Legacy Fund Restoration Evaluations
DNR Clean Water Forum

Minnesota Department of Natural Resources
Minnesota Board of Water and Soil Resources

Wade Johnson | Program Coordinator

Kyla Tripp | Evaluation Specialist

December 19, 2025

Statute Mandate

- Projects stated goals
- Utilization of current science
- Identify problems with implementation
- Improve future restorations

Restoration Evaluations 2012 – 2024 - 304 Projects

On Track to Meet Stated Goals

- Exceed the stated goals
- Achieved the stated goals
- Minimally achieved stated goals
- Not achieve the stated goals

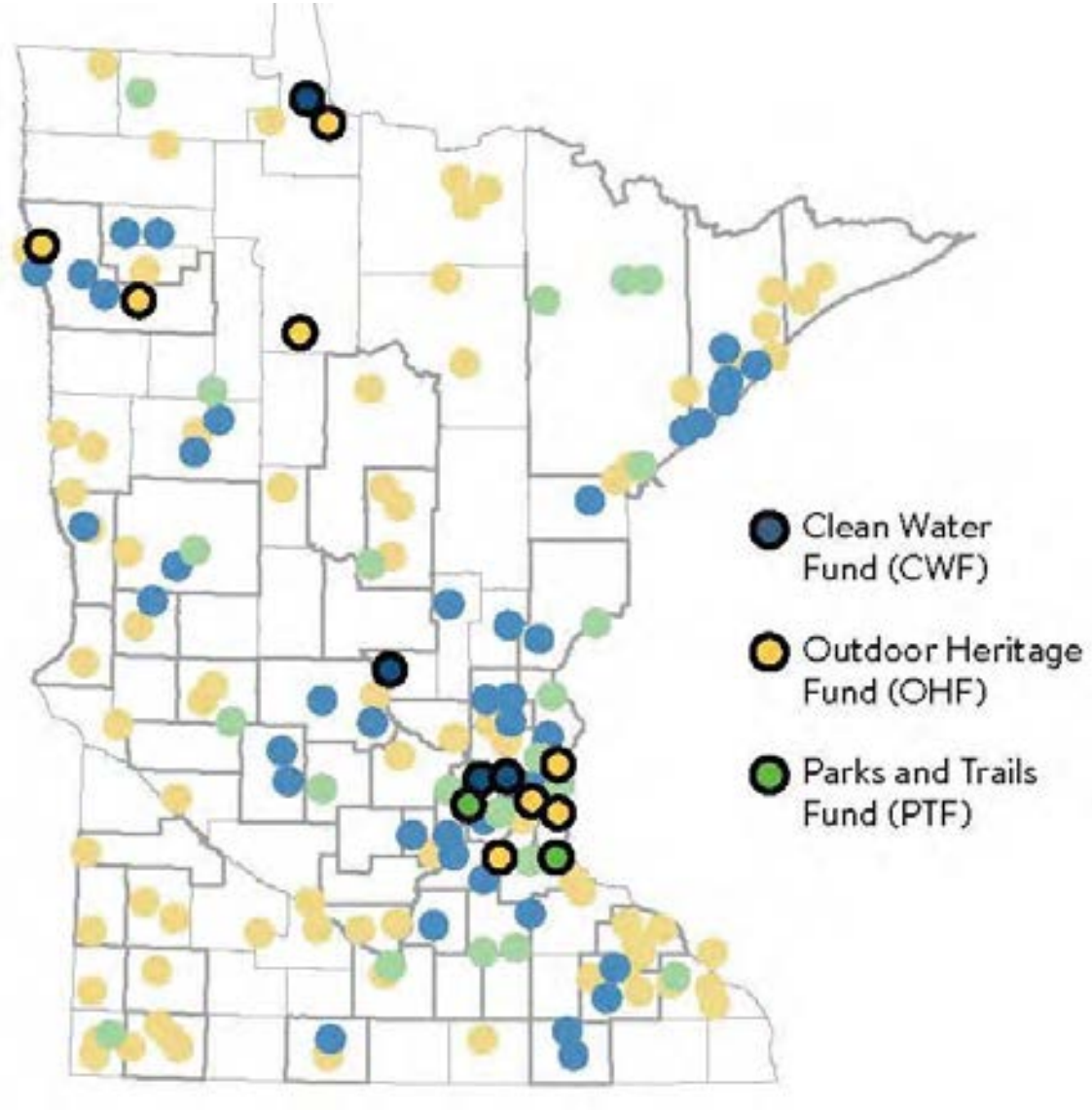
Utilized Current Science

No Portions Yes

Problems with Implementation

No Yes

Where We Have Been



Restoration Evaluation Process

- **Third party assessments**
  - Gather Project Background
  - Conduct Site Visit
  - Complete Project Evaluation
  - Convene Panel Discussion

Current Panel Members

Diverse affiliations and expertise

Greg Berg, Stearns County SWCD

Dan Larkin, U of M

Karen Gran, UMD

Pat Schultz, BWSR

Chris Lenhart, U of M

Dean Paron, DNR

Years of learning from and improving restorations

Website - Annual Report & Appendix of Evaluations

DEPARTMENT OF NATURAL RESOURCES

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Restoration Evaluation Program

When Minnesotans passed the Clean Water, Land and Legacy Amendment in 2008 they did so with high expectations. As projects have moved forward throughout the state, so too have efforts to ensure that the projects are meeting those expectations. Every year we work with project managers and visit restorations around the state. Highlights from the projects and lessons learned are communicated back to the restoration community to improve the quality of Legacy Fund restorations in Minnesota.

- Legacy Fund Restoration Evaluation Report (PDF)
- Appendix A: Program Process and Project Evaluations (PDF)
- View past reports and evaluations in the MN Legislative Reference Library

Website: Recommendations

Recommendations to improve future restorations

The Restoration Evaluation Program evaluates a diverse set of restoration projects every year. Based on review of these projects a panel of restoration experts identifies common opportunities for improvement and provides recommendations for improving future restorations.

Expand all sections

+ Documentation
+ Project Teams
+ Restoration Training
+ Design Criteria for Lakeshore Projects
+ Planning for Stream Projects
+ Vegetation for Stream Projects
+ Improved Project Review by Technical Experts
+ Phased Approach for Buckthorn Management
+ Improved Seed Selection and Implementation
+ Climate Change Contingency Planning
+ Improved Implementation of Common Carp Barriers
+ Improved Alum Treatment Approach

Ongoing Recommendations for Improvement

- Planning for Stream Projects
- Vegetation for Stream Projects
- Project Teams
- Design Criteria for Lakeshore Projects
- Documentation
- Restoration Training

2022 Recommendations to Improve Restorations

LEGACY FUND
RESTORATION EVALUATION REPORT
Technical Panel Findings and Recommendations–2022

Improved Project Review by Technical Experts

Phased Approach for Buckthorn Management

Improved Seed Selection and Implementation

Climate Change Contingency Planning

Improved Project Review by Technical Experts

- Incorporating current science and technical expertise

Phased approach for Buckthorn Management

- Phased / sequenced approach improves long term outcomes

Before

- Nearshore Buckthorn IS a water quality -> aquatic habitat concern

5 yrs After

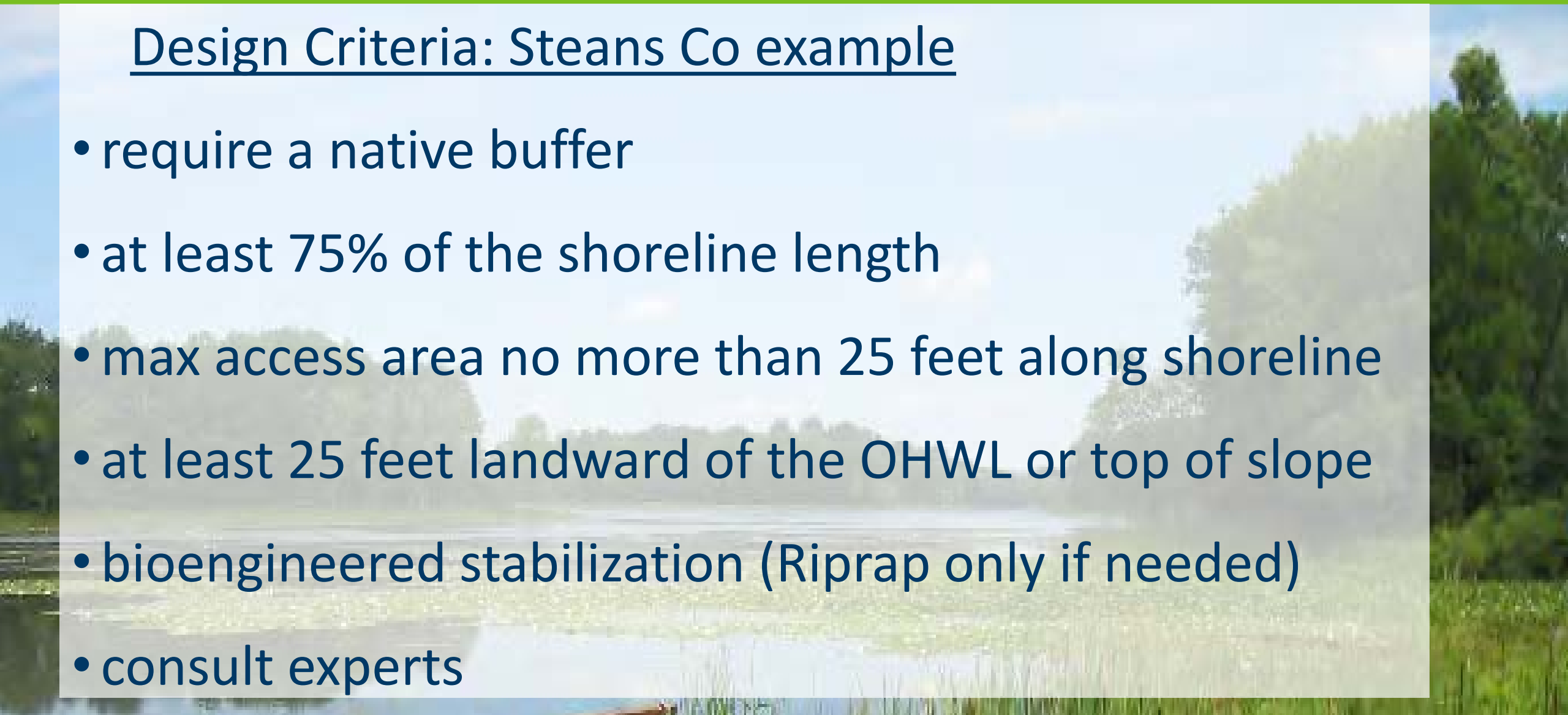
Rec: Improved Lakeshore Design Criteria

Buffer size and contributing area matter for water quality

Rec: Improved Lakeshore Design Criteria

Buffer size and contributing area matter for water quality

Rec: Improved Lakeshore Design Criteria



Design Criteria: Steans Co example

- require a native buffer
- at least 75% of the shoreline length
- max access area no more than 25 feet along shoreline
- at least 25 feet landward of the OHWL or top of slope
- bioengineered stabilization (Riprap only if needed)
- consult experts

Improved Stream Planning

- Consistent and through project planning will enable project managers to make informed decisions and improve capacity to achieve desired outcomes

Improved Vegetation for Stream Projects

- Establishing diverse native vegetation will improve project outcomes and durability.

2019 Special Focus Report: Stream Restoration

Four Stream Take-home Messages:

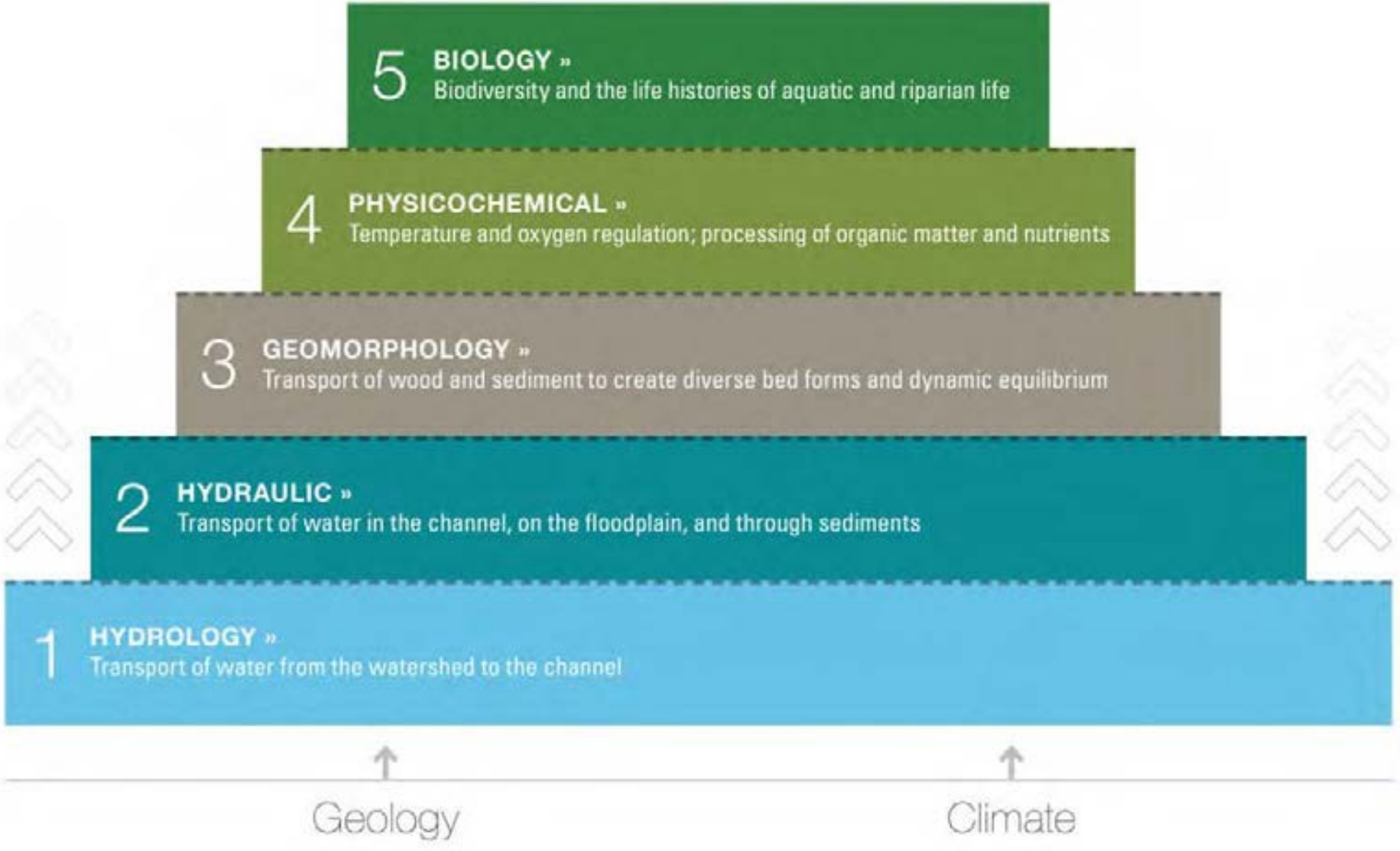
- Stream projects are just as successful other projects
- Consequences of failure can be more significant
- Maintenance and repair is less certain for stream projects
- Stream findings continue to underscore the value of standing Panel recommendations

Need documentation of the system to understand stressors & affects of intervention

Minnesota Stream Quantification Tool and Debit Calculator

Minnesota Stream Quantification Tool and Debit Calculator

Stream Functions Pyramid -> Stream Quantification Tool



Stream Functions Pyramid -> Functional Uplift

		Functional Category [a]																	
		1) Hydrology	2) Hydraulics				3) Geomorphology						4) Physicochemical				5) Biology		
	Functional Statement [a]	Transport of water from the watershed to the channel	Transport of water in the channel, on the floodplain, and through sediments				Transport of wood and sediment to create diverse bed forms and dynamic equilibrium						Temperature and oxygen regulation; processing of organic matter and nutrients				Biodiversity and the life histories of aquatic and riparian life		
	Function [b]	Water delivered to the stream via overland flow and subsurface flow [1]	Stream flow [2]	General hydrodynamic balance [2]	Floodplain inundation and storage [1]	Maintain surface/subsurface water connections and processes [3]	Sediment continuity [2]	Maintain substrate and structural processes [3]	Sediment and wood transport and storage [3]	Riparian processes and succession [1,2,3]	Stream Evolution Processes [2]	Erosion and sediment supply [2]	Maintain chemical processes and nutrient cycles [2]	Maintain water and soil quality [2]	Organic matter transport and storage [3]	Temperture and oxygen regulation	Maintain trophic structures and processes [2]	Support biological communities and processes [2]	Maintain landscape pathways [2]
Function-Based Parameters [1]	Channel-Forming Discharge	•	o	o	o	o	o	o	o		o	o							
	Precipitation/ Runoff Relationship	•	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
	Flow Duration	•	o	o		o		o					o	o	o	o	o	o	o
	Floodplain connectivity			o	•	o	o	o	o	o	o	o	o	o	o	o	o	o	o
	Flow dynamics		•	•			o	o	o	o	o	o	o	o	o	o	o	o	o
	Groundwater/ surfacewater exchange		o	o		•		o		o			o	o	o	o	o	o	
	Sediment transport competency						•	o	•		o	o			o		o	o	
	Sediment transport capacity						•	o	•		o	o			o		o	o	
	Large woody debris transport and storage						o	o	•		o	o	o		o	o	o	o	
	Channel evolution						o	o	o	o	•	o	o				o	o	o
	Bank migration/ lateral stability						o	o		o	o	•	o	o	o	o	o	o	
	Riparian vegetation									•	o	o	o	o	o	o	o	o	o
	Bed form diversity						•	•	•		o			o	o	o	o	o	o
	Bed material characterization							•	o			o					o	o	
	Water quality												o	•		•	o	o	
	Nutrients												•	o			o	o	
	Organic carbon												o	o	•		o	o	
	Microbial communities																•	o	
	Macrophyte communities																o	•	
	Benthic macroinvertebrate communities																o	•	
	Fish communities																o	•	
	Landscape connectivity																		•

Legend

- • Function-based parameter that directly represents the corresponding function.
- o Denotes functions that are supported by the function-based parameter with the • symbol.

Practitioner Note: Manipulation of function-based parameters in Levels 1 - 3 denoted with a • may lead to functional uplift of other functions denoted by o for that same parameter.

a Terminology from *A Function-Based Framework for Stream Assessment and Restoration Projects* by Harman et al.

b Functions from *Functional Objectives for Stream Restoration* by Craig Fischenich and *Stream and Watershed Restoration*, edited by Philip Roni and Tim Beechie

1 Functions from *Functional Objectives for Stream Restoration*

2023 Evaluation Focus – In-Lake Restoration

Improved Implementation of Common Carp Barriers

- Informed by integrated pest mgmt. / lake mgmt.
- Site specific
- Paired with other carp mgmt. efforts

2023 Evaluation Focus – In-Lake Restoration

Improved Alum Treatment Approach

- Can support goals
- Not complete solution

Consider

- Lake characteristics
- Longevity of treatment
- Monitoring needs

Improved Alum Treatment Approach

ROLES OF PROJECT MANAGERS

- Consider integrated lake management approach to guide alum treatment planning
- Develop specific goals, track measures to evaluate the success and longevity of alum treatments. Best practice measures include: pre & post-treatment hypolimnetic P, pre & post sediment P release rates, and sediment cores of aluminum bound P

ROLES OF FUNDING ORGANIZATIONS

- Refine grant requirements to best fit current science on alum treatments and limit problems with implementation

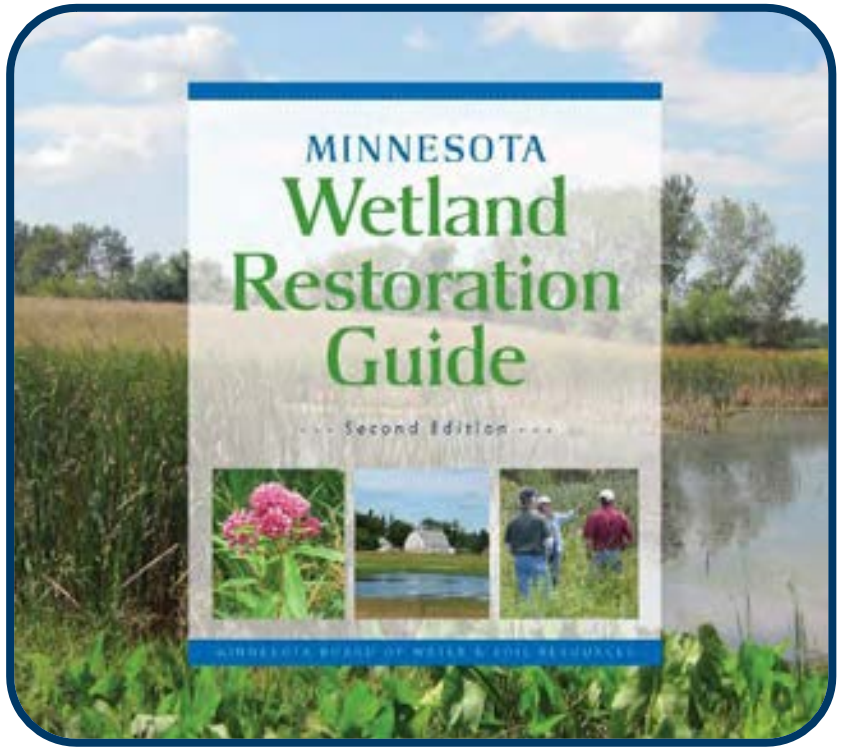
ROLE OF STATE AGENCIES

- Establish a better understanding on the use of alum in Minnesota by reviewing outcomes of completed treatments

Restoration Evaluation → Continuous Improvement

Improved Restoration Training

- *Practitioners will work best with comprehensive training of current science based restoration practices, challenges and successes*



RESTORING MINNESOTA

Connecting Practitioners to Share Knowledge

Bringing Science to the Field

Improving Restorations Webinars

Improving restorations

Home > Natural resources > Environmental education > Improving restorations

Wondering how to get the most out of your next ecological restoration project? Extension and the Legacy Fund Restoration Evaluation Program host free professional development webinars for ecological restoration practitioners and project managers.

Previously recorded webinars are available on our **YouTube Channel playlist, Restoring Minnesota**.

Find out more about the Ecological Restoration online series

Improving Restorations Webinars

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Past webinars

Moving beyond reed canary grass — Dense reed canary grass can pose a difficult challenge for managers looking to restore wetlands and floodplain forests. Learn about research and management efforts that incorporate ecological approaches to long-term restoration (Dec. 27, 2024).

Soils and restoration — From mycorrhizas to amendments for revegetation, discover the importance of soils in your restoration (Dec. 19, 2024).

Restoring oak savannas — Learn how managers are overcoming challenges and restoring oak savannas in Minnesota (Nov. 25, 2024).

Seeding best practices — Learn how to improve vegetation outcomes in your next restoration (Nov. 7, 2024).

Seed sourcing: local, mix and match, assisted migration — Experts in the field present diverse points of view and current science on seed sourcing for restoration (April 25, 2024).

Climate contingency planning for restorations — Hear from state agencies and contractors about how contingency planning has played a critical role in effective stream and wetland restorations (April 11, 2024).

Forest restorations and climate adaptation — Learn how climate adaptation plays a role in forest restorations and how land managers support adaptation and restoration goals (March 14, 2024).

Prairie restorations and climate mitigation — Learn about the relationship between diversity and carbon sequestration in prairie restorations, and how to optimize diversity from a practitioner's perspective (March 28, 2024).

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West Chaska Creek Restoration Project

DNR LOCAL GOVERNMENTS FORUM

JANUARY 21, 2026

TIM SUNDBY

WATER RESOURCES SUPERVISOR

Presentation

- Project Goals
- Location
- Background
- Timeline
- Construction
- Issues
- Costs and Funds

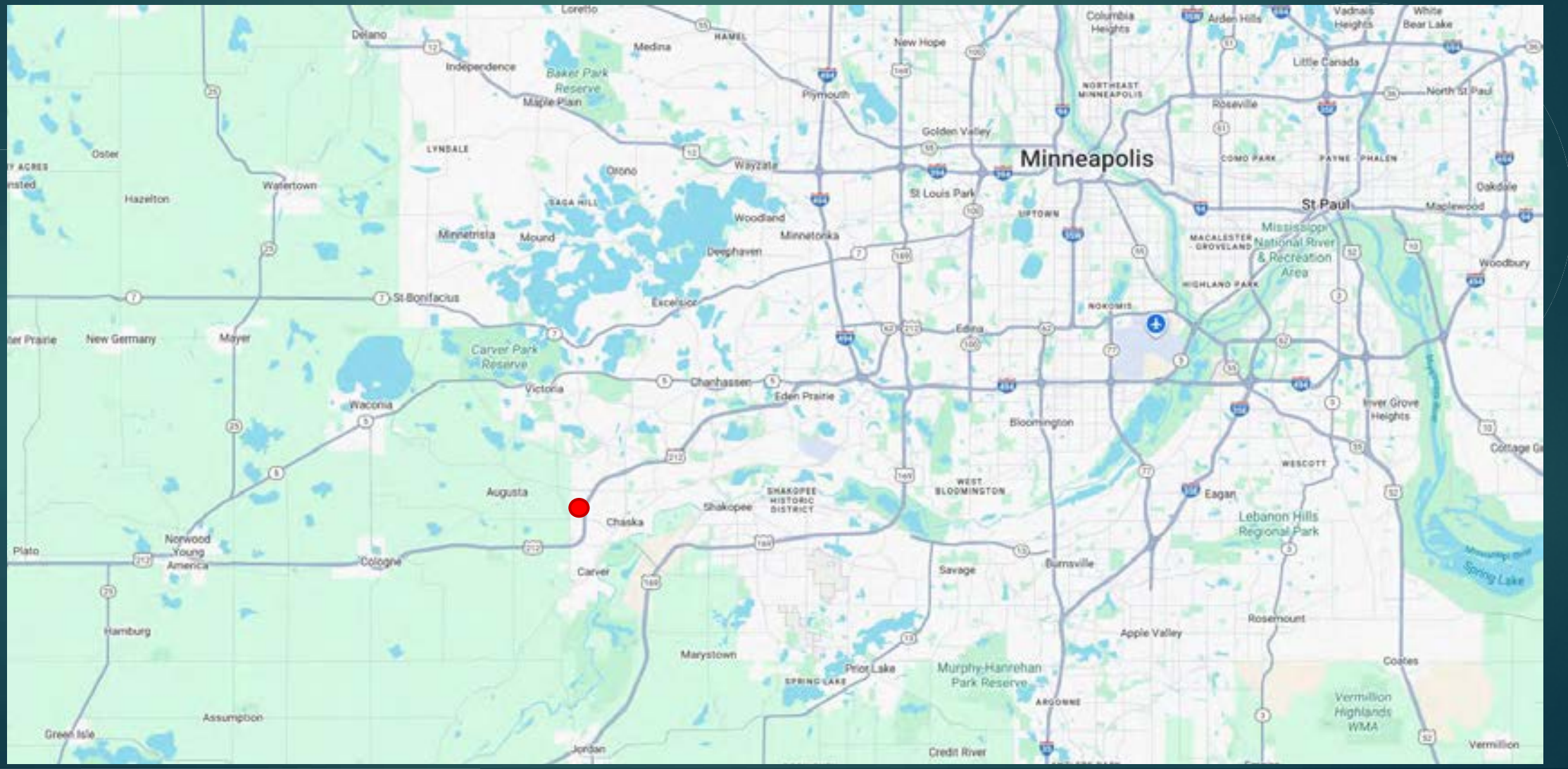
CCWMO Background

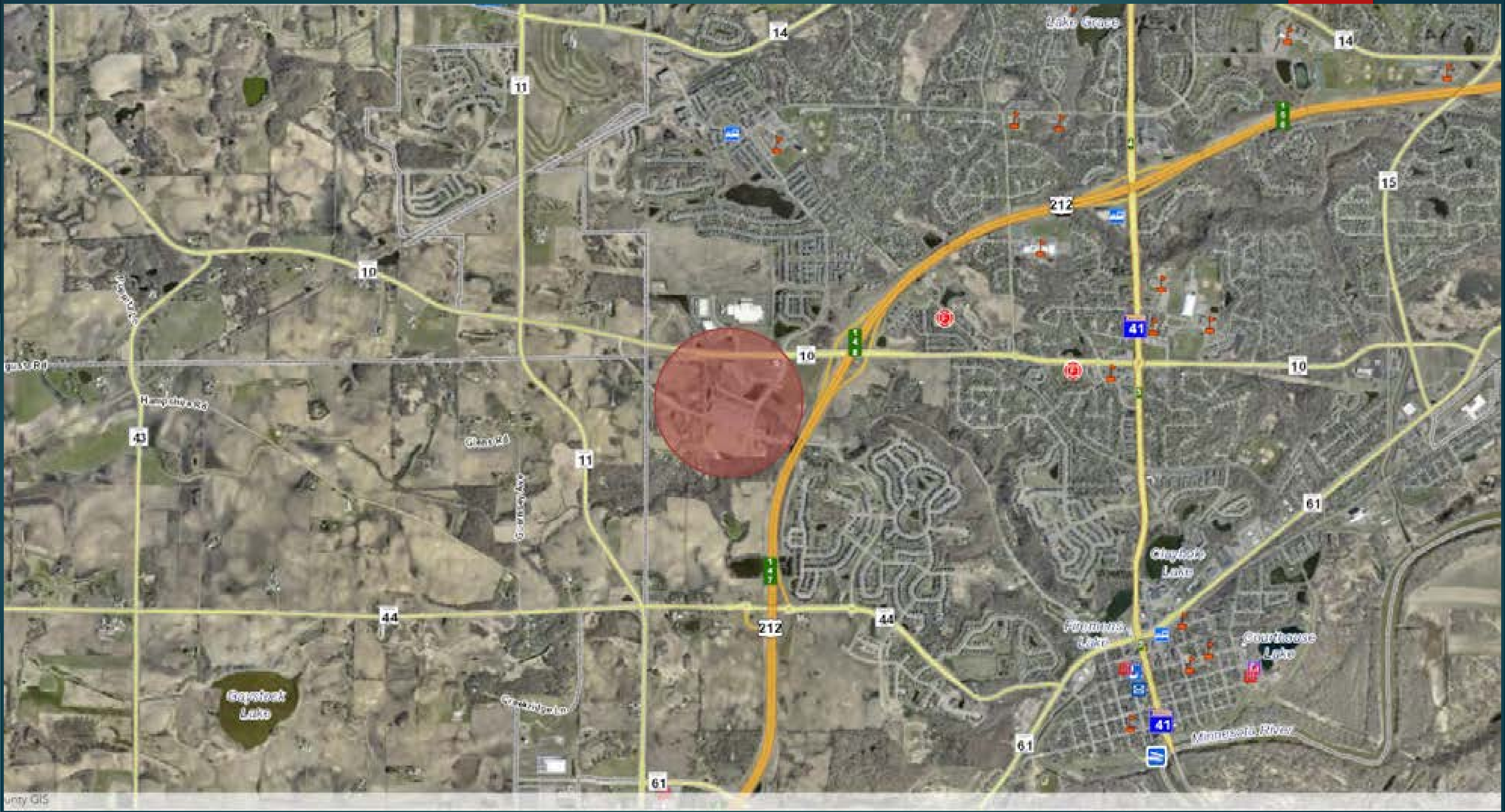
- Project within Carver County Water Management Organization and City of Chaska
- CCWMO covers an area that is 320 square miles with 365 miles of streams and 35 lakes that are larger than 10 acres
- Program areas include Permitting, Monitoring, Projects, Planning, Education, and AIS
- Staff of 9 FTE, 4 seasonal interns and currently 1 Green Corp Member
- 2024 Annual budget of $1.12 Million
- 2024 Grant Funding of $1.34 Million

Project Goals

- Remeander a 940 linear foot ditch, lengthening to 1,100 linear feet.
- Add a 100-foot-wide floodplain
- Reconnecting stream to the floodplain
- Reduce total suspended solids by stabilizing banks
- Establish a native vegetation corridor
- Work with development to produce an amenity within a highly impervious area

Location


Minneapolis
St Paul
Delano
Independence
Medina
Maple Plain
Plymouth
New Hope
Golden Valley
Wayzata
Orono
Minnetrista
Mound
Woodland
Minnetonka
Deephaven
St Louis Park
Hazelton
Watertown
St Bonifacius
New Germany
Mayer
Carver Park Reserve
Victoria
Chanhassen
Eden Prairie
Waconia
Augusta
Chaska
Shakopee
Carver
Cologne
Norwood Young America
Plato
Hamburg
Assumption
Green Isle
Marystown
Prior Lake
Murphy-Hanrehan Park Reserve
Savage
Burnsville
Apple Valley
Rosemount
Eagan
Lebanon Hills Regional Park
Inver Grove Heights
Bloomington
Edina
Roseville
Arden Hills
Columbia Heights
Little Canada
North St Paul
Maplewood
Oakdale
Woodbury
Mississippi National River & Recreation Area
Spring Lake
Vermillion Highlands WMA
Vermillion
Credit River
Jordan

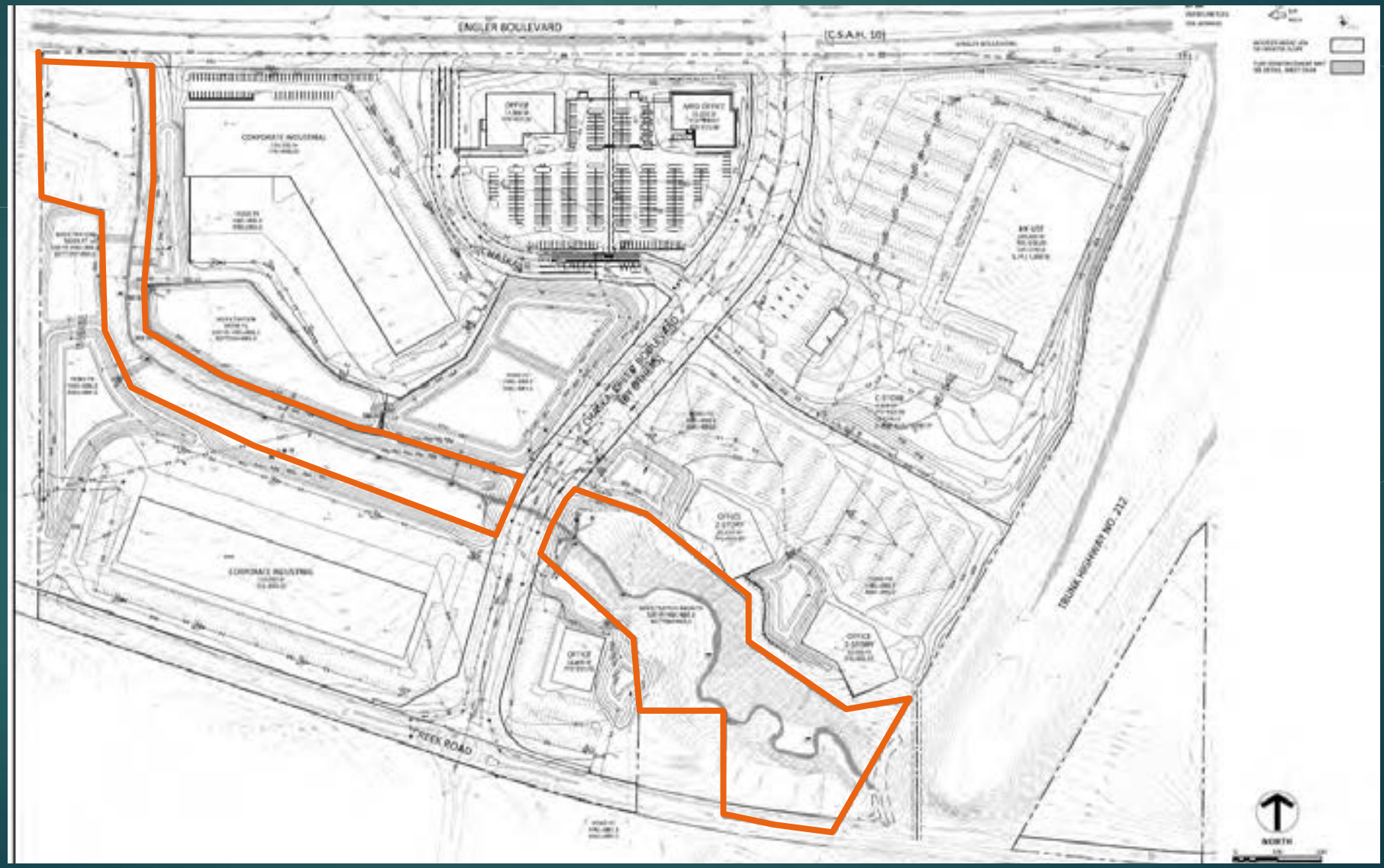

14
11
10
212
41
15
43
44
61
147
Lake Grace
Minnesota River

Location

Background

- Chaska Creek Development Project
  - 2016 initial discussions, 2017 approval
  - 40.99 acres of new impervious, 60% impervious
    - Met CCWMO requirements for WQ, but short for Volume
  - 9.4 acres of upland preservation (City outlot)
- City allowed WMO to construct a stream restoration project
- Developer paid for vegetation

West Chaska Creek Development



West Chaska Creek Development

Project Construction

- Plan
  - Construct in two Phases
  - Allow for new meanders and floodplain to get established
  - 2 year wait between Phases
  - Development occurring after Phase 2 completion

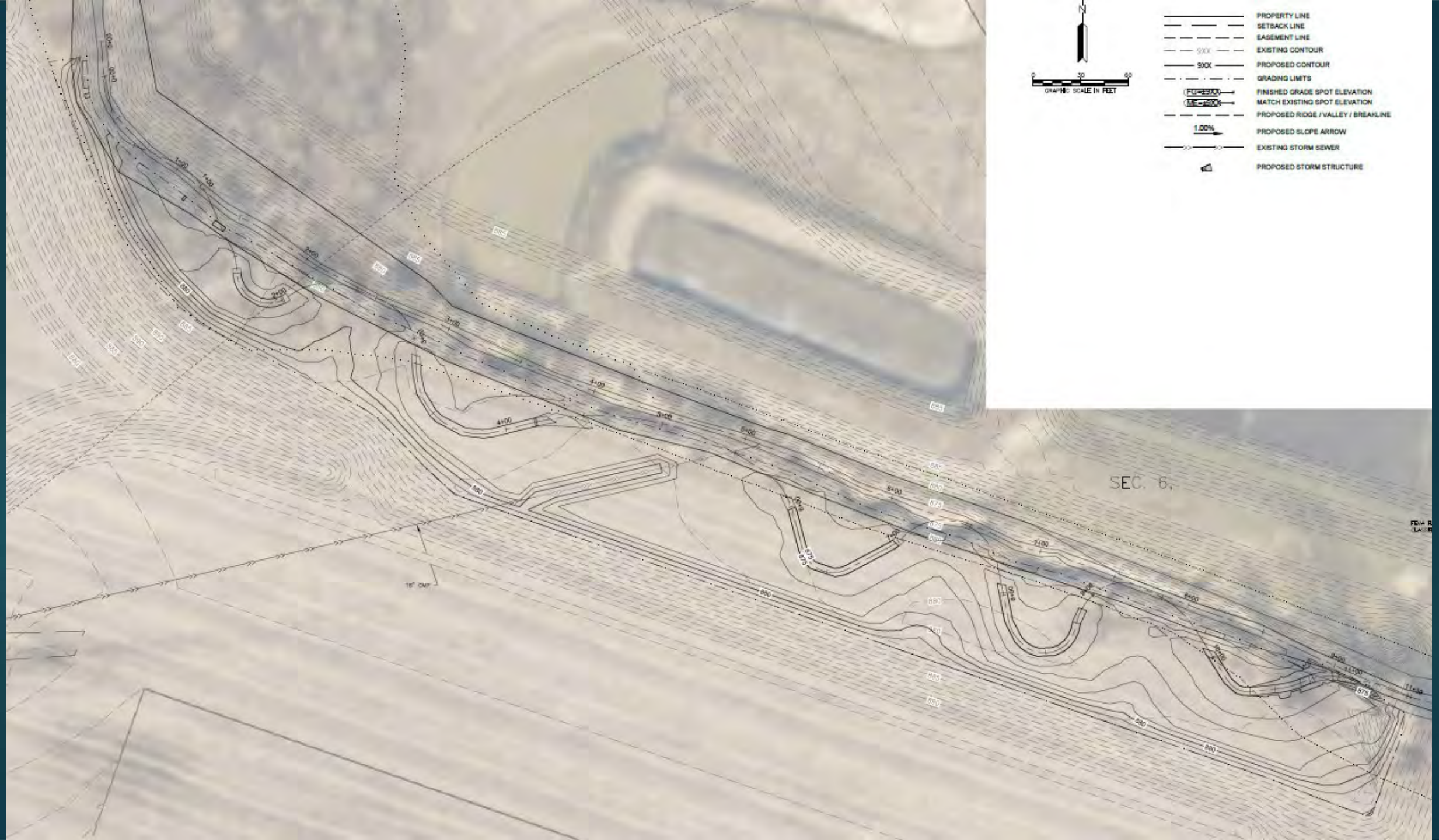

LANDSCAPE LEGEND
TOP OF BANK
RIPRAP
NOTE: SEE SHEETS L-101 AND L-102 FOR PHASING INFORMATION. OVERVIEW PAGE INTENDED FOR REFERENCE ONLY.
NOTE: STABILIZATION METHODS SHOWN OFFSET FROM TOP OF BANK FOR CLARITY ONLY.
SEC. 6
RECORD PLANS
CONTRACTOR: MENGER CONSTRUCTION CO., INC.
DATE: 11/13/19
RECORD DRAWINGS ARE BASED ON INFORMATION OBTAINED THROUGH ON SITE OBSERVATION OF CONSTRUCTION AND FIELD SURVEY DATA COLLECTED BY MENGR

Project Construction

- What happened
  - Constructed floodplain and five meanders in Phase 1
  - Development of lots happened before Phase 2
    - Impacts from failed ESC
    - Lost ability to waste excess soil on south lots, increasing costs by $30,000
  - Phase 2 construction pushed 3 years out
  - Rerouted farm field tile line, kept original basin as an oxbow lake
  - New stilling basin

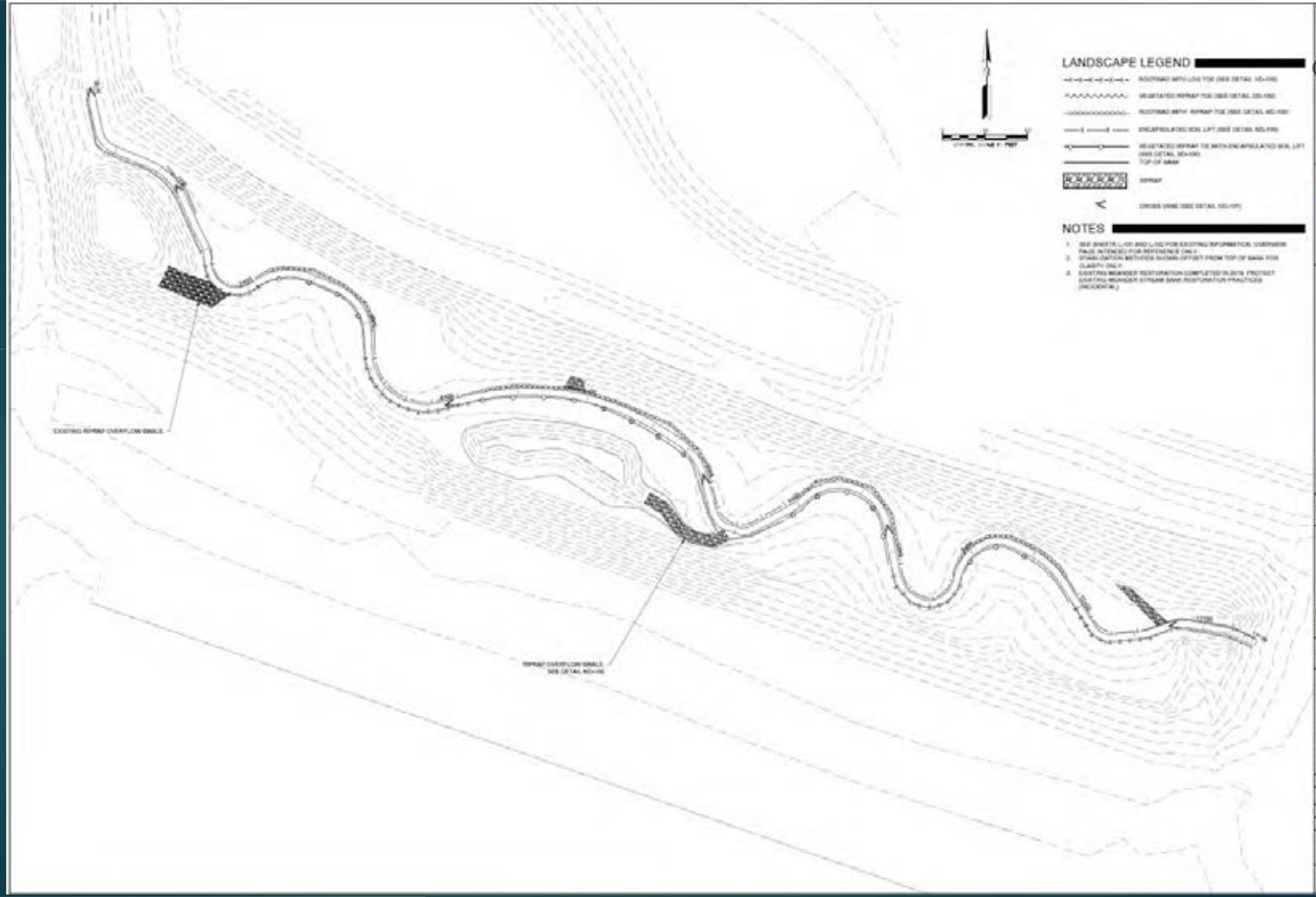
Project Construction

- Phase 1
  - Construct five meanders
  - Establish new 100-foot-wide floodplain
  - Stockpile dirt where stilling basin was designated
  - Easy access to the site


N
0
30
60
GRAPHIC SCALE IN FEET
PROPERTY LINE
SETBACK LINE
EASEMENT LINE
EXISTING CONTOUR
PROPOSED CONTOUR
GRADING LIMITS
FINISHED GRADE SPOT ELEVATION
MATCH EXISTING SPOT ELEVATION
PROPOSED RIDGE / VALLEY / BREAKLINE
1.00%
PROPOSED SLOPE ARROW
EXISTING STORM SEWER
PROPOSED STORM STRUCTURE
SEC. 6,
15" CMP

Phase 2 construction

- Started in August 2023
- Completed in late October 2023
- Added connections for new stilling basin
- Kept original basin to act as oxbow lake



Stantec

CARVER COUNTY

WEST CHASKA CREEK
RESTORATION REMEANDER:
PHASE 2
CITY OF CHASKA
CARVER COUNTY, MINNESOTA

PROJECT NO. 227705172

DESIGN JTP | DRAWN MJZ | APPROVED MPB

ISSUE DATE 4/5/2023

ISSUE NO. 0

STREAMBANK STABILIZATION PLAN OVERVIEW

SHEET NO. C-300

Issues

- Construction Stormwater Failures
  - South Lot ESC failures happening in 2021 and 2022
  - Impacts to 5 different areas
- Phase 2 Construction
  - Failed to document field changes in Phase 1
  - Channel bed slope changed from bottom of culvert to top of sediment in culvert for tie in

Construction Stormwater Failures

- Two different failures in August of 2021 and May of 2022
- Construction Contractor tried to fix 2022 issues, made it worse

August 2021

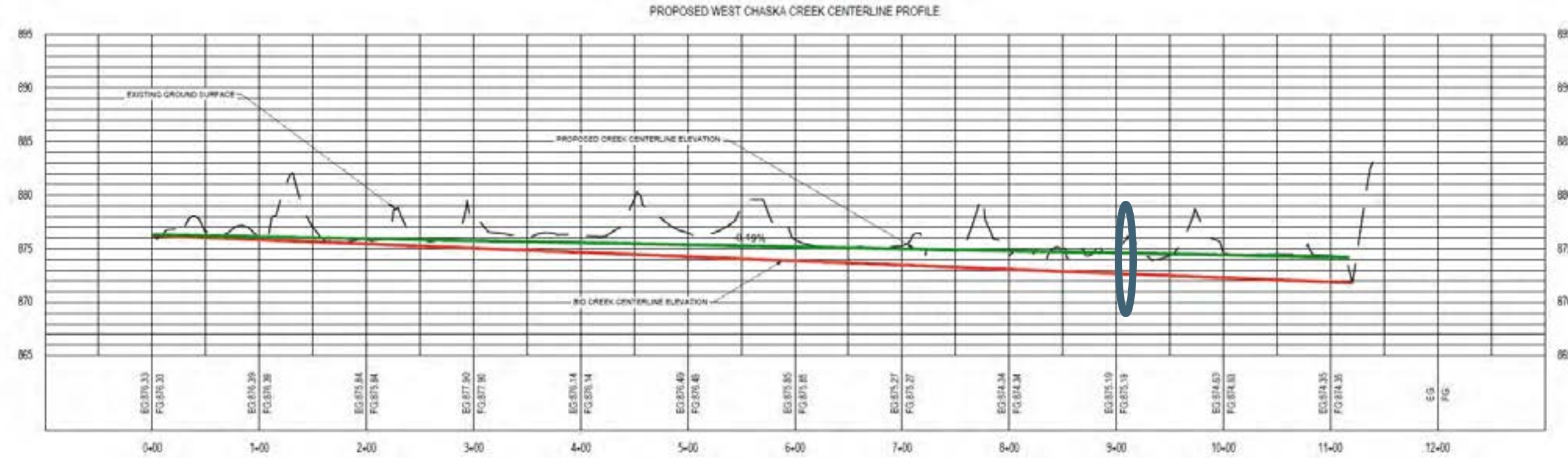
May 2022

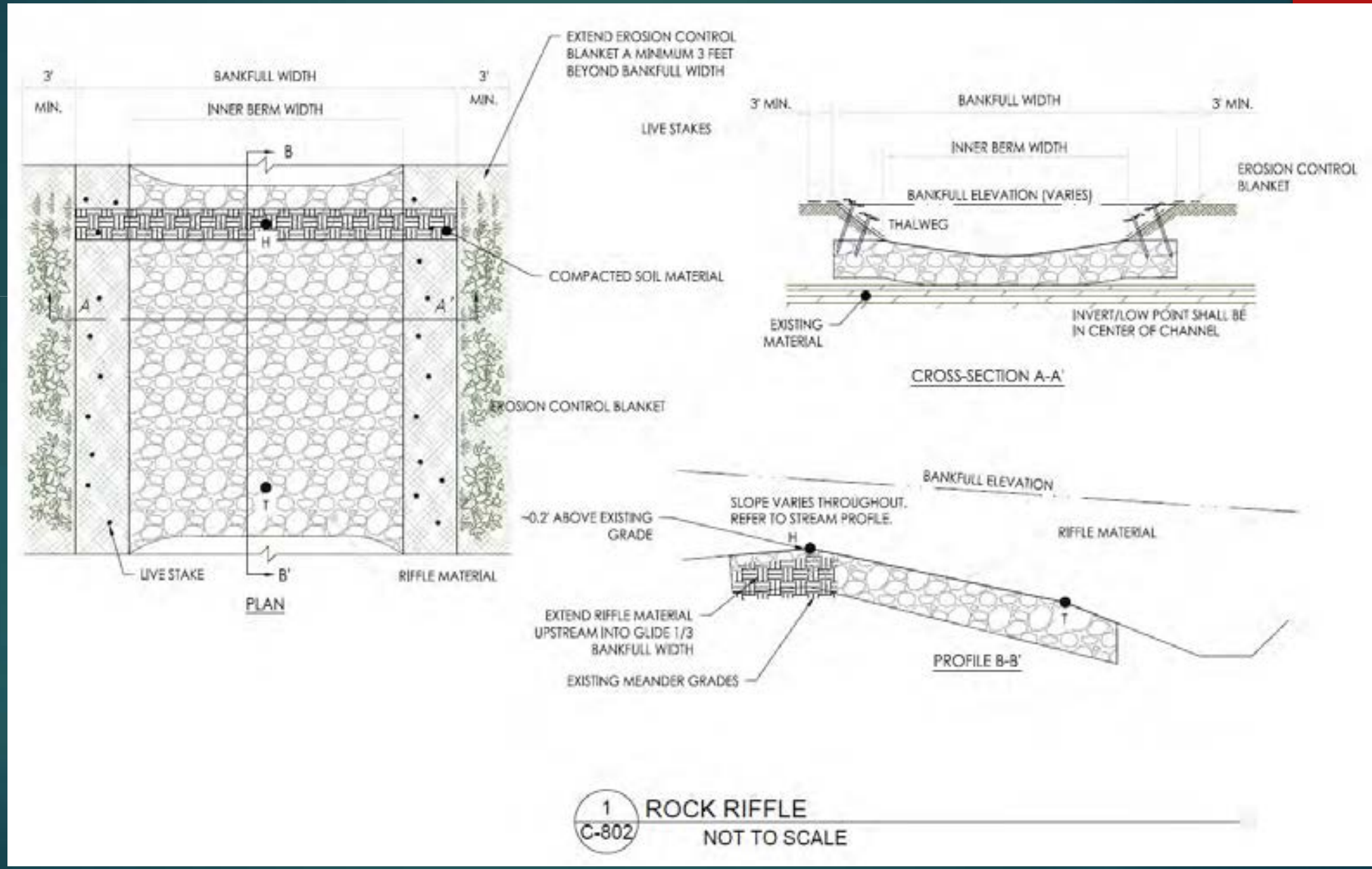
May 2022

Phase 2 Construction

- Noticed a 1.5-foot step into second to last meander
- Reviewed plan sets and potential for field fixes in Phase 1
- Phase 1 changed from bottom of culvert to top of sediment in culvert
- Rock checks, from roughly 4 inches to 2 feet in height

Phase 2 Construction



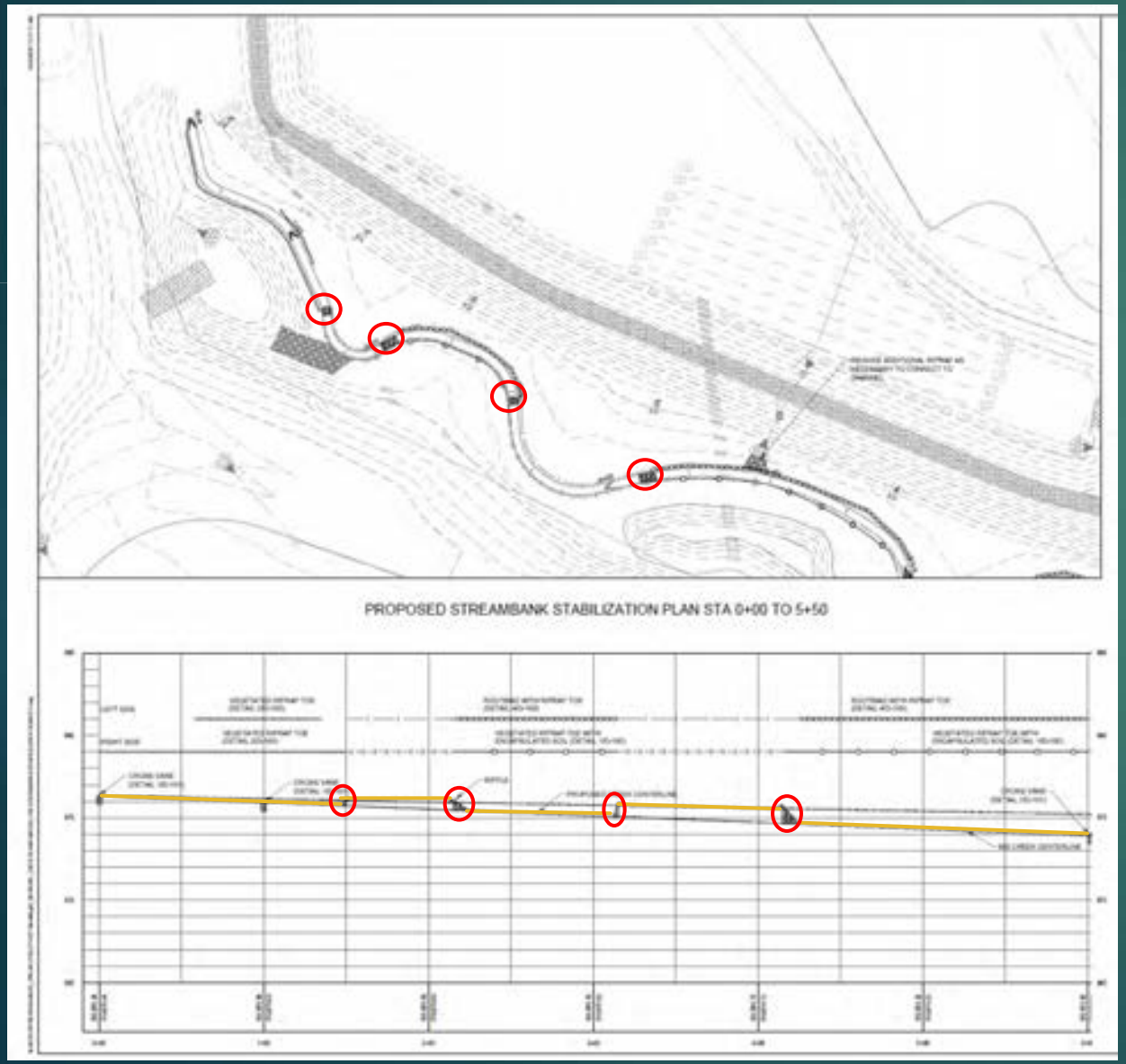


1
C-802

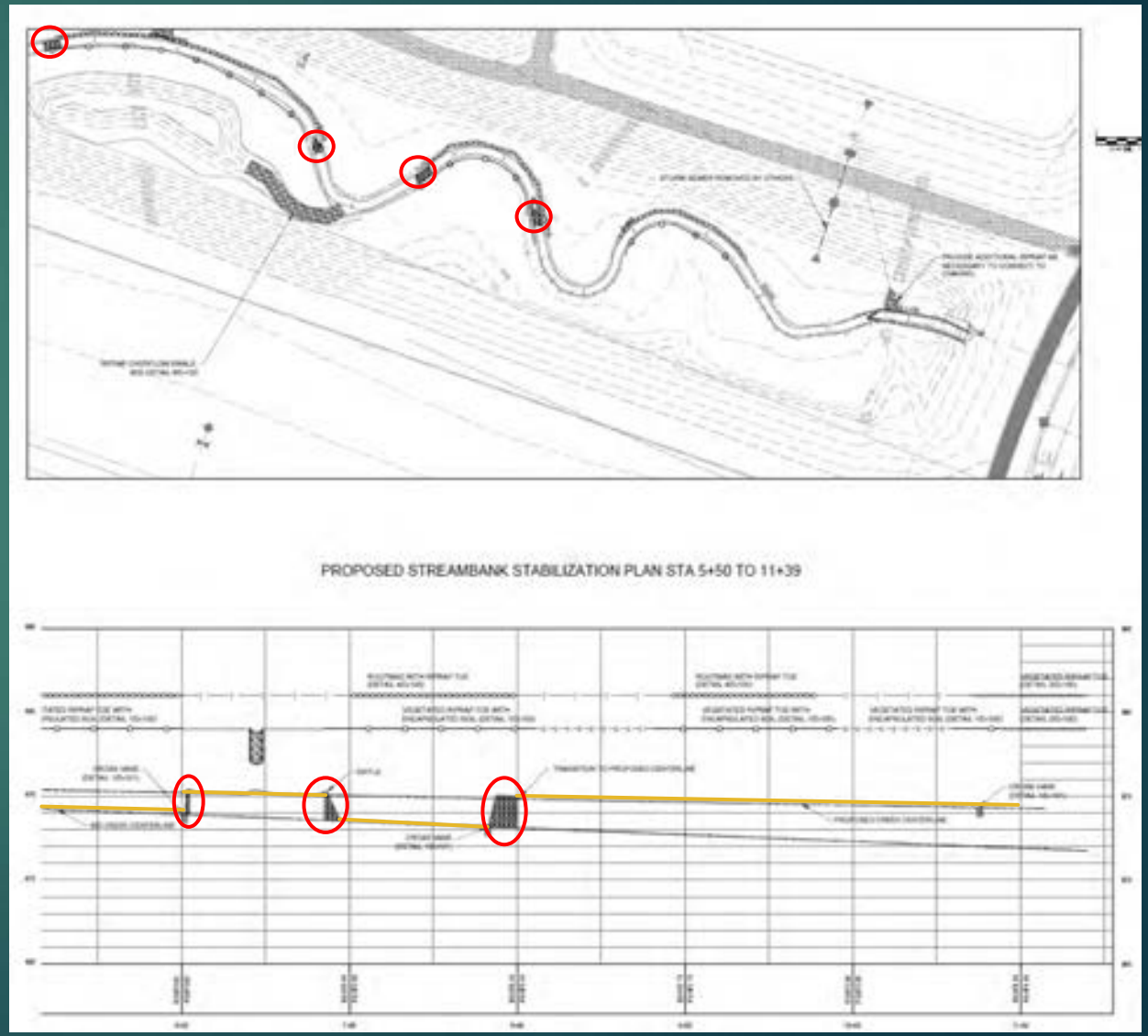
ROCK RIFFLE

NOT TO SCALE

Phase 2 - Fix



PROPOSED STREAMBANK STABILIZATION PLAN STA 0+00 TO 5+50



PROPOSED STREAMBANK STABILIZATION PLAN STA 5+50 TO 11+39

Costs

- Phase 1
  - Construction - $192,669.76
    - $27,441 for new stilling basin
  - Engineering - $64,781.46
  - Vegetation - $10,390
  - Tree Harvesting - $22,910
  - Phase 1 Total - $290,751.22
- Storm Damage
  - Construction - $16,193

- Phase 2
  - Construction - $229,931.20
  - Engineering - $54,286.07
  - Vegetation - $70,694.65
    - $54,289 for 7,020 plugs ($7.74 per installed plug)
    - ~$7,500 in annual native vegetation maintenance
  - Phase 2 Total - $354,911.92
- Project Totals - $645,663.14
  - Cost Per Linear Foot - $586.97

Funds

- 2019 – Watershed Based Funding Metro (BWSR)
  - $150,000
- 2022 Clean Water Funds Competitive BWSR Grant
  - $283,000
- Lower Minnesota Watershed District
  - $50,000
- City of Chaska
  - Value of Land

- Developer/Owner
  - $4,500 for Vegetation and $16,193 for Storm Damages
- SWCD Engineering and Technical Assistance
  - $1,001
- Carver WMO
  - $157,162

Lessons Learned

- Be patient!
- Work with development and cities for potential sites
- If ESC failures do happen, go back to original contractors to fix
- Find local trees to reduce costs
- Reduce soil export as much as possible (difference of $15.50 per Cu Yd)
- Find the right native vegetation management team
- Need to roll with the punches

Questions

- Tim Sundby
- tsundby@carvercountymn.gov
- 952-361-1816

BWSR Resources for Clean Water Fund Projects

Guidance for Local Governments and Consultants

BOARD OF WATER AND SOIL RESOURCES

Presenter: Dan Shaw, BWSR

BWSR Resources for Clean Water Fund Projects

Topics

1) Our Changing Landscape
2) Seed Mixes
3) Vegetation Guidelines
4) Minnesota Wetland Restoration Guide
5) Pollinator Resources
6) What's Working Information




BWSR Resources for Clean Water Fund Projects

There are many impacts on our water resources requiring innovative technical resources

Water pollution/high nutrients/pesticides

Extreme Precipitation

Topsoil Loss

Habitat Loss

Temperature Extremes

Habitat degradation & fragmentation

Impervious Areas

Pollinator/Insect Collapse

Tree Diseases and Impacts

Urban Heat Islands

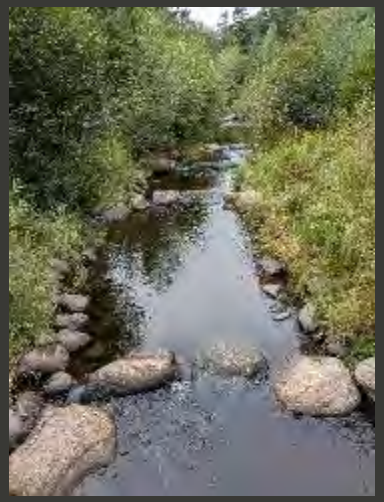
Invasive Species

BWSR Resources for Clean Water Fund Projects

There are Clean Water Fund Projects that involve Bioengineering and Vegetation

Stormwater

Slopes and Ravines



Streams

Wetland

Healthy biological systems lead to healthy soils and clean water

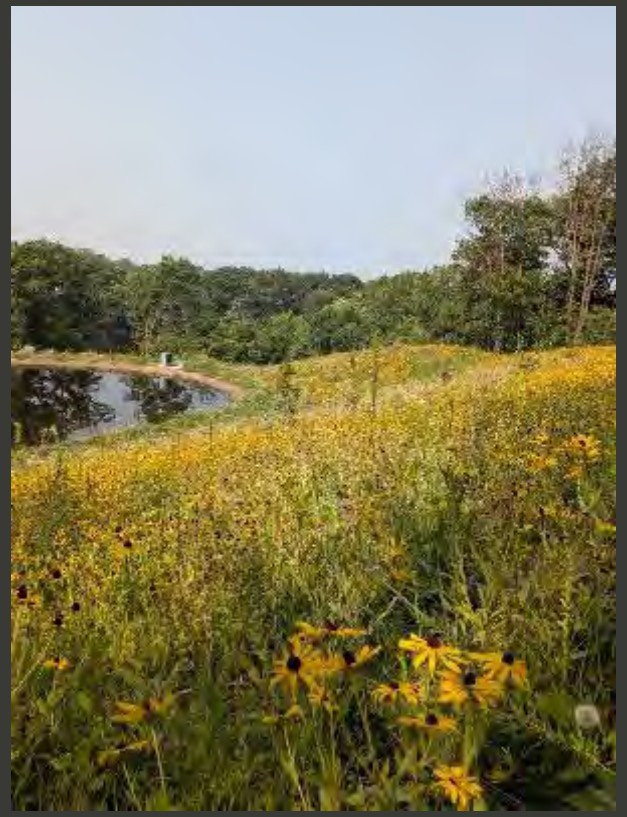
BWSR Resources for Clean Water Fund Projects

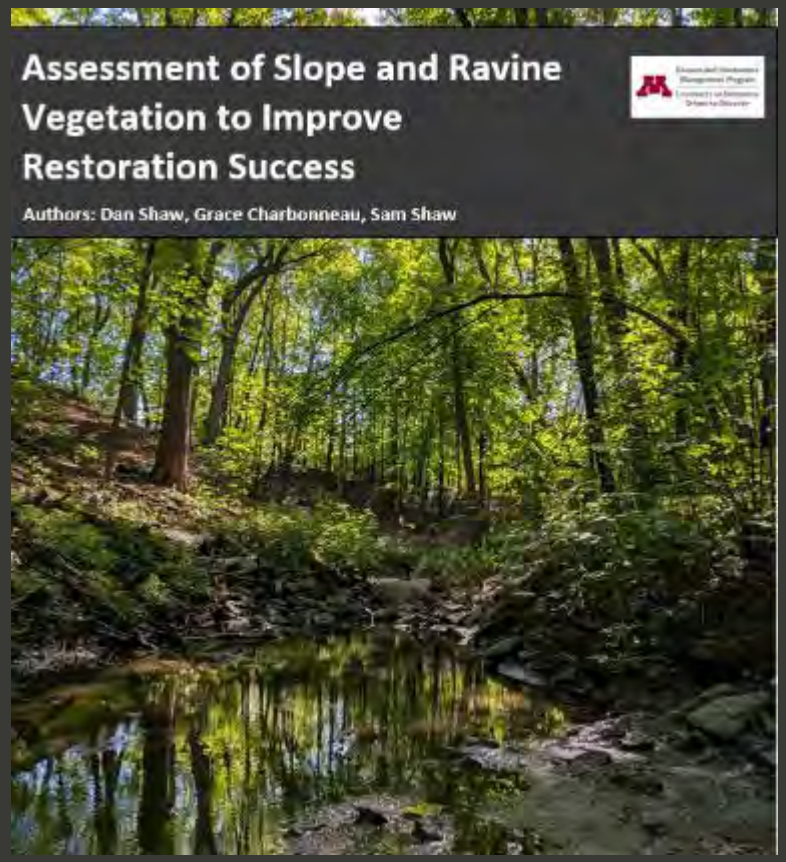
Streams

Healthy vegetation on the edges of streams filters pollutants and provides stabilization

BWSR Resources for Clean Water Fund Projects

Slopes and Ravines

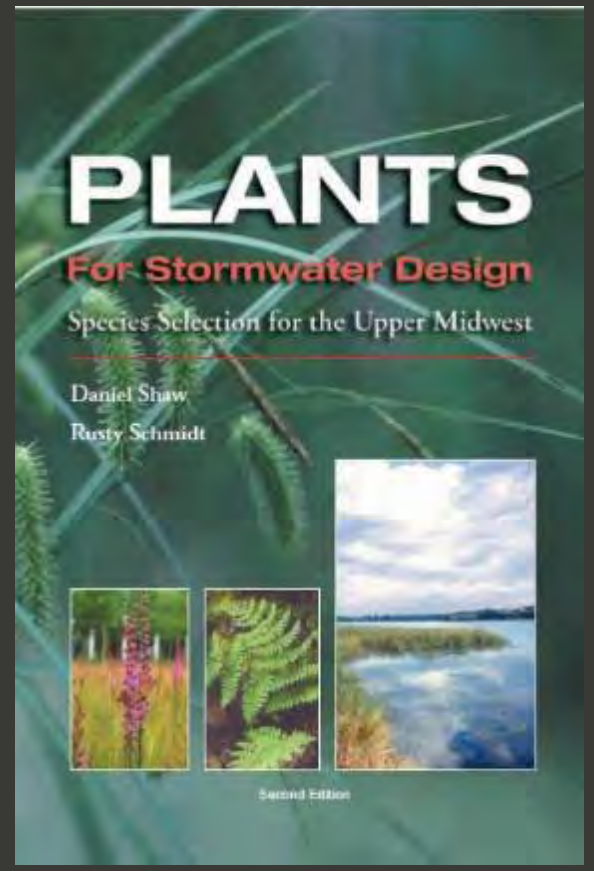




Many slopes and ravines have been assessed in 2025 leading to new guidance

BWSR Resources for Clean Water Fund Projects

Stormwater Projects



The Plants for Stormwater Design book was recently updated with new guidance and case study information added

BWSR Resources for Clean Water Fund Projects

Stormwater Projects

14 new species present in 2024

New species include plants tolerant of increased shade including golden alexanders, ironweed, jewelweed, and beggarsticks,

and species tolerant to disturbance such as wild bergamot, spikerushes, rice-cut grass, prairie wild onion, mountain mint, broadleaf arrowhead, and yellow coneflower

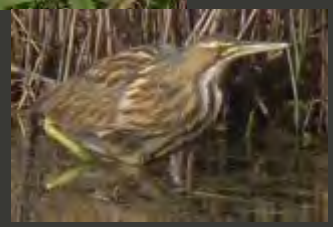
Gervais Beach Stormwater Wetland (Little Canada, MN)

BWSR Resources for Clean Water Fund Projects

Wetlands

State seed mixes are leading to diverse wetlands

Diverse shallow marsh and wet meadow plant communities



BWSR Resources for Clean Water Fund Projects

Wetlands

Project with a diversity of native forbs, grasses, sedges and bulrush and hybrid cattail in areas of shallow marsh

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Seed Mix Evolution

Seed mixes and seeding methods have evolved together

BWSR Resources for Clean Water Fund Projects

Over 70 State Seed Mixes for Restoration

Mixes and guidance for many project types:

-Stormwater
-Wetland
-Grassland
-Pollinator
-Riparian
-Forest
-Conservation Programs
-Habitat Solar Projects
-Other Mixes for specific needs

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Minnesota Seed Mix Information Sheet Links

Title	Label	Seed mix category	Seed mix purpose	Seed mix region	Info Sheet Download Links
Deep Marsh	34-191	Current State Seed Mix	Wetland	Statewide	Microsoft Word | PDF
Wetland Seedbank Release	31-271	Current State Seed Mix	Wetland	Statewide	Microsoft Word | PDF
Wetland Rehabilitation	34-172	Current State Seed Mix	Wetland	Statewide	Microsoft Word | PDF
Wet Prairie	34-266	Current State Seed Mix	Wetland	South & West	Microsoft Word | PDF
Wet Meadow South and West	34-272	Current State Seed Mix	Wetland	South & West	Microsoft Word | PDF
Wet Meadow NE	34-372	Current State Seed Mix	Wetland	Northeast	Microsoft Word | PDF
Wet Meadow Forb Sedge Rush South & West	34-273	Current State Seed Mix	Wetland	South & West	Microsoft Word | PDF
Riparian South & West	34-265	Current State Seed Mix	Wetland	South & West	Microsoft Word | PDF
Riparian NE	34-362	Current State Seed Mix	Wetland	Northeast	Microsoft Word | PDF
Emergent Wetland	34-182	Current State Seed Mix	Wetland	Statewide	Microsoft Word | PDF
Emergent Wetland RIM Project Pilot	34-183	Pilot Seed Mix	Wetland	Statewide	Microsoft Word | PDF
Wet Meadow South and West RIM Project Pilot	34-274	Pilot Seed Mix	Wetland	South & West	Microsoft Word | PDF

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Example wetland seed mix

34-182 Emergent Wetland Mix

Code	Common Name	Scientific Name	PLS lb/ac	% by PLS lb/ac	Seeds/ft2	% by Seeds/ft2
becsyz	American Sloughgrass	Beckmannia syzigachne	0.98	18.85%	18.00	17.26%
glygra	American Manna Grass	Glyceria grandis	0.28	5.38%	7.20	6.90%
leeory	Rice Cut Grass	Leersia oryzoides	0.39	7.50%	4.87	4.67%
		Grasses Subtotal	**1.65**	**31.73%**	**30.07**	**28.83%**
bolflu	River Bulrush	Bolboschoenus fluviatilis	0.63	12.12%	1.00	0.95%
carcom	Bottlebrush Sedge	Carex comosa	0.18	3.46%	1.98	1.90%
carsco	Pointed-broom Sedge	Carex scoparia	0.10	1.92%	3.09	2.96%
carstr	Tussock Sedge	Carex stricta	0.01	0.19%	0.19	0.19%
carutr	Northwest Territory Sedge	Carex utriculata	0.05	0.96%	0.20	0.19%
eleaci	Needle Spikerush	Eleocharis acicularis	0.05	0.96%	1.29	1.23%
elepal	Common Spikerush	Eleocharis palustris	0.05	0.96%	0.94	0.90%
juntor	Torrey's Rush	Juncus torreyi	0.01	0.19%	5.88	5.63%
schpun	Three-square Rush	Schoenoplectus pungens	0.11	2.12%	0.48	0.46%
schtab	Softstem Bulrush	Schoenoplectus tabernaemontani	0.30	5.77%	3.42	3.27%
sciatr	Dark Green Bulrush	Scirpus atrovirens	0.12	2.31%	20.28	19.44%
scicyp	Woolgrass	Scirpus cyperinus	0.04	0.77%	24.98	23.95%
		Sedges & Rushes Subtotal	**1.65**	**31.73%**	**63.71**	**61.08%**
acoame	Sweet Flag	Acorus americanus	0.21	4.04%	0.51	0.49%
alitri	Northern Water Plantain	Alisma triviale	0.12	2.31%	2.91	2.79%
ascinc	Swamp Milkweed	Asclepias incarnata	0.10	1.92%	0.18	0.17%
bidcer	Nodding Bur Marigold	Bidens cernua	0.13	2.50%	1.00	0.96%
iriver	Northern Blue Flag Iris	Iris versicolor	0.08	1.54%	0.04	0.04%
lycame	Water Horehound	Lycopus americanus	0.04	0.77%	2.78	2.66%
saglat	Common Arrowhead	Sagittaria latifolia	0.13	2.50%	2.91	2.79%

Fact sheets now exist for most state seed mixes

Emergent Wetland 34-182 Seed Mix Guidance

Seed mix name: Emergent Wetland 34-182 (previously 34-181)
Geographic area: Statewide
Year of development:2009
Year/s of update:
Status (Standard or Pilot mix): Standard
Primary and Secondary Functions:
Primary – Wildlife habitat, restoration of wetland functions, and water management
Secondary – Carbon Sequestration, emission reductions, pollinator habitat, songbird habitat
Similar State Mixes: Wet Meadow Northeast 34-371, Wet Meadow South and West 34-271
Compatible NRCS Practice Standards: NA
Compatible Minnesota CRP Practices: NA
Suitable Site Conditions: Areas with soil saturation to the surface to two feet deep during a majority of the growing season and full to partial sun along ponds, wetlands or lakeshores or for wetland restoration projects where land is being converted from other uses such as agriculture or non-native grasses to a wetland restoration.
How to Modify for Site Conditions and Goals: This mix includes a list of additional species that can be considered to add species diversity. Site conditions such as sunlight, soils, hydrology and existing vegetation along with functional goals for the project such as pollinator habitat, and benefit to bird species can all have an influence on species selection and the modification of seed mixes. Additional plant species can also be added from containerized plants. It is also common that seed substitutions (see list) are used for wetland seed mixes when other species are not available.
Site Preparation: Primary goals for site preparation tend to focus on controlling weed species and providing ideal growing conditions for seed or plants to be installed. Site preparation methods vary

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Over 70 State Seed Mixes for Restoration

New mixes are planned for this winter

-Bioretention Seed Mix and Guidance

-Regional Forest Ground-layer Mixes and Guidance

-Oak Savanna Seed Mix

-Peatland Sedge Meadow Mix and Guidance

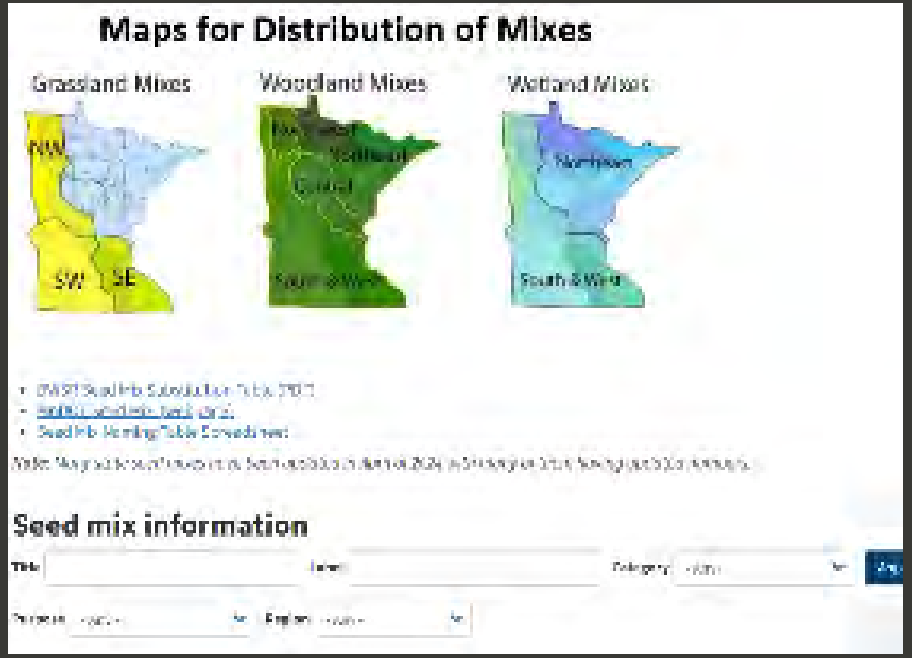
-Invasive Suppression Mix

-Lawns to Legumes Pollinator Meadow Mixes and Fact Sheet

-Utility Corridor Seed Mix and Fact Sheet

-Food Thickets Planting Template

-Food Forests Planting Template



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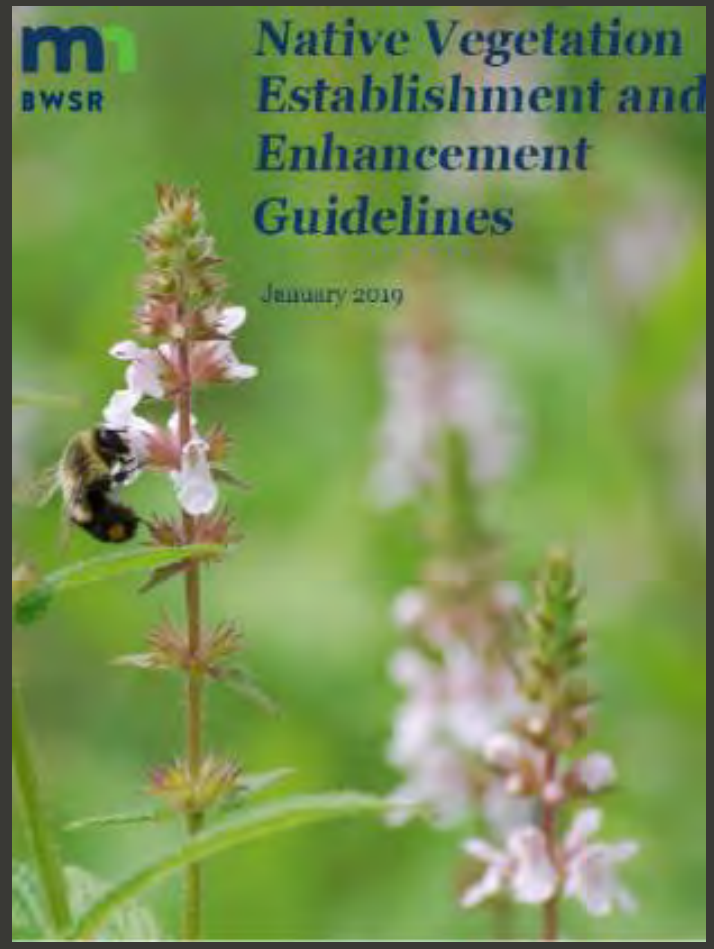
Evolving Vegetation Guidelines and Resources



BWSR Native Vegetation Guidelines

-Guidance on vegetation establishment
-Seed and Plant Source recommendations
-Diversity Levels
-Applicability
-Guidance for specific project types (streams, shorelines, ravines, wetlands, etc.)

BWSR Resources for Clean Water Fund Projects

Evolving Vegetation Guidelines and Resources

BOARD OF WATER AND SOIL RESOURCES

Lakeshores

Updated 8-18-2025

Document Purpose – This fact sheet is a companion to BWSR's Native Vegetation Establishment and Enhancement Guidelines and provides detailed considerations for project planning and design with an emphasis on vegetation selection, installation and management.

Introduction – Lakeshores can be areas of high wildlife use when dominated with native vegetation. They also play important roles with improving water quality and slope stability. It is important that lakeshore buffers are planned in a way that will meet wildlife and water quality goals and result in resilient plantings. Raingardens and vegetated stormwater swales can often be combined with lakeshore projects to maximize water quality benefits and slow water runoff to prevent erosion.

Site Selection – Projects should be located where they will have the greatest functional water quality or habitat benefits depending on program goals. When selecting projects for wildlife it is important to prioritize connected areas of habitat along shorelines to decrease fragmentation and to define specific species that will be targeted by the project. The Minnesota Wildlife Action Plan Minnesota's Wildlife Action Plan | Minnesota DNR identifies species of greatest conservation need for different areas of Minnesota.

Design Considerations for State Funded Projects:

- When state funding is being used, the water quality and habitat benefits of the project should take precedence, acknowledging that some projects may not be able to proceed if landowners are not supportive of the necessary improvements.
- Riprap should not be used in areas where intact native vegetation and ecosystems are present. Rock should only be used when necessary to solve a specific resource concern.
- For BWSR funded projects, lakeshore buffer widths for water quality projects should typically be a minimum of 30 feet landward of the ordinary high-water level. For wildlife habitat projects, buffers should be at least 100 to 330 feet, depending on habitat needs of target wildlife species. Buffers should also cover at least 75% of the shoreline's length.

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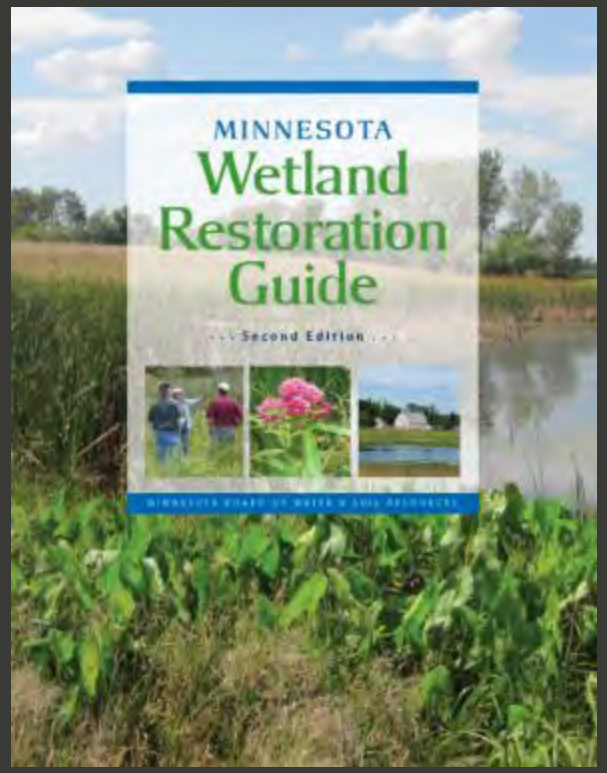

Minnesota is a leader in wetland restoration

BWSR Resources for Clean Water Fund Projects

MINNESOTA WETLAND RESTORATION GUIDE

PRESCRIBED BURNING

TECHNICAL GUIDANCE DOCUMENT

Document No.: WRG 6A-2
Publication Date: 1/26/2012

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Photo by Ken Graeve/MnDOT

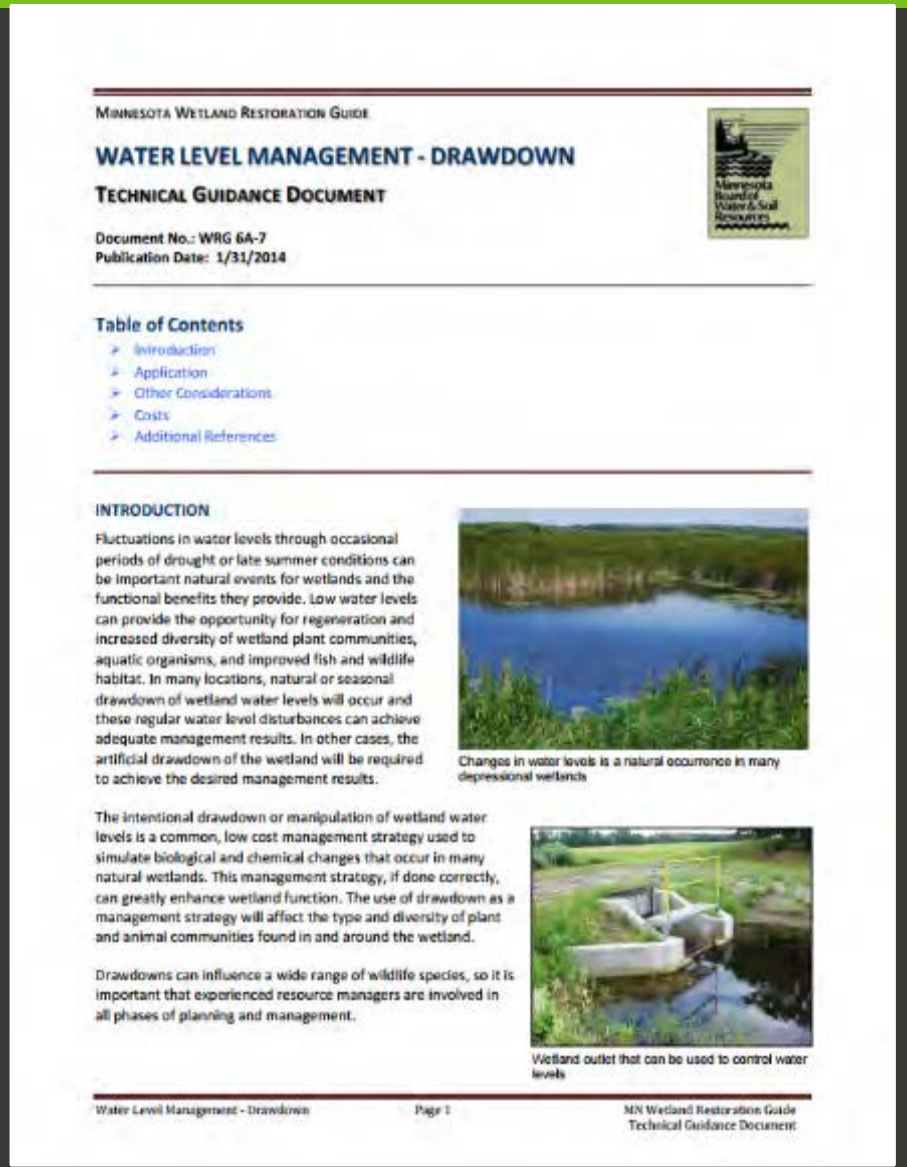
INTRODUCTION

Fire is an important process in many ecosystems, and can be an important tool in the management of restored landscapes. Prescribed fire can achieve specific vegetation establishment or weed control objectives, or can take the form of a recurring treatment to mimic the natural process in well-established restorations. Prescribed burning in uplands is an important strategy for controlling cool-season grasses and woody vegetation. Burning can also remove thatch that can inhibit native plant growth. Many plant communities in Minnesota, particularly those in the prairie region require fire to maintain diversity and control woody plants such as willow, boxelder and cottonwood. In this region where fire traditionally controlled such invasions, the growth of woody vegetation can suppress prairie species by producing excessive shade and decreasing habitat value for ground nesting grassland birds.

Fire also makes nutrients available to plants by breaking down litter. This increased nutrients leads to vigorous growth, and increased flower and seed production, providing more food for grassland birds and animals.

There are many factors that influence decision making about the timing, frequency and need for prescribed burning in and around wetlands and upland buffers, including: the location in the state, surrounding plant communities, target plant communities, invasive species threat, and current vegetation.

A wide variety of equipment is needed for prescribed burning including drip torches for ignition, nomex fire suites, leather boots and gloves, hard hats with face shield and nomex ear/neck protection, first aid kit, radios, drinking water for crews, backpack pumps, slip-on water pump and truck, ATV with water tank, fuel cans, replacement parts and took kit, grass/thatch rakes



MINNESOTA WETLAND RESTORATION GUIDE

WATER LEVEL MANAGEMENT - DRAWDOWN

TECHNICAL GUIDANCE DOCUMENT

Document No.: WRG 6A-7
Publication Date: 1/31/2014

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INTRODUCTION

Fluctuations in water levels through occasional periods of drought or late summer conditions can be important natural events for wetlands and the functional benefits they provide. Low water levels can provide the opportunity for regeneration and increased diversity of wetland plant communities, aquatic organisms, and improved fish and wildlife habitat. In many locations, natural or seasonal drawdown of wetland water levels will occur and these regular water level disturbances can achieve adequate management results. In other cases, the artificial drawdown of the wetland will be required to achieve the desired management results.

Changes in water levels is a natural occurrence in many depressional wetlands

The intentional drawdown or manipulation of wetland water levels is a common, low cost management strategy used to simulate biological and chemical changes that occur in many natural wetlands. This management strategy, if done correctly, can greatly enhance wetland function. The use of drawdown as a management strategy will affect the type and diversity of plant and animal communities found in and around the wetland.

Drawdowns can influence a wide range of wildlife species, so it is important that experienced resource managers are involved in all phases of planning and management.

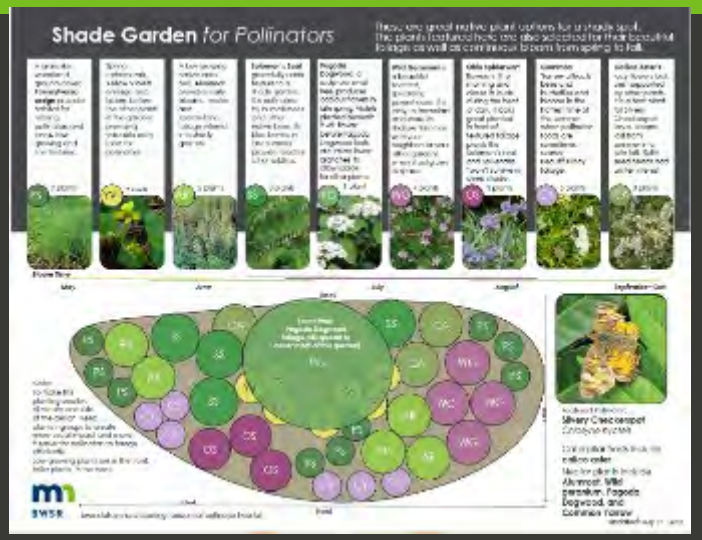
Wetland outlet that can be used to control water levels

17 Technical Guidance sheets along with 11 Appendixes

BWSR Resources for Clean Water Fund Projects

Pollinator Resources

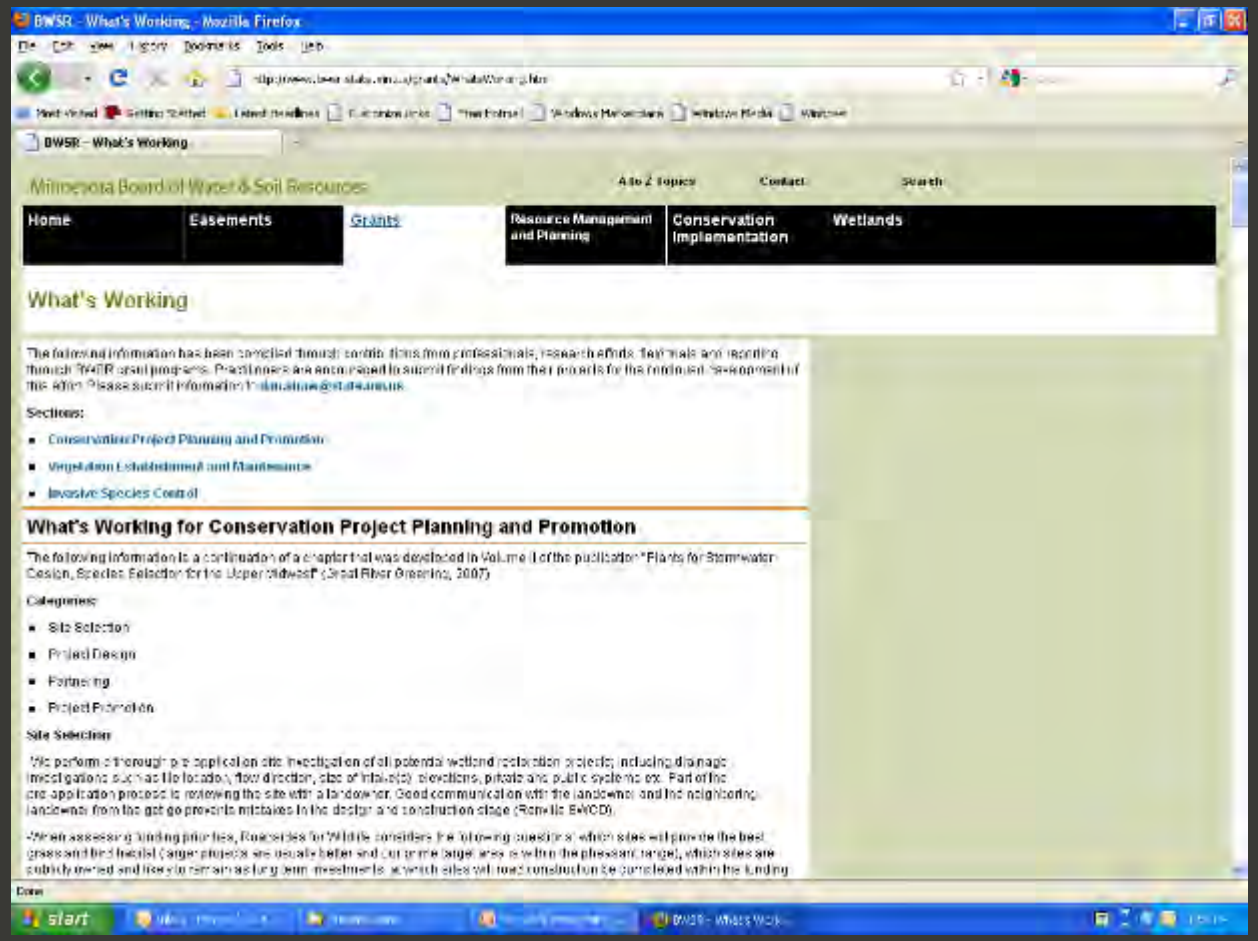
Pollinator habitat is a secondary goal for many Clean Water Fund projects



BWSR Resources for Clean Water Fund Projects

What's Working Information

A peer to peer resource to document successful conservation practices



BWSR Resources for Clean Water Fund Projects

Questions?

Clean Water Project Technical Assistance from DNR Regional Clean Water Program (RCWP) staff

Barbara Weisman, Clean Water Operations Consultant, January 21, 2026

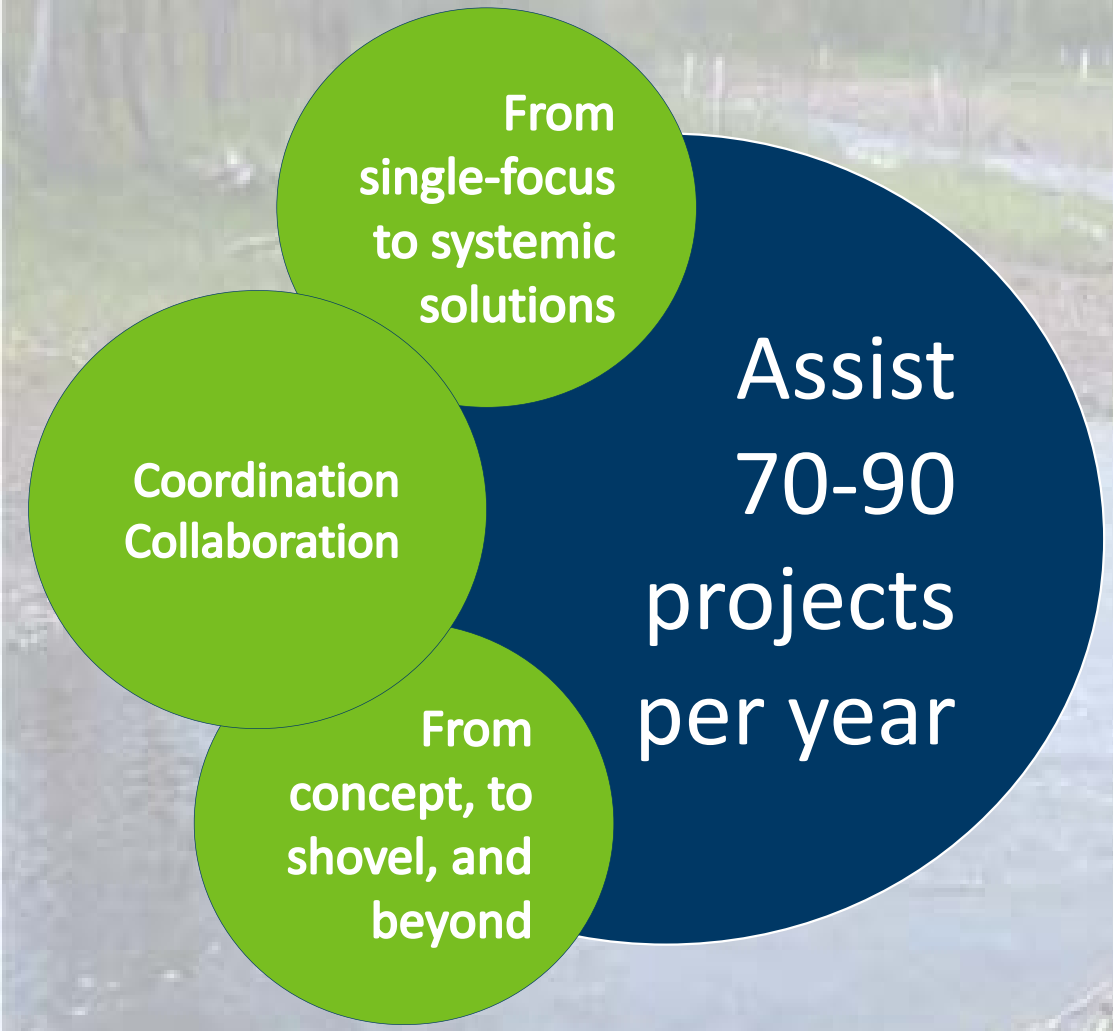
Regional Clean Water Program (RCWP)

[Field Staff Contacts](https://files.dnr.state.mn.us/waters/dnr-clean-water-field-contacts.pdf) https://files.dnr.state.mn.us/waters/dnr-clean-water-field-contacts.pdf

CLEAN WATER LAND & LEGACY AMENDMENT

	Office	Contact	Role	Clean Water work area (see map on flipside)
Region 1 Northwest	Bemidji	Tom Groshens	North District Manager	Regionwide
	Bemidji	Arne Wick	Area Hydrologist	Watersheds: Lake of the Woods, Lower Rainy, Mississippi Headwaters, Rapid, Upper/Lower Red Lake
	Detroit Lakes	LoriLynn Clark	Clean Water Specialist	Regionwide
	Detroit Lakes	Rodger Hemphill	Area Hydrologist	Watersheds: Buffalo, Marsh, Wild Rice, Upper Red
	Detroit Lakes	Jason Vinje	Clean Water Specialist	Regionwide
	Fergus Falls	Ryan Bierkie	Area Hydrologist	Watersheds: Bois de Sioux, Mustinka, Otter Tail, Redeye
	Fergus Falls	Erik Anthonsen	South District Manager	District-wide
	Glenwood	Emily Sirp	Area Hydrologist	Watersheds: Chippewa, Pomme de Terre
	Park Rapids	Mike Kelly	Clean Water Specialist	Regionwide
	Park Rapids	Danica Derks	Area Hydrologist	Watersheds: Crow Wing, Leech Lake
	Thief River Falls	Stephanie Klemm	Area Hydrologist	Watersheds: Clearwater, Grand Marais Creek, Red Lake River, Roseau, Sandhill, Snake, Tamarac/Joe, Thief, Two Rivers
Region 2 Northeast	Brainerd	Kelly Cordiff	Area Hydrologist	Watersheds: Brainerd, Kettle, Little Fork, Pine, Upper St. Croix, Snake
	Brainerd	Darrin Howerson	West District Manager	Regionwide
	Duluth	Cliff Bentley	East District Manager	Regionwide
	Duluth	Bri Speldrich	Area Hydrologist	Watersheds: Nemadji, St. Louis
	Eveleth	Kim Boland	Area Hydrologist	Watersheds: Cloquet, Rainy Headwaters, Vermilion
	Grand Rapids	Rich Biemiller	Clean Water Specialist	Regionwide
	Grand Rapids	Karl Kiefer	Clean Water Specialist	Regionwide
	Grand Rapids	Rian Reed	Area Hydrologist	Watersheds: Big Fork, Grand Rapids, Rainy Lake, Lower Rainy
	Grand Rapids	Ann Thompson	Clean Water Specialist	Regionwide
	Two Harbors	Dani Braund	Area Hydrologist	Watersheds: Lake Superior North, Lake Superior South
Region 3 Central	Lake City	Megan Moore	South District Manager	Regionwide
	Rochester	Jeff Weiss	Clean Water Hydrologist	
	St. Paul Regional	Jason Carlson	Clean Water Hydrologist	Watersheds: Cannon, La Crescent, Lake Pepin (Vermillion & Wells), Long Prairie, Lower Minnesota, Lower St. Croix, Reno, Root, Rum, Sartell, Sauk, Snake, St. Cloud, Twin Cities, Upper Iowa, Winona, Zumbro
	St. Paul Regional	David De Paz	Clean Water Specialist	
	St. Paul Regional	Reid Northwick	Clean Water Specialist	
	St. Paul Regional	Nick Proulx	Clean Water Specialist	
Region 4 South	Hutchinson	Al Gleisner	Area Hydrologist	Watersheds: Lower Minnesota, Middle Minnesota, S. Fork Crow
	Mankato	Evynn Jensen	Area Hydrologist	Watersheds: Blue Earth, Le Sueur
	Mankato	Eric Miller	Clean Water Specialist	Regionwide
	Mankato	Jon Lore	Clean Water Specialist	Regionwide
	Mankato	Salai Zaw	Clean Water Specialist	Regionwide
	Mankato	Katie Wiggs	Area Hydrologist	Watersheds: Watonwan
	Marshall	Kyle Jancho	Area Hydrologist	Watersheds: Cottonwood, Redwood, Yellow Medicine
	Marshall	Ethan Jensen	North District Manager	Regionwide
	New Ulm	Theresa Ehlenga	Assistant Regional Mgr.	Regionwide
	Ortonville	vacant	Area Hydrologist	Watersheds: Lac qui Parle, Minnesota Headwaters, Pomme de Terre
	Sakatah	Todd Kolander	South District Manager	Regionwide
	Sakatah	Todd Piepho	Area Hydrologist	Watersheds: Cannon, Cedar, Shell Rock, Upper Wapsipinicon, Winnebago
	Spicer	Emily Wolf	Area Hydrologist	Watersheds: Chippewa, Hawk Creek, North Fork Crow
	Windom	Tom Kresko	Area Hydrologist	Watersheds: Des Moines Basin, Missouri Basin

DNR Technical Assistance to Address Streambank Erosion



- Natural Channel Design for multiple benefits
- Collaborate with LGUs over several years
- Assist in several ways:
  - Stream Survey Data
  - Project Design
  - Grant Applications
  - Construction Oversight
  - Monitor, Quantify Results
  - Train Partners

CLEAN WATER LAND & LEGACY AMENDMENT

DNR Technical Assistance: Sand Creek in Coon Rapids

DNR involved at every step – survey, design, public buy-in, oversight, monitoring

Before: Bank stabilization was planned to address aquatic life impairment tied to sediment, hydrology

After: Project evolved to add Natural Channel Design features. Meets goals plus 3x more ecolog. benefits