LOWER MINNESOTA RIVER
WATERSHED DISTRICT

September 2019 Administrator report
From: Linda Loomis, Administrator
To: LMRWD Board of Managers

In addition to items on the meeting agenda, work continues on the following District projects and issues:

Other Work

Prairie Conservation Area
Karen Galles, Natural Resource Manager for Hennepin County has been working with her habitat restoration team, the US Fish & Wildlife Service and the City of Eden Prairie on some habitat restoration in the Prairie Bluffs Conservation Area, in an area with a minor ravine system. Karen contacted the LMRWD to see if there is interest from the Watershed District.

Karen is looking for information about the hydrology and current state of the system and find out if it's possible to do habitat restoration (e.g. tree removal) without destabilizing the system. Specifically Karen is looking for the following:

1. Has the WD done any study or analysis of ravines in this area that could be useful to us as we scope this project?
2. Does the LMRWD have any information about stormwater for the neighborhood at the top of the hill? The city of Eden Prairie is checking this too.
3. The County is planning to retain an engineering firm to help figure out what (if anything) we could do here - does that seem like a good next step?

LMRWD staff spoke with Karen about investigating the area and recommending remediation for erosion issues. The LMRWD indicated that we could help with the work. Karen is looking for funding for the project.

MN Greenway Wetland delineation
The DNR held a meeting to discuss impacts the MN Greenway will have on wetlands along the alignment. I was not able to attend the meeting; however Della attended on behalf of the LMRWD.

Joint Carver/Scott Board meeting
The LMRWD was invited to a joint meeting of the Carver County Board of Commissioners and the Scott County Board of Commissioners. Scott Water Management Organization and Carver Water Management Organization were also present. The Boards wanted to learn about what the LMRWD does and its relationship with adjacent Water Management Organizations.

Riley/Purgatory/Bluff Creek Watershed District (RPBCWD) TAC meeting
I attended a meeting of the RPBCWD TAC. The topic of discussion was a flood inundation study. This is a pilot study with the City of Bloomington to look at area that are prone to flooding and prioritize mitigation of the flooding and protecting critical infrastructure.

SCALE meeting
The LMRWD attended a meeting of the Service Delivery Committee of the Scott County Association for Leadership and Efficiency (SCALE) in Jordan September 16th. The Committee wanted to learn about the floodplain rules the LMRWD is implementing.

MN River Boat Tour
The MPCA and the Savage Chamber of Commerce have each been invoiced for one third of the cost of the MN River Boat Tour. Feedback was very positive from both partners and those on the tour.

Watershed Plan Projects

Eden Prairie Area #3 Stabilization: Staff will be organizing a meeting between all the parties (Barr, Braun Intertech, Wenck and Stanley Group) that have had a hand in installation and reading of the inclinometers at Area #3 in Eden Prairie. We want to get everyone together and to look at the data and evaluate what it means. Staff would like to develop a recommendation for the Board about how the LMRWD moves forward.

Riley Creek Cooperative project/Lower Riley Creek restoration - No new information has been received since the last update. Project website: http://www.rpbcwd.org/whats-happening/projects/lower-riley-creek-ecological-restoration

Seminary Fen ravine stabilization project: Lisa Frenette has reached out to John Jaschke, Commissioner, and Angie Becker Kudelka, Assistant Director for Strategy & Operations, about the decision by BWSR to not fund the LMRWD grant. The issue is that BWSR does not have funds since the contract expired. Payment of grants must be requested before the expiration of the grant. Ms. Frenette has said they are willing to work with the LMRWD to replace the grant funds.
Project website: http://lowermnriverwd.org/projects/bwsr-clean-water-fund-grant-administration

East Chaska Creek: (Carver County Watershed Based Funding): The LMRWD has applied for permits from the US Army Corps of Engineers, the DNR and the City for this project. Once permits have been received the LMRWD will request authorization from the City of Chaska to go ahead with this project. All permits and authorization from the City are needed before bids for construction are solicited. Project website: http://lowermnriverwd.org/projects/east-chaska-creek-bank-stabilization

Schroeder Acres Park (Scott County Watershed Based Funding): This project has not begun and staff developing a cooperative agreement between the city and the LMRWD. Project website: http://lowermnriverwd.org/projects/schroeder-acres-parkeagle-creek-sub-watershed-stormwater-study

Shakopee Downtown BMP Retrofit (Scott County Watershed Based Funding): A draft agreement between the city and the LMRWD has been prepared and is awaiting approval from legal counsel and the City. Project website: http://lowermnriverwd.org/projects/targeted-bmps-downtown-shakopee

PLOC (Prior Lake Outlet Channel) Restoration (Scott County Watershed Based Funding): The draft agreement between the City and the LMRWD will be prepared using the draft prepared for the Downtown BMP Retrofit as a model. Project website: http://lowermnriverwd.org/projects/prior-lake-outlet-channel-realignmentwetland-restoration

Dakota County Fen Gap Analysis and Conceptual Model (Dakota County Watershed Based Funding): Staff had a teleconference with the Dakota SWCD and BWSR to discuss progress of this project. BWSR had asked for the LMRWD to change the language in the work to better define the deliverables and the work product of the project. After the phone conversation BWSR said the LMRWD should wait to amend the language of the workplan. BWSR said the floristic assessment did not qualify for the grant. However, the other work related to the project will exceed the amount of the grant and the LMRWD had planned to do much of this work before the grant opportunity presented itself. Project website: http://lowermnriverwd.org/projects/dakota-county-fen-study-management-plan

Hennepin County Chloride Project (Hennepin County Watershed Based Funding): An update on this project was received September 10th on this project. The county-wide project consisted of a survey of commercial property owners and managers. The survey has been completed and the results are being collated. The MPCA and Fortin Consulting has developed and been holding winter maintenance classes for commercial property managers and winter maintenance contractors.

Vegetation Management Plan: The draft vegetation management plan and a brochure to be used in public outreach is complete. Once I complete a review of the documents staff will ask LMRWD's municipal partners for feedback. Staff intends to have this information posted to the LMRWD website so that residents can use the information to manage vegetation on private property.

Sustainable Lake Management Plan - Trout Lakes: This project is currently on hold while staff works on other projects.

Geomorphic Assessment of Trout Streams: This project was submitted to MAWD for a presentation at the Annual Meeting and Conference. The final report has not yet been assembled. It will be posted on the LMRWD website once the report is ready. And recommendations for future work will be in the report.

Spring Creek Cost Share: The Engineer's Report is complete and attached for Manager's review. Staff expects to provide this information to the city of Carver and develop a plan to move forward with stabilization plans for Spring Creek.

West Chaska Creek Re-meander: No new information to report since last update.

Project Reviews

MNDOT Trail - 494: No new information to report since last update.

MNDOT - TH5: The DNR has issued a public waters work permit for this project.

City of Chanhassen - Moon Valley Gravel Pit: No new information to report since last update.

City of Carver - Hawthorne Ridge: No new information to report since last update.

Metropolitan Airport Commission - Environmental Assessment Worksheet for MSP Concourse G Infill - I have reviewed the EAW and I didn't see anything of concern to the LMRWD.

City of Burnsville - Quarry Property, LLC - No new information on this project since last update.

City of Carver - Levee rehabilitation - No new information on this project since last update.

City of Carver - Jonathan Parkway upgrades - No new information on this project since last update.

City of Burnsville - CenterPoint Energy Training Facility - No new information on this project since last update.

City of Burnsville -5337 Properties, LLC: No new information on this project since last update.

City of Burnsville - Freedom Enterprises, LLC: No new information on this project since last update.

City of Burnsville - Industrial Equities - 250 River Ridge Circle North: - No new information on this project since last update.

City of Burnsville - United Properties - 12400 Dupont Avenue North: No new information on this project since last update.

CenterPoint Energy - sign replacement: No new information to report since last update.

City of Burnsville - Kraemer Mining: No new information to report since last update.

Dakota County - MN River Greenway: The DNR held a meeting that was reported above. Project website: **https://www.co.dakota.mn.us/parks/About/TrailPlanning/Pages/minnesota-river.aspx**

City of Shakopee - Jackson Township AUAR: No new information to report since last update.

City of Burnsville - CenterPoint Energy Lyndale Valve Replacement Project: No new information to report since last update.

City of Eden Prairie - C. H. Robinson: No new information to report since last update.

City of Burnsville - Burnsville Sanitary Landfill: No new information to report since last update.

City of Eden Prairie - Peterson Wetland Bank: No new information to report since last update.

City of Chanhassen - TH 101 Improvements: Staff held a meeting with Riley Purgatory, Bluff Creek Watershed District (RPBCWD) to discuss permitting for this project. The Board of Manager of the RPBCWD authorized the LMRWD to permit the project on its behalf. Legal Counsel for RPBCWD is preparing an agreement between the LMRWD and RPBCWS. Project website: **https://www.highway101improvements.com/**

City of Savage - 12113 Lynn Avenue: Since Mosaic has moved its operations to Hastings it is likely that this project will need to re-apply to the City of Savage. Therefore it will be removed from the list of projects beginning next month.

Cities of Richfield/Bloomington - TH 77 & 77th Street underpass: No new information to report since last update.

MNDOT - I494 Brush removal: No new information to report since last update.

MNDOT - TH 5 Signage projects: No new information to report since last update.

MPCA - MN River TSS TMDL: Staff is reviewing this report. Comments are due September 20th. You can reach the MPCA websites through a news article on the LMRWD website: http://www.lowermnriverwd.org/news/state-research-offers-fresh-look-troubled-minnesota-river

MPCA - Watonwan River Watershed Total Maximum Daily Load Study Draft Report and Watershed Restoration and Protection Strategy: Staff has completed its review of these two reports. Comments are attached and will be submitted to the MPCA.

City of Bloomington - MN Valley State Trail: No new information to report since last update. Project website: **https://www.dnr.state.mn.us/state_trails/minnesota_valley/plans.html**

Hennepin County - CSAH 61/Flying Cloud Drive: The most recent inspection report is attached.

MNDOT - I494/TH 5/TH 55 Mill & Overlay project: No new information to report since last update. Project website: **https://www.dot.state.mn.us/metro/projects/i494invergroveheights/**

MNDOT - I35W Bridge Replacement: No new information to report since last update. Project website: **https://www.dot.state.mn.us/metro/projects/i35wbloomington/index.html**

MNDOT - I494 from TH169 to Minnesota River: No new information to report since last update.

Scott County - TH 41/169/78 Interchange: No new information to report since last update. Project website https://www.scottcountymn.gov/1778/Highways-1694178-Interchange?PREVIEW=YES&PREVIEW=YES&PREVIEW=YES&PREVIEW=YES

City of Shakopee - Amazon Fulfillment Center drainage: Shakopee has acknowledged the receipt of our engineers estimate and will acknowledge the contribution of the amount designated in the report. The City has asked us what documentation the LMRWD wants. I will check with legal counsel.

MAC/LMRWD/MCWD boundary realignment: No new information to report since last update.

Fort Snelling - Dominion Housing: The LMRWD received an updated hydrology report, full plan set, and preliminary review response letter. The engineers for the project are submitting permit plans to the state for review. They would like the LMRWD to issue approval for the project at the October Board meeting. They are looking to us for a maintenance agreement for long term maintenance of the stormwater features.

The DNR released an EAW for this project August 26th. Comments are due September 25th.

USACOE/USFWS - Bass Ponds, Marsh & Wetland: No new information to report since last update. Project website: **https://www.scottcountymn.gov/1865/Bass-Ponds-EAW**

Upcoming meetings/events

- Upper Mississippi River Waterway Association - Annual Meeting, Thursday, September 19, 2019, 5:30pm, Southview Country Club, 239 East Mendota Road, West St. Paul, MN
- Metro MAWD - Tuesday, October, 15, 7:00pm Cap Region Watershed District, 595 Aldine Street, St. Paul

Memorandum

Young Environmental Consulting Group, LLC

DATE: August 1, 2019 *(Email transmittal)*

TO: Linda Loomis—Administrator
Lower Minnesota River Watershed District

FROM: Shane Soukup, Water Resources Scientist

Della Schall Young, PMP, CPESC

SUBJECT: Spring Creek Visit Summary
June 21, 2019, 3:00–4:05 p.m.
Spring Creek

WEATHER: 75°F, clear—per WeatherForYou

PRESENT

Shane Soukup—Young Environmental Consulting Group
Jeff Weiss—Barr Engineering

PURPOSE

Two residents from adjacent to Spring Creek (Creek) contacted the Lower Minnesota River with concerns about erosion on their respective properties. As a result, the District has asked its technical consultant to conduct a limited initial assessment of the area to determine the cause of the erosion and evaluate recommended solutons from the Carver County soil and water conservation district.

The pupose of the visit was to document the current state of eroding banks and the extent of the erosion and to determine the cause of the erosion.

GENERAL NOTES AND OBSERVATIONS

- **112 5th Street West, Carver, MN**
  - Met with the Deb Hartley at 112 5th Street West and discussed some of the issues they have with the Creek. They noted that the Creek has moved almost 30 feet northeast, encroaching into their backyard.
  - Photo 1 indicates with an arrow where the old streambed was located in the mid-1990s, according to the landowners, and the new location.
  - The landowners are concerned that the creek will continue to encroach into their backyard and eventually undercut their garage.
  - Photos 2–4 are of the existing streambed.
- **404 Broadway Street, Carver, MN**
  - The landowner at this location was not present.

- There are erosion issues on the left bank that are close to undercutting the garage in the backyard, indicated in photos 5 and 6.
- There are concrete slabs in the creek, indicated in photos 7–9, that appear to be left over from a retaining wall.

Photo #1

Photo #2

Photo #3

Photo #4

Photo #5

Photo #6

Photo #7

Photo #8

Photo #9

resourceful. naturally.
engineering and environmental consultants

BARR

Technical Memorandum

To: Della Schall Young, Young Environmental Consulting Group
From: Jeff Weiss and Kallie Doeden, Barr Engineering
Subject: Spring Creek Assessment Summary
Date: September 6, 2019
Project: 23101028.05

Introduction

Young Environmental Consulting Group contracted with Barr Engineering (Barr) to conduct a site assessment of the stream bank stabilization and erosion at two properties along Spring Creek in Carver, MN. Residents at the two properties (112 5th Street West and 404 Broadway Street; Figure 1) have raised awareness about erosion issues on their properties, and the Carver Soil and Water Conservation District (SWCD) has developed concept plans to stabilize each site. The purpose of this assessment was to develop an additional understanding of the erosion issues; estimate erosion extents and causes; and comment on the Carver SWCD concept plans.

Site Assessment

The two residential properties impacted by the stream bank erosion are located along Spring Creek in Carver, MN in Carver County and within the boundaries of the Lower Minnesota River Watershed District. Staff from Young Environmental Consulting Group and Barr visited the two properties located at 112 5th Street West and 404 Broadway Street on June 21, 2019. The concept plans completed by Carver SWCD are attached to this memorandum.

112 5th Street West

Site Visit

Barr and Young Environmental Consulting Group staff met with the homeowners from the 112 5th Street West property, who showed staff around and explained the stream changes they have seen over the years. Barr and Young Environmental Consulting Group staff inspected the upstream and downstream portions of the main stem of the creek that flows along the property. The homeowners report that the stream path of Spring Creek has moved approximately 25 feet closer to their home in recent years and that the channel is a few feet lower than it used to be. An abandoned stream bed was apparent where the residents said the stream was previously located. It has filled in significantly with sediment and the vegetation does not contain any woody species in the old channel. Homeowners are especially concerned with the rate of erosion and the proximity to the back of their garage. Photos 1 through 6 show several areas along this creek section.

Photo 1: Upstream section unaffected by significant stream bank instability. Structure is approximately 50-feet from the channel.

Photo 2: Stream section facing upstream directly behind garage (sudden drop-off on the right caused by recent erosion, new plant growth on the left, and a previously fallen tree caused by stream bank instability)

Photo 3: Downstream section of creek (new growth is on the right, eroded bank is on the left, and the stream path is relatively new). Barr staff in photo.

Photo 4: Area of stream path changes (from the left flows the incoming fork, to the right is the main stem of the creek, and in the center is the new growth and old stream path). Young Environmental Consulting Group staff, Barr staff, and residents in photo.

Photo 5: Small headcuts causing the stream to become incised.

Photo 6: Bank erosion looking towards the residence at 112 5th Street West. Bank is approximately 40 feet from the structure.

The active bank erosion area is approximately 50-60 feet long, with bank heights between 3-4 feet. The stream gradient in this area is rather steep; however, a survey was not completed to quantify the gradient. The homeowners have stated that flows have increased to the site in recent years, and attribute the increase to development within the watershed. Additional future development within the watershed has been proposed, so they are concerned that the flows will continue to increase.

Evidence observed in the field supports the residents' claim that the stream has moved and become lower. As noted above, an old channel is located nearby, and the channel within the erosion area has tall banks and lacks a sufficient connection to the floodplain. This is evidence that that stream has downcut. Barr and Young Environmental Consulting Group staff did not observe a "smoking gun" of a headcut in the area, but there were several small drops in the stream both within the area in question and in the steep channel upstream of the site.

The erosion observed is likely to continue if stabilization measures are not installed. The erosion does not appear to pose an immediate threat to any structures; however, given the changes the residents have reported in recent years, the system has been changing relatively quickly. Given the recent changes to the system, this site has a moderate level of urgency, meaning that the site should be examined at least once per year and, if possible, visit the site shortly after significant rainfall events to develop a better understanding of the magnitude of flows and velocities at this location. Additional stabilization measures should be installed within five years to minimize the risk of additional erosion; however, installing stabilization measures sooner than five years would be preferable.

Carver SWCD Concept Plan Assessment

The Carver SWCD concept plan includes removing fallen trees, using riprap to armor the channel were banks are eroding, and revegetating with deep rooted species. Barr concurs with the general concept with the following considerations:

1) Additional assessment of the hydrology should be completed to better understand potential changes that have already occurred and may occur into the future, and to help design stabilization measures.
2) Cross vanes should also be installed to provide additional grade control. They may also be used to elevate the stream bed to reconnect the stream to the former floodplain.
3) If the cross vanes cannot completely restore a floodplain connection, then additional grading should be considered to create a floodplain.

A rough estimate for this concept is $75,000, including construction costs, a 30% contingency on construction costs, engineering and design, and the considerations listed above. It would be reasonable to expect the cost to range between -25% and +40% of the estimate above, resulting in an approximate range of $55,000 to $105,000.

Alternative consideration

In a situation like this where the channel has moved, restoring the channel to the previous alignment is often a potential solution. It may be possible in this location; however, it is likely to cost more than the concept developed by Carver SWCD or otherwise stabilizing the channel in place. To restore the channel to the previous alignment, a relatively sharp meander would need to be restored in the midst of the steep channel slope. Flow energy in the channel is likely high due to the steep slope, so the banks would need to be armored in the meander. Furthermore, a significant amount of sediment has already been eroded from the new channel alignment. It is unlikely that accumulated sediment in the old channel would be sufficient to fill the new channel, therefore, additional fill may be necessary to fill the relatively new channel. If the new channel is not completely filled, then it may remain a preferential flow path during high flow events.

A rough estimate for this concept is $114,000, including construction costs, a 30% contingency on construction costs, engineering and design, and the considerations listed above. The main difference between the two estimates is the additional excavation needed to move the channel, plus the additional clearing and restoration that would be required. It would be reasonable to expect the cost to range between -25% and +40% of the estimate above, resulting in an approximate range of $86,000 to $160,000.

404 Broadway Street

Site Visit

The residents from the 404 Broadway Street property were not available, so Barr and Young Environmental Consulting Group staff inspected the portion of Spring Creek that flows along the property. The stream path of Spring Creek has made significant changes, as is evident by the damage to the existing retaining wall and erosion along the stream banks. It is unknown when the retaining wall was breeched and erosion began to pose an immediate threat to the garage; however Google Earth imagery suggests the stream has been moving closer to the garage since 2012. Photos 7 through 10 show several areas of along this creek section.

Photo 7: Upstream section with noticeable change in stream path

Photo 8: Downstream section of stream with significant erosion encroaching on the garage and damaged retaining wall

Photo 9: Close-up of recent erosion that is within a foot or two of the homeowner's garage

Photo 10: Close-up of damaged retaining wall most likely caused by stream path change

The upstream resident at 112 5th Street noted increased flows in recent years. If true, then the increased flows could be contributing to the increased erosion rate at this property as well. Stream also appears to

have been straightened at some point in the past, likely when the retaining wall was installed. Some of the cause of erosion may be attributed to the stream attempting to recreate a meander pattern. Fresh sand bars were also observed in this area, which could be eroded material from upstream. The stream gradient is noticeably less steep in this area, so it would be a location for sediment to deposit. The sediment deposition may be exacerbating the channel movement.

The erosion has already encroached to within a few feet of the garage, so the garage is under an immediate threat of damage if erosion continues. Stabilization work at this site should be implemented as soon as possible.

Carver SWCD Concept Plan Assessment

The Carver SWCD concept plan includes using riprap to armor the channel were banks are eroding, installing coir blocks in other areas with less stress, and revegetating with deep rooted species. Barr concurs with the general concept with the following considerations:

1) Additional assessment of the hydrology should be completed to better understand potential changes that have already occurred and may occur into the future.

A rough estimate for this concept is $88,000, including construction costs, a 30% contingency on construction costs, engineering and design, and the considerations listed above. It would be reasonable to expect the cost to range between -25% and +40% of the estimate above, resulting in an approximate range of $66,000 to $124,000.

Alternative consideration

In a situation like this where the channel has moved, restoring the channel to the previous alignment is often a potential solution. It may be possible in this location; and even though it would likely restore an artificially straightened channel, it would also reduce the risk of additional erosion in the newly created meander on the bank opposite of the garage.. Similar to the upstream property, additional fill would be necessary to restore all banks, so the cost would likely be more than the Carver SWCD concept.

A rough estimate for this concept is $99,000, including construction costs, a 30% contingency on construction costs, engineering and design, and the considerations listed above. It would be reasonable to expect the cost to range between -25% and +40% of the estimate above, resulting in an approximate range of $75,000 to $139,000.

Conclusions and Recommendations

Per the site assessment and review of the proposed plans, Barr has the following recommendations:

- Complete an assessment of the hydrology, including potential future changes. This information will be important for the design of stabilization measures at both locations. Given the urgency of implementing stabilization at the 404 Broadway site, the design and hydrologic analysis could be done concurrently.

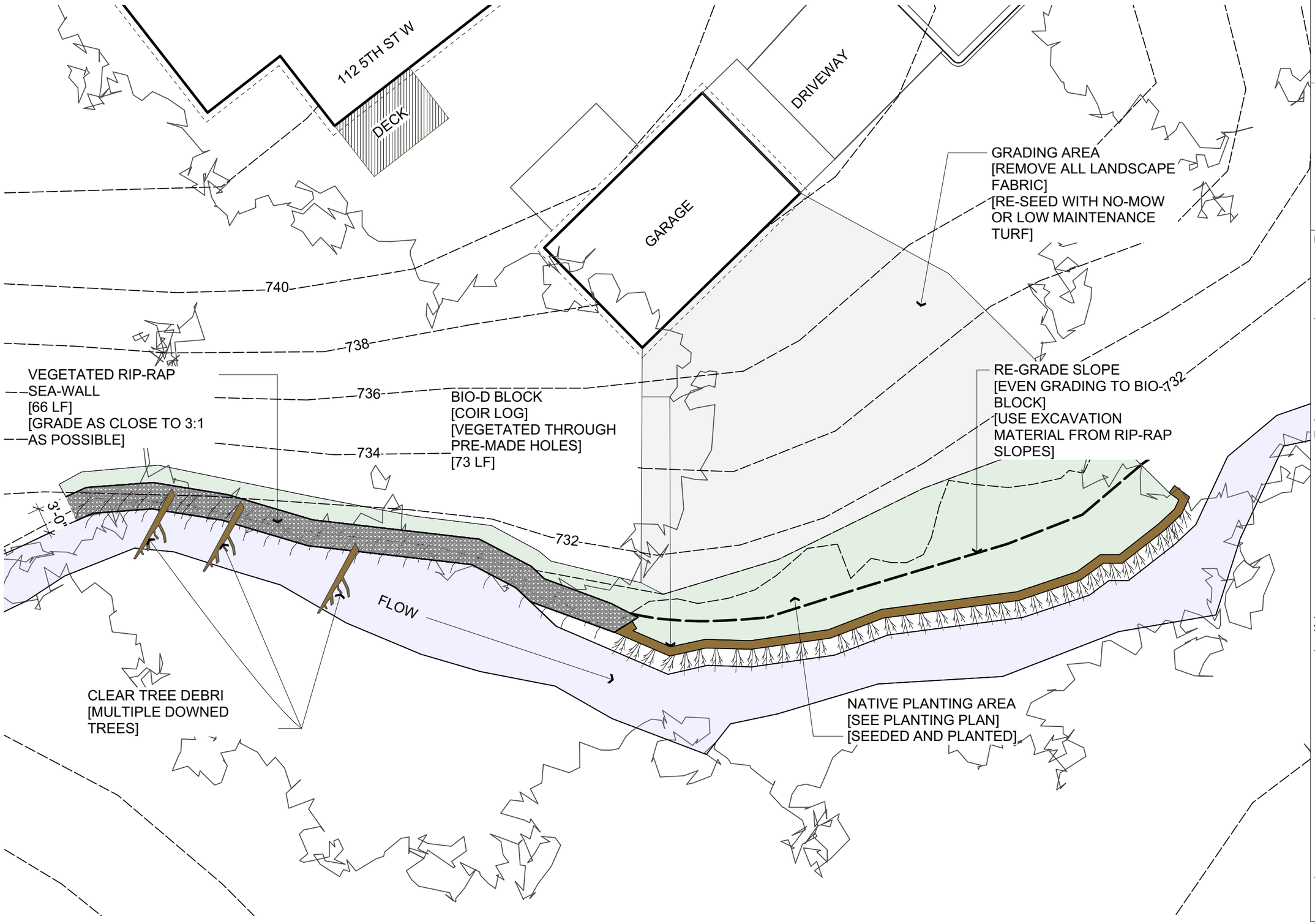
- At 404 Broadway, restore the channel to the previous alignment, which will provide additional space between the garage and the creek.
- Restore the previous channel alignment at 112 5th Street, with consideration of the modified hydrology draining to this location.

Barr Footer: ArcGIS 10.6, 2019-09-06 12:46 File: I:\Client\LowerMinnesotaWD\Work_Orders\2019_Spring_Creek\Maps\Spring Creek base.mxd User: jdw

BARR

SPRING CREEK
EROSION SITES
Carver, MN
Lower Minnesota River
Watershed District

FIGURE 1



LOWER MINNESOTA RIVER WATERSHED DISTRICT

Deb Hartley

112 5th St. W
Carver, MN 55315

Provided By:

CARVER SWCD

CO.CARVER.MN.US/SWCD

DESIGNER: SETH RISTOW

DATE: 11/08/18
REVISION:
REVISION:

NOTES:

- CALL GOPHER 1 PRIOR TO DIGGING
- KILL EXISTING NON-NATIVE VEGETATION AT LEAST 1 WEEK PRIOR TO PLANTING
- CONTACT SETH RISTOW WITH QUESTIONS (952) 466-5264
- USE COIR LOGS AS NEEDED
- PLANTS NEED TO BE WATERED REGULARLY DURING FIRST YEAR

SCALE: 3/32"=1'

L 1.0 SITE PLAN

Quantity	Common Name	Latin Name
10	Bush Honeysuckle	Diervilla lonicera
3	Nannyberry	Viburnum lentago
11	Pussy Willow	Salix discolor
1	Chokecherry	Prunus virginiana
45	Tufted Hair Grass	Deschampsia caespitosa
43	Ostrich Fern	Matteuccia struthiopteris
5	Buttonbush	Cephalanthus occidentalis
3	Blackhaw Viburnum	Viburnum prunifolium
3	Ninebark	Physocarpus opulifolius
7	Prairie Cordgrass	Spartina pectinata
7	Culver's Root	Veronicastrum
5	Queen of the Prairie	Filipendula rubra
6	Joe-Pye Weed	Eupatorium purpureum
6	Marsh Blazing Star	Liatris spicata
7	Switchgrass	Panicum virgatum
6	Canadian Anemone	Anemone canadensis

15-Tufted Hair Grass
43-Ostrich Fern
eysuckle
16-Tufted Hair Grass
14-Tufted Hair Grass
7-Bush Honeysuckle
5-Pussy Willow
3-Ninebark
3-Marsh Blazing Star
3-Marsh Blazing Star
3-Canadian Anemone
7-Switchgrass
3-Canadian Anemone
5-Queen of the Prairie
1-Chokecherry
3-Nannyberry
5-Pussy Willow
3-Blackhaw Viburnum
5-Buttonbush
7-Culver's Root
6-Joe-Pye Weed
7-Prairie Cordgrass

LOWER MINNESOTA RIVER WATERSHED DISTRICT

Deb Hartley

112 5th St. W
Carver, MN 55315

Provided By:
CARVER SWCD
CO.CARVER.MN.US/SWCD

DESIGNER: SETH RISTOW

DATE: 11/08/18
REVISION:
REVISION:

NOTES:

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SCALE: 3/32"=1'

L 1.0 PLANTING PLAN

CARVER SWCD
MATERIAL & COST ESTIMATE

Hartley

Streambank Stabilization

LF: 140
SF: NA
Date: 21-Nov-18

Materials: Streambank Stabilization

Item	Qty	Unit	Unit Cost	Amount	Potential Source
Twice-Shredded Hardwood Mulch (3" depth)	8.0	cu-yd	$ 30.00	$ 240.00	Hedberg, Frador, Local Supplier
Non-Woven Geotextile (Geotex 401, Mirfani 140N, or equal)	200	sq-ft	$ 0.07	$ 14.00	Brock White, (651) 647-0950
C125BN (6.5' x 108.5')	1,390	sq-ft	$ 0.22	$ 305.80	Brock White, (651) 647-0950
Bio D Block 12 (10')	8	each	$ 126.00	$ 1,008.00	Rolanka
Wood Stakes (2" x 4" x 48" - hardwood)	40	each	$ 1.00	$ 40.00	Brock White, (651) 647-0950
Aggregate: Buff Limestone (18"-24")	15.0	Tons	$ 30.00	$ 450.00	Hedberg, Frador, Local Supplier
			Materials Subtotal	$ 2,057.80	

Plants: Streambank Stabilization

Item	Qty	Unit	Unit Cost	Amount	Potential Source
Native Plant: Plug	132	each	$ 2.00	$ 264.00	Native Plant Supplier
Native Shrub: 1 Gallon	36	each	$ 15.00	$ 540.00	Native Plant Supplier
Native Seed (Moist Meadow) 1/4LB	1.00	each	$ 125.00	$ 125.00	Native Plant Supplier
No Mow Seed	2.00	lb	$ 7.00	$ 14.00	Native Plant Supplier
			Plants Subtotal	$ 943.00	

Labor: Streambank Stabiliza

Mobilization	1.00	job	$ 250.00	$ 250.00	Landscape/Excavation Contractor
Deliveries (Mulch, Plants, Rock, Soil, etc)	2	job	$ 150.00	$ 300.00	Suppliers/Contractors
Disposal	1.00	job	$ 500.00	$ 500.00	Landscape/Excavation Contractor
Grading (Tracked Equipment Only - no wheeled vehicles in excavation area)	5	hrs	$ 85.00	$ 425.00	Landscape/Excavation Contractor
Material Installation (4 person crew/ 10hr day)	4.50	job	$ 2,500.00	$ 11,250.00	Landscape/Excavation Contractor
			Subtotal	$ 12,725.00	

Project Total: Raingarden #4

Materials Estimate:	$	2,057.80
Plants Estimate:	$	943.00
Labor Estimate:	$	12,725.00
Project Estimate:	$	15,725.80
:-10%	$	14,153.22
:+10%	$	17,298.38

AREA OF EROSION

X[725.7]

EXISTING CONCRETE
DEBRI
[REMOVE]

PROPERTY LINE

GARAGE

X[723.03]

X[722.13]

X[722.06]

SPRING CREEK

X[725.45]

X[721.71]

PROPERTY LINE

X[722.85]

TOP OF BANK

X[724.3]

EXISTING CONCRETE
WALL
[REMOVE AT JOINT]

PROPERTY LINE

EXISTING CONCRETE
WALL
[KEEP]

EXISTING CONCRETE
WALL
[REMOVE]

FLOW

AREA OF EROSION

BRIDGE

4TH ST. E

LOWER MINNESOTA RIVER
WATERSHED DISTRICT

SPRING CREEK [CITY OF CARVER]

404 BROADWAY ST.
CARVER, MN 55315

Provided By:

CARVER SWCD

CO.CARVER.MN.US/SWCD

DESIGNER: SETH RISTOW

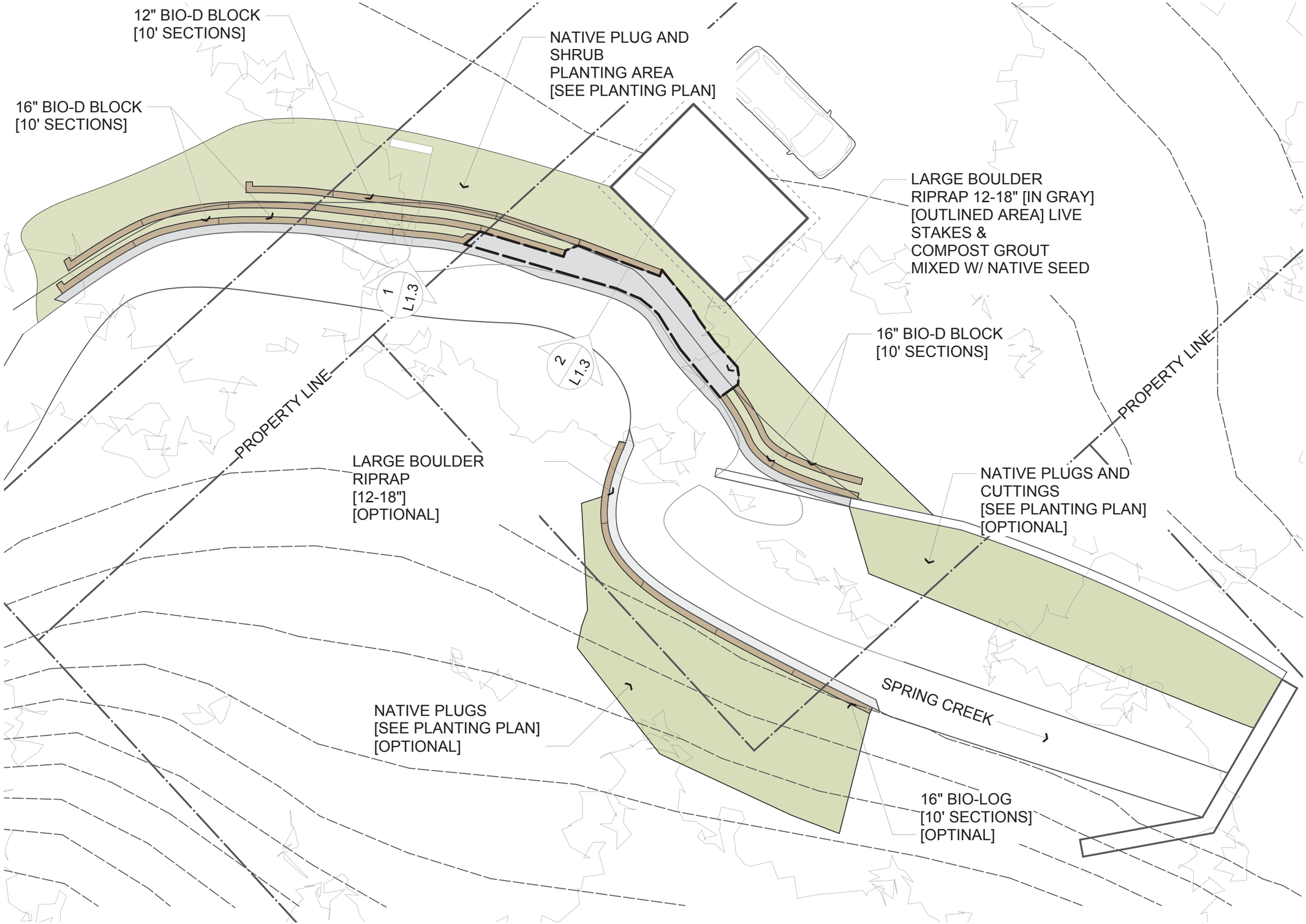
DATE: 02/12/19
REVISION:
REVISION:

NOTES:

- CALL GOPHER 1 PRIOR TO DIGGING
- KILL EXISTING NON-NATIVE VEGETATION AT LEAST 1 WEEK PRIOR TO PLANTING
- CONTACT SETH RISTOW WITH QUESTIONS (952) 466-5264
- USE COIR LOGS AS NEEDED
- PLANTS NEED TO BE WATERED REGULARLY DURING FIRST YEAR

SCALE: 3/32"=1'

L 1.0 EXISTING SITE



LOWER MINNESOTA RIVER WATERSHED DISTRICT

SPRING CREEK [CITY OF CARVER]

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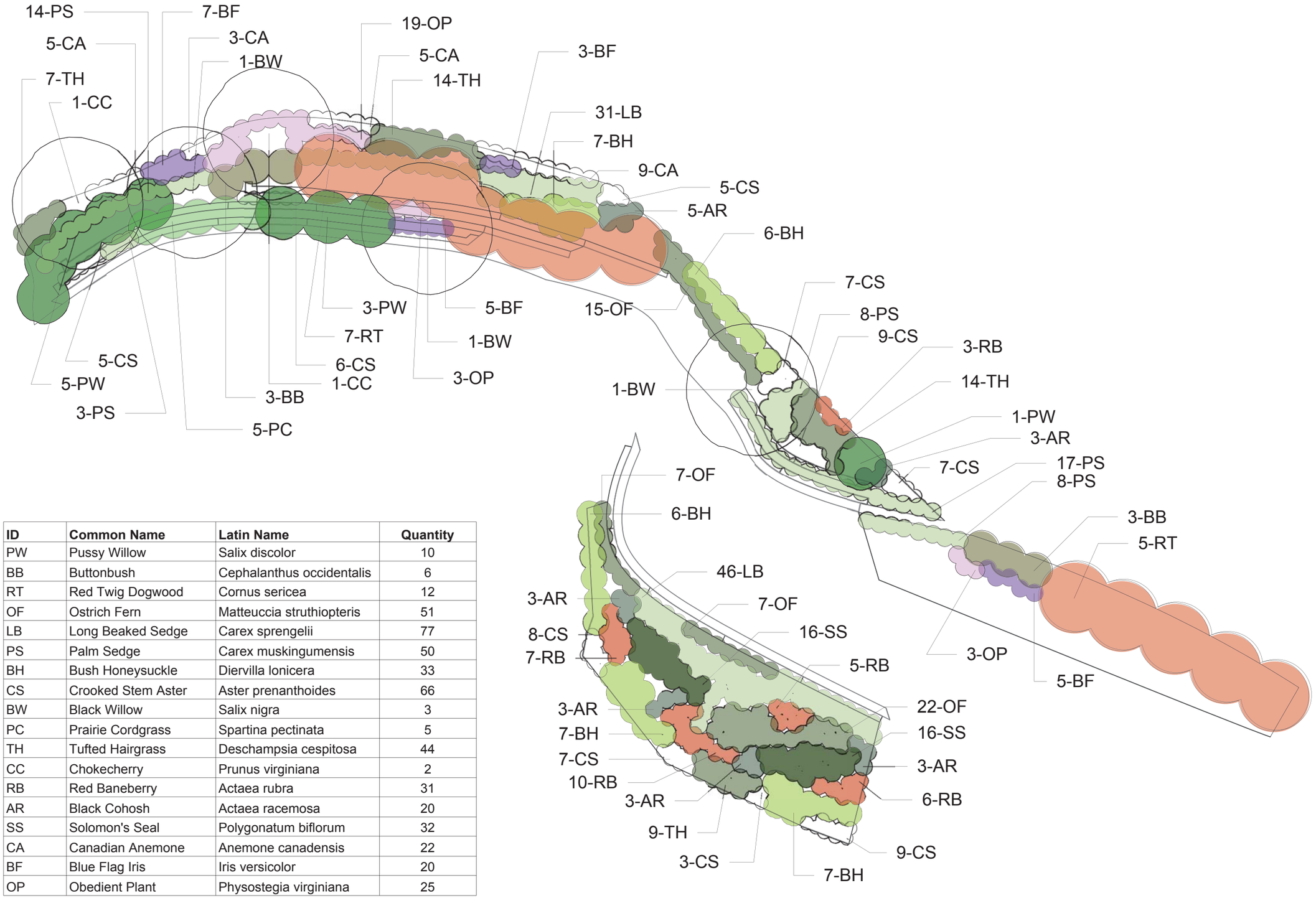
SCALE: 3/32"=1'

L 1.1 SITE PLAN



ID	Common Name	Latin Name	Quantity
PW	Pussy Willow	Salix discolor	10
BB	Buttonbush	Cephalanthus occidentalis	6
RT	Red Twig Dogwood	Cornus sericea	12
OF	Ostrich Fern	Matteuccia struthiopteris	51
LB	Long Beaked Sedge	Carex sprengelii	77
PS	Palm Sedge	Carex muskingumensis	50
BH	Bush Honeysuckle	Diervilla lonicera	33
CS	Crooked Stem Aster	Aster prenanthoides	66
BW	Black Willow	Salix nigra	3
PC	Prairie Cordgrass	Spartina pectinata	5
TH	Tufted Hairgrass	Deschampsia cespitosa	44
CC	Chokecherry	Prunus virginiana	2
RB	Red Baneberry	Actaea rubra	31
AR	Black Cohosh	Actaea racemosa	20
SS	Solomon's Seal	Polygonatum biflorum	32
CA	Canadian Anemone	Anemone canadensis	22
BF	Blue Flag Iris	Iris versicolor	20
OP	Obedient Plant	Physostegia virginiana	25

LOWER MINNESOTA RIVER WATERSHED DISTRICT

SPRING CREEK [CITY OF CARVER]

404 BROADWAY ST.
CARVER, MN 55315

Provided By:

CARVER SWCD

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DESIGNER: SETH RISTOW

DATE: 02/12/19
REVISION:
REVISION:

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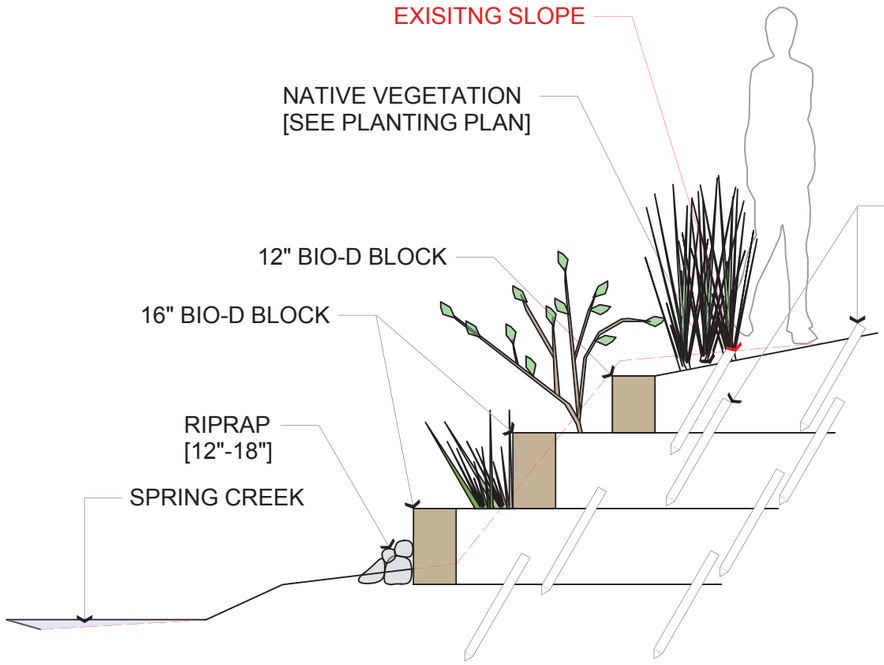
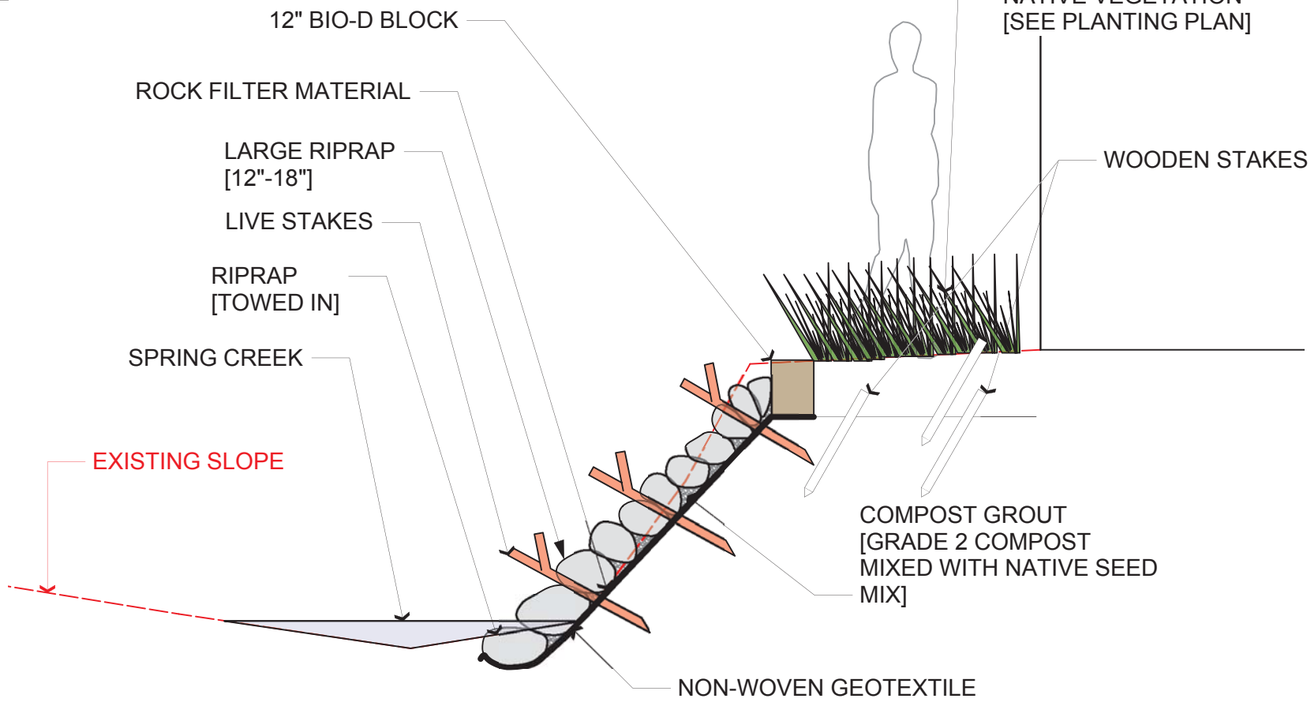
SCALE: 3/32"=1'

L 1.2 PLANTING PLAN

1 SECTION 1
Scale: 3/8" = 1'-0"



2 SECTION 2
Scale: 3/8" = 1'-0"



LOWER MINNESOTA RIVER WATERSHED DISTRICT

SPRING CREEK [CITY OF CARVER]

404 BROADWAY ST.
CARVER, MN 55315

Provided By:
CARVER SWCD
CO.CARVER.MN.US/SWCD

DESIGNER: SETH RISTOW

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REVISION:
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SCALE: 3/32"=1'

L 1.3 SECTIONS

Young Environmental Consulting Group, LLC

Technical Memorandum

To: Linda Loomis, Administrator
Lower Minnesota River Watershed District

From: Lan Tornes
Natural Resources Scientist

Date: August 28, 2019

Re: Review of Watonwan River Watershed Total Maximum Daily Load Study Draft Report and the Watonwan Watershed Restoration and Protection Strategy

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The Lower Minnesota River Watershed District (LMRWD) requested a review and assessment by Young Environmental Consulting Group of the Watonwan River Watershed Total Maximum Daily Load Study Draft Report (TMDL) and the Watonwan Watershed Restoration and Protection Strategy (WRAPS). The results of that review and relevant recommendations are presented below.

TMDL Report

The TMDL report presents information about phosphorus in lakes and fecal-indicator bacteria in streams. The Watonwan River is tributary to the Blue Earth River, and the Watonwan TMDL report defers items such as total suspended solids (TSS) to the larger-scale TMDL for the Blue Earth River watershed. The companion WRAPS document for the Watonwan River has summary information for the TSS TMDL in its appendix.

The TMDL report is well written with good documentation of the assumptions. The logic of the analyses is consistent with guidance for preparing TMDLs. The report is exhaustive and seems somewhat redundant, but that probably is needed to assure that the document is complete, and the audience is fully informed about the intricacies of TMDLs. The report generally is well organized but is confusing in some areas. Appendix A describes the techniques used to derive the numbers that are presented in a summary table in the text without a clear link.

The following table from the TMDL report shows the waterbody name, the assessment unit identifier (AUID) or lake identifier, and the estimated percent reductions needed to meet the TMDLs determined for the report:

Table 16. Summary of load reductions per impaired waterbody [1]

Waterbody Name	**AUID / Lake ID**	**Reduction (%)**	
		E. coli	**Phosphorus**
Eagle Lake	17-0020-00	–	59%
Watonwan River, North Fork	564	85%	–
Butterfield Creek	516	82%	–
Butterfield Lake	83-0056-00	–	7%
Kansas Lake	83-0036-00	–	58%
St James Creek, reach 576	576	81%	–
St James Creek, reach 502	502	58%	–
St James Creek, reach 515	515	18%	–
Bingham Lake	17-0007-00	–	60%
Judicial Ditch 1	581	86%	–
Watonwan River, South Fork	568	85%	–
Spring Branch Creek	574	83%	–
Perch Creek	523	89%	–
Watonwan River	510	75%	–

Waterbodies indicated with "–"are not impaired by the indicated pollutant.

[1]Minnesota Pollution Control Agency, 2019, Watonwan River Watershed Total Maximum Daily Load Study Draft Report

Appendix E of the TMDL shows the results of the Hydrological Simulation Program – FORTRAN (HSPF) calibration and validation results. This model was used to approximate the transport of many flow-related constituents in the watershed. The model appears to perform well and seems to be a good fit for the Watonwan River watershed. Some of the model's accuracy over previous runs is attributed to the improved representation of interflow inflow, which is used to account for tile drainage of agricultural fields. It is mentioned in the appendix of the TMDL that the Lower Minnesota River was modelled using HSPF in conjunction with the Watonwan watershed modeling effort. A table summarizing the results of modeling in the Minnesota River basin suggests that the model performs well at the Minnesota River at Jordan and near the mouth of the river at Fort Snelling State Park.

The Watonwan River watershed TMDL report is technically sound. It establishes realistic goals for the quality of waters in the watershed.

The WRAPS Report

The Watonwan Watershed Restoration and Protection Strategy (WRAPS) report provides important and useful insight into the water quality concerns in the watershed as well as insights and suggestions for management intended to improve the quality of affected resources. The report focuses on pollutants and stressors, including eutrophication-causing nutrients (primarily nitrogen and phosphorus), TSS, habitat, and altered hydrology.

The authors take a reasonable approach dealing with nitrogen, a complex, nonconservative constituent, by combining all forms into total nitrogen. However, it is unclear how the total nitrogen value was obtained, so it can only be assumed it was a direct measurement or a summation of all the measured forms of nitrogen (ammonia, organic, nitrite, and nitrate). Also, it was not stated whether it was total filtered or total unfiltered nitrogen. Not clearly differentiating between the two could be problematic because organic nitrogen often is contained in living cells, which are part of the unfiltered sample. The report seems to apply water quality standards that were developed for nitrate-nitrogen concentrations to concentrations of total or total-dissolved nitrogen. In addition, the report could discuss the unique relationship between ammonia nitrogen toxicity and aquatic life criteria. In healthy aquatic systems, ammonia and nitrite plus nitrate nitrogen are a small component of the total nitrogen.

The report identifies streams in the Watonwan River watershed as having some of the highest total phosphorus (TP) concentrations in Minnesota. However, loading from the watershed is not as large as from other watersheds. This suggests that relatively less runoff from the watershed results in smaller yields. The TP goals for streams advocated in the report are trying to achieve a 40 percent reduction, which is expected to translate to a maximum flow-weighted mean concentration of 150 micrograms per liter (ug/L) in

streams. However, the yield will be most important for documenting loss from the watershed and evaluating the amount of phosphorus delivered to downstream waters.

A summary of data shown as *2013-2017 Discovery Farms Data for the Tiled Farms* provided interesting results about nutrient runoff from agricultural land uses. Nitrogen yield was much greater in discharge from tile drains than in surface runoff; however, phosphorus yield was negligible in tile drainage and much greater in runoff. This is consistent with the association of phosphorus with sediments, which are associated with runoff but filtered by the soil, whereas nitrogen is transported mostly in the dissolved state, and filtering by tile drainage has little effect. This observation has management implications for how to control nitrogen relative to phosphorus yields from agricultural watersheds having tile drainage.

The WRAPS report mentions that bacteria can survive and reproduce in Minnesota River streams.[2] This suggests that upstream sources of bacteria should not be discounted when evaluating riverine systems.

In the report, it is unclear what data were used to assess TSS. Although there is a relation among total suspended solids, suspended sediment, and other surrogate measurements such as turbidity, they are functionally different from each other. TSS usually is sampled from the end of a pipe and measured from a subsample that avoids oversized, heavier particles. Suspended sediment is sampled from streams using specialized, depth-integrating samplers, and the analysis is performed on the entire sample. Turbidity and other surrogate measurements present a variety of complications starting with light wavelength and light scatter. The report could relate whether various measures of sediment are combined and how it compensates for biases in the data. The comparability and accuracy of fluvial-sediment data is discussed by Gray and others.[3]The first table in the report summarizes trends in TSS, TP, and nitrite plus nitrate nitrogen during 1995–2009 and 1969–2009. It was not specified whether these were concentrations, loads, or yields. TSS decreased over the short term, while TP decreased over the long term. No other trends were significant. It is unclear why two different time periods were tested for trends for the same constituents, and this calls the validity of the trend into question. Many of the stressors identified in the report are consistent with stressors believed to be relevant through most of the Minnesota River watershed.

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[2] Chandrasekaran, R., M.J. Hamilton, R. Wang, C. Staley, S. Matteson, A. Birr, M.J. Sadowsky, 2015. “Geographic isolation of Escherichia coli genotypes in sediments and water of the Seven Mile Creek – A constructed riverine watershed” Sci. Total Environ. 538: 78-85.

[3] Gray, J.R., Glysson, G.D., and Mueller, D.S., 2002, Comparability and accuracy of fluvial-sediment data: A view from the U.S. Geological Survey: Proceedings of the American Society of Civil Engineers, Hydraulic Measurements and Methods Symposium, July-August, 2002, Estes Park, CO, 6 p. (http://water.usgs.gov/osw/techniques/asce.pdf).

These stressors include nutrients, TSS, altered stream hydrology, and sediment erosion and transport exacerbated by channel modification and artificial drainage. Although the document is helpful in identifying a variety of stressors in the Watonwan River watershed, it appears to be a qualitative assessment that does not consistently identify the threshold at which these stressors create a problem; this makes it difficult to compare the levels of stressors in this watershed with those identified in nearby watersheds.

Although numeric goals were not consistently provided, qualitative assessments can be helpful. The goals and targets established for the watershed are realistic and based on both numeric goals and input from local residents and resource experts. Table 4[4] of the report probably best summarizes its results and findings.

Table 4: Watershed-wide and subwatershed goals were selected after analyzing water quality data within the watershed. The "10-year Target" and "Years to Reach Goal" were set using an averaging consensus of WRAPS Local Work Group proposals. Refer to the narrative above and to the Goal & 10-year Target subsections in the following report sections for more information.

Parameters (Pollutant/ Stressors)	**Watershed-Wide Goal** (Average/surrogate for Watershed)	**Range of Subwatershed Goals** (Estimated only when TMDL or MSHA data are available)	**10-year Target** (for 2029)	**Years to Reach Goal** (from 2019)
Habitat	35% increase in MSHA habitat score	protect up to a 164% increase	12% ↑	75
Altered Hydrology	25% reduction in peak & annual stream flow	not estimated (TMDLs not completed on this parameter)	4% ↓	45
	increase dry season stream base flow where ID'd in SID by enough to support aquatic life		increase	15
Nitrogen	50% reduction in stream concentrations/loads	not estimated (TMDLs not completed on this parameter)	15% ↓	60
Sediment	20% reduction in stream concentrations/loads	protect up to a 94% reduction	4% ↓	45
Connectivity	Address human-caused issues (dams, culverts) as identified in SID and where practical/feasible	not estimated (TMDLs not completed on this parameter)	Replace 5% of culverts	45
Phosphorus/ Eutrophication	40% reduction in lake and stream concentrations/loads	protect up to a 47% reduction	Streams 5% ↓ Lakes 10% ↓	Streams 60 Lakes 35
Bacteria	65% reduction in stream concentrations/loads	10-84% reduction	12% ↓	65
Parameters that are impacted/addressed by the above pollutants and stressors				
F-IBI & M-IBI	Each parameter's goal is to meet the water quality standard and support downstream goals. Because these parameters are a response to (caused by) the above pollutants/stressors, the above watershed-wide and subwatershed goals are indirect goals for these parameters and are more usable for selecting strategies than direct goals for these parameters.	not estimated (TMDLs not completed on these parameters)	meet other 10-year targets	60
DO				60

[4] Minnesota Pollution Control Agency, 2019, Draft Watonwan River Watershed Restoration and Protection Strategies

The WRAPS report discusses restoration and protection strategies referencing different approaches that address common issues. The issues of building soil health, controlling runoff and erosion by keeping it in the fields, more efficient fertilizer applications, and increasing treatment of drainage seem to be the primary focus of these approaches. Using cover crops, protecting riparian areas, controlling drainage, restoring and protecting wetlands, and practicing stream restoration are suggested to help control runoff and erosion. Resource managers will likely employ these strategies throughout the Minnesota River basin.

One of the suggestions with important management implications is the observation that the transition to more sustainable practices must be developed, demonstrated, and spread by trusted leaders within the community. When leaders embrace a transition, communities are more likely to accept and adopt the transition. This buy-in from local leaders may be one of the best management tools available but also may require considerable effort to educate those leaders so they understand the value of altering resource management practices.

The WRAPS report conveys that stakeholders are concerned about the drinking water supply, especially the quality of groundwater , in the watershed. This suggests that residents in the Watonwan watershed are likely to take measures to protect their groundwater resources.

Tables in the appendix repeat Table 4 above, with minor inconsistencies, and identify restoration and protection strategies as well as best management practices for the Watonwan watershed. The appendix suggests a suite of strategies and practices that are cumulatively capable of meeting the ten-year targets for the Watonwan River Watershed.

A spreadsheet-based model is mentioned in the appendix that allows the user to test different scenarios for reducing nitrogen and phosphorus losses from agricultural lands. The model output is shown for several different scenarios by using coefficients for the Watonwan watershed. The model may be a simple tool for stakeholders that could be applied to other watersheds in the Minnesota River Basin by using the applicable coefficients. The result of an effort directed by William Lazarus at the University of Minnesota, the models are named Nitrogen Reduction Planning Tool and Phosphorus Reduction Planning Tool. They are easily found with an internet search. The results of running scenarios using other, more widely applied, watershed models (including HSPF, SPARROW, and SWAT) were also provided in the appendix.

The appendix has tables summarizing the results of a variety of experiments throughout North America that tested different fertilizer application scenarios and how they affect nutrient loads compared to crop yields. These lists could be useful to reference when extolling the virtues of various nutrient control strategies.

The results of the HSPF model runs show that the yield of nitrogen, phosphorus, and TSS generally is greater in eastern tributaries than in western tributaries in the Watonwan River watershed. This is consistent with other studies and may be related to increased runoff from west to east in the Minnesota River Basin.

The Watonwan River watershed WRAPS report is a useful resource for the watershed. It summarizes much of the information related to water and agricultural resources in the watershed and identifies issues that could be addressed to improve the quality of those resources. Using a variety of available resources and existing outlets, the report suggests changes in agricultural practices, enhanced fertilizer application, and public education. The approaches to data collection, the resource-management tools provided, and the methods for obtaining cooperation from stakeholders have applicability to other nearby watersheds. The discrepancies identified should be addressed to strengthen confidence in the report, and its suggested management strategies.

Memorandum

Young Environmental Consulting Group, LLC

DATE: September 9, 2019 *(Email transmittal)*

TO: Linda Loomis – Administrator, LMRWD

FROM: Shane Soukup, Water Resources Scientist

SUBJECT: Stormwater Visit Summary
September 6, 2019, 6:20 a.m.–7:15 a.m.
CSAH 61 – Flying Cloud Drive
Owner – Hennepin County and Contractor – Ames Construction

WEATHER: 65°F, clear – per AccuWeather

SITE CONDITIONS/PHASE

Construction was active for road base pylons, retaining walls, erosion and sediment control, etc. The bridge is now open and drivable. Current construction is taking place on the western edge of the project and includes grading and preparation for road paving.

PRESENT

Shane Soukup – Young Environmental Consulting Group

PURPOSE

To observe stormwater management/erosion control techniques being implemented by Ames Construction on the reconstruction of Flying Cloud Drive/County State Aide Highway (CSAH) 61 from Highway 101 to Charlson Road in the cities of Eden Prairie and Chanhassen and in Carver and Hennepin counties.

GENERAL NOTES/OBSERVATIONS

- Checked construction trailer and took photos of the inspection log and rain log upon arrival.
- Spoke with Nathan Bren in the construction trailer who mentioned newly graded areas as well as areas of concern to be addressed before construction is completed.
- Crews arrived and began working as the site visit was taking place.
- Pictures were taken of the different best management practices (BMPs) being used to prevent and/or minimize sediment and other construction material from reaching adjacent water resources (Rice Lake, Grass Lake, Riley Creek, and Minnesota River).
- Extensive use of plastic and rock as BMPs and that appeared generally effective when placed properly and maintained.
- Newly graded areas on landslide and water adjacent slopes (see photos).
- Some vegetation taking hold on recently graded slopes (see photos).
- Signs of seed being applied to slopes that had poor vegetation cover (see photos).

- Erosion/sluffing on landside slopes that has been present for more than 14 calendar days (see photos).
- Installation of new stormwater management features (see photos).
- Silt fence appears to require maintenance with sediment approximately ½ its height (see photos).

RECOMMENDATIONS

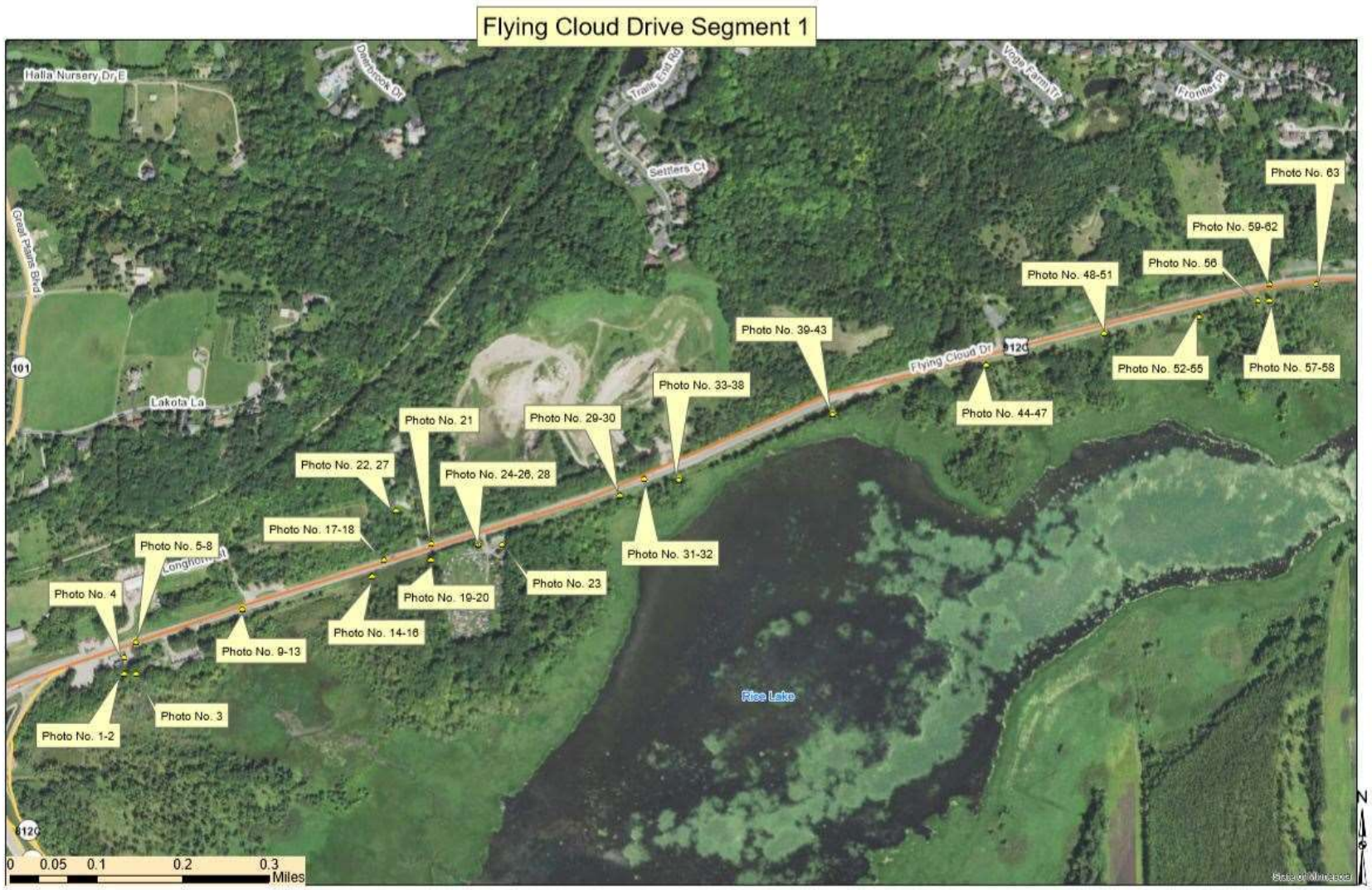
- Pay additional attention to newly or graded areas to make sure the proposed stabilization BMPs are effective.
- Maintain and/or repair BMPs that have failed.
- Inspection log was checked, and the last inspection logged was August 26, 2019. Care should be taken to make sure the log is kept up to date and/or inspections are being completed as required by the NPDES General Construction Permit.
- Attend weekly project construction management meetings.
- Continue every other week visits to the project site.

Memorandum

Young Environmental Consulting Group, LLC

Below is a map indicating where photos were taken. Photos include coordinates and a white arrow indicating north.

Young Environmnetal Consulting Group, LLC
915 Mainstreet, Hopkins, Minnesota 55343
(651) 249-6974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Halla Nursery Dr E
Great Plains Blvd
Lakota La
Flying Cloud Dr
Rice Lake
Photo No. 1-2
Photo No. 3
Photo No. 4
Photo No. 5-8
Photo No. 9-13
Photo No. 14-16
Photo No. 17-18
Photo No. 19-20
Photo No. 21
Photo No. 22, 27
Photo No. 23
Photo No. 24-26, 28
Photo No. 29-30
Photo No. 31-32
Photo No. 33-38
Photo No. 39-43
Photo No. 44-47
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Photo No. 63
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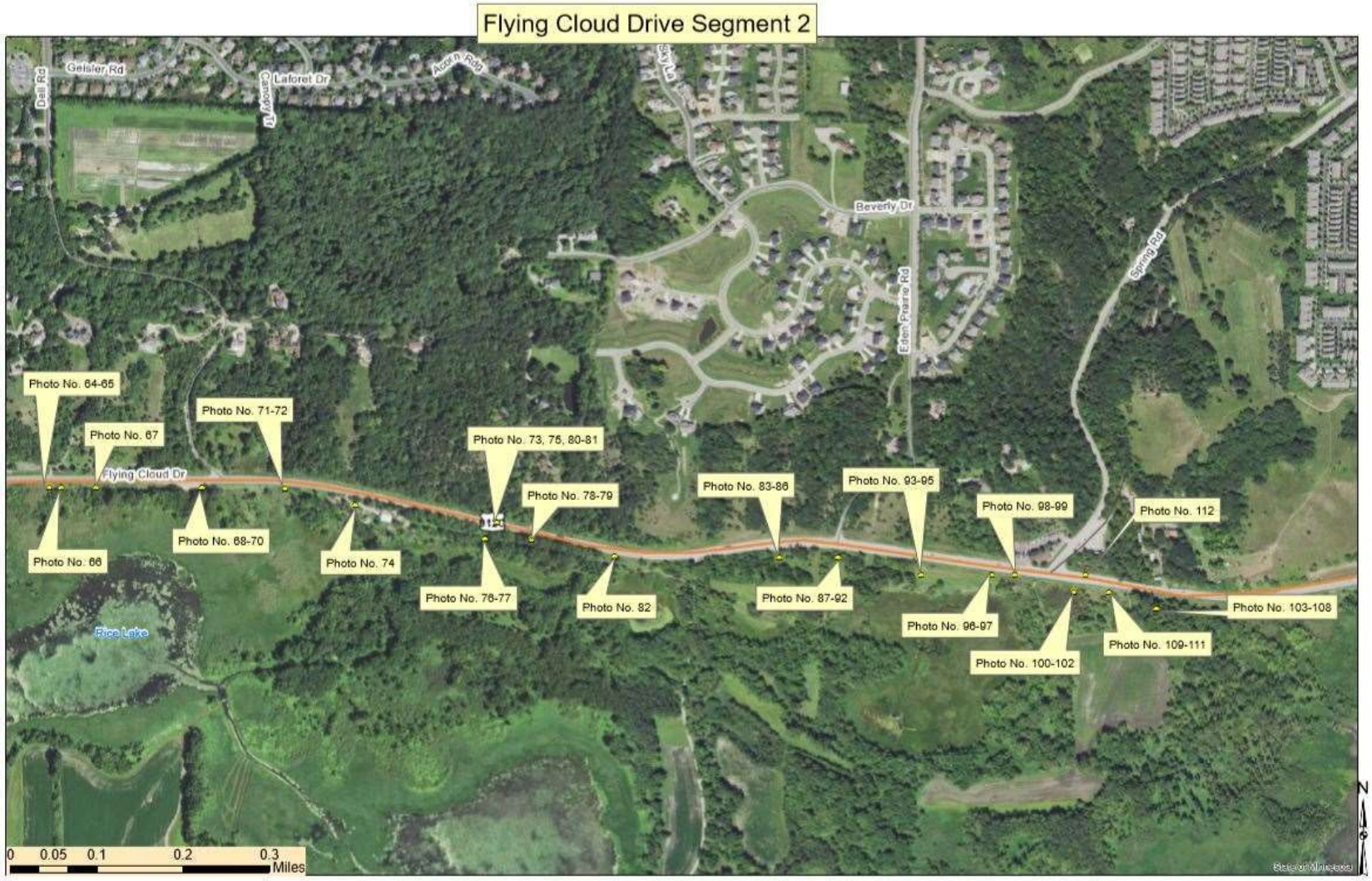
Flying Cloud Drive Segment 2
Gelsler Rd
Laforet Dr
Acorn Rdg
Dell Rd
Beverly Dr
Eden Prairie Rd
Spring Rd
Flying Cloud Dr
Rice Lake
Photo No. 64-65
Photo No. 67
Photo No. 66
Photo No. 71-72
Photo No. 68-70
Photo No. 74
Photo No. 73, 75, 80-81
Photo No. 78-79
Photo No. 76-77
Photo No. 82
Photo No. 83-86
Photo No. 87-92
Photo No. 93-95
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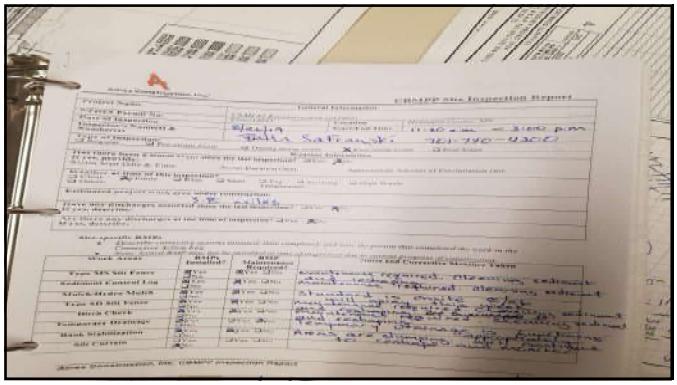

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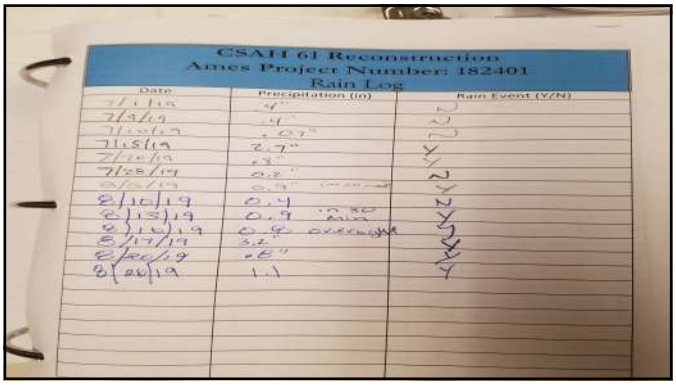
CSAH 61 Reconstruction
Ames Project Number: 182401
Rain Logs
Date
Precipitation (in)
Rain Event (Y/N)

2


44°48'46.7"N 93°32'05.7"W

3


Newly graded areas
44°48'47.7"N 93°32'06.7"W

4


Newly graded areas
CASTAIR
44°48'48.0"N 93°32'05.8"W

5


Newly graded areas
44°48'48.0"N 93°32'05.8"W

6


Vegetation taking hold on recently graded slopes
44°48'48.0"N 93°32'05.8"W

7


AIR MECHANICAL
Join our Team!
NOW HIRING
Technicians, Plumbers & Installers
44°48'48.0"N 93°32'05.8"W

8


44°48'50.2"N 93°31'56.1"W

9


Newly graded areas
44°48'50.2"N 93°31'56.0"W

10


44°48'50.2"N 93°31'56.0"W

11


44°48'50.1"N 93°31'56.0"W

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