LOWER MINNESOTA RIVER
WATERSHED DISTRICT

Executive Summary for Action

Lower Minnesota River Watershed District Board of Managers Meeting
Wednesday, November 16, 2022

Agenda Item
Item 6. H. – LMRWD Projects

Prepared By
Linda Loomis, Administrator

Summary

i. Area #3 MN Riverbank Stabilization Project Update

The last update provided to the Board of Managers was in April 2022. An update is attached for the Board's information.

Soil borings require a permit from the MN Department of Health. The application for a permit requires a signature from the property owner. The LMRWD is working to obtain the land owner's permission.

Attachments
Technical Memorandum – Area 3 Minnesota Riverbank Stabilization Project Update, dated November 10, 2022

Recommended Action
No recommended action – for information only

Young Environmental Consulting Group, LLC

Technical Memorandum

To: Linda Loomis, Administrator
Lower Minnesota River Watershed District (LMRWD)

From: Katy Thompson, PE, CFM
Erica Bock, Water Resource Scientist
Hannah LeClaire, PE

Date: November 10, 2022

Re: Area 3 Minnesota Riverbank Stabilization Project Update

Since the last board update and approval of the comprehensive workplan for the Area 3 Minnesota Riverbank Stabilization project (Project or Area 3) in April 2022, work has been progressing on the design. The following memo provides an overview of the project background for the newest members of the Lower Minnesota River Watershed District (LMRWD) board of managers, as well as an update on the work completed.

Project Background

Area 3 is located within the LMRWD's Steep Slopes Overlay District, adjacent to the Minnesota River and southeast of Flying Cloud Airport in Eden Prairie, Minnesota (Figure 1). Area 3 experiences intense erosion along the steep slopes on the north side of the Minnesota River. Steep slopes, susceptible soils, and changes in river stage are all primary drivers of slope instability. The Area 3 Minnesota Riverbank Stabilization project aims to stabilize the erosion that is taking place along the bluffs of Area 3. The following timeline summarizes the work that was completed as part of the Project up to the most recent project kickoff meeting in August 2022:

February 2021	•LMRWD awarded the Area 3 Minnesota Riverbank Stabilization project to Inter-Fluve
May 2021	•LMRWD, Young Environmental Consulting Group LLC (Young Environmental), and Inter-Fluve met to discuss the causes of riverbank erosion at the Project site. •Causes of erosion include: •Natural progression of the river meander •Groundwater seepage present at the base of the slope saturates the soil and weakens the integrity of the bluff •Previous bank stabilization attempts by the City of Eden Prairie (City) may have exacerbated the erosion by preventing the river from migrating downstream. Armoring the river upstream of the Project site is pushing the river's forces into the Area 3 toe slope.
Winter 2021	•Inter-Fluve developed a conceptual design to address the riverbank erosion which included: •Armoring the toe with launchable riprap •Removal of the City's stormwater pond and bank armor to allow the river to migrate naturally •Inter- Fluve and Young Environmental developed a cost estimate of $4.6M to stabilize the Area 3 riverbank
February 2022	•Young Environmental coordinated with Barr Engineering (Barr) to evaluate the geotechnical characteristics of the upper slope. •Barr completed a preliminary global stability analysis using soil borings and piezometer readings from 2008 and 2010. •Result: The proposed concept design by Inter-Fluve will not impact the bluff slope •Barr recommended collecting additional soil borings further up on the bluff for verification of the preliminary analysis.
March 2022	• Legislative handout (Attachment 1) was develop, includeing estimated project costs and shared with the legislature by the LMRWD's legislative liason to secure bond funding. The Project funding request was unsuccessful.

April 2022	• Decision was made to move forward with the project after recieving approval from the Minnesota Pollution Control Agency to remove the City's stormwater pond. LMRWD approved the updated Project workplan included in Attachment 2. • The workplan includes the development of 60% plans for the legislature session in 2023 to renew the LMRWD's request for construction funding for the Project.
August 2022	• Project kickoff meeting with the LMRWD administrator, Young Environmental, Barr, and Inter-Fluve. • The team agreed to move forward with the approved workplan (Attachment 2) and expedite the 60 percent plans schedule to meeting the January 2023 deadline.

Public Outreach and Site Visits

After the project kickoff meeting in August 2022, Young Environmental began outreach efforts to notify residents of the upcoming field work and facilitate a neighborhood meeting and site visit.

Neighborhood Meeting—October 25, 2022

On October 25, 2022, the LMRWD hosted a neighborhood meeting with residents on Riverview Road to discuss the project background and field data collection needs, determine access routes for the drill rig for soil borings, and answer resident questions. In attendance were residents, the LMRWD administrator, Young Environmental, American Engineering Testing (AET), Barr, the City, and Inter-Fluve. A full summary of the neighborhood meeting is attached (Attachment 3). Table 1 (below) summarizes the questions and answers that were discussed at the meeting.

Table 1. Summary of Questions and Concerns at the Neighborhood Meeting

Question/Concern	Answer
How will the project be funded?	The project is large and too expensive for either the LMRWD or the City to fund independently. Therefore, the LMRWD will continue to request bond funding from the legislature.
Are the homes on the bluff in danger?	Barr informed the residents that the initial results of the preliminary analysis indicated the slope would continue to erode and flatten until stability is achieved and from a global failure perspective, the homes are not in danger. However, new soil borings are needed to confirm the types of soils present on the upper slope of the bluff and to determine the elevation of the groundwater table. Barr also noted that the inclinometer monitoring only showed signs of surficial topsoil movement and no signs of movement before a large failure was observed.
A resident at 12613 Riverview Road is concerned about gully erosion in her backyard.	Photos of the erosion were taken and compared to information from 2020 (Attachment 4). Gully erosion has progressed due to: 1. Extensive tree clearing 2. Drainage from a slotted drainpipe that enters the gully Young Environmental recommends reaching out to residents to provide education on gully and steep slope management and to clarify that the intent of the Project is to stabilize the river toe and prevent global erosion, not to stop localized gully erosion.

Site Visit—October 25, 2022

After the neighborhood meeting concluded, Young Environmental, AET, Barr, Inter-Fluve, and the City completed a site walk to look at potential access routes for AET to collect the geotechnical borings. Barr and AET determined the best access route for the soil borings was along the existing City right-of-way on Riverview Road, shown in Figure 1. Barr and AET noted that there were two small trees on the City right-of-way that would need to be cut down. The City confirmed that they could remove the trees and would be able to unlock the gate to give access to AET on the date of the soil borings, but would need to be notified in advance. On a subsequent site visit on October 31, 2022, Young Environmental confirmed that the trees were removed.

Outfall Condition

During the site visit, Young Environmental also assessed the condition of the City's stormwater pond, Pond 35-23-A, and outfall. The City constructed Pond 35-23-A in 1997 to comply with the Minnesota Pollution Control Agency's stormwater treatment requirements. To objectively inspect the outfall and condition of the pond, Young Environmental used the Minnesota Department of Transportation's (MnDOT) HydInfra Inspectional Manual for culvert and storm drainage systems. HydInfra is an asset management rating system used by MnDOT to assess the conditions of stormwater infrastructure in the field. MnDOT has developed a manual to allow others to utilize this methodology. The inspection criteria according to the manual are based on factors such as structural integrity and the integrity of the surrounding metal. The ratings range from 0 to 4, with 0 being not able to rate or not visible, 1 being excellent—like new condition, and 4 being severe—serious deterioration. Not included in the condition rating is the need for cleaning, plugged infrastructure, sediment percent full, water observed, and water percent full.

The outfall consists of a 36-inch concrete pipe, apron, and trash guard and appeared to be in good condition. The outfall was clean and had no standing water in the pipe nor any separation of the apron, misalignment, or joint separation. The pipe and apron condition rating was 2—fair condition, with some wear but structurally sound (Attachment 4). Given that the proposed design involves removing the stormwater pond and there is extensive erosion due to discharge from the pipe, it is likely that the design of the pipe needs to be modified and the pipe needs to be replaced.

Since the pond's construction, it has been inundated by the Minnesota River multiple times. Under present conditions, the pond is completely filled with sediment and willows. A large scour channel draining to the Minnesota River has formed at the outlet of the outfall pipe. The incision of the channel has led to the outfall pipe now being suspended above the former pond bottom. Overall, the pond was given a HydInfra condition rating of 4 (severe condition, serious deterioration; Attachment 5).

Conceptual Design Meeting—October 31, 2022

As part of its conceptual design process, Inter-Fluve hosted an on-site conceptual design meeting on October 31, 2022, to obtain additional survey data for further topographic assessment of the City's stormwater pond and stormwater inlets. Young Environmental and Inter-Fluve discussed the following topics:

- The toe design extents and impacts to the City's storm sewer outfall and pond area.
- The proposed design—launchable riprap—and the potential for the involvement of bioengineering for habitat restoration along the Minnesota River.
- Options for the treatment of stormwater with the loss of the City's stormwater pond.

Existing Conditions Analysis

After the project kickoff meeting in August 2022, Young Environmental began working on the existing conditions analysis of the City's outfall and stormwater pond.

Construction Plans

The 1985 feasibility report for the Bluffs West Vicinity, provided by the City, indicates that Pond 35-23-A was intended to hold water "for sedimentation and weed control purposes with an additional four feet to the top of the bank for temporary holding capacity" up to a 10-year flood event. The 1986 record plans indicate that the pond should have been 5.8 feet deep, from pond bottom (elev. 702) to the top of the pond berm (elev. 707.8), with a final normal water elevation of 705. The outlet control structure consisted of a weir leading to a 21-inch concrete pipe that discharges to the Minnesota River. However, during the site visit, it appeared that the outlet control structure was either been completely buried by sediment, or washed out due to frequent inundation by the Minnesota River. Photo comparisons from the 2020 Gully Inventory and Condition Assessment and the site visit are provided in Attachment 6.

Modeling

To estimate the surface runoff draining to the outfall and stormwater pond, Young Environmental staff examined the upstream watershed characteristics including drainage area, topography, land use, soil type, and storage capacity. The primary land use is residential, and the soils consist of sandy loams and loamy sands categorized as Hydrologic Soil Group Type A. There is one stormwater pond in the upstream watershed that provides moderate attenuation of stormwater runoff. Based on these characteristics, the weighted curve number of the drainage area is estimated to be 54. This analysis of the upstream watershed will be used to design and properly size the outfall structure that will convey surface runoff to the Minnesota River while minimizing erosion at the outlet of the outfall.

Next Steps

Young Environmental will continue with the Area 3 workplan as proposed in April 2022 and advance the outfall design and permitting process. Outfall design will include coordination with the City of Eden Prairie to ensure the City's needs are met. We recommend sharing information with the residents who attended the neighborhood meeting, including the revised soil boring schedule and access locations, educational information on gully and steep slope management, as well as reiterate that the LMRWD Area 3 project is intended to stabilize the toe of the slope at the river—not to prevent localized erosion on the upper slope (i.e., gullies).

Attachments

Figure 1—Area 3 Location Map

Attachment 1—Area 3 Legislative Handout

Attachment 2—Area 3 Kickoff Meeting Summary

Attachment 3—Area 3 Neighborhood Meeting Summary

Attachment 4—Pipe HydInfra Assessment

Attachment 5—Pond HydInfra Assessment

Attachment 6—Area 3 Photo Comparision

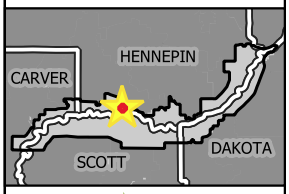
Minnesota River Area 3 Proposed Soil Borings and Access Routes

LEGEND

- October 25, 2022 Meeting Location
- Approximate Locations of Proposed Borings
- Minnesota River Area 3 Project Extents
- Hennepin Co. Parcel Data
- County Boundaries
- Public Waterbodies
- LMRWD Boundary
- City of Eden Prairie Stormwater Pond

For more information about the Area 3 Project, please visit:
http://lowermnriverwd.org/projects/study-area-3-eden-prairie

LMRWD Watershed Location Map



Young Environmental Consulting Group, LLC

LOWER MINNESOTA RIVER
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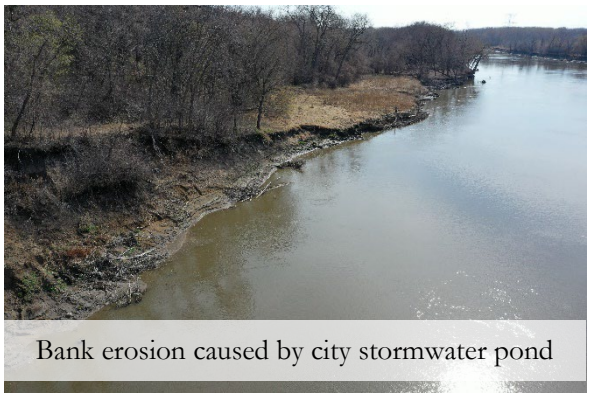
EDEN PRAIRIE AREA 3

Located on the north bank of the Minnesota River, this area has been prone to erosion for some time. The Lower Minnesota River Watershed District, in partnership with the City of Eden Prairie, has evaluated options to stabilize the slope, protect public and private infrastructure, and prevent future degradation of the Minnesota River water quality resulting from Area 3 bank erosion.

PROBLEM



Bank erosion caused by city stormwater pond

- The underlying soils and groundwater seeps, combined with bluff development and erosive flows from the Minnesota River, have destabilized the slope and resulted in continual erosion since at least 2008.
- Using inclinometers, the Lower Minnesota River Watershed District (LMRWD) has monitored slope movements since 2010. However, geotechnical engineers have warned the LMRWD that due to the nature of the soils in Area 3, the slope is more likely to catastrophically fail without advanced warning.
- The City of Eden Prairie has a stormwater pond just downstream of Area 3 that is acerbating the natural erosion processes of the river on the slope, causing further instability.
- This is a larger, more complex problem than either the LMRWD or the City can tackle alone.

SOLUTION

1. Remove the city stormwater pond, capture city stormwater currently being directed to the pond, and convey it to the Minnesota River in a less erosive and bank-destructive manner.
2. Armor the bluff toe and flatten the slope as needed to protect the slope from the Minnesota River.

REQUEST

- To complete the construction, the estimated cost is $4.6M.

For more information, contact Linda Loomis, LMRWD Administrator
Email: admin@lowermnriverwd.org | Phone: (763) 545-4659

Draft Summary

PROJECT NAME: Eden Prairie Area 3 Kickoff Meeting

DATE: August 19, 2022

TIME: Noon–12:36 p.m.

ATTENDEES

- Barr Engineering (Barr): Karen Chandler, Brent Theroux
- Inter-Fluve: Maren Hancock, Jonathon Kusa
- Lower Minnesota River Watershed District (LMRWD): Linda Loomis
- Young Environmental: Katy Thompson, Della Schall Young

SUMMARY

1. ~~Introductions~~
2. Brief project background and components

   Katy provided a brief overview of the recent project history:

   - Barr recommended soil borings on the bluff to confirm assumptions and validate the results from the January 31, 2022, *Preliminary Stability Analysis Results* memo.
   - Inter-Fluve developed conceptual toe designs, but its recommendation was to remove the City of Eden Prairie stormwater pond and armoring to allow the river meander to migrate away from Area 3 before the sediment delta washes out. A hold was put on the project design while the LMRWD worked with its legislative liaison to obtain funding from the Minnesota Legislature based on the rough construction costs Inter-Fluve provided in February 2022.
   - The LMRWD board approved an updated work plan for Area 3, inclusive of the project scopes from Barr and Inter-Fluve, on April 15, 2022.
   - Young Environmental will provide project management and permitting support.
   - Since the work plan was approved, the City of Eden Prairie received approval from the MPCA in July 2022 to decommission the stormwater pond.
   - The LMRWD is now ready to move ahead with collecting field data and developing the 90 percent plans!
3. Schedule

   Katy asked if there was anything within Barr's or Inter-Fluve's workplans that is time-sensitive or dependent on others to complete? Also, is there an ideal time to complete the field activities?

   - Contracts
     - Barr will need to create a task order from the February 11, 2022, estimate to execute through the LMRWD's engineering pool.

    - Inter-Fluve will provide a draft amendment to its previous contract with the LMRWD.
- Supply chain disruptions
    - Brent noted the soil borings may be affected by supply chain issues for the instrumentation and drilling equipment, but because the borings are validating Barr's assessment, the delays should not affect Inter-Fluve's design.
    - Brent will schedule the borings as soon as possible but expects a minimum four-week lead time for the drillers. Frozen ground is acceptable, but snow and ice on the slope could delay the borings further.
    - Brent will put potential soil borings on a map and give it to Katy, who will coordinate with the city and residences to get access.
- Staff schedules
    - Maren will be on maternity leave starting January 2023 (congrats!); Jonathon will take over during that time but is expecting a six-month effort to get through 90 percent design.
    - The survey would ideally be completed after leaf off (or in the first half of October).
    - Della and Linda will coordinate with the legislative liaison to determine what the hard deadline is for the 90 percent package; however, for now, Della wants to target March 2023 for the final 90 percent package. Della and Linda will provide more guidance in the next couple weeks.
    - Bathymetry work can be collected anytime, provided river conditions are adequate.
    - Inter-Fluve will need property access; Katy and Maren will coordinate.
- Overall project schedule
    - Katy will provide a draft schedule for comment based on the provided scopes.

ACTION ITEMS

No.	Item	Responsible Party	Status
1	Provide LMRWD with updated task order or amended contracts	Barr and Inter-Fluve	In progress
2	Soil boring map	Barr	
3	Deadline for 90 percent package	Della and Linda	
4	Draft schedule	Katy	Complete—see attached

LOWER MINNESOTA RIVER
WATERSHED DISTRICT

Area 3 Comprehensive Design Development - Draft Schedule
August 31, 2022

		Start Date	End Date	Aug-22				Sep-22				Oct-22				Nov-22					Dec-22				Jan-23				Feb-23				Mar-23				Apr-23				May-23				
Obj. 1	Project Management																																												
1-1	Project Coordination Meetings																																												
1-1.1	Kickoff mtg	8/19/22	8/19/22		X																																							
1-1.2	Monthly coordination mtg	9/1/22	5/1/23						X					X								X					X				X					X								
1-2	Board Updates	10/1/22	5/31/23													X					X								X								X							X	
Obj. 2	Data Collection, Conceptual Design, and Coordination																																												
2-1	Piezometers and soil borings	9/30/22	12/29/22							X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X																				
2-2	Topographic survey	10/1/22	10/30/22								X	X	X	X	X	X																													
2-3	On-site stormwater pond conceptual design mtg	10/1/22	10/15/22								X	X	X																																
2-4	Conceptual design	10/16/22	10/30/22										X	X	X	X	X	X																										
2-5	Field data results meeting	10/31/22	11/14/22													X	X	X																										
Obj. 3	Prelim Design (60%)																																												
3-1	60% design development (bank design)	10/31/22	11/30/22											X	X	X	X	X	X	X	X																							
3-2	HEC-RAS 1D model for no-rise permit	12/1/22	12/22/22														X	X	X	X	X	X	X																					
3-3	Outfall design	10/31/22	11/30/22											X	X	X	X	X	X	X	X																							
3-4	60% design review	12/23/22	1/13/23																		X	X	X	X	X	X																		
3-5	60% design review mtg	1/14/23	1/28/23																						X	X	X																		
Obj. 4	Permitting																																												
4-1	Pre-permit regulatory agency meetings	1/14/23	2/13/23																						X	X	X	X	X	X															
4-2	Speciality permitting (Phase 1)	2/14/23	3/16/23																										X	X	X	X	X	X											
4-3	Permit applications	3/17/23	5/16/23																														X	X	X	X	X	X	X	X	X	X	X	X	X
Obj. 5	Final Design (90%)																																											
5-1	90% design development	2/21/23	4/22/23																								X	X	X	X	X	X	X	X	X	X	X	X							
5-2	90% design review	3/21/23	4/4/23																														X	X	X	X									
5-3	90% design review meeting	4/5/23	4/19/23																																		X	X	X						

X	Ideal dates
X	Tentative or float

Meeting Summary

Project Name: Eden Prairie Area 3 Geotech Neighborhood Meeting and Site Walk

Date: 10/25/2022

Time: 9–10:30 a.m.

Attendees

- American Engineering Testing (AET)
- Area 3 Residents: Darrel Amiot (12529 Riverview Road), Jim Rohde (12473 Riverview Road), Mabel Sun (12585 Riverview Road)
- Barr Engineering (Barr): Brent Theroux
- City of Eden Prairie: Patrick Sejkora
- Inter-Fluve: Maren Hancock
- Lower Minnesota River Watershed District (LMRWD): Linda Loomis
- Young Environmental: Katy Thompson, Erica Bock

Summary

1. Introductions
2. Brief project background and components
    - Katy provided a brief overview of the project background and a recent project history.
    - Brent provided information about the locations and data to be collected with the new soil borings.
    - Maren provided information on the recommended alternative—launchable rip rap—to protect the failing toe.
    - Patrick provided information on the existing stormwater pond, removal, and how it is contributing to the current failing slope issue.
3. Resident questions
    - Who is paying for the project?
        - Linda answered that the watershed has the power to levy tax, and the LMRWD is asking the legislature for $4M in funding.
    - Are the homes in danger?
        - Brent answered that his preliminary analysis considered global failure of the slope (i.e., a rotational failure) caused by river scour. The initial results indicated the slope would continue to erode and flatten, until stability was achieved and that—from a global failure perspective—the homes will not be in danger. The preliminary analysis relied on soil borings collected at the river's edge, and new soil borings are needed to confirm whether the same types of soil are present, the location of the groundwater table, and to validate the preliminary modeling. He noted that the soils in the area are predominantly sands, which do not show signs of movement before a large failure.
        - Mabel said that her neighbor at 12613 Riverview Road (Patricia Korte, who was unable to attend because she had already moved to Florida for the winter) has been losing several inches of ground to erosion and is concerned that her pool is moving.

Meeting Summary *(continued)*

Mabel said that Patricia has been placing vegetation and brush cuttings in these areas to prevent erosion.

4. Neighborhood meeting concluded at approximately 9:30 a.m.
5. Site walk (9:30–10:30 a.m.)
    a. AET, Barr, Linda, Young Environmental, Inter-Fluve, Patrick, and Mabel walked to the upper slope between 12585 Riverview Road and 12613 Riverview Road to look at potential access routes for the geotechnical borings. Behind 12613 Riverview Road, staff noted a slotted downspout that appears to discharge to the ravine between 12585 and 12613 Riverview Road and may be contributing to the degradation of the ravine behind the homes. Resident Mabel showed us the continuingly failing slope and the brush that was filling the ravine.
    b. Barr and the AET representative walked farther downslope to stake the soil boring locations and consider potential access routes, given the extreme slopes.
    c. The preferred access route was determined to be along the City right-of-way for the eroded portion of Riverview Road. AET noted two dead trees that will need to be cut so the drill rig can access the boring locations. The City will contact its Park Department to remove these snags. If the City cannot, AET can cut down the trees; however, it would require a change order to the contract.
    d. Erica, Katy, and Patrick walked from Riverview Road to the City of Eden Prairie's stormwater pond and inspected the outfall and condition of the pond. The concrete apron and trash guard appeared to be in good condition, but the channel showed signs of erosion. The pond was barely discernible because it was filled with sediment. The remnants of the 2012 bioengineering attempts were also noted along the river side of the pond. The site walk concluded at 10:30 a.m.

Action Items

a. Katy will draft a letter/email to residents notifying them that AET will NOT need to access the boring locations via their properties and will instead use the trail within the City's former Riverview Road right-of-way.
b. Brent will coordinate with AET to complete the Minnesota Department of Health application and approval and confirm the date AET will be on site to collect soil borings.
c. Brent will coordinate with Patrick to determine if the City can clear the dead trees by next week.

Pipe Condition Assessment

November 4, 2022

Status: In place

Pipe ID:	STM - N35 - 5470	
Condition Rating:	2 - Fair Condition	
Inspection Date:	10/25/2022	
Pipe Shape:	Round	
Material:	Concrete	
Length:	70 feet	
Diameter:	36 inches	
Cover:	0-2 ft	
Maintenance Recommendations		
	Inspection Flag	Notes
Clean	No	sediment build up is less than 30% of pipe height
Plugged	No	
Water Observed	No	
Water Levels	No	
Structure Condition		
	Inspection Flag	Notes
Repair	No	
Repair Under Road	No	
Deformed	No	
Standing Water	No	There is supposed to be standing water after outfall
Infiltration	No	
Silt Present	**Yes**	silt present below outfall
Piping	No	
Cracks	No	
Spalling/Flaking	No	
Pitting/Rusting	No	
Separated Apron	No	
Misalignment	No	
Joint Separation	No	
Holes	No	
Roadway and Embankment Condition		

	Inspection Flag	Notes
Inslope Cavity	No	
Erosion	**Yes**	Erosion at outfall leading to scour and channel degadation caused by high water flows.

Pond Condition Assessment

November 4, 2022

Status: In place

Pond ID:	35-23-A	
Condition Rating:	4 - Severe Condition	
Inspection Date:	10/25/2022	
Maintenance Recommendations		
	Inspection Flag	Notes
Clean	**Yes**	Pond is no longer functional and completely filled with sediment.
Plugged	No	
Water Observed	No	No water in the pond
Water Levels	No	No water in the pond
Pond Condition		
	Inspection Flag	Notes
Repair	**Yes**	Pond is no longer functional
Inlet Structure	Yes	See apron condition assessment
Outflow Structure	**No**	No longer present
Standing Water	**No**	No permanent pool as per plans; outlet structure no longer present
Siltation	**Yes**	Pond is no longer functional
Pond Liner	Not Applicable	-
Embankment Liner	Not Applicable	-
Pond Vegetation	**Yes**	Willows abundant
Pond Erosion	**Yes**	
Pond Backup	No	
Embankment Condition		
	Inspection Flag	Notes
Embankment Cavity/Void	No	
Embankment Settlement	**Yes**	Embankment
Vegetation Established	Yes	Willows abundant
Invasive Species/Noxious Weeds	**Yes**	Some buckthorn observed
Erosion	**Yes**	Eroded gully from outfall to MN River; embankment erosion from MN River
Piping	**Yes**	Eroded gully from outfall to MN River

Area 3 Photo Comparison

May 5, 2020 vs. October 25, 2022

1. Looking east at 12641 Riverview Rd (white arrows are reference points)

May 5, 2020

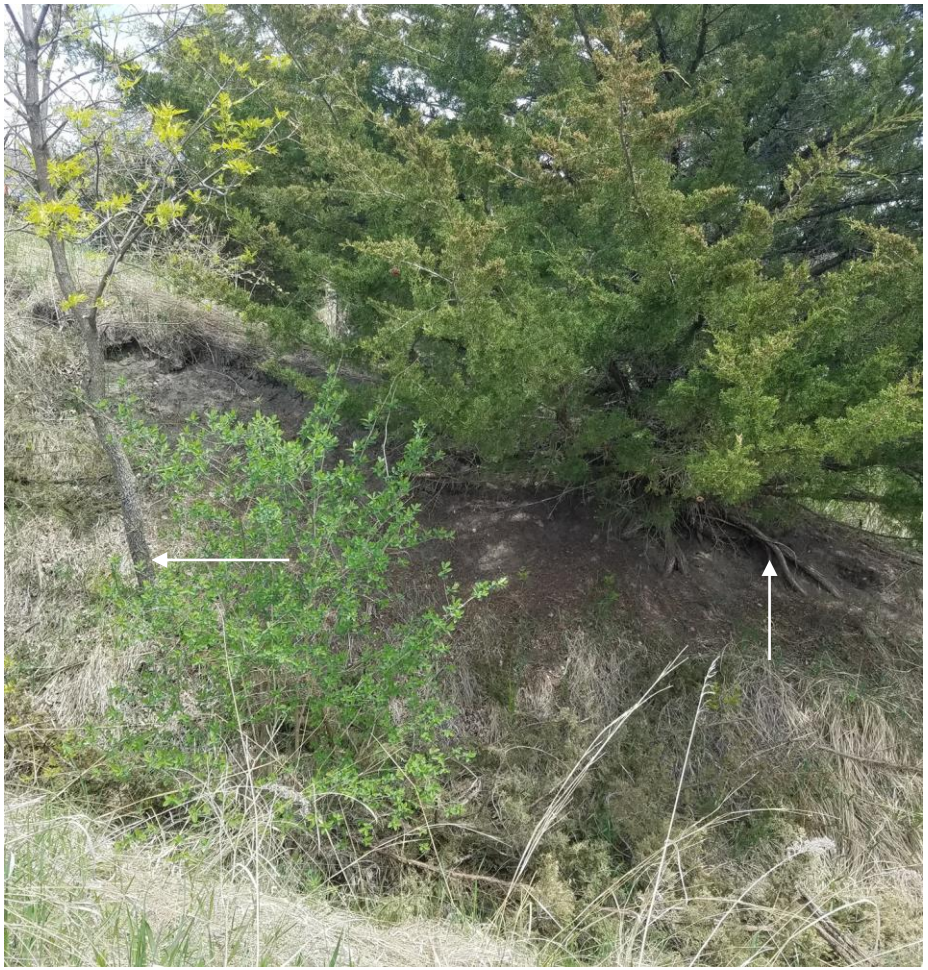
October 25, 2022

2. Looking south at gully from 12613 Riverview Rd (white arrows are reference points)

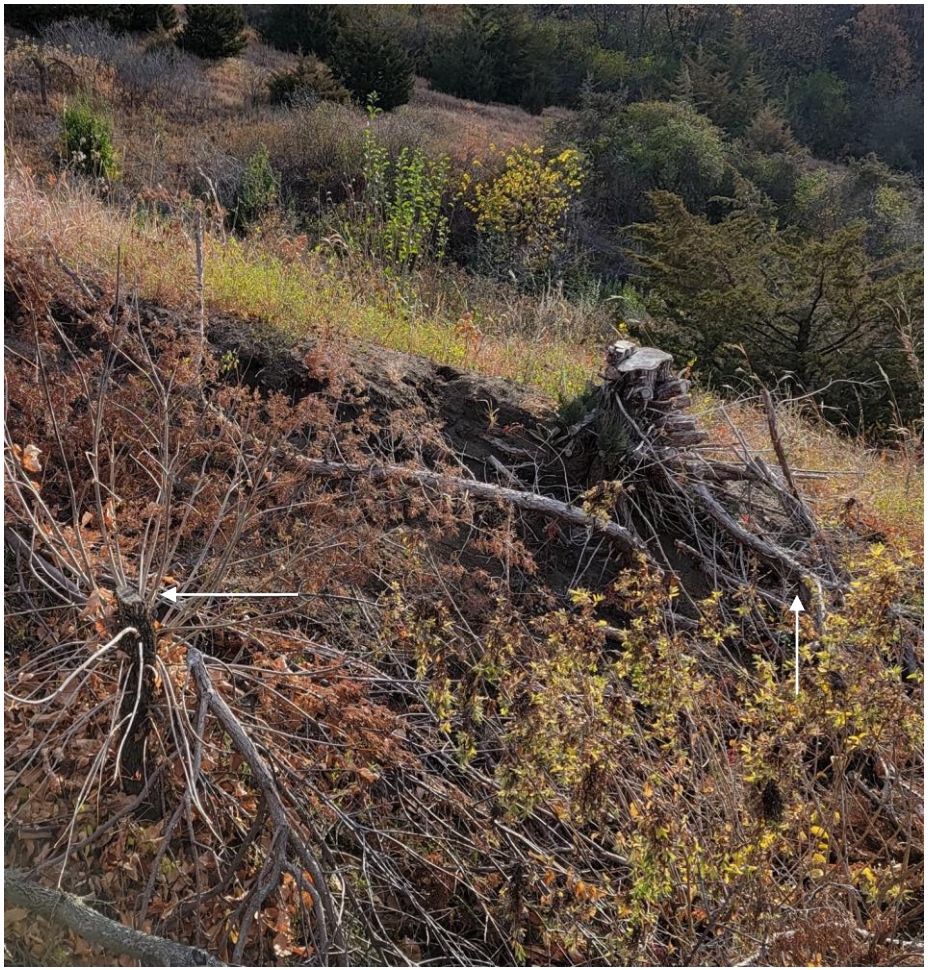
May 5, 2020

October 25, 2022

3. Looking east at gully from 12613 Riverview Rd (white arrows are reference points)



May 5, 2020



October 25, 2022

4. Looking north at 12613 Riverview Rd (white arrows are reference points)

May 5, 2020

October 25, 2022

5. Looking upstream at Area 3 erosion

July 28, 2020

October 25, 2022

July 28, 2020

October 25, 2022