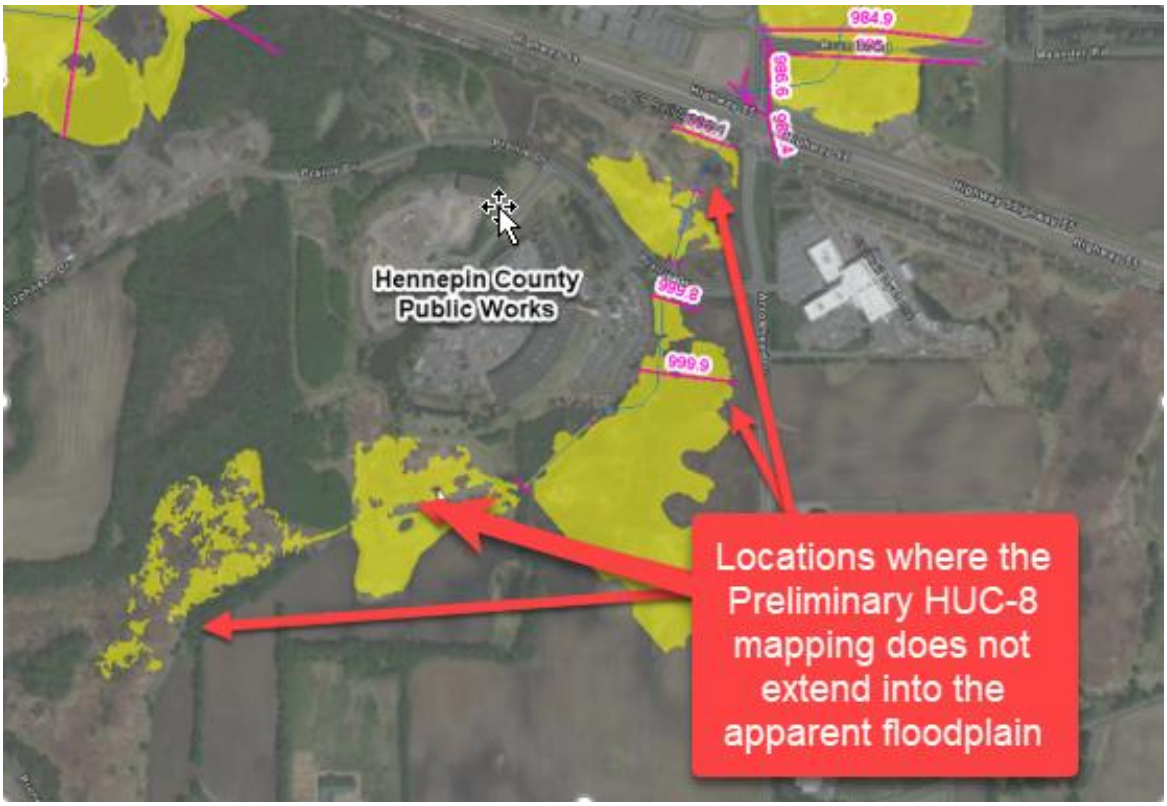


Figure 3 City of Medina near the Hennepin County Public Works facility. Note how the Preliminary HUC-8 model floodplain does not extend into the apparent floodplain (wetlands) shown in the aerial imagery. (HEC-RAS Reach ElmCreek)

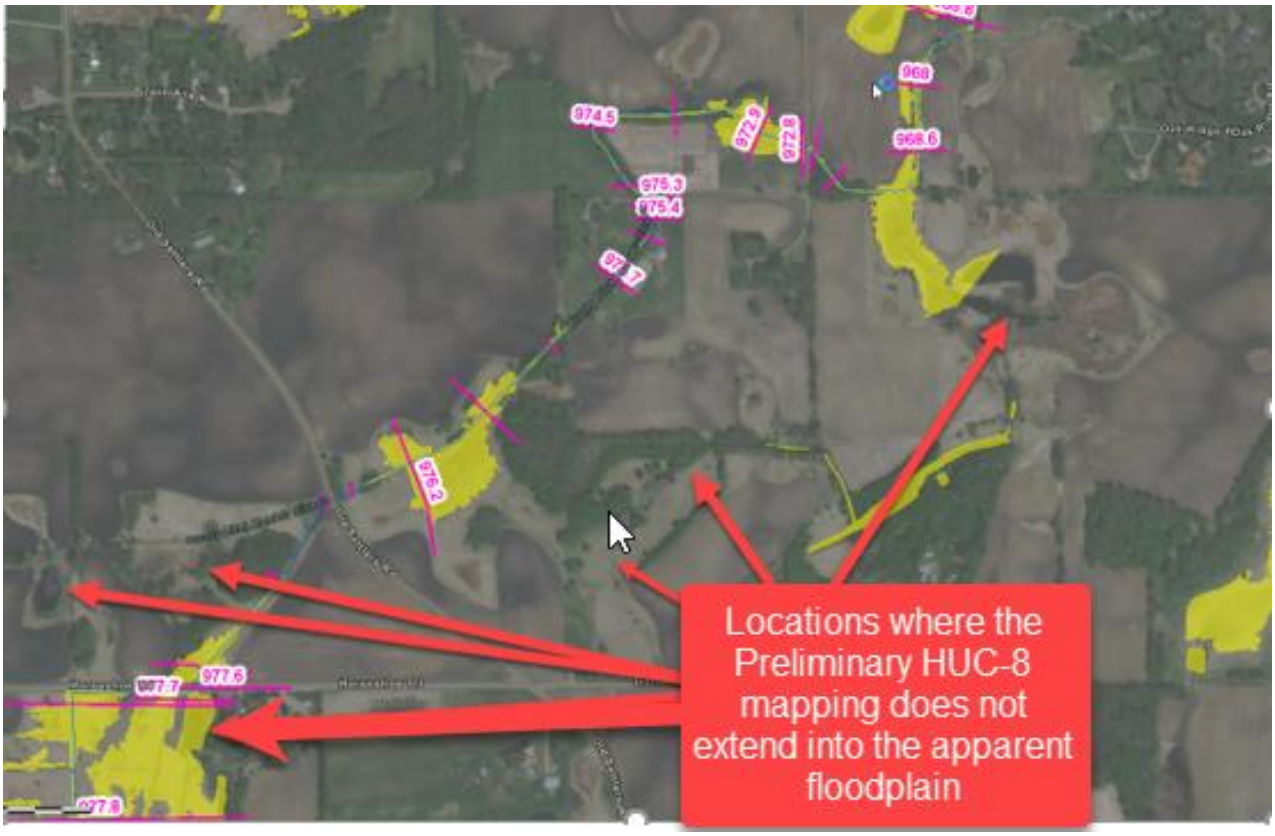


Figure 4 Rush Creek in Corcoran near Old Settlers Road (HEC-RAS Reach RushCreek_BR5)

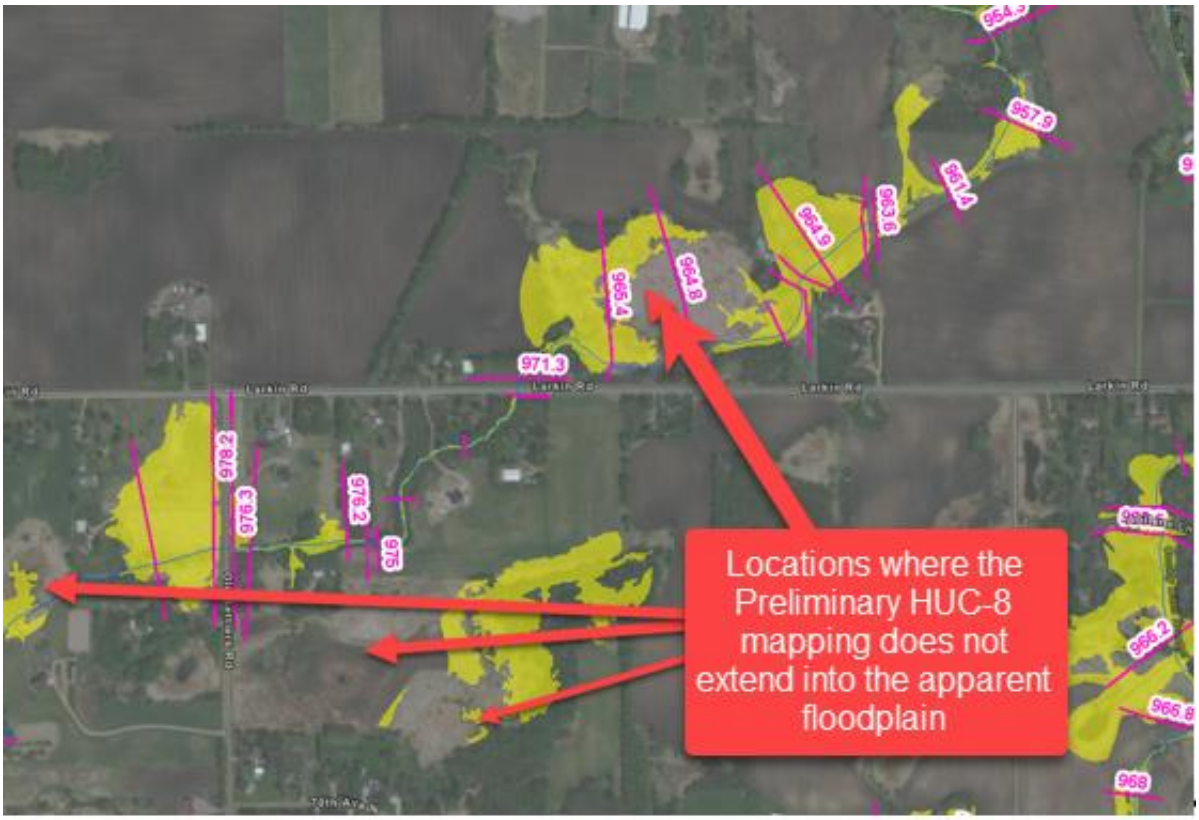


Figure 5 Elm Creek Tributary in Corcoran (HEC-RAS Reach ElmCreek_BR5)

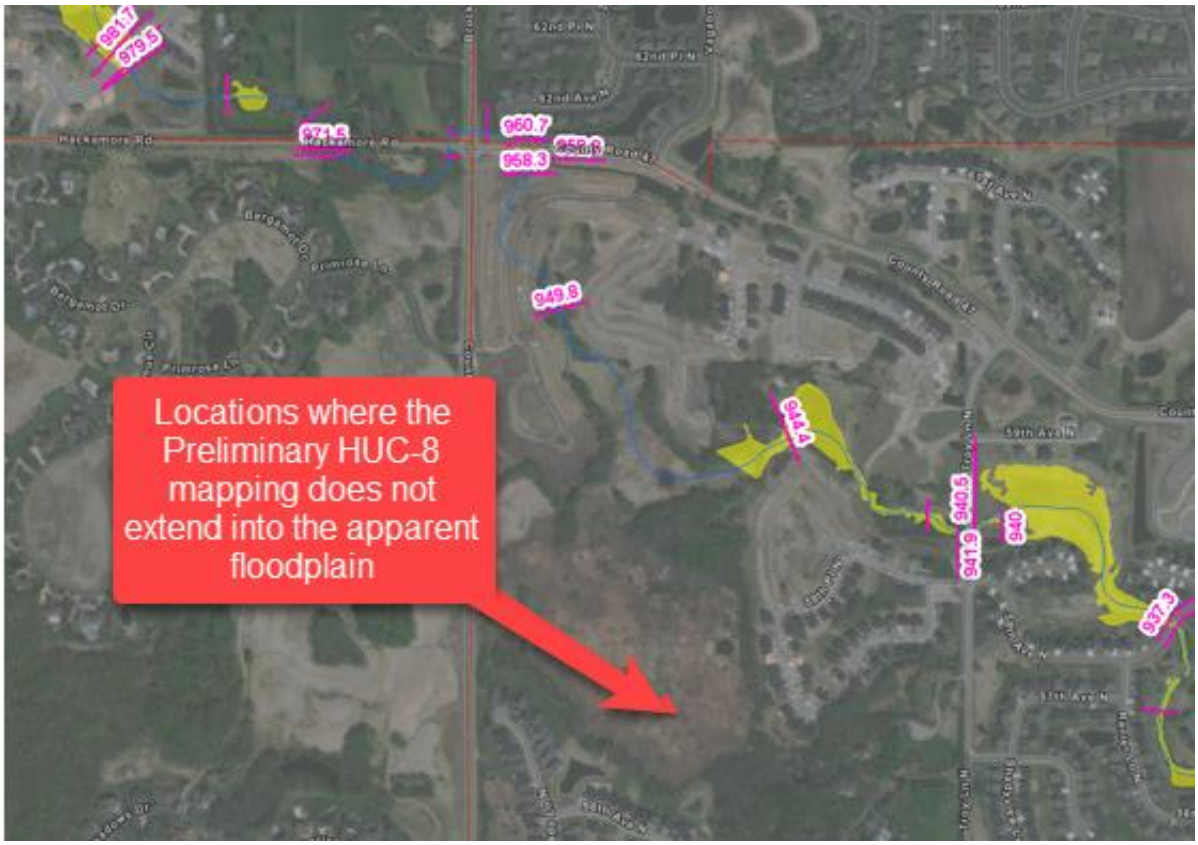


Figure 6 Tributary (HEC-RAS ElmCreek_BR4) tributary from near the Corcoran-Medina-Plymouth-Maple Grove Municipal Boundary. Also note that mapping is not provided between the 979.5 and 944.4-feet base flood elevation.

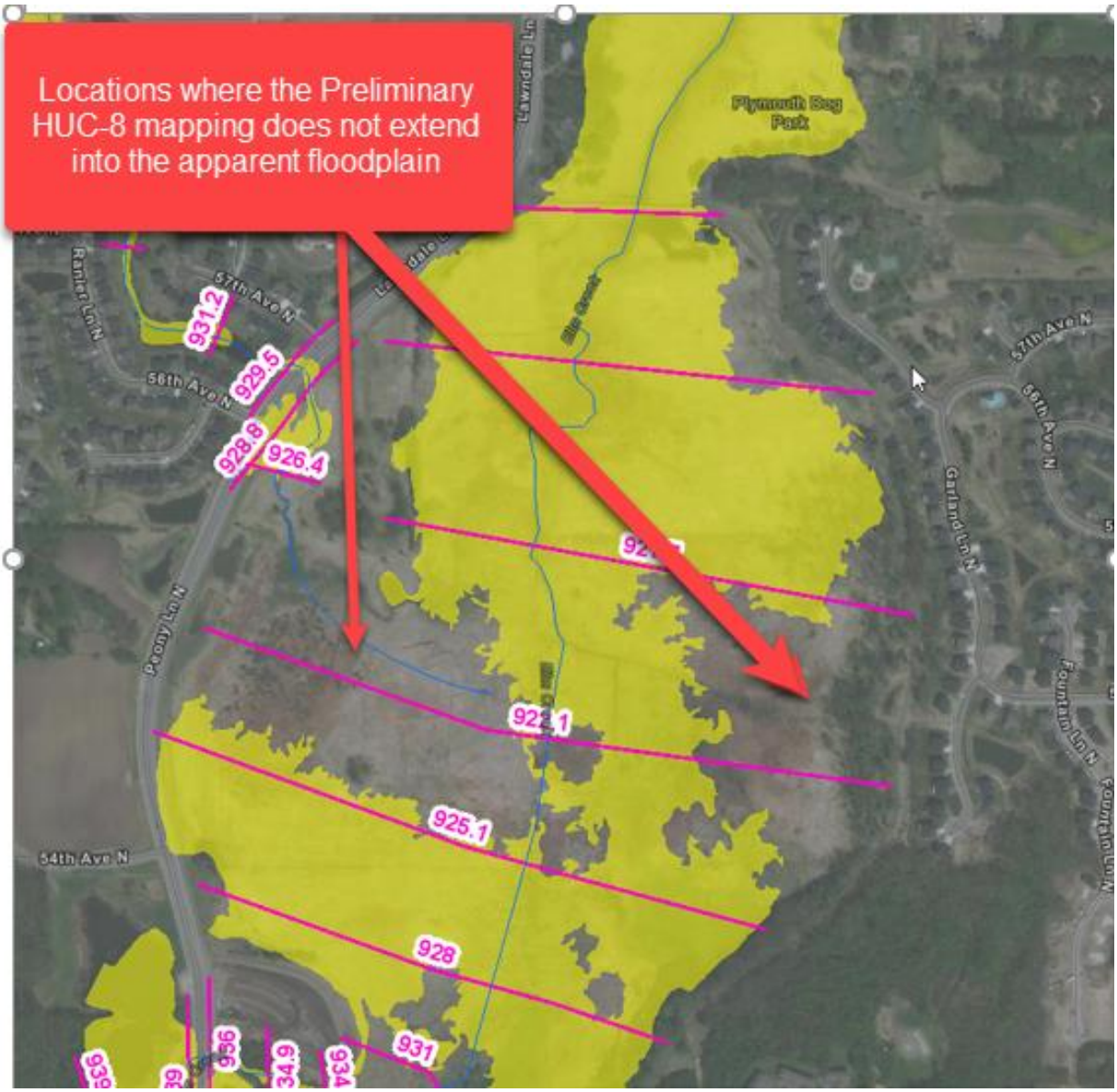


Figure 7 Elm Creek Greenway in Plymouth just east of Peony Lane. Also note that the tributary base flood elevations differ from the adjacent reach and that the cross sections do not extend across the apparent wetlands/floodplains (HEC-RAS Reaches ElmCreek and ElmCreek_BF4)

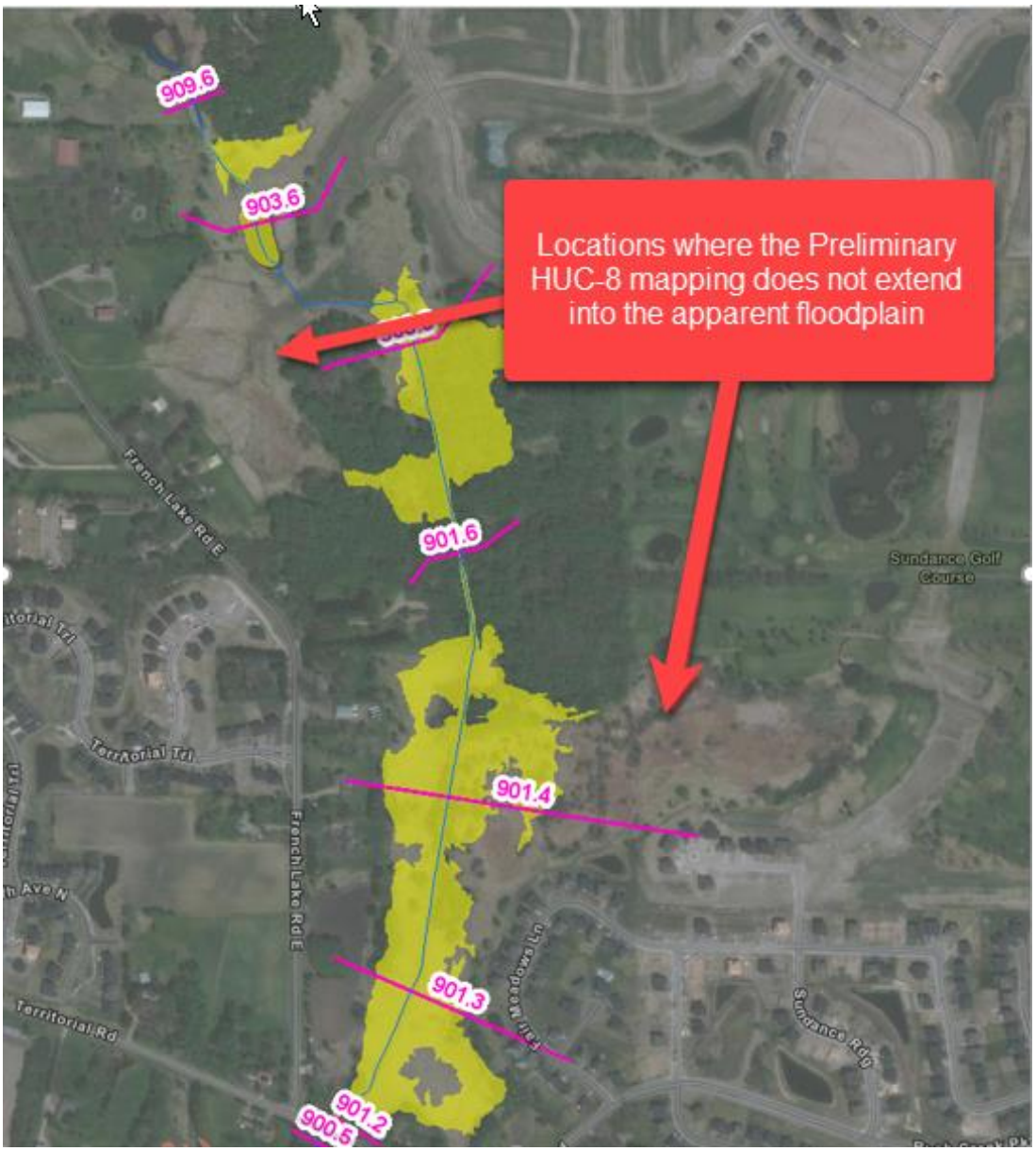


Figure 8 Rush Creek Tributary in Dayton near French Lake Road E (HEC-RAS Reach RushCreek_BR7). Also note the significant decrease in base flood elevation at the upstream end of the reach.

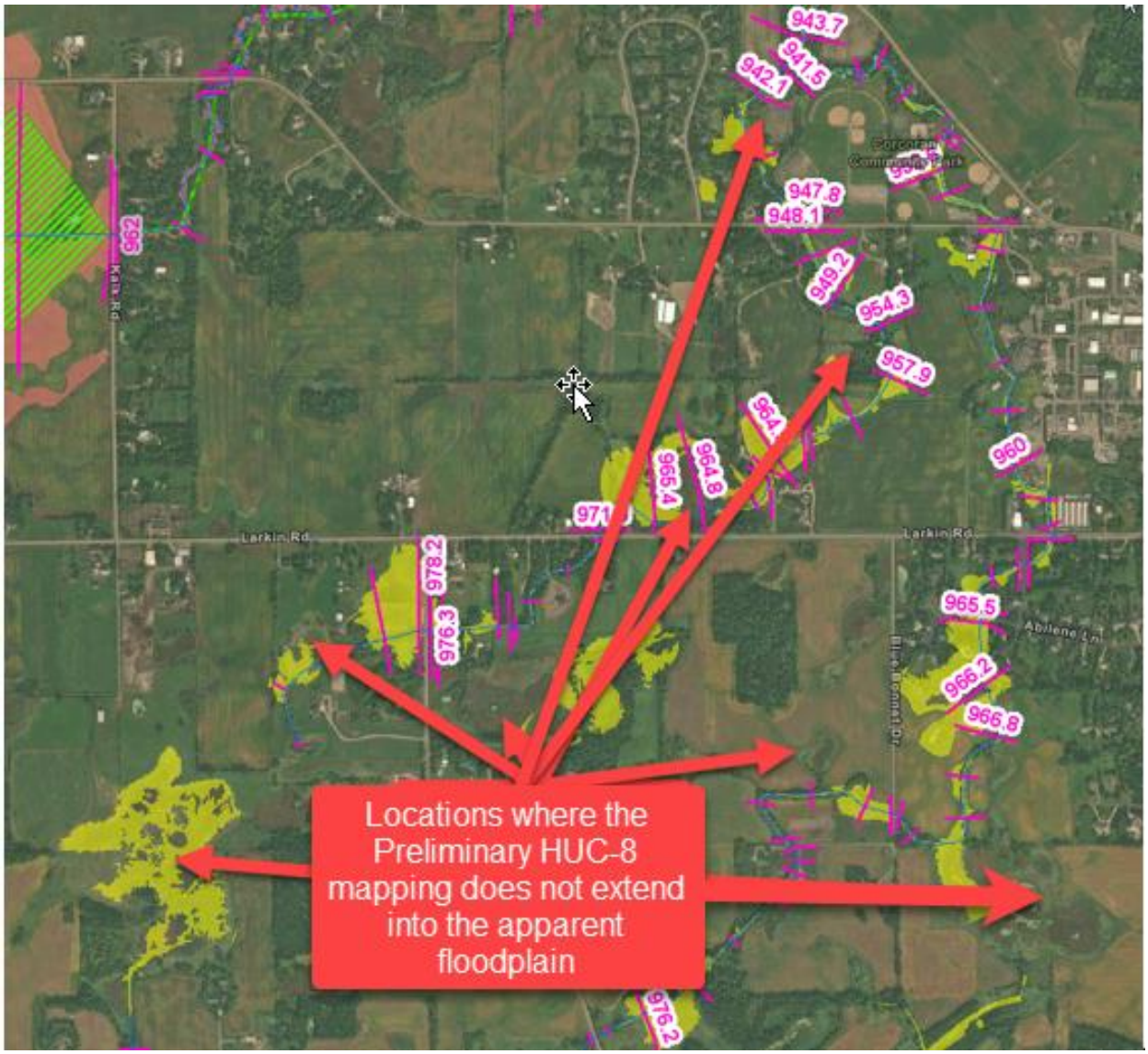


Figure 9 Rush Creek in Dayton near French Lake Road E (HEC-RAS Reach RushCreek, RushCreek_BR4, and RushCreek_BR5).

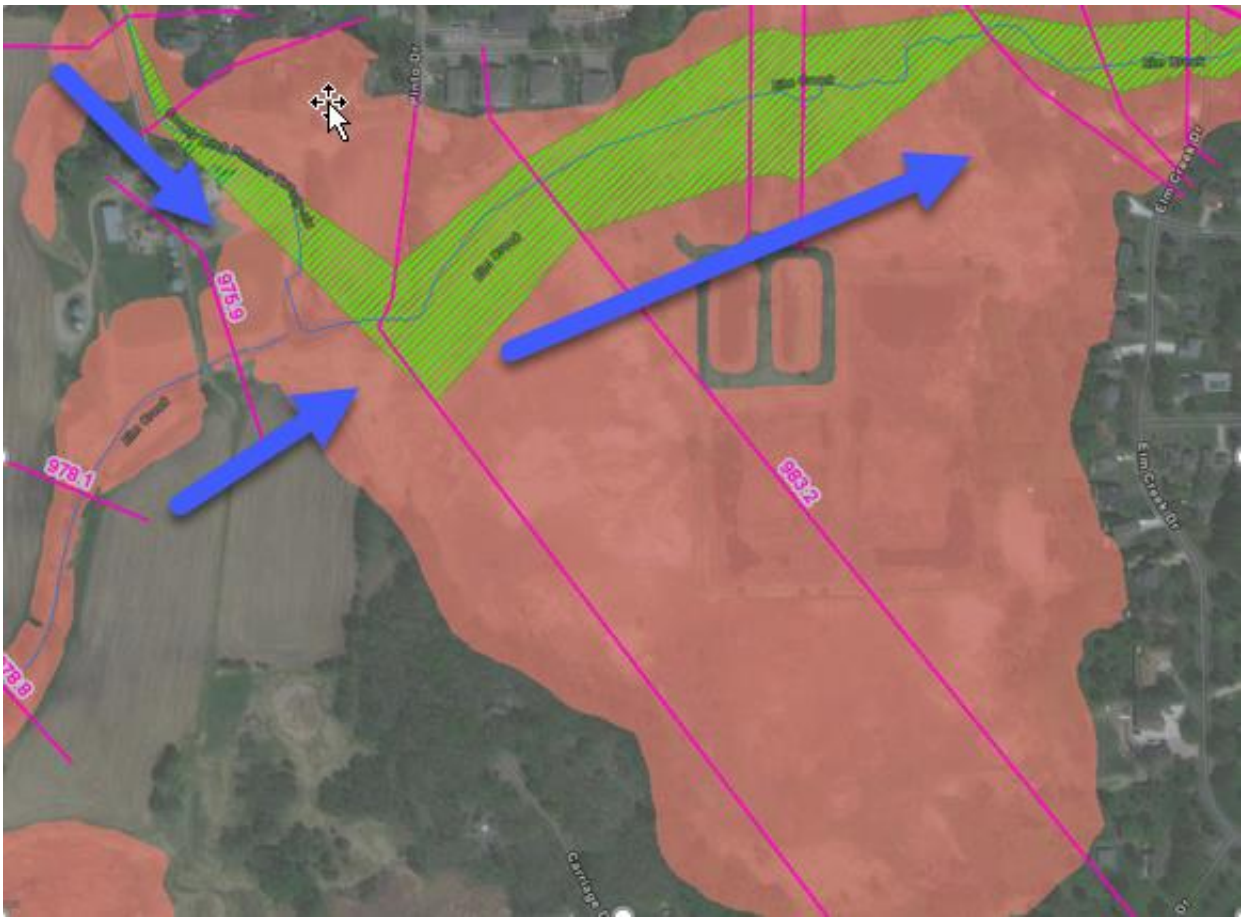


Figure 10 Just upstream of the crossing of Elm Creek's crossing with Hamel Road in Medina (HEC-RAS Reaches ElmCreek and ElmCreek_BR2), note the adversely increasing base flood elevation in the direction of flow (975.9' to 983.2') as well as the inconsistencies in the mapped floodway.

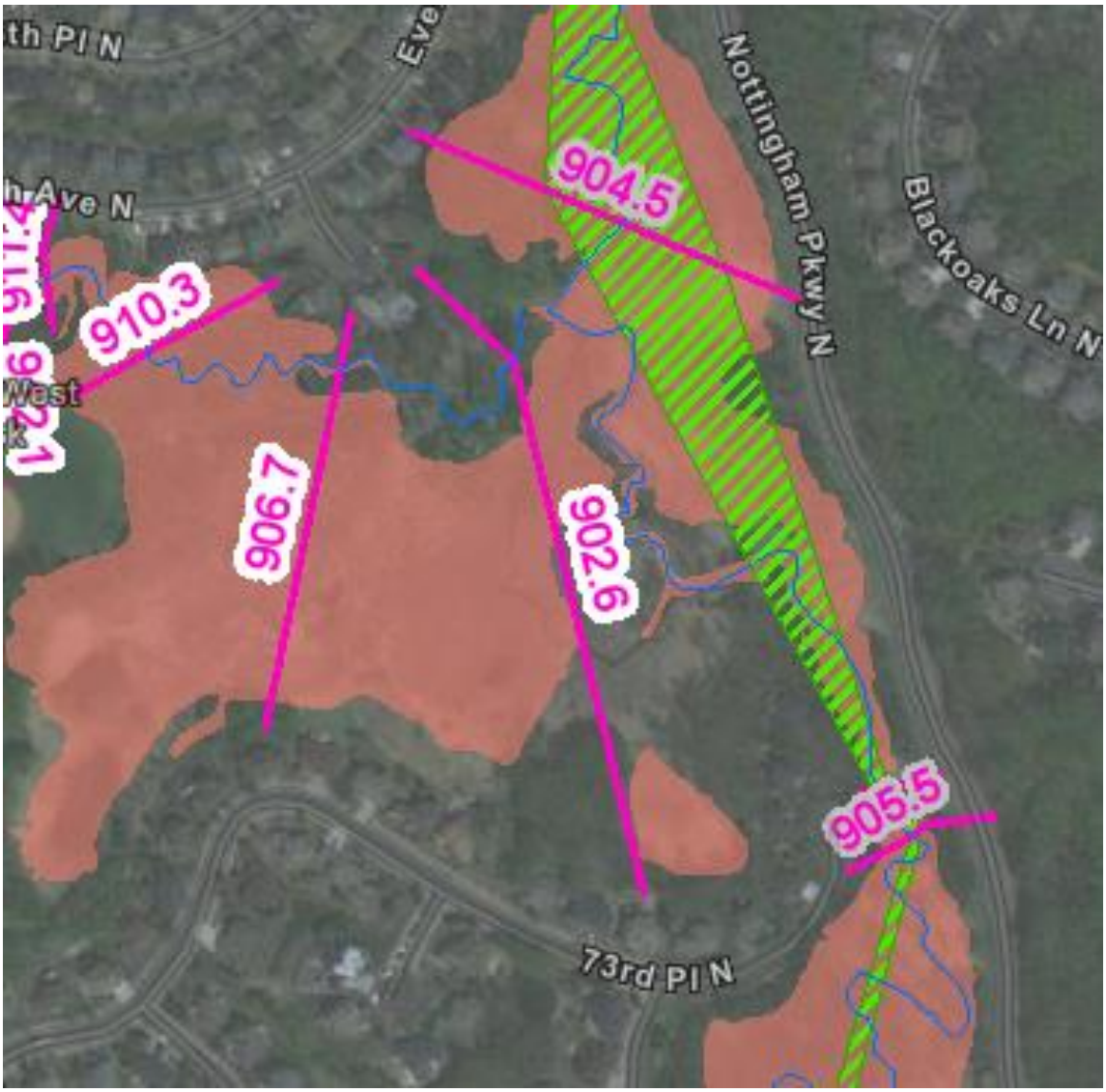


Figure 11 Note the difference in base flood elevations of the confluence of HEC-RAS Reaches ElmCreek and ElmCreek_BR5 between 73rd Place North and Nottingham Parkway N in Maple Grove as well as the inconsistencies in the mapped floodway.

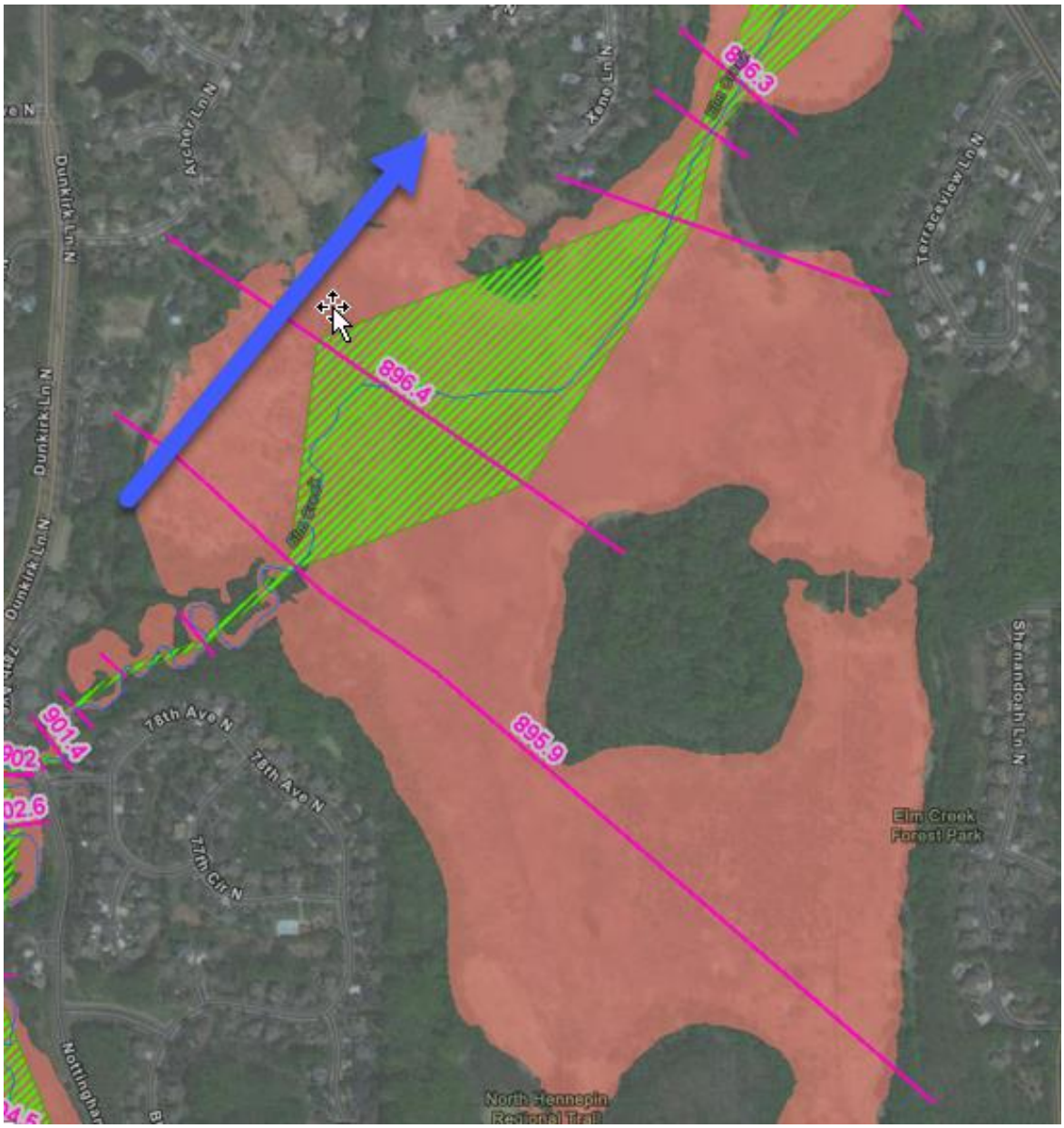


Figure 12 Elm Creek between Nottingham Parkway North and Weaver Lake Road. Note how the simulated floodplain elevation increases with the direction of flow.

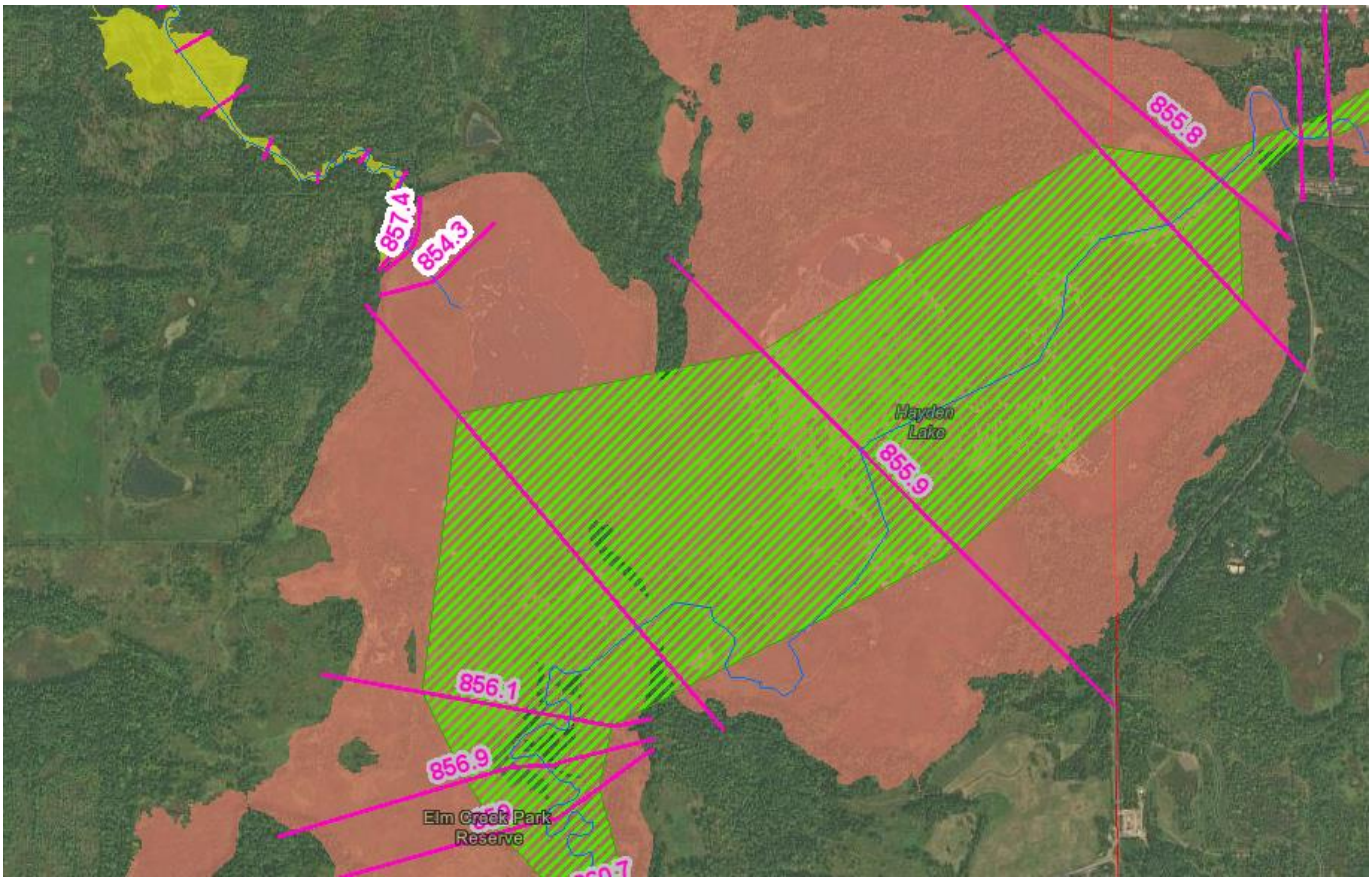


Figure 13 Note the difference in base flood elevations at the confluence of Rush Creek and Elm Creek.

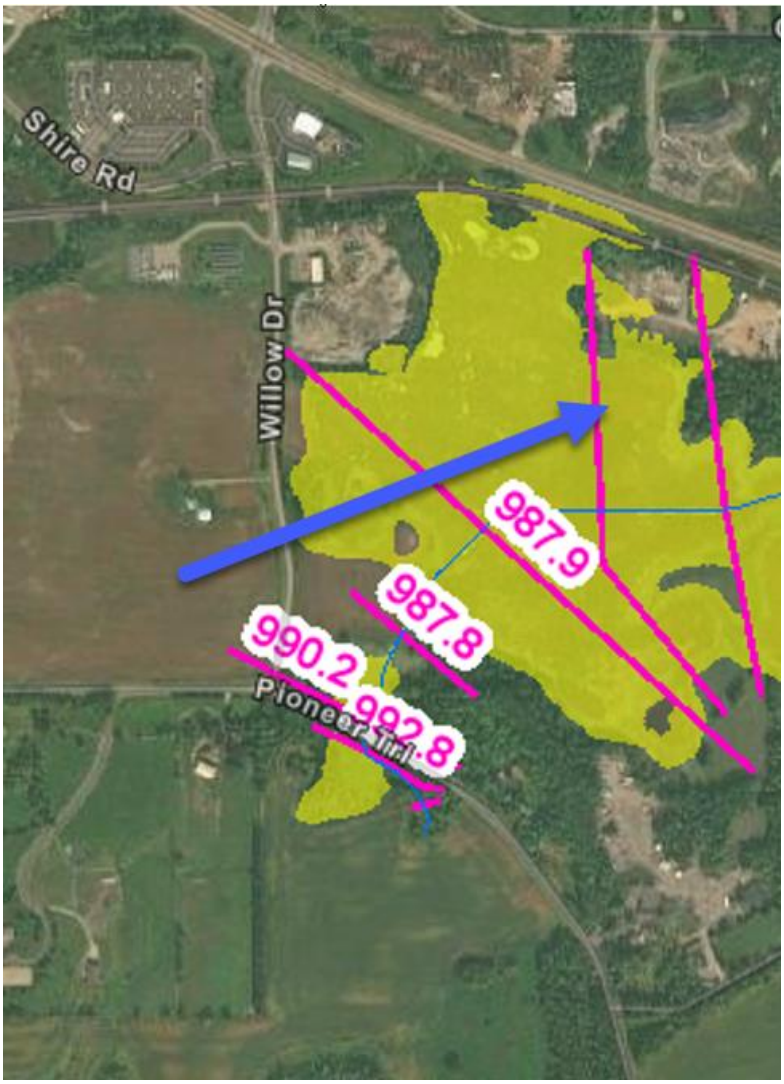


Figure 14 HEC-RAS Reach RushCreek_BR5 in Medina. Note how the simulated floodplain elevation increases with the direction of flow.

Figure 15 HEC-RAS RushCreek_BR5 just north of the Hennepin County Public Works building in. Note portions of the channel are unmapped and the apparent floodplain (upstream of base flood elevation 980.7) is unmapped.

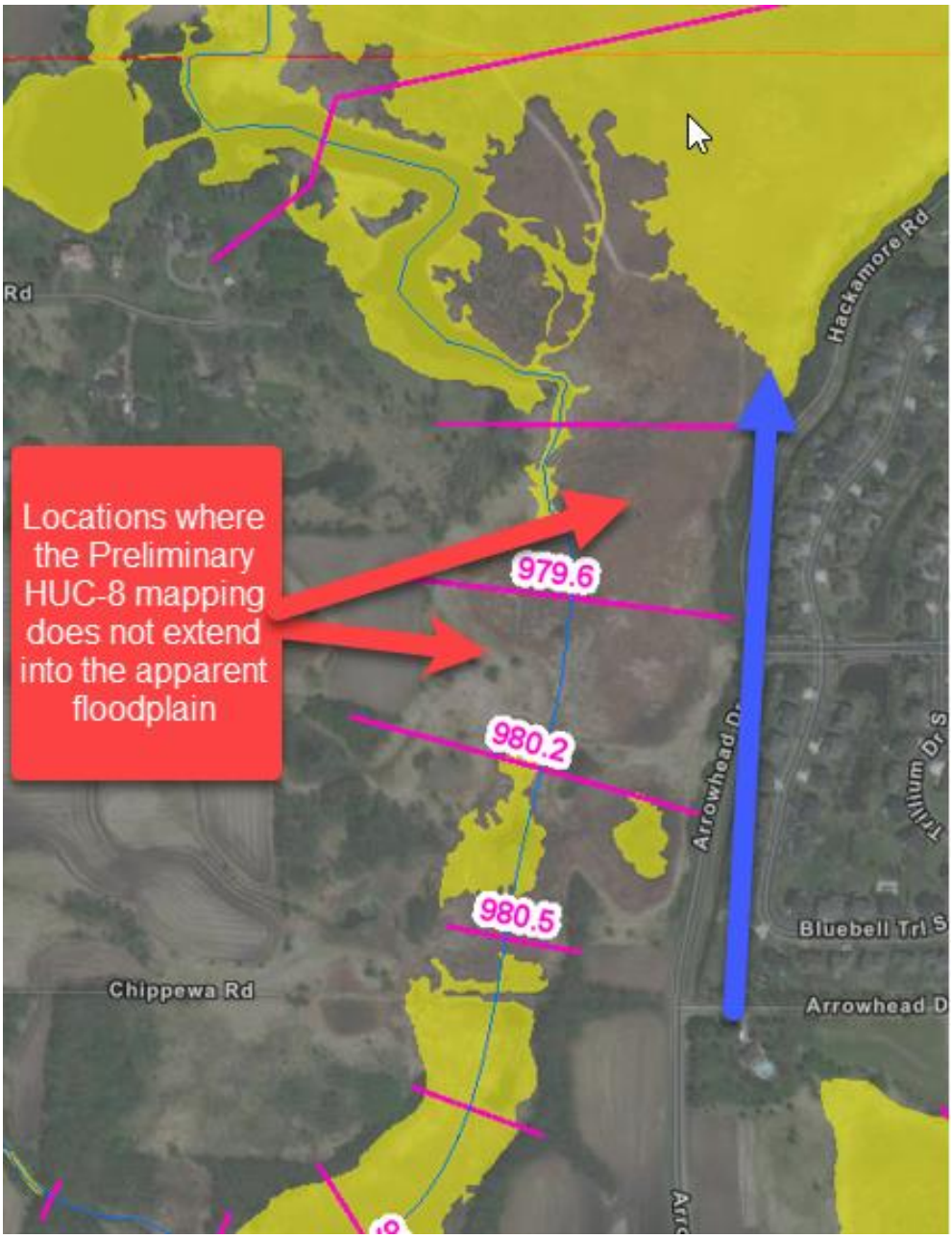


Figure 16 HEC-RAS Reach RushCreek_BR5 near the Medina-Corcoran municipal boundary.

Figure 17 HEC-RAS Reach RushCreek_BR5 in Corcoran near its crossing with Horseshoe Trail and Old Settlers Road. B

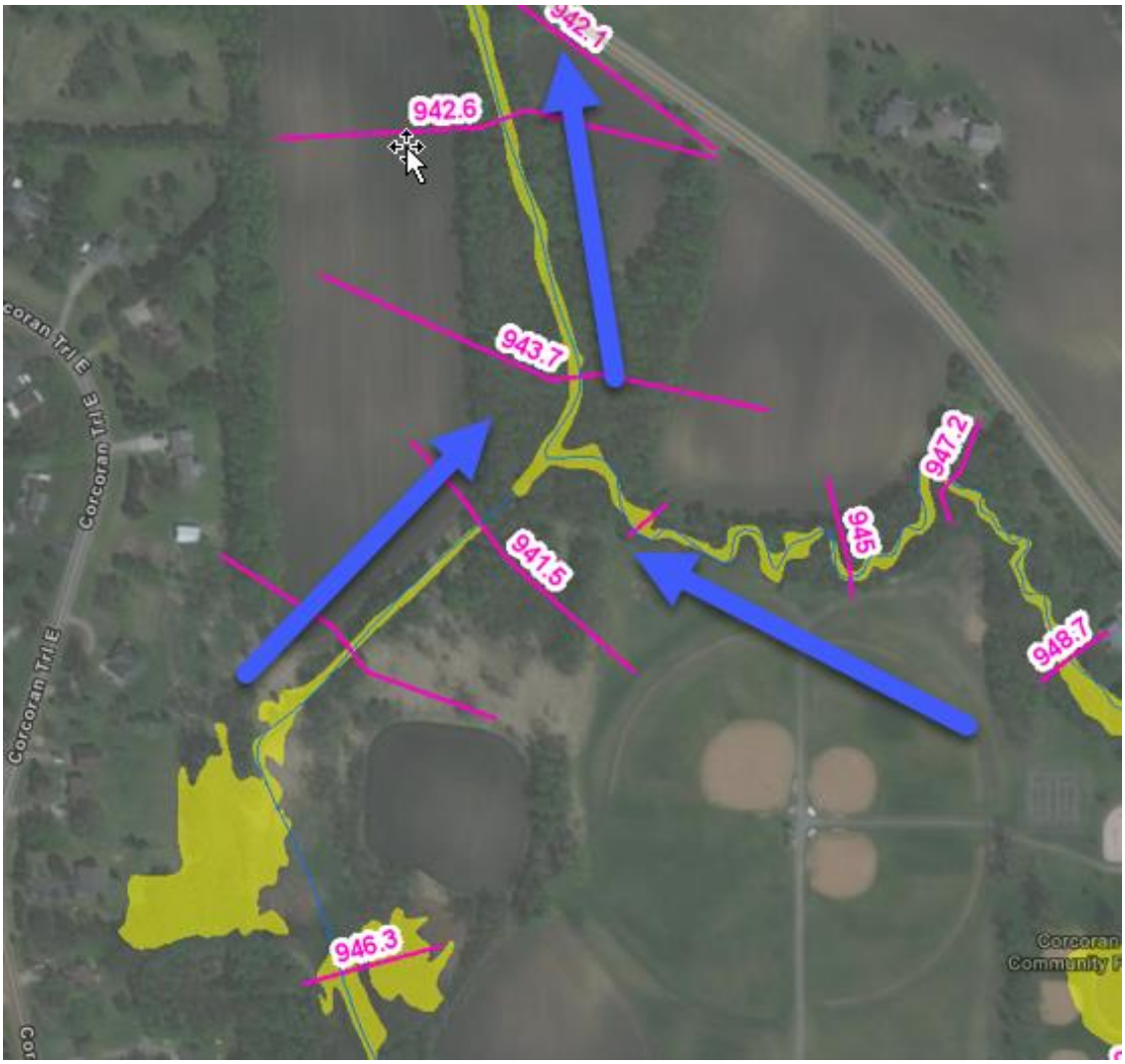


Figure 18 HEC-RAS Reach RushCreek_ BR5 in Corcoran near its confluence with HEC-RAS Reach RushCreek_ BR4. Note the difference in base flood elevations at the confluence of Rush Creek and Elm Creek.

Figure 19 Rush Creek (HEC-RAS Reach RushCreek) over Scott Lake and just downstream of Lake Jupert. Note how the base flood elevation increases in the direction of flow.

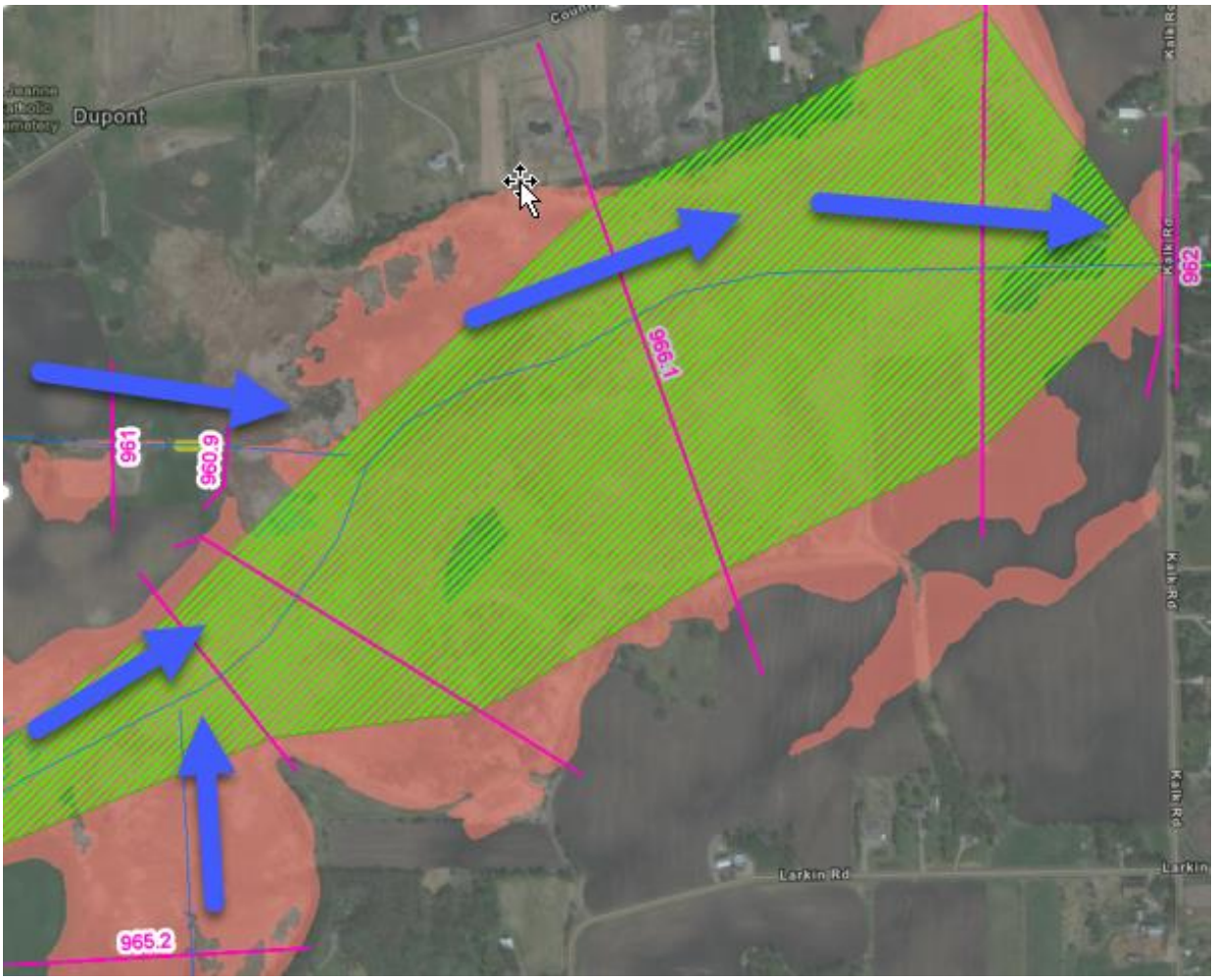
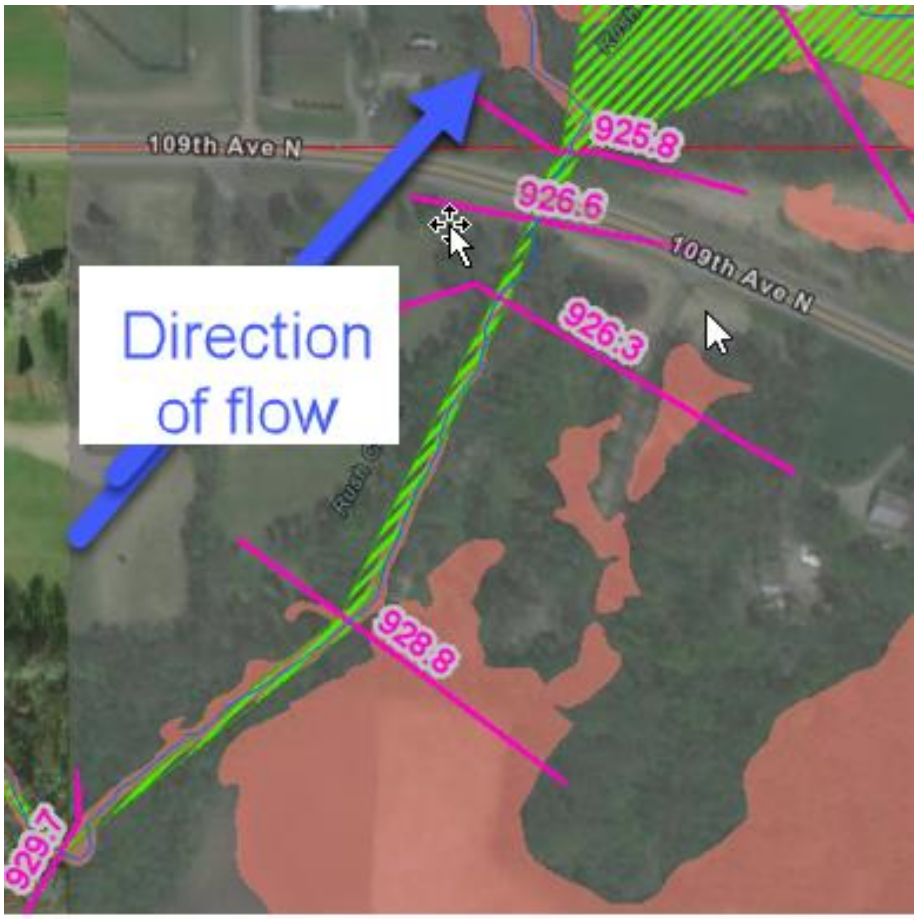


Figure 20 County Ditch #3 (HEC-RAS Reaches RushCreek, RushCreek_BR1, and RushCreek_BR2). Note how the base flood elevation increases in the direction of flow as well as the inconsistencies in the mapped floodway.



\

Figure 21 North Fork Rush Creek in Corcoran near 109th Avenue North (HEC-RAS Reach NorthFrkRushCrk). Note the adversely increasing base flood elevation in the downstream direction

Figure 22 Rush Creek near the Confluence with North Fork Rush Creek in Maple Grove, note the adversely increasing base flood elevation

DEPARTMENT OF NATURAL RESOURCES

Memorandum

Date: 02/14/2022

To: Elm Creek Watershed Management Commission

From: Jeff Weiss, MN DNR

RE: Third Party Review of Elm Creek Preliminary HUC-8 Model

ECWMC had a grant agreement with MNDNR to complete FEMA floodplain modeling and mapping to update the floodplain maps within the watershed. The overall project includes the entire Twin Cities HUC8 watershed. ECWMC provided all required deliverables for the FEMA floodplain modeling and mapping grant, and the grant was closed in June 2021.

On January 18, 2022, Stantec provide a memorandum summarizing comments from a third party review of the preliminary HUC-8 modeling for the Elm Creek Watershed. Comments in this review would, if acted upon, change the modeling and would most likely generate more accurate results than was previously provided. Similarly and as summarized below, MNDNR completed an additional review of the modeling, and if acted upon, would likely result in more accurate modeling of the watershed. Even though these new comments and considerations are being offered to the Commission, they do not change the previous approvals of the models delivered as part of the grant agreement.

This memorandum provides a summary of actions that have taken place since that memorandum and MNDNR's response.

Since receiving the memorandum, MN DNR has:

- Met with Ross Mullen (Stantec) and Derek Asche (ECWMC TAC; Maple Grove) on January 20 to discuss the memorandum
- Completed an additional review of the Elm Creek hydrologic and hydraulic models
- Met with Nathan Campeau (Barr) to discuss general comments from the third party review and most recent DNR review.
- Discussed these meetings/calls with Judie Anderson to keep her informed.
- Attended the 2-9-2022 TAC meeting to discuss this memo and steps forward.

Response to Recommendations

ECWMC Recommendation #1: We recommend the MNDNR update the hydrologic HEC-HMS model with an alternative modeling approach, such as Reservoir Routing, in the upper watershed to account for all of the off-channel flood storage on the landscape.

MNDNR Response: We concur that it would be better to more accurately account for storage that is not currently in the HEC-HMS model. We do not have a comment about the specific methodology proposed.

The contract ECWMC had with MNDNR was to provide hydrologic modeling for the watershed. Even though the grant is expired, if ECWMC wants the model to be revised, it is still the responsibility of ECWMC to provide the revised modeling. Unfortunately, MNDNR does not have any additional funds to provide to assist with any changes.

ECWMC Recommendation #2: We recommend the MNDNR update the hydraulic HEC-RAS model with the best available information for each of the hydraulic structures in the model.

MNDNR Response: Similar to the previous response, the contract ECWMC had with MNDNR was to provide hydraulic modeling for the watershed. That contract included a specific task to acquire the best available data for hydraulic structures. A request for this data was sent to the member cities, by MNDNR, on behalf of the watershed. Data was received from a couple cities. If the other member cities did not provide that data in response to that request, or if new information was collected after the modeling was complete, then it is the responsibility of the watershed, or possibly the specific communities, to update the modeling.

ECWMC Recommendation #3: We recommend the MNDNR review the boundary conditions for each of the stream sections as mapped base flood elevations differ at stream confluences

MNDNR Response: The boundary conditions for each stream were completed as advised by MNDNR. The BFEs at confluences are typically different in the raw modeling, and final mapping creates consistent BFEs between branches and/or the main stem and tributaries. If fact, for most of the modeling MNDNR completes for FEMA, the boundary conditions are set (using reasonable parameters, typically normal depth and using the slope of the immediate downstream reach) such that the BFE for at least the last cross section in a tributary model is lower than the main stem model. That said, there are scenarios where another approach, such as a known water surface elevation, may be the most appropriate boundary condition. This specific recommendation has not discussed in depth with either Stantec or Barr. Further discussion or review may find specific locations where boundary conditions could or should be changed, and MNDNR would be happy to discuss specific areas where changes may be justified.

ECWMC Recommendation #4: We recommend the MNDNR remap the floodplain after the above changes are made to the hydrology and hydraulic models.

MNDNR Response: MNDNR will remap the floodplain as requested if new data is provided.

Additional MNDNR comments

During the review process for the Twin Cities HUC8 project, and with Elm Creek Watershed specifically, MNDNR completed QA/QC of submitted models and provided comments. Each watershed was also tasked with their own internal QA/QC process as part of each respective agreement. MNDNR's approach to the reviews was to review the general approach and methods. Some areas were examined in detail as multiple "spot checks" within each watershed; however, the models were generally too large for MNDNR to review each and every component of the models, which is why it was expected that internal QA/QC processes would catch inaccuracies in the details of the model.

After receiving the third party review, MNDNR completed an additional review of both the hydrologic and hydraulic models for Elm Creek at a more detailed level than was previously done. If the Commission chooses to make revisions to the modeling, then as indicated above, the Commission is responsible to make any changes it feels are necessary to the modeling, along with revisions to project narratives that are closely tied to the modeling. If the Commission completes model revisions, then MNDNR is willing to complete the revised mapping.

If the Commission chooses to make revisions to the model, then MNDNR suggests considering the following comments to improve the modeling accuracy.

Hydrologic Review (HEC-HMS model)

1) All watershed areas in the model should be double checked to make sure they are consistent with delineated watersheds.
2) All connections between watersheds and the downstream stream reach should be double checked and corrected as necessary.
3) Curve numbers should be reviewed to make sure they are consistent with soil types in the watershed.
4) Watersheds with wetlands should be evaluated to determine if storage areas and/or alternative routing methods should be included to model them more accurately.
5) Some watersheds contain significant lengths of multiple streams, and then the flows generated from the HEC-HMS model are distributed proportionally to each stream. We recommend that the Commission subdivide those watersheds to more accurately model flows going to each stream and to create a more direct correlation between HEC-HMS results and flows used in the HEC-RAS model. Examples include but are not limited to EC35, EC26, EC19, EC16, EC3, DC1, RC2, SFRC2, and SFRC7.
6) If some or all of these modifications are made, we recommend rechecking the calibration of the model to determine if a recalibration is necessary.

Hydraulic Review (HEC-RAS model)

7) All structures with assumed/estimated dimensions should be reviewed. We understand the watershed has gathered additional structure data since the initial request to the member cities was sent. We agree that it is better to use plans or survey instead of estimates. For those structures without available plans for survey, the estimated dimensions should be reviewed to make sure they are consistent with what is visible in aerial photography.

8) Similar to comment #6 above, many flows in the HEC-RAS model do not correlate to results in the HEC-HMS model. All flows should be reviewed to make sure they are consistent with the HEC-HMS model. If they are inconsistent or do not directly correlate to flows in the HEC-RAS model, then explanation should be provided to document where the flows come from.
9) If revisions are made to the HEC-HMS model that result in changes to the flows in the hydraulic model, then the hydraulic model should be reviewed to make any necessary corrections, notably for ineffective flow areas and cross section placement upstream and downstream of bridges.
10) The model should extend all the way to the Mill Pond Dam. The known water surface at the dam can be used as the boundary condition. The dam crest can be the last cross section in the model, but the dam does not need to be included as an inline structure in the model. The floodplain downstream of the dam is backwater from the Mississippi River and does not need to be included in the Elm Creek model.
11) As instructed by MNDNR staff, the models for individual reaches were disconnected from each other, so there is effectively many individual models included in one project file. For mapping and FIS purposes, the river stations in each reach need to accurately reflect distances upstream of a reference point. That reference point would be the Mill Pond Dam for the Elm Creek main stem. For all tributaries, the reference point is the confluence with the downstream water body. That stationing needs to be within 25-ft of what someone would reasonably measure on a map. All reaches should be checked to make sure they are consistent with this FEMA requirement.

To: Elm Creek WMO Commissioners

From: Ross Mullen, PE
Ed Matthiesen, PE

Date: May 5, 2021

Subject: Third Party HUC-8 Model Review

Recommended Commission Action	Discuss and consider a third party review of the HUC-8 model

Project Understanding

Member cities of the Elm Creek Watershed Management Commission have noted significant differences between the flood elevations in their community hydrologic and hydraulic (XPSMWM) models and those included in the Elm Creek Floodplain Modeling and Mapping HUC-8 study (HUC-8 study). The MNDNR had proposed to complete extensive surveys of all hydraulic structures (bridges, culverts, and weirs) within the effective (FEMA mapped) floodplain; however the MNDNR was unable to complete these surveys with limited budgets and many hydraulic structures were modeled based on assumptions made from review of aerial imagery.

Wenck-Stantec proposes to compare the approximately 80 hydraulic structures that were modeled based on assumptions made from review of aerial imagery listed in Table 3 of the *Elm Creek Narrative and QAQC Documentation (Barr Engineering Co., 2021)* to the best available information from member cities (existing hydrologic and hydraulic models, construction plans, as-builts, or survey information). Because the MNDNR has previously indicated that the hydraulic models are unable to be shared at this time, the comparison will be limited to the hydraulic structure information provided in Table 3 of the *Elm Creek Narrative and QAQC Documentation (Barr Engineering Co., 2021)*-- typically culvert quantities shape(s), and size(s) or a bridge listing. We will note other information (such as inverts and road overflow elevations) provided by the member cities, should the hydraulic model become available at a later time.

Additionally, we will summarize the peak discharge rates at all locations reported in the November 2016 Hennepin County FIS and compare those to the simulated peak discharge rates in the HUC-8 model, based on the reported discharge in Table 1 of the *Elm Creek Narrative and QAQC Documentation (Barr Engineering Co., 2021)*.

A separate scope of work to survey hydraulic structures where differing or better data is identified can be prepared at the conclusion of this phase. City staff or the MNDNR may elect to survey these structures.

Schedule

Once the MNDNR schedules a member city review meeting for the HUC-8 model, member cities will have 30 days to provide comments to the MNDNR on the inundation areas shown in the HUC-8 model. We understand time is of the essence, so the findings will be documented in a brief technical memorandum within 2 weeks of project authorization.

Budget

Task No.	Task Description	Estimated Hours	Estimated Budget ($)
1	Data Collection from Member Cities	4	$600
2	Comparison of Structures	24	$3,600
3	Reporting/Documentation	4	$600
	Subtotal	32	$4,800

If approved, the review will be funded from the *400 Other Technical Services* funding.

Assumptions

- Does not include review or comparison of hydrologic parameters.
- The review will be limited to the data that is reported in Table 3 of the *Elm Creek Narrative and QAQC Documentation (Barr Engineering Co., 2021)*.
- Road overflows will be noted, but we are unable to review without the hydraulic model. If the hydraulic model is provided, road overflows will also be reviewed.
- Other hydraulic model parameters such as stream lengths, Manning's roughness, and cross section shape will not be reviewed.
- Hydraulic structures in Table 3 of the *Elm Creek Narrative and QAQC Documentation (Barr Engineering Co., 2021)* that are modeled using survey data, CLOMR's/LOMR/s, effective models, construction drawings/ plan sheets, or as-builts will not be reviewed.

DNR Comments Included in Red

resourceful. naturally.
engineering and environmental consultants

BARR

December 7, 2020

Mrs. Suzanne Jiwani
Minnesota Department of Natural Resources
500 Lafayette Road
PO Box 32
St. Paul, MN 55155

Re: FEMA Floodplain Modeling and Mapping

Dear Mrs. Jiwani:

The purpose of this letter is to provide additional detail on the request for modifications to the budget and schedule for the Elm Creek floodplain modeling and mapping project sent on September 24, 2020. The items described below were provided as part of the September 24th memo. Table 1 has been added to show how the approximate cost associated with each high-level task for developing the hydrologic model compares to the original budget.

Hydrologic Modeling

MnDNR approved the Elm Creek hydrology submittal prepared by Barr, on behalf of the ECWMC, on August 17, 2020. However, the Hydrologic Modeling task took a much greater effort than estimated in Barr's initial budget for that task. Barr performed the following additional work that resulted in a budget overrun on this task.

1. An April 24, 2000 MnDNR memo summarized review comments on the hydrologic modeling. Comments that led to additional effort are highlighted in the attachment. On April 30, 2020 Barr and the MnDNR had a conference call to discuss the comments in the April 24, 2020 memorandum. While some rework was expected from the MnDNR review process, the level of effort exceeded what was assumed in the original scope of work. Tasks that required a larger than expected level of effort include:
    a. Request for a spot check of impervious areas with aerial imagery. This added to the quality control effort. **($1,000, approx. 10 hours)** **accept as change in scope**
    b. Request for quality control documentation for areas where storage areas will be used to define water levels. The review of storage areas resulted in additional work to add new storage areas and additional scrutiny of the modeling approach to verify that the changes in elevations and flow rates from publish FEMA values are reasonable and substantiated.
        i. Several storage areas suggested to be mapped using the hydrologic model were significantly lower in elevation than currently mapped special flood hazard areas. In some of these instances, this occurred because the waterbody's inundation extent was not a level pool as assumed from the effective mapping. Where

mapping a single water level for a subcatchment did not generate a reasonable flood extent, the decision was made to map the subcatchment using cross-sections in the hydraulic model. **($3,500, approx. 35 hours)** **accept**

ii. The initial hydrologic model had 29 storage areas for mapping ponds and lakes. MnDNR requested an additional 21 storage areas for shallow depressions that may accumulate water during wet periods. Barr's scope assumed the shallow areas would be modeled with cross sections in the hydraulic model. This effort required defining hydrologic inputs for the subdivided watersheds, development of storage area parameters, and recalibration of the model. **($4,500, approx. 45 hours)** **reject**

iii. Substantial changes in the regulatory flow rates and flood elevations (particularly a significant REDUCTION in several locations) was unexpected given that generally flood flow rates have increased in the past decades and prompted extra scrutiny by Barr staff. This additional scrutiny was critical because adopting lower flows and flood elevations would allow development closer to water bodies and with lower floor elevations, potentially increasing the flood risk for the community. After detailed review of the methodology of FEMA's original hydrologic analysis, Barr staff concluded that the lower flows were justified, and the MnDNR agreed through the hydrology review process. A flow frequency analysis was performed on the Elm Creek stream gage to verify that the results from the HEC-HMS model results were reasonably similar to recurrence interval flows based on the historic record. **($2,500, approx. 25 hours)** **accept**

iv. The additional work under the hydrology scope listed under 1.b. i. ii. & iii. will result in slightly less effort in the hydraulics scope due to mapping in some areas based on the hydrologic model instead of a hydraulic model. The reduced hydraulics effort partially offsets the additional effort required in the hydrology tasks; we estimate a 12 hour savings, or **$1,200** for the hydraulic modeling task.

c. Request for a comparison of how calibrated flows compare to gaged flows. While this a normal part of the calibration process, the task had to be completed three times instead of once because of changes to the hydrologic modeling approach based on DNR comments. The second iteration added new storage areas. The third iteration reverted some storage areas back to cross sections because a level pool assumption was not valid for some areas. This added to the quality control effort. **($1,500, approx. 15 hours)** **accept**

d. Request to update watershed divides such that all individual special flood hazard areas have their own unique drainage area. This added to the modeling effort and required recalibration of the model.

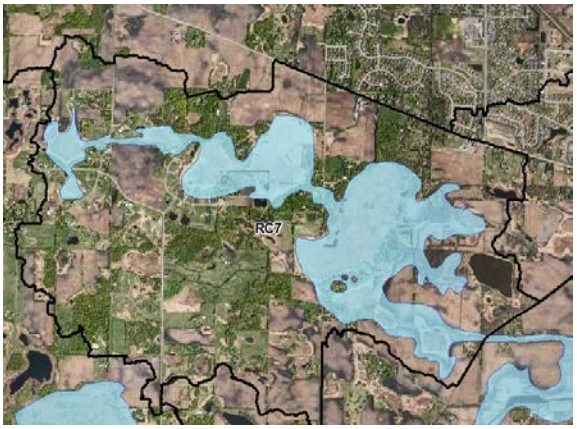
i. After receiving comments from the MnDNR on the draft submittal, we reviewed all 76 subcatchments from the draft submittal, 29 of which we had originally planned to map in HMS. **($1,500, approx. 15 hours)** **reject**

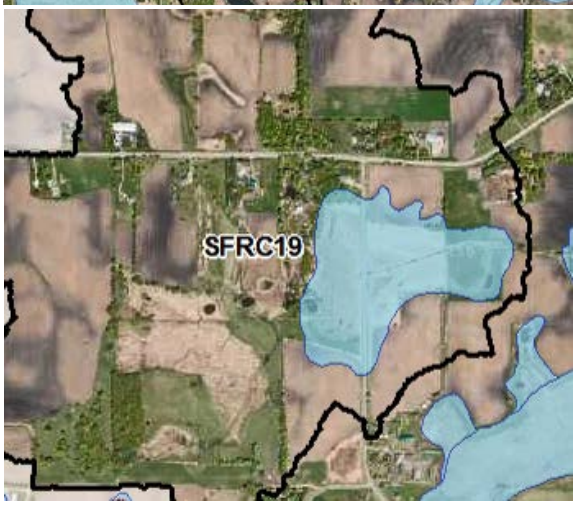
ii. The effort to update watershed divides to all individual special flood hazard areas led to the subdivision of 6 subcatchments and the revision of divides for an additional 15. **($3,000, approx. 30 hours)** **reject**

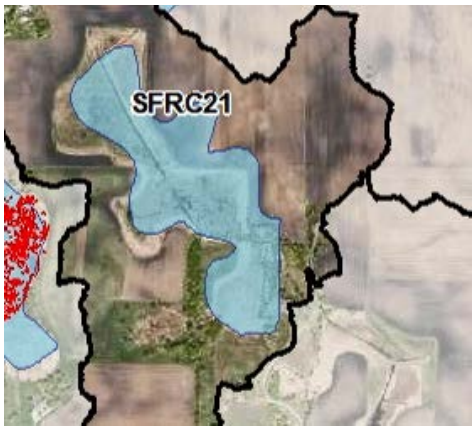
iii. From the discussion with the DNR, it appeared we could increase the number of subcatchments to map in HMS in order to reduce hydraulics work. Therefore, we increased the number of subcatchments to map in HMS to 50. **(accounted for in item 1.b.ii)**

iv. Updated hydrologic inputs were generated for the new and revised subcatchments, and the model was recalibrated. **($4,000, approx. 40 hours)** **accept**

v. After QAQC of the 1% mapped flood extents for the subcatchments we planned to map in HMS, we found that level pool mapping from the HMS model would not provide a reasonable flood extent for 11 of these subcatchments. A few examples are shown below **(accounted for in item 1.b.i):**







vi. Review and QAQC of these 11 areas that would still need to be mapped in the hydraulics model required additional time **(accounted for in item 1.b.i)**.

vii. To support the decision to map the final 37 subcatchments in HMS, we created Addendum Figure 3 depicting the updated 1% inundation compared to the effective. This figure was provided in the final hydrology submittal. **($1,000, approx. 10 hours)** **accept**

2. A May 20, 2020 MnDNR email provided a link to download survey and as-builts data for updating the draft hydrology model (Attachment 3). The information received required sifting through more than 30 pages of handwritten notes on crossings and locating the crossing in the HEC-HMS model. This information came after the draft model was submitted to the MnDNR for review. The timing and format of the data led to more time than expected for incorporating the information into the HEC-HMS model. **($2,500, approx. 25 hours)** **accept**

The work requested by the MnDNR was valuable and will provide greater benefit to the residents of the Elm Creek Watershed, giving the residents a better understanding of their flood risk, helping them make better risk-informed decisions. However, the cost of the additional and out of scope hydrologic modeling work was **$25,000** more than was budgeted for the task. Table 1 shows the original hydrology task budget compared to the actual cost for each task to develop the approved hydrologic model.

Table 1 Elm Creek Hydrology Submittal Task Budgets

Task	Description	Original Budget	Approximate Cost
1	HEC-HMS model	$15,000	$15,000
2	HMS QA/QC	$1,500	$1,500
3	DNR Submittal	$1,000	$2,000
4	Response to DNR Comments	$1,000	$8,000
5	Final HEC-HMS model	$4,500	$16,000
6	Final QA/QC	$900	$6,400
	Hydraulic Modeling Savings	--	*-$1,200*
	Total	**$23,900 (236 hours)**	**$47,700 (477 hours)**

As noted above and accounted for in Table 1, some of the extra hydrology work reduced the level of effort required for the hydraulics model by approximately **$1,200.**

Thank you for your consideration of this matter. Please contact me or Joe Waln regarding any questions.

Sincerely,

Nathan Campeau
Vice President

To: Elm Creek Watershed Management Commissioners, Technical Advisory Committee, and Member Cities

From: Erik Megow, PE
Ross Mullen, PE, CFM

Date: April 6, 2022

Subject: Minor rules revisions to align Elm Creek Watershed Management Commission rules with the latest Municipal Separate Storm Sewer System (MS4) permit

INTRODUCTION AND PURPOSE

In 2021, the Minnesota Pollution Control Agency (MPCA) issued a new a Municipal Separate Storm Sewer System (MS4) Phase II general permit to Minnesota cities. An individual MS4 Phase II permit requires a city to develop and implement a stormwater pollution prevention program to reduce the discharge of pollutants from their storm sewer system. All member communities in the Elm Creek Watershed Management Commission are MS4 Phase II permit holders.

The revised MS4 Phase II permit requires:

- For non-linear projects, treatment of the amount of 1.0-inches of runoff from new and fully reconstructed impervious surfaces.
- For linear projects, treatment of A) 1.0-inches of runoff from the new impervious surface or B) 0.50-inches of runoff from new and fully reconstructed impervious surfaces, whichever is greater.

The 2015 Third Generation Elm Creek Watershed Management Commission Plan rules require applicants to provide treatment in the amount of 1.1-inches of runoff from the net, new impervious areas for projects with construction disturbance of more than one acre.

The revisions to the MS4 Phase II permit create inconsistencies between the 2015 Third Generation Elm Creek Watershed Management Commission Plan rules and the rules of its member cities as required by the newest MS4 Phase II permit. We propose to revise the Commission's rules to align with the MS4 Phase II permit requirements. These proposed revisions will have the greatest impact to redevelopment, including public works projects (i.e. road projects) and will have negligible impact to new construction projects on greenfield sites. It is important to the Commission's member cities that its rules be aligned with their MS4 Phase II permit requirements to be at least as stringent as its member cities and to create consistency in the project review process.

TIMELINE

The MPCA updated MS4 discharge permits to the Commission's member cities in October and November 2021. The member cities have one year to come into compliance with the new MS4 Phase II permit requirements. Project reviews submitted to the Commission after November 30, 2022, shall be required to follow the revised requirements. This rule shall go into effect as soon as a member city fully implements its new MS4 Phase II permit and a Minor Plan Amendment is approved by the Minnesota Board of Soil and Water, no later than November 30, 2022.

REVISIONS TO THE THIRD GENERATION PLAN

1. Revise Rule A to include the definition of fully reconstructed impervious surfaces:

    a. "*Fully Reconstructed Impervious Surfaces. Areas where impervious surfaces have been removed down to the underlying soils. Activities such as structure renovation, mill and overlay projects, and other pavement rehabilitation projects that do not expose the underlying soils beneath the structure, pavement, or activity are not considered fully reconstructed. Maintenance activities such as catch basin repair/replacement, utility repair/replacement, pipe repair/replacement, lighting, and pedestrian ramp improvements are not considered fully reconstructed"*

2. Revise Rule A to include the definition of linear projects:

    a. *"Linear project". Linear projects are projects with construction of new or fully reconstructed roads, trails, sidewalks, or rail lines that are not part of a common plan of development or sale."*

3. Revise Rule D.2.b

    a. Existing: "*Linear projects that create one acre or more of new impervious surface must meet all Commission requirements for the net new impervious surface. Sidewalks and trails that do not exceed twelve feet (12'0") in width, are not constructed with other improvements, and have a minimum of five feet (5'0") of vegetated buffer on both sides are exempt from Commission requirements."*

    b. Proposed: "*Linear projects that create one acre or more of new or fully reconstructed impervious surfaces must meet all Commission requirements for 1.1-inches of runoff from the new impervious surface or 0.55-inches from the combination of new and fully reconstructed impervious surfaces, whichever is greater. When this volume cannot be treated within the existing right-of-way, a reasonable attempt to obtain additional right-of-way, easement, or other permission to treat the stormwater during the project planning process must be made. Volume reduction practices must be considered first. Volume reduction practices are not required if the practices cannot be provided cost effectively. If additional right-of-way, easements, or other permission cannot be obtained, owners of construction activity must maximize the treatment of the water quality volume."*

4. Revise Rule D.3.c

    a. Existing: *"Stormwater runoff volume must be infiltrated/abstracted onsite in the amount equivalent to one point one inch (1.1") of runoff generated from new impervious surface."*

    b. Proposed: *"For non-linear projects, stormwater runoff volume must be infiltrated/abstracted onsite in the amount equivalent to one point one inch (1.1") of runoff from the new impervious surface or 0.55-inches from the combination of new and fully reconstructed impervious surfaces, whichever is greater."*

Stantec

Memo

To: Elm Creek WMC TAC

From: Diane Spector
Erik Megow, PE
Judie Anderson

Date: April 6, 2022

Subject: 2022 Rules and Standards Minor Plan Amendment

Recommended TAC Action	Final review of proposed revisions. Recommend that the Commission initiate a Minor Plan Amendment and hold a public meeting on May 11, 2022 to consider the adoption of the amendment to be effective June 1, 2022.

The Rules and Standards established in the Third Generation Watershed Management Plan is proposed for a Minor Plan Amendment (MPA). The Technical Advisory Committee (TAC) previously reviewed proposed revisions at several meetings. Technical memos providing further history and background are attached.

The proposed Amendment would revise Appendix C of the Plan - the Rules and Standards - to 1) make the rules consistent with the most recent Minnesota General Stormwater Permit; and 2) clarify the Commission's standards regarding the required freeboard between the high-water elevation of a constructed or natural water and the low floor or opening of a proposed adjacent structure.

If the TAC chooses to recommend to the Commission to go forward with the Minor Plan Amendment, we recommend you suggest **setting May 11, 2022** as the public meeting at which it would be discussed. At that May 11 meeting, the Commission would discuss and act on the proposed revisions. If approved, the revised Rules could go into effect June 1, 2022, or some other date if you prefer.

Attached is the proposed Notice of Minor Plan Amendment. The Commission must send a copy of the proposed minor plan amendment to the member cities, Hennepin County, the Met Council, and the state review agencies for review and comment, and must hold a public meeting (not a hearing) to explain the amendment. This meeting must be public noticed twice, at least seven and 14 days prior to the meeting.

Notice of Minor Plan Amendment
Elm Creek Watershed Management Commission

The Elm Creek Watershed Management Commission proposes to amend its *Third Generation Watershed Management Plan* to adopt revisions to Appendix C of that document – the development Rules and Standards – to conform the Rules to the most recent Minnesota General Stormwater Permit and to clarify requirements regarding the minimum elevation separation between constructed and natural waterbodies and adjacent structures.

The proposed minor plan revision is shown as additions (underlined) or deletions (~~strike outs~~).

The Elm Creek WMC Third Generation Plan Appendix C Rules and Standards is hereby revised as follows:

1. Rule A is hereby revised to add:

   Fully reconstructed impervious surface. Areas where impervious surfaces have been removed down to the underlying soils. Activities such as structure renovation, mill and overlay projects, and other pavement rehabilitation projects that do not expose the underlying soils beneath the structure, pavement, or activity are not considered fully reconstructed. Maintenance activities such as catch basin repair/replacement, utility repair/replacement, pipe repair/replacement, lighting, and pedestrian ramp improvements are not considered fully reconstructed.

   Linear project. Linear projects are projects with construction of new or fully reconstructed roads, trails, sidewalks, or rail lines that are not part of a common plan of development or sale.

   Low Opening. The low opening is the lowest elevation of an enclosed area, such as a basement, that allows surface water to into the enclosed area. Examples of low openings, include but are not limited to doors and windows. Foundation wall cracks, drainage seepage through drain tile, and sewer backup elevations are not low openings.

2. Rule D.2.b is hereby revised as follows:

   ~~Linear projects that create one acre or more of new impervious surface must meet all Commission requirements for the net new impervious surface. Sidewalks and trails that do not exceed twelve feet (12'0") in width, are not constructed with other improvements, and have a minimum of five feet (5'0") of vegetated buffer on both sides are exempt from Commission requirements.~~

   Linear projects that create one acre or more of new or fully reconstructed impervious surfaces must meet all Commission requirements for 1.1-inches of runoff from the new impervious surface or 0.55-inches from the combination of new and fully reconstructed impervious surfaces, whichever is greater. When this volume cannot be treated within the existing right-of-way, a reasonable attempt to obtain additional right-of-way, easement, or other permission to treat the stormwater during the project planning process must be made. Volume reduction practices must be considered first. Volume reduction practices are not required if the practices cannot be provided cost effectively. If additional right-of-way, easements, or other permission cannot be obtained, owners of construction activity must maximize the treatment of the water quality volume.

3. Rule D.2.c is hereby revised as follows:

~~Stormwater runoff volume must be infiltrated/abstracted onsite in the amount equivalent to one point one inch (1.1") of runoff generated from new impervious surface.~~

For non-linear projects, stormwater runoff volume must be infiltrated/abstracted onsite in the amount equivalent to one point one inch (1.1") of runoff from the new impervious surface or 0.55-inches from the combination of new and fully reconstructed impervious surfaces, whichever is greater.

4. Rule D.3.b.i.7 is hereby revised as follows:

~~The low floor elevation shall be at minimum two feet above the critical event 100-year elevation and at minimum one foot above the emergency overflow elevation of nearby waterbodies and stormwater ponds.~~

Structures shall be elevated according to the following criteria based on the flooding source:

i. Structures that are within the closed basin of naturally landlocked waterbodies and outside of the effective Federal Emergency Management Agency floodplain as shown on the Flood Insurance Rate Map and outside of the Commission's floodplain shall meet the following criteria:

    1. The low floor must be at minimum one foot above the normal water level and
    2. The low floor must be at least two feet above the back-to-back 100-year 24-hour flood elevation.

ii. Structures within the proposed Federal Emergency Management Agency and/or within the Commission's floodplain (excluding FEMA Zone A areas) shall meet the following criteria:

    1. The low floor must be at minimum two feet above the 100-year flood elevation and at least one foot above the emergency overflow

iii. Structures that are within the closed basin of naturally landlocked waterbodies and the Federal Emergency Management Agency and/or Commission's floodplain shall have a low floor elevation at whichever elevation highest elevation calculated from the following:

    1. The low floor must be at minimum one foot above the normal water level and
    2. The low floor must be at least two feet above the back-to-back 100-year 24-hour flood elevation.
    3. The low floor must be at minimum two feet above the 100-year flood elevation.

iv. Structures near the maximum inundation extents caused during the high-water level of nearby stormwater ponds and/or waterbodies that are outside of a naturally landlocked waterbody basin, Federal Emergency Management Agency floodplain, and the Commission's floodplain shall meet the following criteria:

1. The low floor must be at minimum one foot above the normal water level of hydraulically or hydrologically connected waterbodies (as determined by paragraph d. below) and
2. The low opening must be at least two feet above the 100-year flood elevation and
3. The low opening should be at least one foot above the emergency overflow and
4. Hydrogeological analyses demonstrating a structure is outside of the lateral transmissivity zone of groundwater flow mounding caused by the 100-year event on hydraulically or hydrologically connected waterbodies and based on the duration of the flood hydrograph in those hydraulically or hydrologically connected waterbodies, to the satisfaction of the Commission's engineer, may be used to exempt structures from the above rules.
5. Structures located greater than 200-feet away from the high- water level inundation of hydraulically or hydrologically connected waterbodies (as determined by paragraph d. above) are exempt from the above rules.
6. The emergency overflow should be an overland flow section, where possible, but piped outlets with appropriate conveyance capacity that are designed to limit clogging may be used as determined by the Commission's Engineer

v. Structures adjacent to localized depressions use to route stormwater to waterbodies and stormwater ponds are exempt from these requirements.

5. Rule F.3.b is hereby revised as follows:

~~*All new structures shall be constructed with the low floor at the elevation required in the municipality's ordinance, however, in no case shall the low floor be less than two feet above the regulatory elevation.*~~

Structures shall be elevated to reduce flood risk as specified in Rule D.3.b.i.7.

Stantec

Memo

To: Elm Creek WMC TAC

From: Diane Spector
Judie Anderson

Date: April 6, 2022

Subject: 2022 CIP Minor Plan Amendment

Recommended TAC Action	1) Confirm that smaller projects submitted to the CIP should be directed to the Cost Share Program instead of the CIP; 2) Determine if any items to be considered by the WBIF grants must be added to the CIP and revise the proposed CIP; and 3) Recommend that the Commission proceed with the attached Minor Plan Amendment (revised if necessary) and set the date for the required public meeting as the May 11, 2022, regular meeting.

The Third Generation Watershed Management Plan and Capital Improvement Program (CIP) is proposed for a Minor Plan Amendment (MPA). The Technical Advisory Committee (TAC) previously reviewed proposed revisions at its March 9, 2022, meeting.

As considered and revised at the March meeting, the Plan would be revised to add three new projects to the Capital Improvement Program (CIP):

- Add the Maple Grove South Fork Rush Creek Steam Restoration project to the CIP for 50% cost share in 2022 and 50% cost share in 2023.
- Add a new project to the CIP – "City Cost Share Program" – to share in the cost of small Best Management Practices (BMPs) on city projects, in accordance with the Commission's Cost Share Policy. (Approved in August 2021)
- Add a new project to the CIP – "Partnership Cost Chare Program" – to share in the cost of voluntary load-reduction BMPs on private property, in accordance with the Commission's Cost Share Policy. (Approved in August 2021)

Some smaller projects (under $100,000) have been submitted to the CIP by the cities, as well as one since the March meeting from Three Rivers for the proposed Oxbow Trail - Rush Creek Channel Stabilization that is likely to be under $100,000. It is our recommendation that those projects be handled administratively through the city cost share program rather than including small (<$50,000) line items on the CIP.

Ongoing discussions regarding the Watershed Based Implementation Funding (WBIF) may result in additional projects to be added to the CIP, and the TAC may need to suggest a revision to the proposed Minor Plan Amendment. One option would be simply to allocate some of the WBIF grant funding to the city Cost Share program to accommodate the several small projects that are currently being contemplated. That would not require a Plan Amendment.

If the TAC chooses to recommend to the Commission to go forward with the Minor Plan Amendment, we recommend you suggest **setting May 11, 2022** as the public meeting at which it would be discussed. At that May 11 meeting, the Commission would discuss the proposed 2022 CIP and establish a maximum levy for 2022. The Minor Plan amendment and maximum levy would then be forwarded to Hennepin County for consideration by the Hennepin County Board.

Attached is the proposed Notice of Minor Plan Amendment. The Commission must send a copy of the proposed minor plan amendment to the member cities, Hennepin County, the Met Council, and the state review agencies for review and comment, and must hold a public meeting (not a hearing) to explain the amendment. This meeting must be public noticed twice, at least seven and 14 days prior to the meeting.

If these revisions are adopted at the May 11 meeting, the proposed 2022 CIP would be as shown in Table 1 and would be considered at a Public Hearing later this year.

Table 1. Potential 2022 CIP and levy.

Project	City	Commission Share	Levy
S Fork Rush Creek Stream Restoration	Maple Grove	$406,250	$430,828
City Cost Share	Various	100,000	106,500
Partnership Cost Share	Various	50,000	53,250
TOTAL		$556,250	$590,578

Project Descriptions

S Fork Rush Creek Stream Restoration. Stream restoration and floodplain re-establishment from 101st Avenue North, north to the confluence with the North Fork of Rush Creek. Approximately 7,200 linear feet. Estimated phosphorus reduction of 423.56 lbs per year, improved riparian environment, improved floodplain connectivity, improved recreation and access to the creek, improved education. The 2022 proposed amount of $406,250 is ½ the total requested Commission share of $812,500. The City has requested that Commission consider funding the other ½ from funds levied in 2023.

City Cost Share. This annual project provides cost sharing to retrofit smaller BMPs on city property on a voluntary basis. The TAC developed policies and procedures to administer these funds and makes recommendations to the Commission on which projects should be funded. The proposed levy is $100,000, to be matched at least one-to-one by a member city or cities.

Partnership Cost Share. This program makes funds available to member cities to help fund the cost of Best Management Practices (BMPs) partnership projects with private landowners. Participating projects on private property must be for water quality improvement and must be for improvement above and beyond what would be required to meet Commission rules. The proposed levy is $50,000, and funding does not require a match.

Notice of Minor Plan Amendment
Elm Creek Watershed Management Commission

The Elm Creek Watershed Management Commission proposes to amend its *Third Generation Watershed Management Plan* to adopt revisions to Table 4.5 of that document - the Capital Improvement Program (CIP) – to add three projects and to revise Appendix G, to add descriptions of those projects.

The proposed minor plan revision is shown as additions (underlined) or deletions (~~strike outs~~).

Table 4.5. Elm Creek WMC Third Generation Plan Capital Improvement Program is hereby revised to add the following:

Description	Location	Priority	Project Cost	Partners	Funding Source(s)	Commission Share		
						2022	2023	2024
South Fork Rush Creek Stream Restoration	Maple Grove	H	$3,250,000	Maple Grove	City, levy	$406,250	$406,250	$0
City Cost Share	Watershed	M	100,000	Cities	Cities, levy	50,000	50,000	50,000
Partnership Cost Share	Watershed	M	50,000	Owners	levy	50,000	50,000	50,000

Appendix G, CIP Descriptions is hereby revised as follows:

S Fork Rush Creek Stream Restoration. Stream restoration and floodplain re-establishment from 101st Avenue North, north to the confluence with the North Fork of Rush Creek. Approximately 7,200 linear feet. The cost is split 50/50 between 2022 and 2023.

City Cost Share. This annual project provides 50% cost sharing to complete smaller projects on city property on a voluntary basis in accordance with policies and procedures established by the Commission.

Partnership Cost Share. This program provides up to 100% cost sharing to member cities to complete smaller partnership projects with private landowners. Participating projects on private property must be for water quality improvement and must be for improvement above and beyond what would be required to meet Commission rules.

3235 Fernbrook Lane
Plymouth, MN 55447
(763) 553-1144
Fax: (763) 553-9326
judie@jass.biz

To: Elm Creek Commissioners
Cc: Technical Advisory Committee
From: Judie Anderson
Date: April 5, 2022
Subject: Call for a Public Meeting – Minor Plan Amendment

THIS MEMO SERVES AS AN ADDENDUM TO STANTEC'S APRIL 6 MEMOS.

At the April 13, 2022, meeting it is anticipated the Commission's Technical Advisory Committee (TAC) will make the following recommendations to the Commission:

A. Revise the Capital Improvement Program:

1. Move the following projects:
   - a. Line 11 — Fox Creek South Pointe, Rogers, from 2022 to 2023, (est cost $90,000, Comm share $22,500)
   - b. Line 19 — Ranchview Wetland Restoration, Maple Grove, from 2022 to 2025 (est cost $2,500,000, Comm share $250,000)
   - c. Line 30 — Downtown Pond Expansion and Reuse, Rogers, from 2022 to 2023 (est cost $406,000, Comm share $101,500)
   - d. Line 37 — Lowell Pond Raingarden, Champlin, from 2022 to 2024 (est cost $400,000, Comm share $100,000)
   - e. Line 49 — Tower Drive West Stormwater Improvements, Medina, from 2022 to 2024 (est cost $271,250, Comm share $67,813)

2. Add the following projects:
   - f. Line 50* — South Fork Rush Creek Stream Restoration Ph 1 and 2, Maple Grove (est cost $3,250,000, Comm share $406,252 each in 2022 and 2023)
   - g. Line 56* — Rush Creek Eastman Nature Center, Oxbow Trail Channel Stabilization, Maple Grove (est cost $100,000, Comm share $25,000 in 2023)
   - h. Line 57* — City Cost Share ($100,000 in 2022 and subsequent years)
   - i. Line 58* — Partnership Cost Share ($50,000 in 2022 and subsequent years)

3. Consider adding the following projects
   - j. Line 51** — Update City-wide Stormwater Model, Champlin (est cost $50,000, Comm share $12,500 in 2024)
   - k. Line 52** — Reconstruct Bridge at Cartway and Elm Creek, Champlin (est cost $950,000, Comm share $237,500 in 2024)
   - l. Line 53** — Lemans Lake Water Quality Improvements, Champlin (est cost $100,000, Comm share $25,000 in 2026)
   - m. Line 54** — Goose Lake Road Area Infiltration Improvements TMDL, Champlin (est cost $200,000, Comm share $50,000 in 2026)
   - n. Line 55 — Mill Pond BMPs Water Quality Project Area, Champlin (est cost $200,000 Comm share $50,000 in 2026)

* TAC has received feasibility report or similar back-up information

** TAC has not received back-up information

B. Approve the following revisions to the Elm Creek Watershed Management Commission's Rules and Standards:

1. Revise Rule A to include the definition of fully reconstructed impervious surfaces:

a. "*Fully Reconstructed Impervious Surfaces. Areas where impervious surfaces have been removed down to the underlying soils. Activities such as structure renovation, mill and overlay projects, and other pavement rehabilitation projects that do not expose the underlying soils beneath the structure, pavement, or activity are not considered fully reconstructed. Maintenance activities such as catch basin repair/replacement, utility repair/replacement, pipe repair/replacement, lighting, and pedestrian ramp improvements are not considered fully reconstructed."*

2. Revise Rule A to include the definition of linear projects:

a. *"Linear project". Linear projects are projects with construction of new or fully reconstructed roads, trails, sidewalks, or rail lines that are not part of a common plan of development or sale."*

3. Revise Rule D.2.b:

a. Existing: "*Linear projects that create one acre or more of new impervious surface must meet all Commission requirements for the net new impervious surface. Sidewalks and trails that do not exceed twelve feet (12'0") in width, are not constructed with other improvements, and have a minimum of five feet (5'0") of vegetated buffer on both sides are exempt from Commission requirements."*

b. Proposed: "*Linear projects that create one acre or more of new or fully reconstructed impervious surfaces must meet all Commission requirements for 1.1-inches of runoff from the new impervious surface or 0.55-inches from the combination of new and fully reconstructed impervious surfaces, whichever is greater."*

c. *Linear projects that create one acre or more of new or fully reconstructed impervious must meet all Commission requirements for 1.1-inches of runoff from the new impervious surface or 0.55-inches from the combination of new and fully reconstructed impervious surfaces, whichever is greater. When this volume cannot be treated within the existing right-of-way, a reasonable attempt to obtain additional right-of-way, easement, or other permission to treat the stormwater during the project planning process must be made. Volume reduction practices must be considered first. Volume reduction practices are not required if the practices cannot be provided cost effectively. If additional right-of-way, easements, or other permission cannot be obtained, owners of construction activity must maximize the treatment of the water quality volume.*

4. Revise Rule D.3.c a.

a. Existing: *"Stormwater runoff volume must be infiltrated/abstracted onsite in the amount equivalent to one point one inch (1.1") of runoff generated from new impervious surface."*

b. Proposed: *"For non-linear projects, stormwater runoff volume must be infiltrated/ abstracted onsite in the amount equivalent to one point one inch (1.1") of runoff generated from new and fully reconstructed impervious surfaces."*

ACTION:
If these actions are approved by the Commission, a public meeting must be ordered to present the actions in the form of a Minor Amendment to the Commission's Third Generation Watershed Management Plan and to take comment from the member cities and the public. The purpose of the public meeting is NOT to approve going forward with any of the capital projects. The public meeting would occur during the May 11, 2022, regular meeting of the Commission.

Table 4.5. Elm Creek Third Generation Plan Capital Improvement Program

	Levy Proj #	Description	Location	Est Total Project Cost	2027	2026	2025	2024	2023	2022 Est Cost	2022 Levy Amount	2021 Est Cost	2021 Levy Amount	2020 Est Cost	2020 Levy Amount	2019 Est Cost	2019 Levy Amount	2018 Est Cost	2017 Est Cost	2016 Est Cost	2015 Est Cost	2014 Est Cost	Description	Line
1	2014-01	Tower Drive Improvements	Medina	$3,437,300																		68,750	Tower Drive Improvements	1
2	2014-02	Elm Creek Dam at Mill Pond	Champlin	350,000																		62,500	Elm Creek Dam at Mill Pond	2
3		TMDL implementation special study PLACEHOLDER	Watershed	$225,000.00																			TMDL implementation special study	3
4		Stream segment prioritization PLACEHOLDER	Watershed	$20,000.00																			Stream segment prioritization	4
5	2015-01	Elm Cr Reach E	Plymouth	$1,086,000.00																	250,000		Elm Cr Reach E	5
6	2016-01	CIP-2016-RO-01 Fox Cr, Creekview	Rogers	$321,250.00												0		0	0	80,312	0		CIP-2016-RO-01 Fox Cr, Creekview	6
7	2016-02	Mississippi Point Park Riverbank Repair	Champlin	$300,000.00												0		0	0	75,000	0		Mississippi Point Park Riverbank Repair	7
8	2016-03	Elm Creek Dam	Champlin	$7,001,220.00												0		0	0	187,500	0		Elm Creek Dam	8
9		Tree Thinning and Bank Stabilization Project PLACEHOLDER	Watershed	$50,000.00												~~50,000~~		~~50,000~~	~~50,000~~		0		Tree Thinning and Bank Stabilization Project	9
10	2017-01	Fox Cr, Hyacinth	Rogers	$450,000.00												0		0 ~~,000~~ 112,500		0	0		Fox Cr, Hyacinth	10
11		Fox Cr, South Pointe, Rogers MOVED TO 2021	Rogers	$90,000.00					22,500	~~22,500~~	~~23,861~~					~~22,500~~		0	~~22,500~~	0	0		Fox Cr, South Pointe, Rogers MOVED TO 2021	11
12		Other High Priority Stream Project PLACEHOLDER	Watershed	$500,000.00												~~125,000~~		~~125,000~~	0	0	0		Other High Priority Stream Project	12
13	2016-04 2018-01 2019-01	CIP-2016-MG-02 Rush Creek Main	MG	$1,650,000.00								~~25,000~~				25,000	26,513	75,000	~~75,000~~	75,000			CIP-2016-MG-02 Rush Creek Main	13
14		CIP-2016-MG-03 Rush Creek South	MG	~~$675,000.00~~														~~168,750~~					CIP-2016-MG-03 Rush Creek South	14
15	2018-02	CIP-2017-PL-01 EC Stream Restoration Reach D	Plymouth	$850,000.00														212,500					CIP-2017-PL-01 EC Stream Restoration Reach D	15
16		~~DNR #27-0437~~	MG	~~$75,000.00~~											4	0		0	0	0	0		DNR #27-0437	16
17		~~Stone's Throw Wetland~~	~~Corcoran~~													~~112,500~~		~~112,500~~	~~112,500~~	0	0		Stone's Throw Wetland	17
18		Other High Priority Wetland Projects PLACEHOLDER	Watershed	$100,000.00												0		0	0	0	0		Other High Priority Wetland Projects	18
19	2019-02	CIP-2016-MG-01 Ranchview W'land Restora MOVED TO 2019	MG	2,500,000.00			250,000			~~250,000~~	~~265,125~~					~~125,000~~		~~250,000~~	~~250,000~~				CIP-2016-MG-01 Ranchview Wetland Restoration M	19
20	2017-03	Mill Pond Fishery and Habitat Restoration	Champlin	$5,000,000.00												0		0	250,000	0	0		Mill Pond Fishery and Habitat Restoration	20
21		Other Priority Lake Internal Load Projects PLACEHOLDER	Watershed	$100,000.00												0		0	0	0	0		Other Priority Lake Internal Load Projects	21
22	2016-05	CIP-2016-MG-04 Fish Lake Alum Treatment-Phase 1	MG	$300,000.00																75,000			CIP-2016-MG-04 Fish Lake Alum Treatment-Phase 1	22
23		~~Stonebridge~~	~~MG~~	~~$200,000.00~~												~~0~~		~~0~~	~~50,000~~		~~0~~		~~Stonebridge~~	23
24	2017-04	Rain Garden at Independence Avenue	Champlin	$300,000.00												0		0	75,000		0		Rain Garden at Independence Avenue	24
25		CIP-2016-CH-01 Mill Pond Rain Gardens	Champlin	$400,000.00								~~100,000~~				~~100,000~~		~~100,000~~		0	0		CIP-2016-CH-01 Mill Pond Rain Gardens	25
26		Other Priority Urban BMP Projects PLACEHOLDER	Watershed	$200,000.00												0		0	0	0	0		Other Priority Urban BMP Projects	26
27	2020-01	Livestock Exclus, Buffer & Stabilized Access new 2020	Watershed	$50,000.00										50,000	53,025	0		50,000	0	0	0		Livestock Exclus, Buffer & Stabilized Access new 20	27
28	2020-02	Agricultural BMPs Cost Share new 2020	Watershed	$50,000.00										50,000	53,025	~~50,000~~ 20,000		50,000			0		Agricultural BMPs Cost Share new 2020	28
29		~~CIP-2016-RO-04~~ CIP-2017-RO-1 ~~Ag BMPs~~ Cowley-Sylvan Connections BMPs	Rogers	$300,000.00														75,000					~~CIP-2016-RO-04~~ CIP-2017-RO-1 ~~Ag BMPs~~ Cowley-	29
30		CIP-2016-RO-03 Downtown Pond Exp & Reuse	Rogers	$406,000.00					101,500	~~101,500~~	~~107,641~~							101,500					CIP-2016-RO-03 Downtown Pond Exp & Reuse	30
31	2019-04	Hickory Dr Stormwater Improvement COST ADJUSTED 201	Medina	$307,920.00												~~56250~~ 76,823	81,471						Hickory Drive Stormwater Improvement COST ADJ	31
32		SE Corcoran Wetland Restoration	Corcoran	$400,000.00												~~100,000~~							SE Corcoran Wetland Restoration	32
33	2019-05	Downtown Regional Stormwater Pond NEEDS FEAS STUDY	Corcoran	$105,910.00												~~10,000~~ 26,477	28,079						Downtown Regional Stormwater Pond REQUIRES F	33
34	2018-03	Elm Creek Stream Restoration Phase III	Champlin	$400,000.00														100,000					Elm Creek Stream Restoration Phase III	34
35	2018-04	Downs Road Trail Raingarden	Champlin	$300,000.00														75,000					Downs Road Trail Raingarden	35
36	2019-06	Elm Creek Stream Restoration Phase IV	Champlin	$600,000.00												150,000	159,075						Elm Creek Stream Restoration Phase IV	36
37		Lowell Pond Raingarden	Champlin	$400,000.00				100,000		~~100,000~~	~~106,500~~					~~100,000~~							Lowell Pond Raingarden	37
38		Rush Creek Headwaters SWA BMP Implementation	Rogers	$200,000.00																			Rush Creek Headwaters SWA BMP Implementation	38
39		Hydrologic & Hydraulic Modeling	Watershed	$25,000.00												0		25,000	0	0	0		Hydrologic & Hydraulic Modeling	39
40		Brockton Lane Water Quality improvements NEW 2019	Plymouth	$150,000.00				37,500	moved to 2024	~~37,500~~		~~37,500~~	moved to 2022			0							Brockton Lane Water Quality improvements NEW	40
41		Mill Pond Easement REMOVED 2019	Champlin	$64,000.00												~~16,000~~							Mill Pond Easement NEW, REMOVED 2019	41
42		The Meadows Playfield NEW 2019	Plymouth	$5,300,000.00				250,000	moved to 2024	~~250,000~~													The Meadows Playfield NEW 2019	42
43	2020-03	Enhanced Street Sweeper NEW 2019	Plymouth	$350,000.00										75,000	31,512								Enhanced Street Sweeper NEW 2019	43
44		Fourth Generation Plan	Commission	$70,000												0		0	0	0	0		Fourth Generation Plan	44
45	2021-01	Elm Road Area/Everest Lane Stream Restora NEW 2020	MG	$500,000								125,000	132,563										Elm Road Area Stream Restoration NEW 2020	45
46		Corcoran City Hall Parking Lot NEW 2020/RESCHEDULED 2	Corcoran	$40,000					10,000	~~10,000~~	~~10,605~~	~~10,000~~	moved to 2023										Corcoran City Hall Parking Lot NEW 2020. RESCHE	46
47	2021-02	EC Stream Restora Ph V Hayden Lk Outfall NEW 2020	Champlin	00,000 ~~$10900~~								150000.00	159,075										EC Stream Restoration Ph ~~IV~~ V Hayden Lake Outfall NEW	47
48		CSAH 12/Dayton River Road Ravine Stabilization	Dayton	$382,000					95,500														CSAH 12/Dayton River Road Ravine Stabilizatio	48
49		Tower Drive West Stormwater Improvement	Medina	$271,250				67,813		~~67,813~~	~~71,916~~			moved to 2022, Complete feasibility study, consider using iron-enhanced filtration, improvements to impervious areas.									Tower Drive West Stormwater Improvement	
~~50~~		~~Grass Lake wetland monitoring~~	~~Dayton~~	~~$16,000~~						~~4,000~~		not considered to be a CIP by TAC											~~Grass Lake wetland monitoring~~	
50	New 2022	South Fork Rush Creek Stream Restoration	M Grove	$3,250,000				~~270,833~~	406,252 270,833	406,252 ~~270,833~~	430,828 ~~287,219~~												South Fork Rush Creek Stream Restoration	
51		Update City-wide Stormwater Model	Champlin	$50,000				12,500															Update City-wide Stormwater Model	
52		Reconstruct Bridge at Cartway and Elm Creek	Champlin	$950,000				237,500															Reconstruct Bridge at Cartway and Elm Creek	49
53	Place holders for 2023 CIP	Lemans Lake Water Quality Improvements	Champlin	$100,000		25,000																	Lemans Lake Water Quality Improvements	
54		Goose Lake road Area Infiltraiton Improvements TMDL	Champlin	$200,000		50,000																	Goose Lake road Area Infiltraiton Improvements TM	
55		Mill Pond BMPs Water Quality Project Area	Champlin	$200,000		50,000																	Mill Pond BMPs Water Quality Project Area	
56	New 2022	Rush Ck Eastman Nature Ctr Oxbow Trail Channel Stabil	M Grove	$100,000				25,000															Rush Ck Eastman Nature Ctr Oxbow Trail Channel S	
57		City Cost Share			100,000	100,000	100,000	100,000	100,000	100,000	106,500												City Cost Share	56
58		Partnership Cost Share			50,000	50,000	50,000	50,000	50,000	50,000	53,250												Partnership Cost Share	57
59																								58
60		**TOTAL STUDIES**		245,000																			**TOTAL STUDIES**	59
61		**TOTAL CIPS**		36,899,600	150,000	275,000	400,000	880,313	785,752	556,250		275,000		175,000		278,300		764,000	437,500	492,812	250,000	131,250	**TOTAL CIPS**	60
61		**LEVY AMOUNT**									590,578		291,638		137,562		$ 295,138	462,500	$ 437,500	$ 492,812	$ 250,000	131,250	**LEVY AMOUNT**	61
62		**ACCUMULATED LEVY AMOUNT**									3,088,978		2,498,400		2,206,762		2,069,200	1,774,062	1,311,562	$ 874,062	$ 381,250	131,250	**ACCUMULATED LEVY AMOUNT**	62
	Projects awarded Henn. County ad valorem funding are highlighted in yellow.			40,873,850						Formula = Comm share x 1.05% for admin and other costs x 1.01% for levy shortfalls														

Stantec

Memo

To: Elm Creek WMO Commissioners
Elm Creek TAC

From: Diane Spector

Date: April 6, 2022

Subject: Elm Creek WBIF Convene Meeting #2

Recommended Convenor Action	Continue to discuss options

At our second convene meeting we will continue to discuss potential opportunities for funding, starting to develop priorities and strategies to guide the selection process.

A table of potential general activities is attached. Please review and bring any additional items to the meeting for further discussion.

1. The amount allocated to the Elm Creek watershed Area is **$297,774,** which will become available July 1, 2022 and expire December 31, 2025. Funding must be focused on prioritized and targeted cost-effective actions with *measurable water quality results* that were identified in the implementation section of a state approved and locally adopted comprehensive watershed management plan.

2. The BWSR-Recommended Convene Meeting Process:
   a) Choose a facilitator. *(Selected ECWMC)*
   b) Choose a decision-making process. *(Selected consensus)*
   c) Decide how to select activities for funding. Note that partnerships may also want to choose funding targets for different categories (e.g., projects, studies, education).
   d) Select the highest priority, targeted, measurable, and eligible activities to be submitted to BWSR as a budget request.
   e) Confirm which entity will serve as grantee and/or fiscal agent for each selected activity and decide on the source of the 10% required match.

3. Discuss preference for funding:
   a) Limit to one or two activities or fund several activities.
   b) Focus on one or two specific resources (one or two lakes; a stream)
   c) Fund an existing CIP project or projects.
   d) Solicit new ideas.
   e) Other

4. Discuss and generate specific options for funding, starting with attached.

Table 1. Potential WBIF-Funded Actions

Action	Partners	Year	Total	Share
CIP Projects				
South Fork Rush Creek Stream Restoration	Maple Grove	2022	3,250,000	812,500
CSAH 12/Dayton River Road Ravine Stabilization	TRPD	2023	382,000	95,500
CIP-2016-RO-03 Downtown Pond Exp & Reuse	Rogers	2023	406,000	101,500
Reconstruct Bridge at Cartway and Elm Creek	Champlin	2024	950,000	237,500
Tower Drive West Stormwater Improvement	Medina	2024	271,250	67,813
Brockton Lane Water Quality improvements	Plymouth	2024	150,000	37,500
Lowell Pond Raingarden	Champlin	2024	400,000	100,000
The Meadows Playfield	Plymouth	2024	5,300,000	250,000
Rush Ck Eastman Nature Ctr Oxbow Trail Channel Stabil	M Grove, TRPD	2024	100,000	25,000
TMDL Actions				
Rough fish management	TRPD		25,000-50,000	
Internal load feas: Rice, Diamond, Goose, Cowley, Sylvan, Henry	TRPD		15,000-30,000	
CLP management: Rice, Diamond, Cowley, Sylvan, Henry	TRPD		25,000-30,000	
Update stream condition assessments	HCEE, TRPD, cities		15,000-20,000	
Small BMPs (add to cost share program)	cities, TRPD		50,000-100,000	
Small BMPs (add to partnership program)	cities		25,000-50,000	
SWAs				
Ag cost share projects	HCEE		50,000-100,000	
Streambank repairs in ID'd areas	HCEE, cities, owners		50,000-100,000	
Additional SWA in priority area	HCEE, cities		30,000-50,000	
Education and Outreach				
Targeted ed/outreach: nutrients and sediment	HCEE, WMWA, cities		10,000-50,000	
Targeted ed/outreach: bacteria & manure mgmt	HCEE, WMWA, cities		10,000-50,000	
Targeted ed/outreach: chloride	HCEE, WMWA, cities		10,000-20,000	
Contribution toward shared staff person (over 2years)	WMWA		20,000-30,000	