RAMSEY-WASHINGTON
METRO WATERSHED DISTRICT

October 2022
Board Packet

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Agenda

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RAMSEY-WASHINGTON
METRO WATERSHED DISTRICT

Regular Board Meeting Agenda

Wednesday, October 5, 2022
7:00 PM

This month's meeting will be held at the District office (2665 Noel Drive, Little Canada, MN) but also via the video conferencing platform Zoom. Board members, staff, consultants, and general public will be able to join in person OR via video and/or phone. In order to continue to be sensitive to the COVID-19 pandemic, we may need to limit the number of public in the board room. The public will be able to listen to meeting but not participate with the exception of the visitor comments portion of the agenda. Instructions for joining in on the Zoom meeting can be found after the agenda.

1. Call to Order – 6:30 PM
2. **Approval of Agenda *(pg. 3)***
3. **Consent Agenda: To all be approved with one motion unless removed from consent agenda for discussion.**
    - A. Approval of Regular Meeting Minutes September 7, 2022 *(pg. 7)*
    - B. Treasurer's Report and Bill List *(pg. 16)*
    - C. Permit Program
        - i. 22-26 3M Avenue R Maintenance, Maplewood *(pg. 27)*
        - ii. 22-27 3M Lake Culvert Replacement, Maplewood *(pg. 30)*
        - iii. 22-28 Pioneer Commons, Little Canada *(pg. 34)*
    - D. Stewardship Grant Program
        - i. 21-39 CS Washington County Community Development Agency Budget Extension Request *(pg. 38)*
        - ii. 22-08 CS Battle Creek Middle School Budget Extension Request *(pg. 39)*
4. Visitor Comments (limited to 4 minutes each)
5. Permit Program
    - A. Applications
        - i. 22-25 Xcel Energy Maplewood Gas Plant Variance, Maplewood *(pg. 41)*
    - B. Enforcement Action Report *(pg. 52)*
6. Stewardship Grant Program
    - A. Applications
        - i. 22-29 CS Woodbury Enhanced Street Sweeping *(pg. 55)*
    - B. Budget Status Update *(pg. 118)*
7. Action Items
    - A. **Watershed Excellence Award Winners *(pg.120)***
8. Attorney Report
9. Board Issues, Policies and Operation (for discussion at meeting)
    - A. Action Log: Additions, deletions
    - B. Manager Topics
10. New Reports and/or Presentations
    - A. District Inspection Standardization and Mobile Data Collection Update *(pg. 122)*
    - B. Woodbury Target Store Targeted Retrofit Scope Summary *(pg. 148)*

11. Administrator's Report *(pg. 153)*
    A. Meetings Attended
    B. Upcoming Meetings and Dates
    C. Ongoing Project Update
    D. WEFTEC Conference
12. Project and Program Status Reports *(pg. 156)*

Project Feasibility Studies

A. Interim Emergency Response Planning
B. Kohlman Creek Flood Risk Feasibility Study
C. Kohlman Creek/Wakefield Lake Diversion Feasibility Study
D. County Ditch 17 Improvements Feasibility Study
E. Phalen Village Feasibility Study
F. Ames Lake Area Flood Risk Reduction Planning Study
G. Owasso Basin/North Star Estates Improvements
H. Double Driveway Pond Optimization Study
I. Carver Ponds Improvement Study
J. South Metro Mississippi River TSS TMDL

Monitoring Water Quality and Special Projects

K. Annual Water Quality Report Assistance

Research Projects

L. Kohlman Permeable Weir Test System
M. Shallow Lake Aeration Study

Capital Improvements

N. Target Store Stormwater Retrofit Projects
O. Targeted Retrofit Projects
P. Stewardship Grant Program – Street Sweeping
Q. Lake Emily Subwatershed Regional BMP

CIP Project Repair and Maintenance

R. Beltline Five Year Inspection
S. District Inspection Standardization

New Technology Report

T. Miyawaki Mini-Forest Assessment

Program Updates

U. Natural Resources Program Update
V. Public Involvement and Education Program Update
W. Communications Program and Website Update
X. Citizen Advisory Committee Update

13. Manager Comments and Next Month's Meeting
    A. Board Action Log *(pg. 184)*
14. **Adjourn**

RAMSEY-WASHINGTON
METRO WATERSHED DISTRICT

PUBLIC NOTICE OF BOARD MEETING
Wednesday, October 5, 2022
*5:00 PM and 7:00 PM
Hybrid Meeting: In-Person and Web Conference

*PLEASE TAKE NOTICE that the Ramsey-Washington Metro Watershed District ("District") Board of Managers will conduct a tour of various sites and projects within the District on Wednesday, **October 5, 2022,** departing from the District office, 2665 Noel Drive, Little Canada, MN 55117 at 5:00 p.m. and returning around 6:30 p.m.

*PLEASE FURTHER TAKE NOTICE that the regular meeting of the Board of Managers will be held on **October 5, 2022, at 7:00 p.m.** This is a one-time departure from its regular meeting time of 6:30 p.m. to accommodate the aforementioned District tour.

This month's meeting will be held at the District office (2665 Noel Drive, Little Canada, MN) AND via the video conferencing platform Zoom. Board members, staff, consultants, and general public will be able to join in person OR via Zoom. In order to continue to be sensitive to the COVID-19 pandemic, we may need to limit the number of public in the board room area. The public will be able to listen to meeting but not participate with the exception of the visitor comments portion of the agenda. Visitor comment may be given in person or via Zoom. Instructions for joining in on the Zoom meeting can be found below.

To access the meeting via webcast, please use this link: https://us02web.zoom.us/j/83111140717?pwd=bUhRU0IyMTB3OG5OVk9QMHAxdzhyUT09

The meeting room will open at 6:50 pm with the meeting starting at 7:00 pm. To connect to audio you may choose to use your computer audio options or you may use your mobile device to call. The phone access number is **(312) 626-6799**. The Meeting ID is **831 1114 0717**. The meeting password is **808082**. If you have any questions, please contact Tina Carstens at tina.carstens@rwmwd.org.

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Consent Agenda

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Ramsey-Washington Metro Watershed District
Minutes of Regular Board Meeting
September 7, 2022

The Regular Meeting of September 7, 2022, was held at the District Office Board Room, 2665 Noel Drive, Little Canada, Minnesota, and via Zoom web conferencing, at 6:30 p.m. A video recording of the meeting can be found at https://youtu.be/FT9rRTwcwK4. Video time stamps included after each agenda item in minutes.

PRESENT:
Larry Swope, President
Dianne Ward, Vice President
Dr. Pam Skinner, Secretary
Val Eisele, Treasurer

ABSENT:
Matt Kramer, Manager

ALSO PRESENT:
Tina Carstens, District Administrator
Brad Lindaman, Barr Engineering
Dave Vlasin, Project Coordinator
Nicole Bolduc, Hamline University Student
Paige Ahlborg, Project Manager
Mary Fitzgerald, District Inspector
Laurann Kirschner, Attorney for District
Cory Tellers, Xcel Energy

1. CALL TO ORDER
The meeting was called to order by President Swope at 6:30 p.m.

2. APPROVAL OF AGENDA (1:15)
Motion: Manager Eisele moved, Manager Ward seconded, to approve the agenda as presented.

Further discussion: Manager Eisele referenced an email and asked if that would be discussed. Tina Carstens noted that could be covered under Manager Comments.

A roll call vote was performed:

Manager Skinner	aye
Manager Eisele	aye
Manager Ward	aye
President Swope	aye

Motion carried unanimously.

3. CONSENT AGENDA (2:10)
~~A. Approval of Minutes from August 3, 2022~~
B. Treasurer's Report and Bill List
C. Permit Program
   i. 22-24 – Impact Apartments, Oakdale
D. 2022 Targeted Retrofit Projects – Change Order No. 3

Manager Eisele requested to remove Item A from the Consent Agenda for further discussion.

Motion: Manager Ward moved, Manager Eisele seconded, to approve the consent agenda as amended.

Further discussion: Manager Eisele referenced the McDonald's item and stated that he was curious about the budget. President Swope stated that he had questions about that too and it was a closed-out permit where funds were returned.

A roll call vote was performed:

Manager Skinner	aye
Manager Eisele	aye
Manager Ward	aye
President Swope	aye

Motion carried unanimously.

A. Approval of Minutes from August 3, 2022

Manager Eisele noted that he did not recall saying that residents are expected to provide the manpower for sandbagging and would like that statement removed. Tina Carstens confirmed that she could remove that statement.

Motion: Manager Ward moved, Manager Eisele seconded, to approve the minutes from August 3, 2022 as amended.

A roll call vote was performed:

Manager Skinner	aye
Manager Eisele	aye
Manager Ward	aye
President Swope	aye

Motion carried unanimously.

4. VISITOR COMMENTS (5:33)

No comments.

5. PERMIT PROGRAM (5:55)

A. Applications

Permit #22-25: Xcel Energy Maplewood Gas Plant – Maplewood

Mary Fitzgerald presented the request from Xcel Energy for repairs to their existing gas plant. She noted that there are emergency repairs and repairs to bring the station up to code. She noted that the request includes a wetland variance request for truck access. She stated that the improvements to stormwater will be an upgrade from the existing site conditions.

Manager Skinner referenced the permanently disturbed wetland buffer in the amount of .29 acres and asked if that would be made up somewhere else on the site. Tina Carstens replied that typically if there is a utility or significant safety concern a buffer disturbance has been approved. She stated that the stormwater improvements would offset the buffer loss.

Manager Skinner referenced the incidental wetland determination and asked if that would be impacted. Mary Fitzgerald confirmed that the incidental wetland would be impacted. Manager Skinner expressed concern because even the incidental wetland is of high quality. She noted that there would also be wetland buffer loss on a high-quality wetland.

Tina Carstens stated that the incidental wetland is under WCA and was determined to be created without intent to create a wetland.

Manager Skinner stated that there are not enough places to make quality wetland in the District, but this is a great place to create a wetland as these are high quality and this will result in a loss of one of those wetlands. She stated that she may not support the request for that reason.

Manager Ward asked what other options were reviewed to avoid the loss of wetland buffer. Paige Ahlborg stated that she does not have all the background but is aware of the urgency for these repairs and upgrades. She stated that the District follows the WCA guidelines for incidental and therefore if a wetland is considered incidental, it does not have the protections given by WCA.

Manager Skinner referenced the disturbed buffer and asked if there were a policy in place that would require that to be made up in another area. She stated that the District has a budget to create wetlands and perhaps the District could preserve that incidental wetland to create an expanded wetland. Tina Carstens stated that typically a gas station or gas plant would not be an ideal location for wetlands. She stated that staff would not find this to be an ideal location because of the land use.

Paige Ahlborg commented that currently the water draining through the buffer and into the wetland is sediment laden and dirty and therefore this will provide an improvement even with the buffer disturbance because of the stormwater treatment provided.

Manager Eisele stated that he was equally concerned but it seems that the wetland buffer would be disturbed to ensure that if there was spillage, it would not directly go to the wetland. Paige Ahlborg confirmed and noted that additional spill containment would be added during this upgrade.

Tina Carstens stated that she understands the concerns but noted that because of the land use and safety reasons, she would not want to hold up safety improvements that are needed for the site.

President Swope stated that Barr Engineering is the firm for the applicant but also reviews the District permits. He asked for input on how that is managed procedurally as the firm would essentially be reviewing its own work. Brad Lindaman confirmed that this happens from time to time. He noted that Barr discusses this with Tina Carstens and ensures the application form is submitted by someone other than Barr Engineering. He stated that Barr did assist with the wetland portion of this project. He stated that the District has staff to ensure that there is no conflict of interest.

President Swope asked for details on the incidental wetland. Paige Ahlborg stated that Nicole Soderholm did walk the site with someone from BWSR. Tina Carstens stated that the Notice of Decision.

President Swope recognized the concern for the wetland but noted that these are needed safety improvements and the District has to follow its procedures for incidental wetlands.

Manager Skinner asked if it could be explored more as to how this site could do better to create wetlands. She was reluctant to approve anything that would involve a loss. She stated that she would like to see a different solution.

President Swope asked if the wetland could be moved but acknowledged that it seems the whole site is going to be used. Tina Carstens stated that it is not within the District policy to require that.

Manager Ward stated that perhaps that would be an option to require that for the loss of the buffer.

Manager Ward commented that this is presented as an exception for safety but did not see timeframes.

Manager Skinner commented that she would be voting against the request. Tina Carstens asked for clarification on whether that would be opposition to the permit or the variance request, or both. Manager Skinner commented that she would oppose the variance.

Mary Fitzgerald commented that the existing facilities are already in the wetland buffer and therefore a variance request would be needed no matter what.

Manager Skinner asked if the buffer could be expanded in another area to meet the average. Mary Fitzgerald was unsure where the property lines fall and whether there would be room for expansion. Tina Carstens commented that the District does not consider what is currently in place disturbance because the District has changed the rules since the site was created.

Manager Eisele asked if other considerations were reviewed in the layout and mitigation of this risk. Brad Lindaman stated that he was unsure but asked another member of Barr whether they reviewed other areas in which the disturbance could occur or where expansion could occur in return for the loss of buffer. He noted that a review of the perimeter of the site was done but it was limiting because of the railroad and roadway. He stated that if the Board denies this request, the applicant would most likely reduce the size of the holding area for spill response, which may not be big enough and could delay the project. He stated that the only reason the buffer is being lost is to create the storage volume.

Tina Carstens clarified that the incidental wetland is not shown on the District wetland map and does not have a high quality designation and a wetland that will not be disturbed with this project is shown as Manage 1 on the map.

Manager Skinner hoped that the applicant could do something better.

Cory Tellers, Xcel, provided background information on the purpose of the site which was created in the 1950s. He stated that the codes and variances of the 1950s are not the same as they are today, and they are attempting to bring the site up to the current standards. He stated that they need a new truck loading system that will fill propane bullets and the code requires that facility be 75 feet from any buildings, which it currently is not. He stated that the new code also requires a distance of 100 feet from the road. He stated that with the current footprint of the facility this was the only option that would meet those standards. He noted that it was a wet spring, so there was some standing water in the incidental area which is a result of the grading that was done in the 1950s. He stated that when they reviewed the site recently the incidental wetland was completely dry. He stated that the grading of the site is not the best and erosion has not helped that, therefore they are attempting to be proactive. He stated that if a spill were to occur now, it would pool under the tank which is a fire hazard, therefore they will be completing some grading to ensure that a spill would properly drain. He also provided details on the stormwater treatment that would occur.

Manager Skinner commented that she is bothered by the loss of wetland buffer and asked if this could be redesigned to create replacement of that wetland buffer in another area.

Mr. Tellers stated that the purpose of the buffer is to have a strip between the facility and wetland and was unsure how they could create buffer on another side of the wetland in an area that is already native. He stated that they

are constrained with options because of the size of the facility and its footprint as the rules of the District have changed since the site was created. He stated that if there was a leak the propane would vaporize unless is it very cold, under which conditions the leaked propane would follow the designated path into the capture basin as proposed.

President Swope stated that essentially the District would not be losing anything.

Manager Skinner commented that they would be losing the incidental wetland and the buffer. Tina Carstens confirmed that there would be loss of the low spot, but the applicant would be building another low spot.

Manager Eisele stated that he believes that the buffer loss would be a result of the creation of the fill pond and the incidental wetland would be the truck loading area. He stated that the buffer reduction would provide an area for containment if there were a spill.

Manager Ward commented that is the problem of Xcel and not the District. Tina Carstens commented that the pond needs to be in that location because of the proximity to the facility. She stated that the applicant has stated that in order to create more buffer, they would be disturbing an already natural area on the other sides of the wetland.

Manager Eisele stated that the holding pond will provide benefit. Tina Carstens stated that incidental wetland was never rated high quality as it is incidental and therefore is not included on the plans.

Paige Ahlborg stated that perhaps staff could work with the natural resource specialists to improve the natural areas around the wetland to address the concerns of Manager Ward. Mr. Tellers confirmed that they would be more than willing to do that. He stated that they believe this is the best path forward and are open to improvement.

Manager Ward asked why this needs to be done tonight rather than postponed. Mr. Tellers replied that the truck loading is not in a working stage, and they need to get that moving prior to the winter when the facility would be needed.

Tina Carstens stated that if the decision were to table, the additional information requested would need to be specified. She noted that additional conditions could be added as well.

Manager Eisele stated that perhaps a condition could be added about working with staff on the buffers. He asked if Xcel is trying to get the work done before winter. Mr. Tellers replied that they are trying to get the truck loading done this year before winter. He stated that the catch basin pond would not be created under next year, but they submitted the entire project as a whole.

Manager Eisele asked if approval could be done for the truck loading and then the Board could ask Xcel to come back for the remainder which involves the buffer disturbance. Mr. Tellers confirmed that he would agree to that.

Laurann Kirschner stated that the variance request should be tabled pending additional information. Tina Carstens confirmed that if the variance is tabled, and the permit is approved, the applicant could move forward with the work that does not involve disturbance of the buffer.

Motion: Manager Eisele moved, Manager Ward seconded, to table the variance request and approve Permit #22-25.

A roll call vote was performed:

Manager Skinner nay
Manager Eisele aye
Manager Ward aye
President Swope aye

Motion carried unanimously.

Laurann Kirschner stated that the tabled variance would need to be considered within 60 days or it would become approved, therefore it should be presented at the next meeting. Tina Carstens asked and received confirmation that the applicant can authorize extension of that review period.

B. Monthly Enforcement Report

During August, 23 notices were sent to address: install/maintain inlet protection (2), install/maintain perimeter control (9), sweep streets (2), stabilize exposed soils (2), remove discharged sediment (2), implement property dewatering (1), install/maintain permanent BMPs (1), install slope/ditch checks (1), install/maintain energy dissipation (2), and complete required site inspections (1).

6. STEWARDSHIP GRANT PROGRAM (52:55)

A. Applications - None

B. Budget Status Update

Paige Ahlborg provided a brief update.

Manager Ward noted that this item is under budget every year and asked if the budget should be reduced in order to reduce the levy. Paige Ahlborg stated that staff is looking to offer a program to the cities for enhanced street sweeping that would use funds as well. Tina Carstens noted that the budget is variable because last year almost all the funds were spent. She noted that the funds do carry over so if less funds are used, less are levied.

7. ACTION ITEMS (56:16)

A. 2023 Preliminary Budget and Levy Public Hearing

i. Approval of 2023 Preliminary Budget and Levy Certification to Ramsey and Washington Counties – Resolution 22-10

President Swope opened the public hearing.

Tina Carstens stated that the last time the budget was reviewed there was a proposed 12 percent increase to the levy which has been decreased to seven percent. She provided an overview of the budget broken down per program and plan goals.

Manager Skinner reiterated the desire to keep the levy stable or increase slightly.

President Swope agreed but noted that there is also high inflation and projects still need to be completed. He believed that this does follow that slower increase, compared to the increases proposed by some cities or counties this year.

Manager Ward commended staff for carefully vetting projects and managing funds well. She stated that people's taxes will go up because the market value has increased and not solely because of levies.

Tina Carstens explained that even though the levy is increasing, the tax rate is decreasing because of the increase in market value. She highlighted some of the items that are budgeted conservatively and will be known in the coming months before the final budget and levy are certified. She highlighted the capital improvement projects items that are budgeted.

There were no comments from the public.

President Swope closed the public hearing.

Motion: Manager Skinner moved, Manager Ward seconded, to approve the draft budget for purposes of the preliminary levy and approve Resolution 22-01.

A roll call vote was performed:

Manager Skinner	aye
Manager Eisele	aye
Manager Ward	aye
President Swope	aye

Motion carried unanimously.

8. ATTORNEY REPORT (1:09:00)

Laurann Kirschner provided an overview of the work her firm did for the District including ensuring the notice was provided for the public hearing and contract documents for projects.

President Swope asked if there was any feedback on the appointment of Board members that was previously discussed. Laurann Kirschner replied that there has not been any further instruction.

9. BOARD ISSUES, POLICIES, AND OPERATION (FOR DISCUSSION AT MEETING) (1:10:34)

A. Action Log: Additions, Deletions, Purpose

Manager Eisele stated that he appreciated the details and content that was added. He asked if others read the report in the email regarding requested changes to the drainage law. He stated that it seems to be a proposed set of work that he is not familiar with. He stated that it seems that the working group looks at the big changes to see if there is an impact downstream, which seems in addition to the review the District does.

Tina Carstens commented that there are MAWD representatives that attend the work group meetings to represent the watersheds. She stated that there was legislation proposed that was a major concern to the working group and, in the opinion of MAWD, that legislation would delay the maintenance needs for ditch work that could impact property owners. She commented that this is not a public notice but discusses the notification requirements. She commented that the District does not manage ditches like places outside of the metro area, and therefore does not fall into that category. She noted that if desired, she could provide more context at the next meeting. Manager Eisele confirmed that it would be helpful to have a paragraph or so of information in the Administrator Report.

B. Board Member Roles and Responsibilities

Manager Eisele stated that perhaps a workshop had an agenda item devoted to this purpose. He stated that he would be more interested in the different roles and responsibilities such as Treasurer, Secretary, etc. He noted that would allow him to better understand what he should or should not be doing. Tina Carstens confirmed that she is working to develop some written information that will be presented to the Board.

10. NEW REPORTS AND/OR PRESENTATIONS (1:22:25)

None.

11. ADMINISTRATOR'S REPORT (1:22:31)

A. Meetings Attended

No comments.

B. Upcoming Meetings and Dates
No comments.

C. Ongoing Project Update
President Swope asked for details on the Ponds of Battle Creek. Tina Carstens stated that she has been in talks with the County and provided a brief update.

She also provided an update on the potential boundary change process for West Vadnais Lake.

Tina Carstens asked if there are conflicts with any potential Board tour dates and the Managers provided input.

D. MAWD Items for Discussion
Tina Carstens provided an update on the summer tour that she attended.

She provided details on the proposed MAWD changes to the dues structure and the strategic plan. She noted that MAWD would like a comment letter related to the strategic plan.

President Swope commented that there is a mix of strategy and short-term tactics. He commented that he was happy to see a lot of information and direction towards more transparency. He stated that many of the items are assigned to the President, Vice President, etc. and believed that there should be further review into delegation of those duties to ensure those officers are not overrun with meetings.

Manager Ward commented that she would support a general letter of support encouraging the group to continue to work on and refine the plan.

Manager Eisele stated that the committees formed do not seem to be unique to drive the initiatives. He agreed that the plan is directionally correct but is not necessarily measurable.

President Swope commented that it is a good first step.

Motion: Manager Eisele moved, Manager Ward seconded, to direct staff to draft a letter of general support for the MAWD strategic plan, incorporating the comments of the Board.

A roll call vote was performed:

Manager Skinner	aye
Manager Eisele	aye
Manager Ward	aye
President Swope	aye

Motion carried unanimously.

12. PROJECT AND PROGRAM STATUS REPORTS (1:51:25)

A. Interim Emergency Response Planning
B. Kohlman Creek Flood Risk Feasibility Study
C. Kohlman Creek/Wakefield Lake Diversion Feasibility Study
D. County Ditch 17 Improvements Feasibility Study
E. Phalen Village Feasibility Study
F. Ames Lake Area Flood Risk Reduction Planning Study
G. Owasso Basin/North Star Estates Improvements

H. Double Driveway Pond Optimization Study
I. Carver Pond Improvement Study
J. South Metro Mississippi River TSS TMDL
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Q. Woodbury Target Stormwater Retrofits
R. Lake Emily Subwatershed Regional BMP
S. Beltline Five Year Inspection
T. District Inspection Standardization
U. CIP Maintenance and Repair Project 2022
V. Natural Resources Program Update
W. Public Involvement and Education Program Update
X. Communications Program and Website Update

President Swope commented that he was happy to see the lake levels monitoring integration page on the website working its way forward.

Manager Ward asked if the agenda could be similar to this format of the report. Tina Carstens confirmed that she could make that change.

Manager Eisele asked the feedback on the response time for Item A. Brad Lindaman stated that some of these sites have longer response time which provides an opportunity for sandbagging while some sites are prone to flash flooding and therefore cannot be protected. He stated that they are working with the cities to share that information as it is the responsibility of the cities to act upon the plans and make necessary decisions.

Manager Eisele referenced Item J and stated that it seems there is not the data to complete the assessment. Tina Carstens commented that the District does have the data but needs to complete that assessment. She stated that data will help to guide the District to determine if the requirements are being met.

Manager Eisele referenced Item P and asked if he could find out more information. Tina Carstens confirmed that she has data that she can share with him.

13. MANAGER COMMENTS AND NEXT MONTH'S MEETING (1:57:33)

A. Action Log

No comments.

14. ADJOURN

Motion: Manager Skinner moved, Manager Eisele seconded, to adjourn the meeting at 8:28 p.m. Motion carried unanimously.

RWMWD BUDGET STATUS REPORT
Administrative & Program Budget
Fiscal Year 2022
9/30/2022

Budget Category	Budget Item	Account Number	Original Budget	Budget Transfers	Current Month Expenses	Year-to-Date Expenses	Current Budget Balance	Percent of Budget
Manager	Per diems	4355	$8,500.00	-	450.00	1,409.10	$7,090.90	16.58%
	Manager expenses	4360	4,000.00	-	-	-	4,000.00	0.00%
Committees	Committee/Bd Mtg. Exp.	4365	3,500.00	-	273.84	3,124.00	376.00	89.26%
	Sub-Total: Managers/Committees:		**$16,000.00**	**$0.00**	**$723.84**	**$4,533.10**	**$11,466.90**	**28.33%**
Employees	Staff salary/taxes/benefits	4010	1,660,000.00	-	189,191.49	1,259,960.02	400,039.98	75.90%
	Employee expenses	4020	15,000.00	-	834.17	5,605.17	9,394.83	37.37%
	District training & education	4350	75,000.00	-	2,524.50	22,510.31	52,489.69	30.01%
	Sub-Total: Employees:		**$1,750,000.00**	**$0.00**	**$192,550.16**	**$1,288,075.50**	**$461,924.50**	**73.60%**
Administration/ Office	GIS system maint. & equip.	4170	10,000.00	-	165.00	2,706.02	7,293.98	27.06%
	Data Base/GIS Maintenance	4171	40,000.00	-	-	98.94	39,901.06	0.25%
	Equipment maintenance	4305	3,000.00	-	-	152.69	2,847.31	5.09%
	Telephone	4310	4,000.00	-	59.34	534.06	3,465.94	13.35%
	Office supplies	4320	7,000.00	-	553.08	5,157.72	1,842.28	73.68%
	IT/Internet/Web Site/Software Lic.	4325	75,000.00	-	6,469.70	58,479.61	16,520.39	77.97%
	Postage	4330	3,000.00	-	-	962.62	2,037.38	32.09%
	Printing/copying	4335	5,000.00	-	698.00	3,666.40	1,333.60	73.33%
	Dues & publications	4338	11,000.00	-	2,119.00	11,188.94	(188.94)	101.72%
	Janitorial/Trash Service	4341	15,000.00	-	294.04	7,194.39	7,805.61	47.96%
	Utilities/Bldg.Contracts	4342	30,000.00	-	91.50	8,371.10	21,628.90	27.90%
	Bldg/Site Maintenance	4343	150,000.00	-	73,683.43	94,932.06	55,067.94	63.29%
	Miscellaneous	4390	5,000.00	-	-	-	5,000.00	0.00%
	Insurance	4480	55,000.00	-	-	53,156.00	1,844.00	96.65%
	Office equipment	4703	150,000.00	-	4,669.98	11,587.79	138,412.21	7.73%
	Vehicle lease, maintenance	4810-40	20,000.00	-	943.47	5,565.61	14,434.39	27.83%
	Sub-Total: Administration/Office:		**$583,000.00**	**$0.00**	**$89,746.54**	**$263,753.95**	**$319,246.05**	**45.24%**
Consultants/ Outside Services	Auditor/Accounting	4110	70,000.00	-	1,557.19	49,242.18	20,757.82	70.35%
	Engineering-administration	4121	125,000.00	-	5,029.00	58,382.50	66,617.50	46.71%
	Engineering-permit I&E	4122	10,000.00	-	23.00	3,326.50	6,673.50	33.27%
	Engineering-eng. review	4123	60,000.00	-	3,750.50	52,867.00	7,133.00	88.11%
	Engineering-permit review	4124	55,000.00	-	6,078.00	38,039.50	16,960.50	69.16%
	Project Feasibility Studies	4129	410,000.00	-	27,133.26	234,732.98	175,267.02	57.25%
	Attorney-permits	4130	10,000.00	-	-	-	10,000.00	0.00%
	Attorney-general	4131	40,000.00	-	5,019.60	14,489.70	25,510.30	36.22%
	Outside Consulting Services	4160	20,000.00	-	-	-	20,000.00	0.00%
	Sub-Total: Consultants/Outside Services:		**$800,000.00**	**$0.00**	**$48,590.55**	**$451,080.36**	**$348,919.64**	**56.39%**
Programs	Educational programming	4370	75,000.00	-	3,571.69	30,002.67	44,997.33	40.00%
	Communications & Marketing	4371	50,000.00	-	84.00	28,700.05	21,299.95	57.40%
	Events	4372	46,000.00	-	766.63	46,837.22	(837.22)	101.82%
	Water QM-Engineering	4520-30	180,000.00	-	49,281.57	183,364.45	(3,364.45)	101.87%
	Project operations	4650	200,000.00	-	2,120.70	126,585.59	73,414.41	63.29%
	SLMP/TMDL Studies	4661	125,000.00	-	3,087.00	16,757.00	108,243.00	13.41%
	Natural Resources/Keller Creek	4670-72	120,000.00	-	27,227.95	93,931.99	26,068.01	78.28%
	Outside Prog.Support/Weed Mgmt.	44683	57,000.00	-	-	17,369.33	39,630.67	30.47%
	Research Projects	4695	225,000.00	-	4,633.58	76,301.27	148,698.73	33.91%
	Health and Safety Program	4697	3,000.00	-	84.80	3,663.18	(663.18)	122.11%
	Sub-Total: Programs:		**$1,081,000.00**	**$0.00**	**$90,857.92**	**$623,512.75**	**$457,487.25**	**57.68%**
GENERAL FUND TOTAL			**$4,230,000.00**	**$0.00**	**$422,469.01**	**$2,630,955.66**	**$1,599,044.34**	62.20%
CIP's	CIP Project Repair & Maintenance	516	1,500,000.00	-	55,833.49	997,244.51	502,755.49	66.48%
	Targeted Retrofit Projects	518	1,500,000.00	-	38,131.81	331,801.79	1,168,198.21	22.12%
	Flood Risk Reduction Fund	520	5,200,000.00	-	94.50	24,911.94	5,175,088.06	0.48%
	Debt Services-96-97 Beltline/MM/Battle Creek	526	394,710.00	-	-	393,040.40	1,669.60	99.58%
	Stewardship Grant Program Fund	529	1,000,000.00	-	58,386.12	194,969.83	805,030.17	19.50%
	Wetland Restoration Projects	540	500,000.00	-	-	-	500,000.00	0.00%
CIP BUDGET TOTAL			**$10,094,710.00**	**-**	**$152,445.92**	**$1,941,968.47**	**$8,152,741.53**	19.24%
TOTAL BUDGET			**$14,324,710.00**	**$0.00**	**$574,914.93**	**$4,572,924.13**	**$9,751,785.87**	**31.92%**

Current Fund Balances:

Fund:	Beginning Fund Balance @ 12/31/21	Fund Transfers	Year to date Revenue	Current Month Expenses	Year to Date Expense	Fund Balance @ 09/30/22
101 - General Fund	$2,382,780.20	-	1,734,532.44	422,469.01	2,630,955.66	1,486,356.98
516 - CIP Project Repair & Maintenance	162,659.00	-	991,590.60	55,833.49	997,244.51	157,005.09
518 - Targeted Retrofit Projects	948,555.00	-	-	38,131.81	331,801.79	616,753.21
520 - Flood Damage Reduction Fund	3,415,744.00	-	886,952.70	94.50	24,911.94	4,277,784.76
526 - Debt Services-96-97 Beltline/MM/Beltline-Battle Creek Tunnel Repair	944,949.00	-	-	-	393,040.40	551,908.60
529 - Stewardship Grant Program Fund	854,750.00	-	181,199.96	58,386.12	194,969.83	840,980.13
536 - Stormwater Impact Fund	309,837.00	-	-	-	-	309,837.00
540 - Wetland Restoration Projects	498,036.00	-	-	-	-	498,036.00
580 - Contingency Fund	1,465,487.00	-	-	-	-	1,465,487.00
Total District Fund Balance	**$10,982,797.20**	**$0.00**	**$ 3,794,275.70**	**$ 574,914.93**	**$4,572,924.13**	**$10,204,148.77**

Ramsey Washington Metro Watershed Dist.
Check Register
For the Period From Sep 1, 2022 to Sep 30, 2022

Check #	Date	Payee ID	Invoice #	Payee	Description	Amount
EFT	09/01/22	met008	Sep 2022	MetLife-Group Benefits	Employee Benefits	$1,813.91
EFT	09/09/22	hea002	Oct 2022	HealthPartners	Employee Benefits	12,563.83
72714V	9/27/22	chi003	#19-06	Christ United Methodist Church	Stewardship Grant Fund	(222.50)
73250	9/12/22	aws001	S1335957-090122	AWS Service Center	Janitorial/Trash Service	294.04
73251	9/12/22	gal001	Aug 2022	Galowitz Olson, PLLC	August Legal Fees	1,865.00
73252	9/12/22	kin001	060300018152	FedEx Office	Educational Program	25.00
73253	9/12/22	lak007	Casey Lake Fall/Phalen	Lakes Aquatic Weed Removal	Natural Resources Program	27,203.50
73254	9/12/22	put001	Sep 2022	Catherine C. Putzier	Employee Reimbursement	5.67
73255	9/12/22	sai001	3642	Saint Paul Media	Communications & Marketing	50.00
73256	9/12/22	ups001	0000F4471X372	United Parcel Service	Water QM Staff	28.40
73257	9/12/22	usb005	481321446	US Bank Equipment Finance	Printing Expense	294.00
73258	9/12/22	wat003	WSTQ131770A	Water Storage Tanks, Inc.	Project Operations	1,883.70
73259	9/27/22	anc001	20-30	Anchor View, LLC	Dev.Escrow-General	19,845.00
73260	9/27/22	ass001	21-38 CS	Association Team Management	Stewardship Grant Fund	5,235.00
73261	9/27/22	att002	287256653401X09252022	AT & T Mobility - ROC	IT/Project Operations/Water QM	166.54
73262	9/27/22	bal002	Sep 2022	Darcy Ballantyne	Employee Reimbursement	23.72
73263	9/27/22	bar001	8/20/22-9/16/22	Barr Engineering	Aug/Sep Engineering Expense	117,993.83
73264	9/27/22	bat001	P54956149	Batteries Plus	Water QM Staff	431.80
73265	9/27/22	blo001	Aug-Sep 2022	Simba Blood	Employee Reimbursement	250.84
73266	9/27/22	bre003	4th Qtr-2022	Bremer Bank	Employee Benefits	8,668.75
73267	9/27/22	cad001	18792021	Allstream	Water QM Staff	139.68
73268	9/27/22	cir001	22-04 CS	Molly Cirillo	Stewardship Grant Fund	1,309.35
73269	9/27/22	cit011	231211	City of Roseville	IT/Website/Software	6,264.21
73270	9/27/22	com004	Sep 2022	Comcast	Utilities/Bldg. Contracts	81.50
73271	9/27/22	dav003	144118	Davey Resource Group, Inc.	Bldg/Site Maintenance/Constr.Imprv.	72,860.25
73272	9/27/22	don001	Aug-Sep 2022	Matthew Doneux	Employee Reimbursement	491.48
73273	9/27/22	fit002	Sep 2022	Mary Fitzgerald	Employee Reimbursement	58.25
73274	9/27/22	fle001	100289	Flemings Auto Service	Vehicle Maintenance	73.35
73275	9/27/22	gal001	Sep 2022	Galowitz Olson, PLLC	September Legal Fees	3,154.60
73276	9/27/22	gil001	221922	Gilbert Mechanical Contractors, Inc.	Bldg/Site Maintenance	4,368.00
73277	9/27/22	haw001	6285516	Hawkins, Inc.	Water QM Staff	7,417.10
73278	9/27/22	hbf001	21-29 CS	HB Fuller	Stewardship Grant Fund	923.02
73279	9/27/22	int001	W22080483	Office of MN, IT Services	Telephone Expense	59.34
73280	9/27/22	int003	190080	Intereum, Inc.	Office Equipment	1,074.99
73281	9/27/22	lan003	Sep 2022	Lancer Catering	Events	750.00
73282	9/27/22	lan009	1395	Landbridge Ecological, Inc.	Stewardship Grant Fund	12,713.08
73283	9/27/22	lea002	366848	League of Minnesota Cities	Dues & Publications	2,119.00
73284	9/27/22	mel001	Sep 2022	Michelle L. Melser	Employee Reimbursement	83.13
73285	9/27/22	met004	INV2126260	Metro Sales, Inc.	Printing Expense	404.00
73286	9/27/22	mid003	591089	Roseville Midway Ford	Vehicle Maintenance	80.64
73287	9/27/22	min008	36051	Minnesota Native Landscapes, Inc.	Construction Imp.-Maint. & Repair	18,978.00
73288	9/27/22	ncp001	Sep 2022	NCPERS Group Life Ins.	Employee Benefits	16.00
73289	9/27/22	nsp001	7950618596-795815685	Xcel Energy	Project Operations	750.63
73290	9/27/22	pac001	22100387657	Pace Analytical Services, Inc.	Water QM Staff	18,519.54
73291	9/27/22	pas002	Aug-Sep 2022	Carol Passi	Employee Reimbursement	461.68
73292	9/27/22	pre003	318968587	Premium Waters, Inc.	Utilities/Bldg. Contracts	10.00
73293	9/27/22	qwe001	Sep 2022	CenturyLink	Project Operations	271.89
73294	9/27/22	red002	150472760	Redpath & Company	August Accounting Services	1,307.24
73295	9/27/22	rmb001	B006306	RMB Environmental Laboratories	Water QM Staff	4,023.00
73296	9/27/22	san003	090622	Sandstrom Land Management	Construction Imp.-Maint. & Repair	2,253.75
73297	9/27/22	shi001	B15796719	SHI International Corp.	Office Equipment	3,567.00
73298	9/27/22	sho004	Progress Pay #2	Shoreline Landscaping	Construction-Targeted Retrofit	10,828.80
73299	9/27/22	sim001	Sep 2022	Emily Simmons	Employee Reimbursement	61.88
73300	9/27/22	sod001	Sep 2022	Nicole Soderholm	Employee Reimbursement	40.00
73301	9/27/22	sta004	22-14 CS	Ann Starr	Stewardship Grant Fund	7,806.83
73302	9/27/22	stu001	2019633	Studio Lola	Office Supplies/Stewardship Grant	451.25
73303	9/27/22	tec001	326405	Tech Sales Co.	Water QM Staff	16,895.00
73304	9/27/22	til002	Sep 2022	Joseph S. Tillotson	Employee Reimbursement	32.73
73305	9/27/22	tim002	M27620	Timesaver Off-Site Secretarial, Inc.	Committee/Board Meeting Expense	228.75
73306	9/27/22	tro002	22-9	Cathy Troendle	Educational Program	3,490.86
73307	9/27/22	uli001	150558220	Uline	Project Operations	150.46
73308	9/27/22	ups001	000F4471X382	United Parcel Service	Water QM Staff	45.68
73309	9/27/22	usb002	Sep 2022	U.S. Bank	Monthly Credit Card Expense	3,608.29
73310	9/27/22	vla001	Jan 2022	Dave Vlasin	Employee Reimbursement	622.92
73311	9/27/22	voy001	8692934232239	US Bank Voyager Fleet Sys.	Vehicle Fuel	652.22
73312	9/27/22	was002	5751	Washington Conservation District	Stewardship Grant Fund	4,660.00
73313	9/27/22	wes004	21-26 CS	Westwood Village 1 Association	Stewardship Grant Fund	15,406.00
73314	9/27/22	wit002	22-27 CS	Catherine Witzel	Stewardship Grant Fund	198.84
73315	9/27/22	nsp001	Sep 2022	Xcel Energy	Bldg./Site Maintenance	763.18
Total						**$428,947.42**

Ramsey Washington Metro Watershed Dist.
Check Register
For the Period From Sep 1, 2022 to Sep 30, 2022

Check #	Date	Payee ID	Invoice #	Payee	Description	Amount
EFT	09/02/22	myp001	09/02/22	September 2nd Payroll Fees	4110-101-000	$72.00
EFT	09/16/22	myp001	09/16/22	September 16th Payroll Fees	4110-101-000	72.00
EFT	09/30/22	myp001	09/30/22	September 30th Payroll Fees	4110-101-000	72.00
Dir.Dep.	09/02/22	---	Payroll Expense-Net	September 2nd Payroll	4010-101-000	31,934.51
EFT	09/02/22	int002	Internal Rev.Serv.	September 2nd Federal Withholding	2001-101-000	11,441.30
EFT	09/02/22	mnd001	MN Revenue	September 2nd State Withholding	2003-101-000	2,054.14
EFT	09/02/22	per001	PERA	September 2nd PERA	2011-101-000	6,319.13
EFT	09/02/22	emp002	Empower Retirement	Employee Def.Comp. Contributions	2016-101-000	2,420.00
EFT	09/02/22	emp002	Empower Retirement	Employee IRA Contributions	2018-101-000	400.00
Dir.Dep.	09/16/22	---	Payroll Expense-Net	September 16th Payroll	4010-101-000	31,161.19
EFT	09/16/22	int002	Internal Rev.Serv.	September 16th Federal Withholding	2001-101-000	11,296.12
EFT	09/16/22	mnd001	MN Revenue	September 16th State Withholding	2003-101-000	2,003.10
EFT	09/16/22	per001	PERA	September 16th PERA	2011-101-000	6,319.13
EFT	09/16/22	emp002	Empower Retirement	Employee Def.Comp. Contributions	2016-101-000	3,170.00
EFT	09/16/22	emp002	Empower Retirement	Employee IRA Contributions	2018-101-000	400.00
Dir.Dep.	09/30/22	---	Payroll Expense-Net	September 30th Payroll	4010-101-000	30,715.78
EFT	09/30/22	int002	Internal Rev.Serv.	September 30th Federal Withholding	2001-101-000	11,152.51
EFT	09/30/22	mnd001	MN Revenue	September 30th State Withhholding	2003-101-000	1,965.60
EFT	09/30/22	per001	PERA	September 30th PERA	2011-101-000	6,319.13
EFT	09/30/22	emp002	Empower Retirement	Employee Def.Comp. Contributions	2016-101-000	3,170.00
EFT	09/30/22	emp002	Empower Retirement	Employee IRA Contributions	2018-101-000	400.00
					Payroll/Benefits:	**$162,857.64**
Total					**Accounts Payable/Payroll/Benefits:**	**$591,805.06**

Ramsey Washington Metro Watershed Dist.
Cash Disbursements Journal
For the Period From September 1, 2022 - September 30, 2022

Date	Check #	Vendor ID	Name	Account ID	Account Description	Amount	Check Detail
09/01/22	EFT	met008	MetLife-Group Benefits	4040-101-000	Employee Benefits-General	$1,813.91	
09/09/22	EFT	hea002	HealthPartners	4040-101-000	Employee Benefits-General	12,563.83	
09/27/22	72714V	chi003	Christ United Methodist Church	4682-529-000	Stewardship Grant Fund	(222.50)	
09/12/22	73250	aws001	AWS Service Center	4341-101-000	Janitorial/Trash Service	294.04	
09/12/22	73251	gal001	Galowitz Olson, PLLC	4131-101-000	Attorney General-General	1,865.00	
09/12/22	73252	kin001	FedEx	4370-101-000	Educational Program-General	25.00	
09/12/22	73253	lak007	Lake Aquatic Weed Removal	4670-101-000	Natural Resources Project-General	27,203.50	
09/12/22	73254	put001	Catherine C. Putzier	4020-101-000	Employee Expenses-General	5.67	
09/12/22	73255	sai001	St. Paul Media	4371-101-000	Communications & Marketing	50.00	
09/12/22	73256	ups001	United Parcel Service	4530-101-000	Water QM Staff-General	28.40	
09/12/22	73257	usb005	US Bank Equipment Finance	4335-101-000	Printing-General	294.00	
09/12/22	73258	wat003	Water Storage Tanks, Inc.	4650-516-000	Project Operations-General	1,883.70	
09/27/22	73259	anc001	Anchor View, LLC	2024-101-000	Dev. Escrow-General	19,845.00	
09/27/22	73260	ass001	Association Team Management	4682-529-000	Stewardship Grant Fund	5,235.00	
09/27/22	73261	att002	AT & T Mobility			166.54	
				4530-101-000	Water QM Staff-General		27.54
				4325-101-000	IT/Website/Software		54.66
				4650-101-000	Project Operations-General		84.34
09/27/22	73262	bal002	Darcy Ballantyne			23.72	
				4020-101-000	Employee Expenses-General		9.77
				4670-101-000	Natural Resources Project-General		13.95
09/27/22	73263	bar001	Barr Engineering			117,993.83	
				4121-101-000	Engineering Admin-General Fund		5,029.00
				4123-101-000	Engineering-Review		3,750.50
				4129-101-000	Project Feasability-General		1,238.00
				4129-101-000	Project Feasability-General		253.00
				4129-101-000	Project Feasability-General		3,608.00
				4129-101-000	Project Feasability-General		6,753.00
				4129-101-000	Project Feasability-General		2,997.50
				4129-101-000	Project Feasability-General		681.00
				4129-101-000	Project Feasability-General		161.00
				4129-101-000	Project Feasability-General		1,558.26
				4129-101-000	Project Feasability-General		36.00
				4129-101-000	Project Feasability-General		9,847.50
				4170-101-000	GIS System Maint. & Equipment		165.00
				4520-101-000	Engineering-WQM		736.00
				4520-101-000	Engineering-WQM		878.50
				4520-101-000	Engineering-WQM		46.00
				4122-101-000	Engineering-Permit I&E		23.00
				4124-101-000	Engineering-Permit Review		6,078.00
				4661-101-000	SLMP/TMDL Studies		195.00
				4661-101-000	SLMP/TMDL Studies		69.00
				4661-101-000	SLMP/TMDL Studies		2,823.00
				4695-101-000	Research Projects-General		980.00
				4695-101-000	Research Projects-General		1,173.00
				4695-101-000	Research Projects-General		2,480.58

Ramsey Washington Metro Watershed Dist.
Cash Disbursements Journal
For the Period From September 1, 2022 - September 30, 2022

Date	Check #	Vendor ID	Name	Account ID	Account Description	Amount	Check Detail
				4650-101-000	Project Operations-General		929.50
				4128-518-000	Engineering-Targeted Retrofit		698.00
				4128-518-000	Engineering-Targeted Retrofit		680.00
				4128-520-000	Engineering-Flood Damage		94.50
				4128-518-000	Engineering-Targeted Retrofit		7,573.26
				4682-529-000	Engineering-Stewardship Grant Program		10,234.00
				4128-518-000	Engineering-Targeted Retrofit		18,351.75
				4128-516-000	Engineering-Maint. & Repair		24,373.48
				4128-516-000	Engineering-Maint. & Repair		721.00
				4128-516-000	Engineering-Maint. & Repair		1,845.50
				4128-516-000	Engineering-Maint. & Repair		933.00
09/27/22	73264	bat001	Batteries Plus	4530-101-000	Water QM Staff-General	431.80	
09/27/22	73265	blo001	Simba Blood			250.84	
				4040-101-000	Employee Benefits-General		80.00
				4020-101-000	Employee Expenses-General		91.85
				4350-101-000	Training & Education-General		28.51
				4630-516-000	Construction Imp.-Maint & Repair		33.85
				4372-101-000	Events		16.63
09/27/22	73266	bre003	Bremer Bank	4040-101-000	Employee Benefits-General	8,668.75	
09/27/22	73267	cad001	Allstream	4530-101-000	Water QM Staff-General	139.68	
09/27/22	73268	cir001	Molly Cirillo	4682-529-000	Stewardship Grant Fund	1,309.35	
09/27/22	73269	cit011	City of Roseville	4325-101-000	IT/Website/Software	6,264.21	
09/27/22	73270	com004	Comcast	4342-101-000	Utilities/Bldg. Contracts	81.50	
09/27/22	73271	dav003	Davey Resource Group, Inc.			72,860.25	
				4343-101-000	Bldg./Site Maintenance		68,199.50
				4630-516-000	Construction Imp.-Maint & Repair		4,660.75
09/27/22	73272	don001	Matthew Doneux			491.48	
				4020-101-000	Employee Expenses-General		183.11
				4040-101-000	Employee Benefits-General		80.00
				4820-101-000	Vehicle Maint.-General		8.58
				4350-101-000	Training & Education-General		219.79
09/27/22	73273	fit002	Mary Fitzgerald	4040-101-000	Employee Benefits-General	58.25	
09/27/22	73274	fle001	Flemings Auto Service	4820-101-000	Vehicle Maint.-General	73.35	
09/27/22	73275	gal001	Galowitz Olson, PLLC	4131-101-000	Attorney General-General	3,154.60	
09/27/22	73276	gil001	Gilbert Mechanical Contractors, Inc.	4343-101-000	Bldg./Site Maintenance	4,368.00	
09/27/22	73277	haw001	Hawkins, Inc.	4530-101-000	Water QM Staff-General	7,417.10	
09/27/22	73278	hbf001	HB Fuller	4682-529-000	Stewardship Grant Fund	923.02	
09/27/22	73279	int001	Office of MN, IT Services	4310-101-000	Telephone-General	59.34	
09/27/22	73280	int003	Intereum, Inc.	4703-101-000	Office Equipment-General	1,074.99	
09/27/22	73281	lan003	Lancer Catering	4372-101-000	Events	750.00	
09/27/22	73282	lan009	Landbridge Ecological, Inc.	4682-529-000	Stewardship Grant Fund	12,713.08	
09/27/22	73283	lea002	League of MN Cities	4338-101-000	Dues & Publications	2,119.00	
09/27/22	73284	mel001	Michelle Melser	4020-101-000	Employee Expenses-General	83.13	
09/27/22	73285	met004	Metro Sales, Inc.	4335-101-000	Printing-General	404.00	
09/27/22	73286	mid003	Roseville Midway Ford	4820-101-000	Vehicle Maint.-General	80.64	
09/274/22	73287	min008	Minnesota Native Landscapes, Inc.	4630-516-000	Construction Imp.-Maint. & Repair	18,978.00	
09/27/22	73288	ncp001	NCPERS Group Life Insurance	4040-101-000	Employee Benefits-General	16.00	
09/27/22	73289	nsp001	Xcel Energy	4650-101-000	Project Operations-General	750.63	
09/27/22	73290	pac001	Pace Analytical Services, Inc.	4530-101-000	Water QM Staff-General	18,519.54	

Ramsey Washington Metro Watershed Dist.
Cash Disbursements Journal
For the Period From September 1, 2022 - September 30, 2022

Date	Check #	Vendor ID	Name	Account ID	Account Description	Amount	Check Detail
09/27/22	73291	pas002	Carol Passi			461.68	
				4020-101-000	Employee Expenses-General		325.85
				4040-101-000	Employee Benefits-General		80.00
				4370-101-000	Educational Program-General		55.83
09/27/22	73292	pre003	Premium Waters, Inc.	4342-101-000	Utilities/Bldg. Contracts	10.00	
09/27/22	73293	qwe001	CenturyLink	4650-101-000	Project Operations-General	271.89	
09/27/22	73294	red002	Redpath & Company, Ltd.	4110-101-000	Auditor/Accounting	1,307.24	
09/27/22	73295	rmb001	RMB Environmental Laboratories	4530-101-000	Water QM Staff-General	4,023.00	
09/27/22	73296	san003	Sandstrom Land Management	4630-516-000	Construction Imp.-Maint. & Repair	2,253.75	
09/27/22	73297	shi001	SHI International Corp.	4703-101-000	Office Equipment-General	3,567.00	
09/27/22	73298	sho004	Shoreline Landscaping	4630-518-000	Construction-Targeted Retrofit	10,828.80	
09/27/22	73299	sim001	Emily Simmons			61.88	
				4020-101-000	Employee Expenses-General		21.88
				4040-101-000	Employee Benefits-General		40.00
09/27/22	73300	sod001	Nicole Soderholm	4040-101-000	Employee Benefits-General	40.00	
09/27/22	73301	sta004	Ann Starr	4682-529-000	Stewardship Grant Fund	7,806.83	
09/27/22	73302	stu001	Studio Lola			451.25	
				4320-101-000	Office Supplies-General		328.75
				4682-529-000	Stewardship Grant Fund		122.50
09/27/22	73303	tec001	Tech Sales	4530-101-000	Water QM Staff-General	16,895.00	
09/27/22	73304	til001	Joseph Tillotson			32.73	
				4670-101-000	Natural Resources Project-General		10.50
				4020-101-000	Employee Expenses-General		22.23
09/27/22	73305	tim002	Timesaver Off-Site Secretarial, Inc.	4365-101-000	Committee/Board Meeting Expense	228.75	
09/27/22	73306	tro002	Cathy Troendle			3,490.86	
				4370-101-000	Educational Program-General		3,465.00
				4370-101-000	Educational Program-General		25.86
09/27/22	73307	uli001	Uline	4650-516-000	Project Operations-Maint & Repair	150.46	
09/27/22	73308	ups001	United Parcel Service	4530-101-000	Water QM Staff-General	45.68	
09/27/22	73309	usb002	U.S. Bank			3,608.29	
				4365-101-000	Committee/Board Meeting Expense		33.19
				4530-101-000	Water QM Staff-General		27.54
				4325-101-000	IT/Website/Software		54.66
				4650-101-000	Project Operations-General		84.34
				4325-101-000	IT/Website/Software		96.17
				4320-101-000	Office Supplies-General		62.92
				4110-101-000	Auditor/Accounting		8.95
				4365-101-000	Committee/Board Meeting Expense		11.90
				4840-101-000	Vehicle Maint.-General		(10.14)
				4110-101-000	Auditor/Accounting		97.00
				4320-101-000	Office Supplies-General		17.99
				4320-101-000	Office Supplies-General		55.00
				4350-101-000	Training & Education-General		135.00
				4697-101-000	Health & Safety Program		84.80
				4703-101-000	Equipment Expense		27.99
				4350-101-000	Training & Education-General		145.00
				4530-101-000	Water QM Staff-General		65.79
				4320-101-000	Office Supplies-General		69.00
				4840-101-000	Vehicle Maint.-General		138.82
				4320-101-000	Office Supplies-General		17.48
				4343-101-000	Vehicle-Miscellaneous Expense		154.00
				4350-101-000	Training & Education-General		1,950.00
				4343-101-000	Vehicle-Miscellaneous Expense		119.25
				4371-101-000	Communications & Marketing		34.00
				4343-101-000	Vehicle-Miscellaneous Expense		79.50
				4350-101-000	Training & Education-General		28.72
				4350-101-000	Training & Education-General		17.48

Ramsey Washington Metro Watershed Dist.
Cash Disbursements Journal
For the Period From September 1, 2022 - September 30, 2022

Date	Check #	Vendor ID	Name	Account ID	Account Description	Amount	Check Detail
				4320-101-000	Office Supplies-General		1.94
09/27/22	73310	vla001	David Vlasin			622.92	
				4020-101-000	Employee Expenses-General		90.68
				4040-101-000	Employee Benefits-General		532.24
09/27/22	73311	voy001	US Bank Voyager Fleet Sys.	4830-101-000	Vehicle Fuel-General	652.22	
09/27/22	73312	was002	Washington Conservation District	4682-529-000	Stewardship Grant Fund	4,660.00	
09/27/22	73313	wes004	Westwood Village 1 Association	4682-529-000	Stewardship Grant Fund	15,406.00	
09/27/22	73314	wit002	Catherine Witzel	4682-529-000	Stewardship Grant Fund	198.84	
09/27/22	73315	nsp001	Xcel Energy	4343-101-000	Bldg./Site Maintenance	763.18	
			Accounts Payable Total:			**$428,947.42**	
EFT	09/02/22	myp001	Payroll Fees	4110-101-000	September 2nd Payroll Fees	72.00	
EFT	09/16/22	myp001	Payroll Fees	4110-101-000	September 16th Payroll Fees	72.00	
EFT	09/30/22	myp001	Payroll Fees	4110-101-000	September 30th Payroll Fees	72.00	
Dir.Dep.	09/02/22	---	Payroll Expense-Net	4010-101-000	September 2nd Payroll	31,934.51	
EFT	09/02/22	int002	Internal Rev.Serv.	2001-101-000	September 2nd Federal Withholding	11,441.30	
EFT	09/02/22	mnd001	MN Revenue	2003-101-000	September 2nd State Withholding	2,054.14	
EFT	09/02/22	per001	PERA	2011-101-000	September 2nd PERA	6,319.13	
EFT	09/02/22	emp002	Empower Retirement	2016-101-000	Employee Def.Comp. Contributions	2,420.00	
EFT	09/02/22	emp002	Empower Retirement	2018-101-000	Employee IRA Contributions	400.00	
Dir.Dep.	09/16/22	---	Payroll Expense-Net	4010-101-000	September 16th Payroll	31,161.19	
EFT	09/16/22	int002	Internal Rev.Serv.	2001-101-000	September 16th Federal Withholding	11,296.12	
EFT	09/16/22	mnd001	MN Revenue	2003-101-000	September 16th State Withholding	2,003.10	
EFT	09/16/22	per001	PERA	2011-101-000	September 16th PERA	6,319.13	
EFT	09/16/22	emp002	Empower Retirement	2016-101-000	Employee Def.Comp. Contributions	3,170.00	
EFT	09/16/22	emp002	Empower Retirement	2018-101-000	Employee IRA Contributions	400.00	
Dir.Dep.	09/30/22	---	Payroll Expense-Net	4010-101-000	September 30th Payroll	30,715.78	
EFT	09/30/22	int002	Internal Rev.Serv.	2001-101-000	September 30th Federal Withholding	11,152.51	
EFT	09/30/22	mnd001	MN Revenue	2003-101-000	September 30th State Withhholding	1,965.60	
EFT	09/30/22	per001	PERA	2011-101-000	September 30th PERA	6,319.13	
EFT	09/30/22	emp002	Empower Retirement	2016-101-000	Employee Def.Comp. Contributions	3,170.00	
EFT	09/30/22	emp002	Empower Retirement	2018-101-000	Employee IRA Contributions	400.00	
			Payroll/Benefits			**$162,857.64**	
			TOTAL:			**$591,805.06**	

BARR

Summary of Professional Engineering Services During the Period
August 20, 2022 through September 16, 2022

	Total Engineering Budget (2022)	Total Fees to Date (2022)	Budget Balance (2022)	Fees During Period	District Accounting Code	Plan Implementation Task Number
Engineering Administration						
General Engineering Administration	$80,000.00	$58,382.50	$21,617.50	$5,029.00	**4121-101**	DW-13
RWMWD Health and Safety/ERTK Program	$2,000.00	$540.00	$1,460.00	$0.00	**4697-101**	DW-13
Educational Program/Educational Forum Assistance	$20,000.00	$2,847.50	$17,152.50	$0.00	**4129-101**	DW-11
Topical Workshop, Education, and Planning	$25,000.00	$0.00	$25,000.00	$0.00	**4129-101**	DW-13
Engineering Review						
Engineering Review	$60,000.00	$52,867.00	$7,133.00	$3,750.50	**4123-101**	DW-13
Project Feasibility Studies						
Interim emergency response plan funds for top priority District flooding areas	$30,000.00	$21,855.00	$8,145.00	$1,238.00	**4129-101**	DW-19
Groundwater/Surface Water Next Steps	$50,000.00	$0.00	$50,000.00	$0.00	**4129-101**	DW-10, DW-16
Hillcrest Golf Course	$20,000.00	$72.00	$19,928.00	$0.00	**4129-101**	DW-6
Kohlman Creek flood damage reduction feasibility study	$75,000.00	$6,066.50	$68,933.50	$253.00	**4129-101**	DW-9, KC-2, BELT-3
Kohlman Creek- Wakefield Lake Diversion Planning and Design	$111,600.00	$51,746.50	$86,010.00	$3,608.00	**4129-101**	DW-9, KC-2, BELT-3
Improvements to County Ditch 17	$20,000.00	$30,646.00	-$10,646.00	$6,753.00	**4129-101**	DW-9, BELT-3
Improvements to Phalen Village	$20,000.00	$18,435.50	$1,564.50	$2,997.50	**4129-101**	DW-9, BELT-3
Ames Lake Technical Assisstance and Project Planning with St. Paul	$25,000.00	$15,082.00	$9,918.00	$681.00	**4129-101**	DW-9, BELT-3
694/494/94 WQ treatment feasibility study	$30,000.00	$0.00	$30,000.00	$0.00	**4129-101**	BCL-3
Double Driveway Optimization Study	$25,000.00	$4,471.50	$20,528.50	$161.00	**4129-101**	FC-2
Carver Pond Improvements Study (Fish Creek Subwatershed)	$25,000.00	$15,148.51	$9,851.49	$1,558.26	**4129-101**	FC-2
Evaluate compliance with South Metro Mississippi River TSS TMDL	$30,000.00	$2,064.00	$27,936.00	$36.00	**4129-101**	MR-2
Owasso Basin area/North Star Estates improvements (with City of Little Canada)	$50,000.00	$61,573.97	-$11,573.97	$9,847.50	**4129-101**	GC-3
Wetland Restoration Workshop, Education, and Planning	$5,000.00	$2,969.00	$2,031.00	$0.00	**4129-101**	DW-8
Contingency*	$45,000.00	$0.00	$45,000.00	$0.00	**4129-101**	
GIS Maintenance						
GIS Maintenance	$5,000.00	$1,019.00	$3,981.00	$165.00	**4170-101**	DW-13
Monitoring Water Quality/Project Monitoring						
Lake Water Quality Monitoring (Misc QA/QC)	$10,000.00	$34.50	$9,965.50	$0.00	**4520-101**	DW-2
Annual WQ Report Assistance	$10,000.00	$13,126.00	-$3,126.00	$736.00	**4520-101**	DW-2
Special Project BMP Monitoring	$25,000.00	$9,484.67	$15,515.33	$878.50	**4520-101**	DW-12
Grass Lake Berm Wetland Monitoring	$10,000.00	$8,893.08	$1,106.92	$46.00	**4520-101**	DW-5
Permit Processing, Inspection and Enforcement						
Permit Application Inspection and Enforcement	$10,000.00	$3,326.50	$6,673.50	$23.00	**4122-101**	DW-7
Permit Application Review	$55,000.00	$38,039.50	$16,960.50	$6,078.00	**4124-101**	DW-7
Lake Studies/TMDL Reports						
2022 Grant Applications	$40,000.00	$2,005.50	$37,994.50	$0.00	**4661-101**	DW-13
WMP Updates - Including Implementation Plan Updates if needed	$20,000.00	$5,333.00	$14,667.00	$195.00	**4661-101**	DW-13
Prioritization of water quality projects from subwatershed feasibility studies	$5,000.00	$933.00	$4,067.00	$69.00	**4661-101**	DW-13
Cost/Benefit Analysis of Treatment Options for Bennett and Wakefield in 2020 Internal Load Analysis	$35,000.00	$6,415.50	$28,584.50	$2,823.00	**4661-101**	WL-3, BeL-3
Phalen Chain of Lakes Changes in Water Quality	$2,500.00	$2,070.00	$430.00	$0.00	**4661-101**	DW-2, DW-12
Contingency for Lake Studies	$22,500.00	$0.00	$22,500.00	$0.00	**4661-101**	
Research Projects						
New Technology Mini Case Studies (average 6 per year)	$12,000.00	$3,914.50	$8,085.50	$980.00	**4695-101**	DW-12
Kohlman Permeable Weir Test System - Implement Monitoring Plan	$50,000.00	$15,818.13	$34,181.87	$1,173.00	**4695-101**	DW-12
Shallow Lake Aeration Study	$90,000.00	$56,568.64	$33,431.36	$2,480.58	**4695-101**	DW-12
Project Operations						
2022 Tanners Alum Facility Monitoring	$15,000.00	$19,586.77	-$4,586.77	$929.50	**4650-101**	TaL-3
Capital Improvements						
North St. Paul Target	$160,000.00	$157,954.30	$2,045.70	$698.00	**4128-518**	DW-6
East St Paul and North St. Paul Target Retrofit Projects	$5,000.00	$4,202.00	$798.00	$680.00	**4128-518**	DW-6
Ryan Drive-Keller Parkway Conveyance	$194,000.00	$226,362.20	-$32,362.20	$94.50	**4128-520**	DW-9. GC-3
2022 Targeted Retrofit Projects	$191,000.00	$152,682.28	$38,317.72	$7,573.26	**4128-518**	DW-6
Stewardship Grant Program: Gen'l BMP Design Assistance and Review (cases where Dist is approached by landowner, or landowner is not commercial, school, church).	$75,000.00	$36,628.31	$38,371.69	$10,234.00	**4682-529**	DW-6
Kohlman Creek Storage and Detention	$200,000.00	$0.00	$200,000.00	$0.00	**4128-520**	KC-2
Wetland Restoration	$100,000.00	$0.00	$100,000.00	$0.00	**4128-529**	DW-8
South Owasso Boulevard East WQ Pond	$150,000.00	$0.00	$150,000.00	$0.00	**4128-520**	GC-3
West Industrial Park Berm and associated improvements	$150,000.00	$0.00	$150,000.00	$0.00	**4128-520**	GC-3
Lake Emily Subwatershed Regional BMP	$160,000.00	$26,727.00	$133,273.00	$18,351.75	**4128-518**	LE-3
CIP Project Repair & Maintenance						
Routine CIP Inspection and Unplanned Maintenance Identification	$125,000.00	$80,245.70	$44,754.30	$24,373.48	**4128-516**	DW-5
Beltline 5-year Inspection	$70,000.00	$68,692.45	$1,307.55	$721.00	**4128-516**	BELT-2
District Inspection Standardization	$34,200.00	$33,171.26	$1,028.74	$1,845.50	**4128-516**	DW-5
2022 CIP Maintenance and Repairs	$150,000.00	$93,765.92	$56,234.08	$933.00	**4128-516**	DW-5
2023 CIP Maintenance and Repairs (planning, bidding, and project setup)	$40,000.00	$0.00	$40,000.00	$0.00	**4128-516**	DW-5
				$117,993.83		

Barr declares under the penalties of Law that this Account,
Claim, or Demand is just and that no part has been paid.

Bradley J. Lindaman, Vice President

2022 SCHOOLS & FAITH-BASED SITES BMP RETROFITS
RAMSEY-WASHINGTON METRO WATERSHED DISTRICT
Progress Payment Application No. 2

1.	Completed to Date:	$ 158,749.89		
2.	Less Previously Billed:		$ 146,717.89	
3.	Amount Completed This Period:			$ 12,032.00
4.	Amount Previously Retained:		$ (14,671.79)	
5.	Amount Retained This Period (See Note 1):			$ (1,203.20)
6.	Total Amount Retained (See Note 2):		$ (15,874.99)	
7.	Retainage Released Through This Period:			$ -
8.	Less Total Retainage Remaining:		$ (15,874.99)	
9.	Less Amounts Previously Paid (Pay Application Nos. 1, 2, 3)	$ 132,046.10		
10.	Amount Due This Period:			**$ 10,828.80**

Note 1: At rate of 10% until Completed to Date equals 50% of current Contract Price and a rate of 0% thereafter.
Note 2: Maximum amount is 5% of current Contract Price (Original Contract Price is $477,624.50; adjusted Contract Price to date is $505,963.39)

SUBMITTED BY:
Name: Stephan McLafferty Date: 9/21/2022
Title: President
Contractor: Shoreline Landscaping, Inc.

Signature: Stephan McLafferty

RECOMMENDED BY:
Name: Marcy Bean Date: 9/18/2022
Title: Project Manager
Engineer: Barr Engineering Company

Signature: Marcy L Bean

APPROVED BY:
Name: Lawrence Swope Date:
Title: President
Owner: Ramsey-Washington Metro Watershed District

Signature:

MOUNDS PARK ACADEMY

CONSTRUCTION CONTRACT AMOUNT FOR PROGRESS PAYMENT

				BID TOTAL		INVOICE #3826, 8/4/2022 TOTAL COMPLETED THROUGH THIS PERIOD			INVOICE #3826, 9/9/2022 TOTAL COMPLETED THROUGH THIS PERIOD		
Bid Item	**Description**	**Unit**	**Estimated Quantity**	**Unit Price**	**Extended Cost**	**Unit Price**	**Actual Quantity***	**Extended Cost**	**Unit Price**	**Actual Quantity***	**Extended Cost**
A	Mobilization/Demobilization/Traffic Control/Erosion Control (C.0.1.B)	L.S.	1	**$5,000.00**	$5,000.00	**$26,050.00**	1	$26,050.00	**$26,050.00**		$0.00
B	Construction Entrance (P)	EA	1	$1,500.00	$1,500.00	$1,500.00	1	$1,500.00	$1,500.00		$0.00
C	Inlet Protection	EA	2	$150.00	$300.00	$150.00	2	$300.00	$150.00		$0.00
D	Tree Protection Fencing	L.F.	112	$5.00	$560.00	$5.00	112	$560.00	$5.00		$0.00
E	6" Sediment Control Logs	L.F.	206	$6.00	$1,236.00	$6.00	**245**	$1,470.00	$6.00		$0.00
F	Sawcut Pavement	L.F.	232	$2.50	$580.00	$2.50	232	$580.00	$2.50		$0.00
G	Remove and Dispose of Existing Concrete Curb and Gutter	L.F.	190	$10.00	$1,900.00	$10.00	190	$1,900.00	$10.00		$0.00
H	Clearing and Grubbing (P)	AC	0.5	$13,000.00	$6,500.00	$13,000.00	0.5	$6,500.00	$13,000.00		$0.00
I	Remove and Dispose of Bituminous Pavement	SY	698	$8.00	$5,584.00	$8.00	698	$5,584.00	$8.00		$0.00
J	Excavate, Haul, and Dispose of Materials (P)	C.Y.	10	$25.00	$250.00	$25.00	10	$250.00	$25.00		$0.00
K	Bituminous Wearing Course (2" Depth), Including Tack Coat	S.Y.	338	$16.00	$5,408.00	$16.00	**342**	$5,472.00	$16.00		$0.00
L	Bituminous Base Course (2" Depth)	S.Y.	338	$16.00	$5,408.00	$16.00	**342**	$5,472.00	$16.00		$0.00
M	MnDOT B612 Concrete Curb and Gutter	L.F.	152	$48.00	$7,296.00	$48.00	152	$7,296.00	$48.00		$0.00
N	6x12 Concrete Utility Curb	L.F.	72	$48.00	$3,456.00	$48.00	**77**	$3,696.00	$48.00		$0.00
O	Iron Enhanced Sand	C.Y.	20	$180.00	$3,600.00	$180.00	20	$3,600.00	$180.00		$0.00
P	4" CPEP Draintile, Perforated	L.F.	120	$5.00	$600.00	$5.00	120	$600.00	$5.00		$0.00
Q	6" SCH 40 PVC, Solid	L.F.	34	$20.00	$680.00	$20.00	34	$680.00	$20.00		$0.00
R	Planting Soil (P)	C.Y.	94	$38.00	$3,572.00	$38.00	**195**	$7,410.00	$38.00		$0.00
S	4" CPEP Draintile Cleanout	EA	3	$150.00	$450.00	$150.00	3	$450.00	$150.00		$0.00
T	Riprap	SF	57	$30.00	$1,710.00	$30.00	57	$1,710.00	$30.00		$0.00
U	Precast Stormwater Concrete Curb Inlet	EA	1	$8,500.00	$8,500.00	$8,500.00	1	$8,500.00	$8,500.00		$0.00
V	Landscape Edging	L.F.	280	$10.00	$2,800.00	$10.00	280	$2,800.00	$10.00		$0.00
W	Twice-Shredded Hardwood Mulch (P)	C.Y.	27	$80.00	$2,160.00	$80.00	27	$2,160.00	$80.00		$0.00
X	Perennial (#1 Cont.) (P)	EA	459	$18.00	$8,262.00	$18.00	0	$0.00	$18.00	459	$8,262.00
Y	Shrub (#2 Cont.) (P)	EA	44	$30.00	$1,320.00	$30.00	0	$0.00	$30.00	44	$1,320.00
Z	Deciduous Tree (#10 Cont.) (P)	EA	7	$350.00	$2,450.00	$350.00	0	$0.00	$350.00	7	$2,450.00
AA	Soil Loosening	SY	561	$4.00	$2,244.00	$4.00	561	$2,244.00	$4.00		$0.00
BB	Turf Seeding (Mn/DOT Mix#)	AC	0.1	$6,500.00	$650.00	$6,500.00	0.1	$650.00	$6,500.00		$0.00
CC	Turf Reinforcement Mat (P)	SY	30	$12.00	$360.00	$12.00	30	$360.00	$12.00		$0.00
DD	Painted Pavement Markings	L.S.	1	$1,500.00	$1,500.00	$1,500.00	1	$1,500.00	$1,500.00		$0.00
1.A	Parallel Pedestrian Curb Ramp w/Truncated Domes	EA	1	$2,500.00	$2,500.00	$2,500.00	1	$2,500.00	$2,500.00		$0.00
1.B	Concrete Curb and Gutter, Tipout	L.F.	30	$48.00	$1,440.00	$48.00	30	$1,440.00	$48.00		$0.00
1.C	Concrete Walks (C.0.1.B)	S.Y.	98	**$130.00**	$12,740.00	$65.00	**99**	$6,435.00	$65.00		$0.00
1.D	Decomposed Granite Surfacing (C.0.1.B)	S.Y.	42	**$180.00**	$7,560.00	$90.00	42	$3,780.00	$90.00		$0.00
1.E	~~Dry Placed Stone Seat Wall w/Concrete Foundation (C.0.1.B)~~	L.S.	1	**$39,600.00**	$39,600.00	$39,600.00	0	$0.00	$0.00		$0.00
1.F	4" CPEP Draintile, Perforated	L.F.	80	$8.00	$640.00	$8.00	80	$640.00	$8.00		$0.00
1.G	6" SCH 40 PVC, Solid	L.F.	13	$20.00	$260.00	$20.00	13	$260.00	$20.00		$0.00
1.H	Flagstone Surfacing	S.F.	78	$45.00	$3,510.00	$45.00	78	$3,510.00	$45.00		$0.00
1.I	Fine Filter Aggregate (P)	CY	2	$120.00	$240.00	$120.00	2	$240.00	$120.00		$0.00
1.J	Class 5 Aggregate Base	TON	12	$90.00	$1,080.00	$90.00	12	$1,080.00	$90.00		$0.00

C.0.1.B	Stone Outcropping	L.S.				**$11,300.00**	**1**	$11,300.00			
C.0.1.D	Select Tree Removal	EA				**$650.00**	**10**	$6,500.00			
C.0.1.E	Catch Basin Adjustment	LS				**$4,800.00**	**1**	$4,800.00			
C.0.3.A	Weedy species removal	CY				**$29.00**	**24**	$700.00			
C.0.3.B	Compactible fill	CY				**$28.50**	**98**	$2,793.00			
C.0.3.C	Topsoil borrow	CY				**$25.00**	**18**	$450.00			
C.0.3.D	Pollinator seed mix	LS				**$245.89**	**1**	$245.89			
C.0.3.E	Seeding and blanketing	LS				**$400.00**	**1**	$400.00			
C.0.3.F	Grout catch basin	LS				**$350.00**	**1**	$350.00			
	TOTAL			**BID TOTAL**	**$155,406.00**		**TOTAL (PAY APPLICATION #1)**	**$146,717.89**		**TOTAL (PAY APPLICATION #1)**	**$12,032.00**

** NOTE: Items noted as **BOLD** indicate a change from original bid quantities.*

Galowitz Olson, PLLC
10390 39th Street North
Lake Elmo, Minnesota 55042
Office: (651) 777-6960
Fax: (651) 777-8937

Ramsey-Washington Metro Watershed District
C/O Tina Carstens
2665 Noel Drive
Little Canada MN 55117

September 21, 2022
File No: 9M

	Balance
General Account	$3,154.60

Permit Application Coversheet

Date October 05, 2022

Project Name 3M Avenue R Maintenance Project Number 22-26

Applicant Name Mary Lenzmeier-Carlson, 3M

Type of Development Linear

Property Description

This project is located on the Maplewood 3M campus, between McKnight Road North and Carlton Street along Avenue R. The applicant is proposing to complete a mill-and-overlay of Avenue R with some curb and gutter replacement. The total land disturbance area is 0.05 acre but triggers District Rule F for erosion and sediment control due to the project area's proximity to a wetland '3M Lake.' To accommodate an anticipated early construction start, a temporary erosion control permit was issued on 9/15/22.

Watershed District Policies or Standards Involved:

- ☐ *Wetlands*
- ☑ *Erosion and Sediment Control*
- ☐ *Stormwater Management*
- ☐ *Floodplain*

Water Quantity Considerations

There are no water quantity considerations.

Water Quality Considerations

Short Term

The proposed erosion and sediment control plan is sufficient to protect downstream water resources during construction.

Long Term

There are no long term water quality considerations.

Staff Recommendation

Staff recommends approval of this permit.

Attachments:

- ☑ Project Location Map
- ☐ Project Grading Plan

#22-26 3M Avenue R Maintenance

Wetlands
- Manage A
- Manage B
- Manage C
- Lake
- Sediment Pond
- Not Assessed

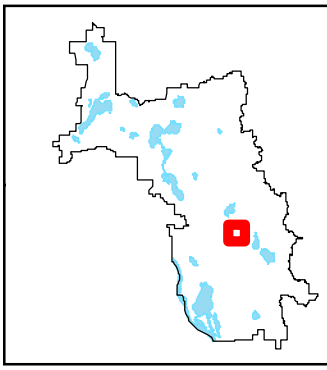
- Flow Arrows
- Major Flow Arrows
- Subwatersheds
- Creeks
- Permits

Highlighted Areas Represent Active Permit

0 350 700
Feet

0 0.075 0.15
Miles

N



22-26

Special Provisions

None

Permit Application Coversheet

Date October 05, 2022

Project Name 3M Lake Culvert Maintenance Project Number 22-27

Applicant Name Mary Lenzmeier-Carlson, 3M

Type of Development Drainage

Property Description

This project is located along Avenue R at '3M Lake,' east of 14th Street on the Maplewood 3M campus. The applicant is proposing to replace a culvert and drainage pipe from an existing parking lot. The existing pipe is buried without freeboard from the normal water elevation. The applicant is proposing to remove 135 cubic yards of accumulated sediment from the DNR-regulated wetland '3M Lake' and raise the outfall approximately 1 foot with associated riprap to provide energy dissipation. A wetland delineation and no-loss Wetland Conservation Act (WCA) application was approved by RWMWD staff on 9/27/22. A Public Waters permit has been submitted for work below the Ordinary High Water Level (OHWL) with a decision pending by the DNR. The applicant has submitted cut and fill volumes below the District's 100-year floodplain elevation of 980.64' to demonstrate no net fill in the floodplain.

Watershed District Policies or Standards Involved:

- [x] *Wetlands*
- [x] *Erosion and Sediment Control*
- [ ] *Stormwater Management*
- [x] *Floodplain*

Water Quantity Considerations

The proposed project results in no net loss of floodplain storage.

Water Quality Considerations

Short Term

The proposed erosion and sediment control plan is sufficient to protect downstream water resources during construction.

Long Term

There are no long term water quality considerations.

Staff Recommendation

Staff recommends approval of this permit.

Attachments:

- [x] Project Location Map
- [x] Project Grading Plan

#22-27 3M Lake Culvert Maintenance

Wetlands
- Manage A
- Manage B
- Manage C
- Lake
- Sediment Pond
- Not Assessed

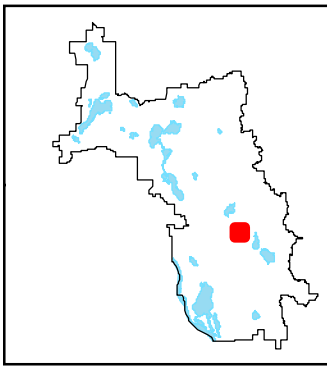
- Flow Arrows
- Major Flow Arrows
- Subwatersheds
- Creeks
- Permits

Highlighted Areas Represent Active Permit

0 200 400
Feet

0 0.05 0.1
Miles

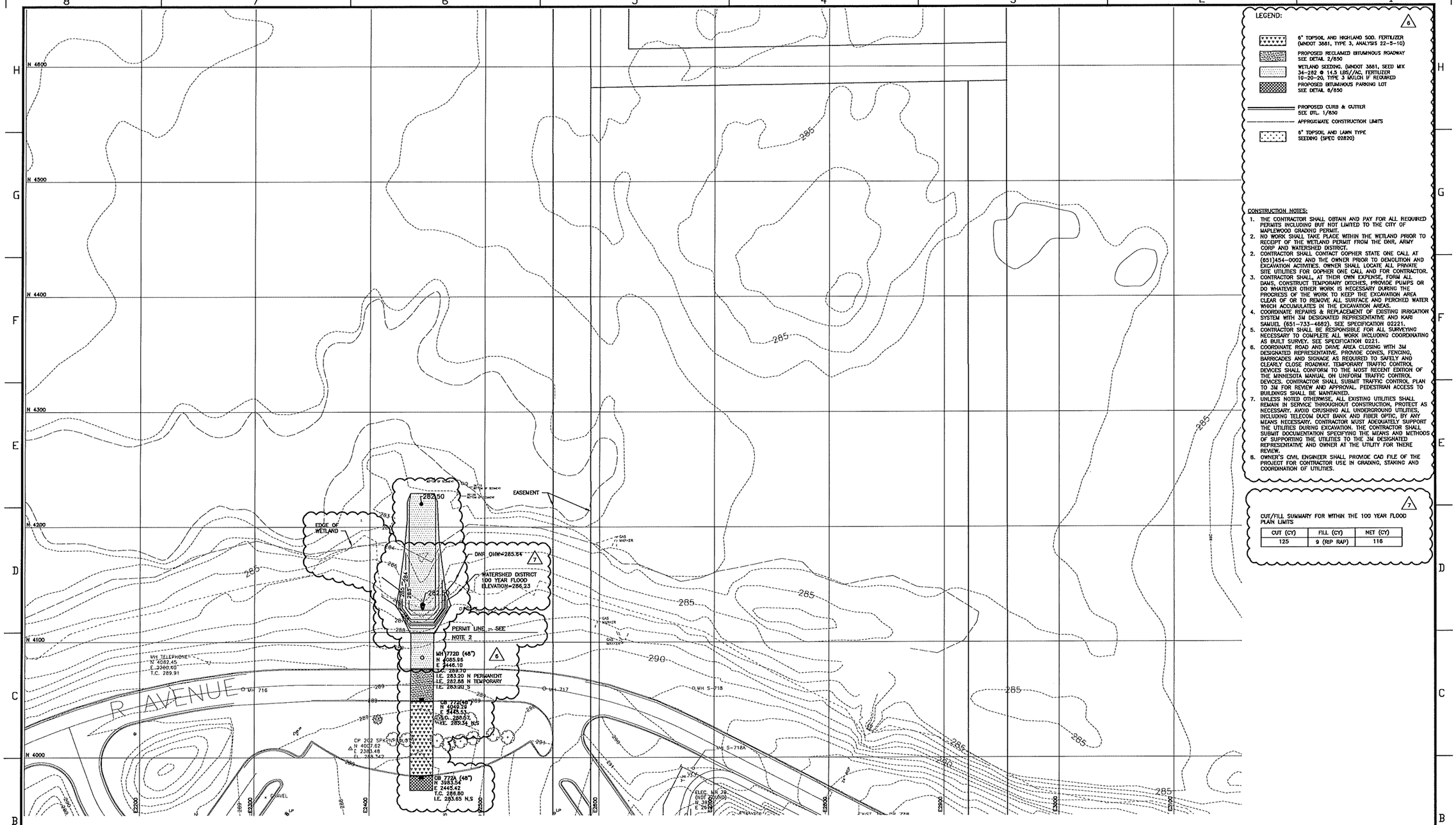
N



22-27

Special Provisions

None



LEGEND:

△6

- 6" TOPSOIL AND HIGHLAND SOD. FERTILIZER (MNDOT 3881, TYPE 3, ANALYSIS 22-5-10)
- PROPOSED RECLAIMED BITUMINOUS ROADWAY SEE DETAIL 2/650
- WETLAND SEEDING. (MNDOT 3881, SEED MIX 34-262 @ 14.5 LBS//AC, FERTILIZER 10-20-20, TYPE 3 MULCH IF REQUIRED
- PROPOSED BITUMINOUS PARKING LOT SEE DETAIL 8/650
- PROPOSED CURB & GUTTER SEE DTL. 1/650
- APPROXIMATE CONSTRUCTION LIMITS
- 6" TOPSOIL AND LAWN TYPE SEEDING (SPEC 02820)

CONSTRUCTION NOTES:

1. THE CONTRACTOR SHALL OBTAIN AND PAY FOR ALL REQUIRED PERMITS INCLUDING BUT NOT LIMITED TO THE CITY OF MAPLEWOOD GRADING PERMIT.
2. NO WORK SHALL TAKE PLACE WITHIN THE WETLAND PRIOR TO RECEIPT OF THE WETLAND PERMIT FROM THE DNR, ARMY CORP AND WATERSHED DISTRICT.
2. CONTRACTOR SHALL CONTACT GOPHER STATE ONE CALL AT (651)454-0002 AND THE OWNER PRIOR TO DEMOLITION AND EXCAVATION ACTIVITIES. OWNER SHALL LOCATE ALL PRIVATE SITE UTILITIES FOR GOPHER ONE CALL AND FOR CONTRACTOR.
3. CONTRACTOR SHALL, AT THEIR OWN EXPENSE, FORM ALL DAMS, CONSTRUCT TEMPORARY DITCHES, PROVIDE PUMPS OR DO WHATEVER OTHER WORK IS NECESSARY DURING THE PROGRESS OF THE WORK TO KEEP THE EXCAVATION AREA CLEAR OF OR TO REMOVE ALL SURFACE AND PERCHED WATER WHICH ACCUMULATES IN THE EXCAVATION AREAS.
4. COORDINATE REPAIRS & REPLACEMENT OF EXISTING IRRIGATION SYSTEM WITH 3M DESIGNATED REPRESENTATIVE AND KARI SAMUEL (651-733-4682). SEE SPECIFICATION 02221.
5. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL SURVEYING NECESSARY TO COMPLETE ALL WORK INCLUDING COORDINATING AS BUILT SURVEY. SEE SPECIFICATION 0221.
6. COORDINATE ROAD AND DRIVE AREA CLOSING WITH 3M DESIGNATED REPRESENTATIVE. PROVIDE CONES, FENCING, BARRICADES AND SIGNAGE AS REQUIRED TO SAFELY AND CLEARLY CLOSE ROADWAY. TEMPORARY TRAFFIC CONTROL DEVICES SHALL CONFORM TO THE MOST RECENT EDITION OF THE MINNESOTA MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES. CONTRACTOR SHALL SUBMIT TRAFFIC CONTROL PLAN TO 3M FOR REVIEW AND APPROVAL. PEDESTRIAN ACCESS TO BUILDINGS SHALL BE MAINTAINED.
7. UNLESS NOTED OTHERWISE, ALL EXISTING UTILITIES SHALL REMAIN IN SERVICE THROUGHOUT CONSTRUCTION, PROTECT AS NECESSARY. AVOID CRUSHING ALL UNDERGROUND UTILITIES, INCLUDING TELECOM DUCT BANK AND FIBER OPTIC, BY ANY MEANS NECESSARY. CONTRACTOR MUST ADEQUATELY SUPPORT THE UTILITIES DURING EXCAVATION. THE CONTRACTOR SHALL SUBMIT DOCUMENTATION SPECIFYING THE MEANS AND METHODS OF SUPPORTING THE UTILITIES TO THE 3M DESIGNATED REPRESENTATIVE AND OWNER AT THE UTILITY FOR THERE REVIEW.
8. OWNER'S CIVIL ENGINEER SHALL PROVIDE CAD FILE OF THE PROJECT FOR CONTRACTOR USE IN GRADING, STAKING AND COORDINATION OF UTILITIES.

△7

CUT/FILL SUMMARY FOR WITHIN THE 100 YEAR FLOOD PLAIN LIMITS

CUT (CY)	FILL (CY)	NET (CY)
125	9 (RIP RAP)	116

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

SIGNATURE: Amanda Kieffer DATE: 09/23/2022

PRINTED NAME: AMANDA MARIE KIEFFER LIC. NO.: 56216

ACCESS CODES	USER1	USER2					DESIGN REFERENCE	NEXT ASSEMBLY	
7			09-23-2022	AVE. R WATERSHED RESUBMITTAL				CHK	AMK
6			09-08-2022	2022 BITUMINOUS MAINTENANCE ADD#1				CHK	AMK
5			01-05-2001	HYBRID CREATED				CAD	
REV	PROJECT ID		DATE	DESCRIPTION				DRVN	CHKD

CONSULTANT NAME/LOGO: TKDA PROJ. #: 12970.778

FACILITIES ENGINEERING

SCALE 1"=30' — 0, 15, 30, 60 — SCALE IN FEET

REGISTRATION STAMP

DRVN DATE MFG DATE

CHKD DATE APPVD DATE

3M 3M CENTER ST. PAUL, MN 55144

TITLE: GRADING & CONTOUR PLAN

3M DIV. NO. 888

MAPLEWOOD MN

DRAWING NUMBER: SIPA-888-C-216

SHEET 7

REV 7

Permit Application Coversheet

Date October 05, 2022

Project Name Pioneer Commons Project Number 22-28

Applicant Name Melissa Duce, Lennar Homes

Type of Development Residential

Property Description

This project is located north of the current end to Vanderbie Street, between Allen Avenue & I-694 in the City of Little Canada. The applicant is proposing to construct a residential subdivision with 178 units including parking, residential street connections, and stormwater treatment areas. The total site area is 21.6 acres with historically agricultural land use. Two wet ponds and a filtration bench are proposed to meet stormwater treatment requirements, located towards the center of the proposed subdivision. Filtration is being proposed due to poor soils. A Wetland Conservation Act (WCA) no wetland determination was approved by District staff on 7/12/18.

Watershed District Policies or Standards Involved:

- ☐ *Wetlands*
- ☑ *Erosion and Sediment Control*
- ☑ *Stormwater Management*
- ☐ *Floodplain*

Water Quantity Considerations

The proposed stormwater management plan is sufficient to handle the runoff from the site.

Water Quality Considerations

Short Term

The proposed erosion and sediment control plan is sufficient to protect downstream water resources during construction.

Long Term

The proposed stormwater management plan is sufficient to protect the long term quality of downstream water resources.

Staff Recommendation

Staff recommends approval of this permit with the special provisions.

Attachments:

- ☑ Project Location Map
- ☑ Project Grading Plan

#22-28 Pioneer Commons

Wetlands
- Manage A
- Manage B
- Manage C
- Lake
- Sediment Pond
- Not Assessed

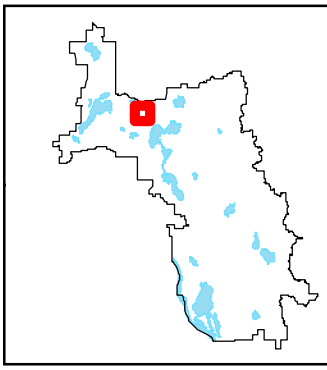
- Flow Arrows
- Major Flow Arrows
- Subwatersheds
- Creeks
- Permits
- Ramsey Co Parcels

Highlighted Areas Represent Active Permit

0 300 600
Feet

0 0.05 0.1
Miles

N



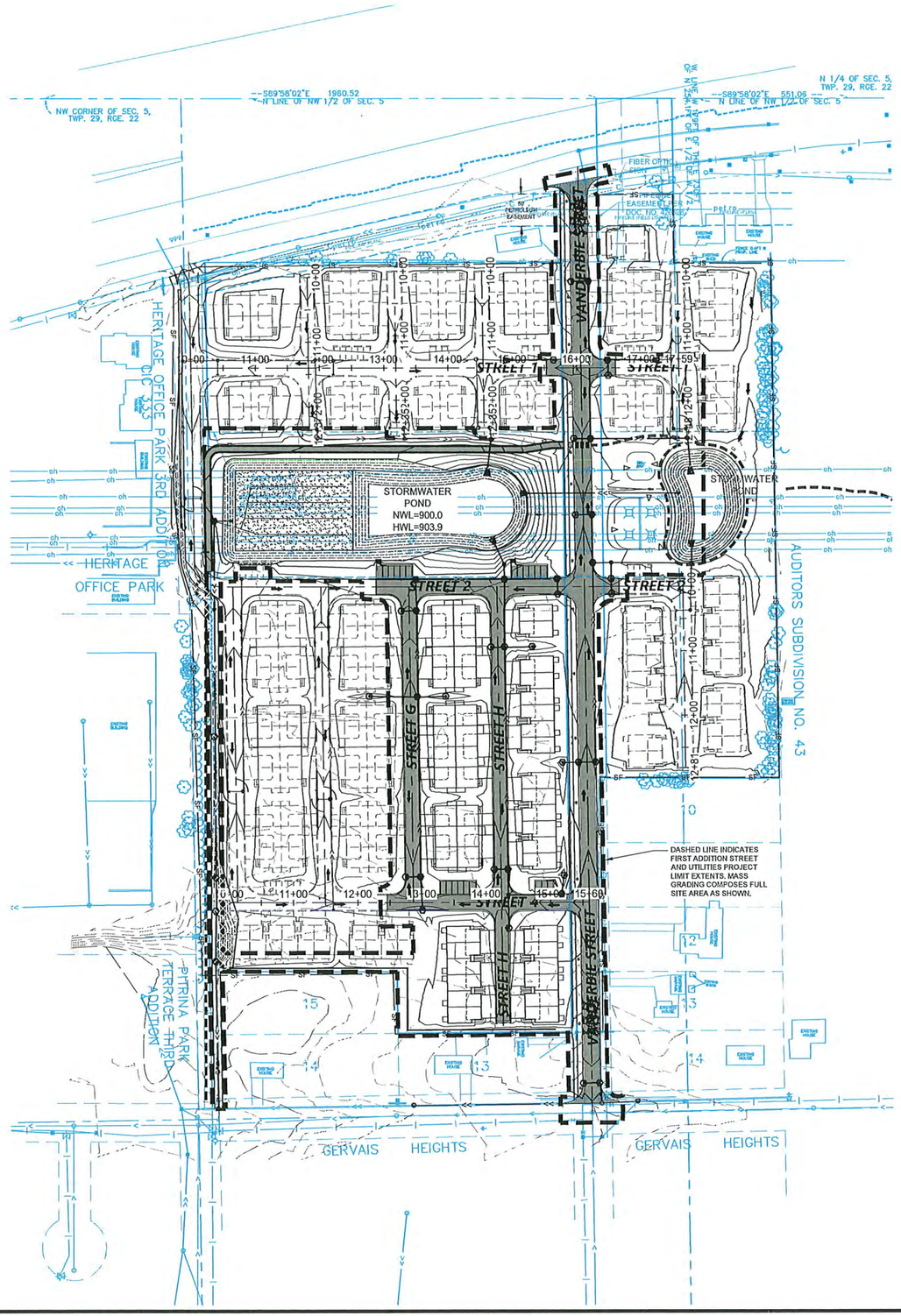
22-28

Special Provisions

1. The applicant shall submit the final, signed plans set including phased erosion control plans as applicable.

2. The applicant shall submit the executed maintenance agreement for the proposed stormwater facilities.

3. The applicant shall submit written confirmation that the City of Little Canada has reviewed and approved the increase in discharge rates from the north outfall.



GRADING NOTES

1. NOTIFY NICOLE SODERHOLM, RAMSEY-WASHINGTON METRO WATERSHED AT 651-792-7976 PRIOR TO BEGINNING CONSTRUCTION ACTIVITY IN ORDER TO SCHEDULE AN INITIAL SWPPP INSPECTION.
2. NOTIFY NICOLE SODERHOLM, RAMSEY-WASHINGTON METRO WATERSHED DISTRICT, AT 651-792-7976 AT LEAST 48 HOURS PRIOR TO CONSTRUCTION OF THE STORMWATER FILTRATION BENCH.

N

0 100 200
H: SCALE IN FEET

wsb

SCALE:	DESIGN BY:
AS SHOWN	LCW
PLAN BY:	CHECK BY:
LCW/SJH	KWH

REVISIONS

NO.	DATE	DESCRIPTION

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

KYLE W. HOFF LIC. NO: 59709

DATE: 09/23/2022

MASS GRADING, DRAINAGE, & EROSION CONTROL PLAN

PIONEER COMMONS
LENNAR HOMES - LITTLE CANADA, MINNESOTA

WSB PROJECT NO.
019789-000

SHEET
CG-101

K:\019789-000\Cad\Plan\PHASE 1\019789-000-C-GRAD-PH 1-PLAN.dwg 9/23/2022 10:52:46 AM

RAMSEY-WASHINGTON
METRO WATERSHED DISTRICT

(651) 792-7950
rwmwd.org

2665 Noel Drive
Little Canada, MN 55117

October 5, 2022

To: RWMWD Board of Managers

From: Paige Ahlborg, Watershed Project Manager

Re: Reimbursement Deadline Extension; 21-39 CS, Washington County Community Development Agency

Washington County applied for a $15,000 Stewardship Grant for a native planting project at the Washington County Community Development Agency and were approved on 11/3/2021. The application funded a native planting project in front of their building and main parking lot. Requirements of the Stewardship Grant Program give one year to seek reimbursement for the allocated funds. Washington County is requesting an extension until 11/3/2023 due to difficulties obtaining a contractor in 2022. Work is anticipated to begin spring 2023.

RAMSEY-WASHINGTON
METRO WATERSHED DISTRICT

(651) 792-7950
rwmwd.org

2665 Noel Drive
Little Canada, MN 55117

October 5, 2022

To: RWMWD Board of Managers
From: Paige Ahlborg, Watershed Project Manager

Re: Reimbursement Deadline Extension; 22-08 CS, Battle Creek Middle School

St. Paul Public Schools applied for a $100,000 Stewardship Grant for a stormwater BMP at Battle Creek Middle School and were approved on March 2, 2022. The application funded a filtration basin with native plantings. Requirements of the Stewardship Grant Program give one year to seek reimbursement for the allocated funds. St. Paul Public Schools is requesting an extension until to December 31, 2023 due to the need to finalize other funding sources and obtain a contractor. Work is anticipated to begin summer 2023.

****

Permit Program

****

RAMSEY-WASHINGTON
METRO WATERSHED DISTRICT

MEMORANDUM

Date: October 5, 2022

To: RWMWD Board of Managers

From: Nicole Soderholm, Permit Coordinator
Ramsey-Washington Metro Watershed District (RWMWD)

Subject: Permit #22-25 Variance Request (Rule E)- Xcel Energy Maplewood Gas Plant

Last month the RWMWD Board of Managers conditionally approved the Xcel Energy Maplewood Gas Plant project with special provisions. The variance request for wetland buffer impacts (Rule E) was tabled after a detailed discussion. The Board requested additional information on mitigation measures to be completed during the project to help offset the proposed loss of wetland buffer.

The applicant has submitted a tree preservation and vegetation enhancement plan to demonstrate proposed mitigation measures. The project would maintain a 75' average buffer around Wetland 2 and enhance Wetland 3 buffer vegetation by removing invasive species, planting plugs, and seeding with a native species mix.

Attachment: Wetland Buffer Variance Request, Figure 2 (Project Layout), Attachment 3 (Native Seed Mix), Attachment 5 (Tree Preservation Restoration Plan)

Request For Board Action:

Staff recommendation: Approve the wetland buffer variance with the proposed tree preservation plan and buffer vegetation enhancement plan which will include invasive species removal and supplemental planting/seeding.

(651) 792-7950
fax (651) 792-7951
office@rwmwd.org
rwmwd.org
2665 Noel Drive
Little Canada, MN 55117

Memorandum

To: Ramsey Washington Metro Watershed District Board of Managers
From: Brian Sullivan; Xcel Energy, Cory Tellers; Xcel Energy
Subject: Wetland Buffer Variance
Date: September 19, 2022
Project: Xcel Energy Maplewood Propane Plant Variance Request
c: Aaron Mielke; Barr Engineering, Tyler Conley; Barr Engineering

Xcel Energy is proposing modifications to their existing Maplewood Propane Plant Facility located in the City of Maplewood in Ramsey County (Figure 1). The project includes expanding the plant boundary for modifications needed to meet fire code requirements. The purpose of this memo is to request a variance to the wetland buffer requirements from the Ramsey Washington Metro Watershed District (RWMWD) for the proposed modifications.

Purpose and Need

A review of the Maplewood Propane Plant identified hazardous conditions on-site, including pooling of precipitation at the base of the tank bases. In the event of a liquid propane spill, it is plausible that propane could pool in similar low spots, trapping dangerous flammable liquids underneath tanks; these conditions appear to be in violation of the national fire prevention Association 59 Requirements (NFPA 59). The area under containers needs to be re-graded or shall have dikes or curbs installed so that the flow or accumulation of flammable liquids with flash points below 200°F is prevented." (NFPA 59, 5.4.1.8, ref 11.7). In addition, the third party identified saturated conditions at tank banks that could compromise subgrades and foundation and poses a risk of foundation movement or deterioration.

The core Project objective is to improve the existing stormwater routing, storage, and discharge systems at the Maplewood Propane Plant while reducing the failure risk potential of on-site storage tanks and meeting NFPA 59 requirements. To meet this core objective, the Project will specifically include grading revisions to better comply with the requirements set forth by NFPA 59, drainage system upgrades, and revised stormwater storage and discharge design and operations. Site upgrades, design, and operations would also consider new anticipated vehicle loading operations.

Additional improvements recommended by the third party include impervious fence linings surrounding the proposed containment/water quality pond, a channel protection outlet structure, an emergency pond outlet shutdown device, pond pretreatment structures, and (forebays) to facilitate maintenance activities and reduce sediment loading from a generally unsurfaced and sediment-laden site.

Grading Extents

The project will grade approximately 4.98 acres; 3.48 acres of grading would occur within the existing facility fence line, and the remaining 1.5 acres of ground disturbance would occur outside the facility fence line (Figure 2). Of this disturbance area, approximately 0.11 acres will be temporarily disturbed from

grading activities, and 1.39 acres will be permanently disturbed from the construction of the truck loading area. Please refer to Attachment 1 for grading plans.

Impervious Surface

The project would create 1.49 acres of additional impervious surface. Including 0.70 acres from the construction of the loading area and 0.79 acres from the western pond, as the pond will have an impermeable liner.

Stormwater

The project includes permanent drainage improvements such as an engineered water quality and channel protection outlet structure. The outlet structure incorporates a water quality screen to prevent clogging, a steel orifice plate to limit post development discharge to pre development values, a micropool to prevent unwanted mosquito breeding in shallow pools within the pond, an impermeable pond lining to prevent infiltration of hazardous materials that may enter the impoundment basin by design, an emergency pond outlet shutdown device, and engineered forebays (pond pretreatment structures) to facilitate maintenance activities and to reduce sediment loading from a generally unsurfaced and sediment-laden site. A rock-lined emergency spillway will be implemented to pass extreme flows in the event of a pond failure.

Infiltration is prohibited on site due to low permeability soils, proximity to seasonal high groundwater levels, and the implementation of our pond liners to prevent groundwater contamination. Alternative compliance, per the district's guidance, is considered to be met via filtration. District required volume reduction for the eastern truck unloading pond will be deferred to a later date within the western tank bank area pond. The western pond will be constructed in 2023 and will incorporate a sand filter and underdrain system, pending final design, located just east of the pond outlet, that will meet volume reduction requirements for the site in its entirety. The location of the sand filter is shown on drawing 4300 (Attachment 1).

The district's rate control standards are met for the 1, 2, 5, 10, 25, 50, and 100-year storm frequencies.

Floodplain Impacts

The 100-year flood elevation is 980.0' (Figure 2). There will be no project related disturbance below the 100-year flood elevation. As a result, the project will not trigger Rule D for flood control.

Wetland Impacts

Barr Engineering completed a wetland delineation of the proposed project area on May 13, 2022. The wetland delineation identified three wetlands totaling 5.79 acres. Wetland 1 was determined to be an incidental wetland. RWMWD approved the delineation and incidental determination on July 6, 2022 (Attachment 2). Construction of the truck loading area will directly fill all of wetland 1 (0.03 acres). Wetland 2 and Wetland 3 will not be impacted by the proposed project.

To: Ramsey Washington Metro Watershed District Board of Managers
From: Tyler Conley; Barr Engineering
Subject: Wetland Buffer Variance
Date: September 19, 2022 September 19, 2022

Variance Request

The watershed requires buffer zones around the existing wetlands, lakes, and streams to be preserved during construction. The wetland buffer requirements are identified in Table 1. It is not feasible to maintain the buffer around wetland 3 due to the available space for construction. A variance is requested for the Maplewood Propane Plant in locations where buffer zones cannot be feasibly preserved around Wetland 3. The project would permanently disturb approximately 0.29 acres of the wetland 3 buffer (Figure 2). No temporary wetland buffer impacts would occur.

Table 1 Wetland Buffer Requirement

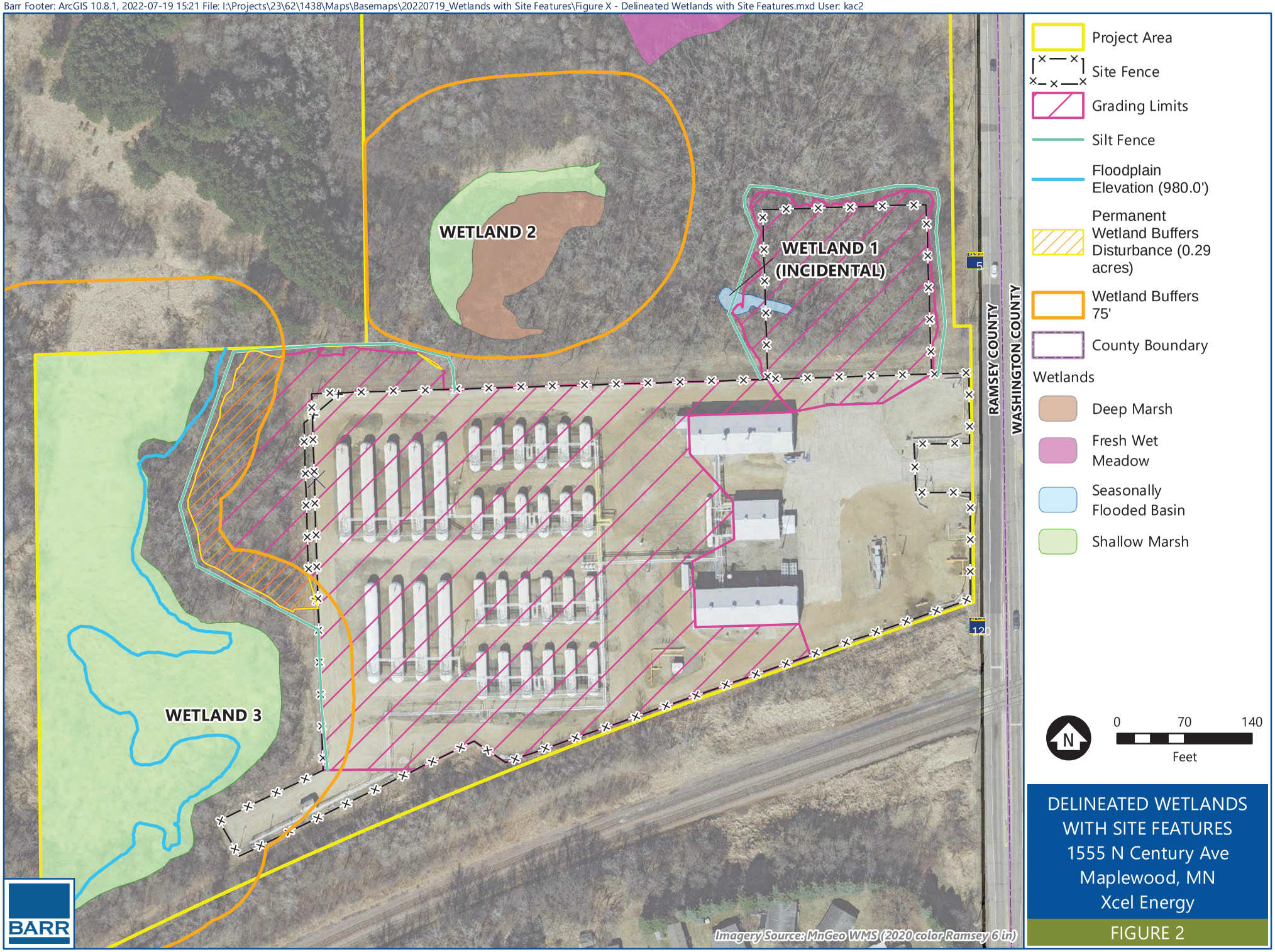
Wetland	Minimum Buffer Width	Average Buffer Width	Temporary Wetland Buffer disturbance (Acres)	Permanent Wetland Buffer disturbance (Acres)
Wetland 2 (Manage B)	50'	25'	0	0
Wetland 3 (Manage A)	75'	37.5'	0	0.29

Minimization measures

Xcel will install redundant sediment controls to prevent sedimentation into adjacent wetlands (Figure 2). The temporarily disturbed wetland buffers will be restored to their original contours and planted with the woodland edge south and west native seed mix (Attachment 3). In addition, Xcel will implement the Stormwater Pollution Prevention Plan included in Attachment 4. The Tree Preservation Restoration Plan (Attachment 5) was developed for the City of Maplewood to mitigate impacts to the wetland buffer. This plan shows the wetland buffer impact locations and proposed mitigation measures. As shown in the plans, the project would maintain an average 75-foot buffer around wetland 2 and would impact the wetland 3 buffer. To offset the impacts to the wetland 3 buffer, Xcel proposes to enhance the remaining wetland 3 buffer on their property by removing invasive species and planting native plugs and a native seed mix.

Attachments
Figure 1 – Project Location Map
Figure 2 – Project Layout
Attachment 1- Plan Sheets
Attachment 2- WCA Notice of Decision
Attachment 3 – Seed Mix
Attachment 4 – SWPPP
Attachment 5 - Tree Preservation Restoration Plan

Barr Footer: ArcGIS 10.8.1, 2022-07-19 15:21 File: I:\Projects\23\62\1438\Maps\Basemaps\20220719_Wetlands with Site Features\Figure X - Delineated Wetlands with Site Features.mxd User: kac2



BARR

DELINEATED WETLANDS WITH SITE FEATURES
1555 N Century Ave
Maplewood, MN
Xcel Energy

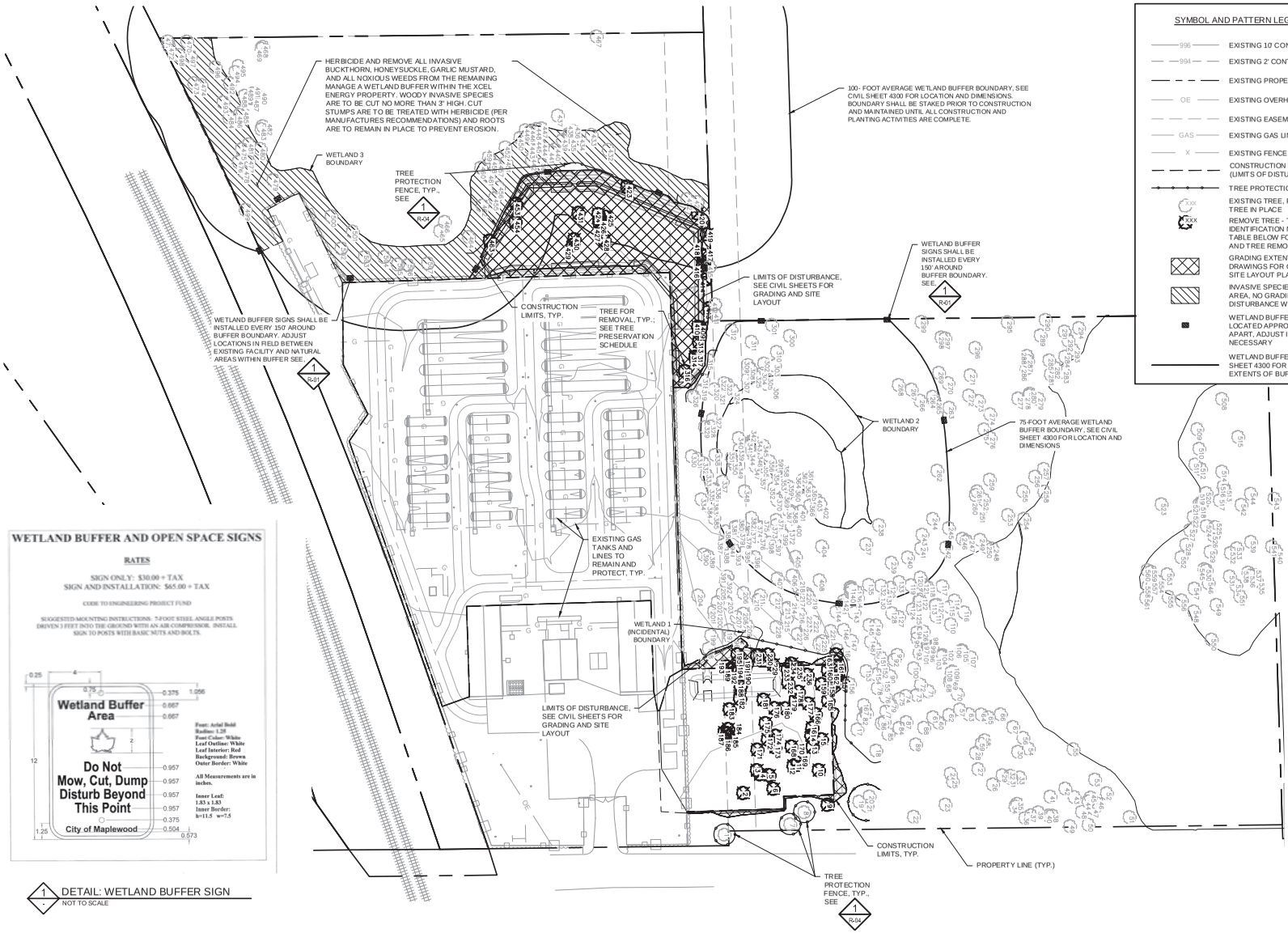
FIGURE 2

TWIN CITY SEED COMPANY

36-211 **Woodland Edge South & West**

Common Name	Scientific Name	Rate (kg/ha)	Rate (lb/ac)	% of Mix (% by wt)	Seeds/ sq ft
big bluestem	*Andropogon gerardii*	1.12	1.00	2.90%	3.68
side-oats grama	*Bouteloua curtipendula*	1.12	1.00	2.89%	2.20
kalm's brome	*Bromus kalmii*	1.68	1.50	4.34%	4.40
nodding wild rye	*Elymus canadensis*	1.40	1.25	3.61%	2.38
bottlebrush grass	*Elymus hystrix*	0.36	0.32	0.91%	0.88
slender wheatgrass	*Elymus trachycaulus*	1.40	1.25	3.64%	3.18
switchgrass	*Panicum virgatum*	0.07	0.06	0.17%	0.30
little bluestem	*Schizachyrium scoparium*	0.69	0.62	1.79%	3.40
Indian grass	*Sorghastrum nutans*	1.12	1.00	2.89%	4.40
	Total Grasses	**8.97**	**8.00**	**23.14%**	**24.82**
common yarrow	*Achillea millefolium*	0.03	0.03	0.09%	2.00
blue giant hyssop	*Agastache foeniculum*	0.11	0.10	0.28%	3.20
white snakeroot	*Ageratina altissima*	0.03	0.03	0.09%	1.70
white prairie clover	*Dalea candida*	0.19	0.17	0.50%	1.20
Canada tick trefoil	*Desmodium canadense*	0.16	0.14	0.42%	0.29
ox-eye	*Heliopsis helianthoides*	0.15	0.13	0.38%	0.30
wild bergamot	*Monarda fistulosa*	0.07	0.06	0.18%	1.60
stiff goldenrod	*Oligoneuron rigidum*	0.07	0.06	0.17%	0.90
Clayton's sweet cicely	*Osmorhiza claytonii*	0.07	0.06	0.17%	0.06
smooth wild rose	*Rosa blanda*	0.07	0.06	0.17%	0.06
black-eyed susan	*Rudbeckia hirta*	0.20	0.18	0.52%	6.10
Lance-leaved Figwort	*Scrophularia lanceolata*	0.06	0.05	0.14%	3.20
zigzag goldenrod	*Solidago flexicaulis*	0.02	0.02	0.05%	0.50
showy goldenrod	*Solidago speciosa*	0.07	0.06	0.18%	1.80
smooth aster	*Symphyotrichum laeve*	0.07	0.06	0.19%	1.30
American vetch	*Vicia americana*	0.20	0.18	0.52%	0.14
golden alexanders	*Zizia aurea*	0.12	0.11	0.33%	0.46
	Total Forbs	**1.68**	**1.50**	**4.38%**	**24.80**
Oats	*Avena sativa*	28.02	25.00	72.48%	11.14
	Total Cover Crop	**28.02**	**25.00**	**72.48%**	**11.14**
	Totals:	**38.67**	**34.50**	**100.00%**	**60.75**
Purpose:	Partly shaded grassland planting for native roadsides, reclamation, etc.				
Planting Area:	Tallgrass Aspen Parklands, Prairie Parkland, and Eastern Broadleaf Forest Provinces. Mn/DOT Districts 2(west), 3B, 4, Metro, 6, 7 & 8.				

7265 WASHINGTON AVE. S. EDINA, MINNESOTA 55439
PHONE: 952-944-7105 FAX: 952-944-7239 800-545-TURF EMAIL: twincityseed@twincityseed.com



SYMBOL AND PATTERN LEGEND

- 996 — EXISTING 10' CONTOUR
- 994 — EXISTING 2' CONTOUR
- EXISTING PROPERTY LINE
- OE — EXISTING OVERHEAD ELECTRIC
- EXISTING EASEMENT
- GAS — EXISTING GAS LINE
- X — EXISTING FENCE
- CONSTRUCTION LIMITS (LIMITS OF DISTURBANCE)
- TREE PROTECTION FENCE
- XXX — EXISTING TREE, PROTECT TREE IN PLACE
- XXX — REMOVE TREE - TREE IDENTIFICATION NUMBER. SEE TABLE BELOW FOR TREE SURVEY AND TREE REMOVAL SUMMARY
- GRADING EXTENTS, SEE CIVIL DRAWINGS FOR GRADING AND SITE LAYOUT PLAN
- INVASIVE SPECIES REMOVAL AREA, NO GRADING OR SOIL DISTURBANCE WITHIN
- WETLAND BUFFER SIGN TO BE LOCATED APPROXIMATELY 150' APART, ADJUST IN FIELD AS NECESSARY
- WETLAND BUFFER, SEE CIVIL SHEET 4300 FOR LOCATING EXTENTS OF BUFFER

NOTES:

1. EXISTING TREE LOCATIONS, SPECIES AND DIAMETER ARE BASED ON SURVEY COMPLETED ON 5/12/2022. SURVEYORS ONLY RECORDED TREES OVER 6"; SMALLER TREES MAY BE PRESENT IN REMOVAL AREA. TREES NOT SPECIFICALLY SHOWN WERE NOT INCLUDED AS PART OF ORIGINAL SURVEY. CONTRACTOR IS RESPONSIBLE FOR VERIFYING TREE LOCATIONS AND DIAMETER IN THE FIELD PRIOR TO CONSTRUCTION.
2. REMOVE AND DISPOSE OF ALL WOOD AND DEBRIS IN REMOVAL AREA IN ACCORDANCE WITH ALL LOCAL RULES AND REGULATIONS.
3. ASH TREES MUST BE REMOVED AND TAKEN TO AN APPROVED SITE FOR DISPOSAL IN ACCORDANCE WITH ALL STATE AND LOCAL REGULATIONS. CONTRACTOR MUST PROVIDE ASSURANCE THAT ASH TREES DO NOT LEAVE QUARANTINED AREA.
4. CONTRACTOR SHALL MARK ALL TREES FOR REMOVAL PRIOR TO ANY CONSTRUCTION ACTIVITY. OWNER WILL APPROVE MARKED TREES PRIOR TO REMOVAL. COORDINATE WITH OWNER TWO (2) WEEKS PRIOR TO CONSTRUCTION.
5. REMOVE TREE, GRIND STUMPS, AND DISPOSE OF ALL WOOD AND DEBRIS IN ACCORDANCE WITH ALL LOCAL RULES AND REGULATIONS. ANY TREE REMOVED WITH DIAMETER AT BREAST HEIGHT GREATER THAN 6" SHALL HAVE STUMPS REMOVED.
6. CONTRACTOR TO VERIFY AND RECORD QUANTITY OF TREES REMOVED WITH DIAMETER GREATER THAN 6".
7. IN AREAS TO BE CLEARED AND GRUBBED, ALL TREES NOT MARKED FOR REMOVAL SHALL BE AVOIDED AND ANY GRADING OR COMPACTION WITHIN THE DRIPLINE SHALL BE MINIMIZED.
8. CLEARING ALL TREES 6" DIAMETER WITHIN PROJECT LIMITS UNLESS OTHERWISE NOTED. SLASH MAY REMAIN WITHIN PROJECT LIMITS UNLESS REQUIRED BY FORESTER OR OWNER AT NO ADDITIONAL COST.
9. THE CONTRACTOR SHALL AVOID DAMAGING EXISTING TREES. DO NOT STORE OR DRIVE HEAVY MATERIALS OVER TREE ROOTS. DO NOT DAMAGE TREE BARK OR BRANCHES.
10. THE CONTRACTOR SHALL KEEP PAVEMENTS, FIXTURES AND BUILDINGS CLEAN AND UNSTAINED. ANY DAMAGE TO EXISTING FACILITIES SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE. THE PROJECT SITE SHALL BE KEPT CLEAR OF CONSTRUCTION WASTES AND DEBRIS.
11. CONTRACTOR IS TO FOLLOW ALL EROSION CONTROL REQUIREMENTS AS NOTED ON THE SWPPP.
12. THE TREE REPLACEMENT SCHEDULE ANTICIPATES THE MAXIMUM NUMBER OF TREES THAT WILL BE REMOVED. IF FEWER TREES ARE REMOVED THE QUANTITIES SHOWN MAY BE REDUCED WITH THE APPROVAL OF THE CITY.
13. CLIENT INTENDS TO PAY FEE FOR MITIGATION OF TREES REMOVED AS NOTED BELOW. REFER TO TREE REMOVAL SCHEDULE ON SHEET R-02 FOR D.B.H., SPECIES, AND TYPE OF ALL TREES SURVEYED.
14. PROVIDE SIGNAGE ON TREE PROTECTION FENCE OR SILT FENCE ACTING AS TREE PROTECTION FENCE PER MAPLEWOOD TREE STANDARDS (2017).
15. SEE R-05 FOR ADDITIONAL CONSTRUCTION SPECIFICATIONS (REQUIRED)
16. SEE SHEET R-03 FOR RESTORATION PLAN

WETLAND BUFFER AND OPEN SPACE SIGNS

RATES

SIGN ONLY: $30.00 + TAX
SIGN AND INSTALLATION: $65.00 + TAX

CODE TO ENGINEERING PROJECT FUND

SUGGESTED MOUNTING INSTRUCTIONS: 7-FOOT STEEL ANGLE POSTS DRIVEN 3 FEET INTO THE GROUND WITH AN AIR COMPRESSOR. INSTALL SIGN TO POSTS WITH BASIC NUTS AND BOLTS.

1 DETAIL: WETLAND BUFFER SIGN
NOT TO SCALE

TREE PRESERVATION PLAN MITIGATION REQUIREMENTS

REF: CITY OF MAPLEWOOD MUNICIPAL CODE 18-245

	Trees	Total Diameter (in)
Healthy Significant Specimen Tree	542	8165
Total Healthy Significant Specimen Tree to be Removed	82	1356
Percent Total to Healthy Tree	15%	17%
	Replacement Rate	Trees (@ 2" each)
Maplewood Tree Replacement Requirement (20%)	1:1	82

Tree removal calculation (less than 20 percent of the total significant or specimen tree diameter inches on the property removed, the applicant has reached one tree per significant and specimen tree removed. Tree replacement has been a minimum of two caliper inches in size

NOTE: SEE SHEET R-03 FOR RESTORATION PLAN; 27 TREES PROPOSED. THE EXISTING CONDITIONS ON SITE ARE NOT SUITABLE FOR THE INSTALLATION OF ADDITIONAL NEWLY PLANTED TREES. THE PROPERTY IS EITHER HEAVILY WOODED, WETLAND, OR PAVED FOR PLANT OPERATIONS. AS A RESULT, XCEL WILL MITIGATE REMOVED TREES PER CITY OF MAPLEWOOD'S COMMUNITY DEVELOPMENT 2022 FEE SCHEDULE.

TREE REPLACEMENT FEE

REF: CITY OF MAPLEWOOD MUNICIPAL CODE 18-245, COMMUNITY DEVELOPMENT 2022 FEE SCHEDULE

FEE FOR TREE REPLACEMENT: 60/CALIPER INCH
TOTAL TREES FOR MITIGATION: 55 TREES
FEE FOR TREE MITIGATION: 60/CALIP. IN x (55 TREES X 2 IN) 6,600

1 PLAN: TREE PRESERVATION
0 60 120
SCALE IN FEET

PRELIMINARY DRAFT
NOT FOR CONSTRUCTION

Xcel Energy®

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.
PRINTED NAME
SIGNATURE
DATE LICENSE #

BARR
4300 MARKETPOINTE DRIVE
Suite 200
MINNEAPOLIS, MN 55435
Ph: 1-800-632-2277
Fax: (952) 832-2601
www.barr.com

HISTORY	DATE
DRAWN BY: AMW	09/07/2022
DESIGNED BY: BARR	09/07/2022
CHECKED BY: BHD	09/07/2022
APPROVED BY: BHD	09/07/2022
IN SERVICE DATE:	

NO.	DESCRIPTION	BY	DATE
A	ISSUED FOR REVIEW	BHD	09/07/2022

MAPLEWOOD PHASE II FIRE SUPPRESSION
TREE PRESERVATION PLAN

SERVICE CENTER: NORTHERN STATES POWER COMPANY | PROJECT: 4501038238
DIVISION: NORTH | CITY/COUNTY : MENDOTA HEIGHTS / DAKOTA | TYPE:

DRAWING
R-01
A

CADD USER: Brendan H. Dougherty FILE: M:\DESIGN\23821438.00\MAPLEWOOD\23821437_R-01_TREE PROTECTION PLAN.DWG PLOT SCALE: 1:2 PLOT DATE: 9/8/2022 4:27 PM

MAPLEWOOD PHASE II FIRE SUPPRESSION TREE PRESERVATION AND REMOVAL TABLE

Tree ID	Species	DBH (in)	Health	Definition	Tree Type	Remove
0	EmAmerican	15	Healthy	Significant	Softwood Deciduous	
1	EmAmerican	18	Healthy	Significant	Softwood Deciduous	
2	Cottonwood	23	Healthy	Significant	Softwood Deciduous	Yes
3	Cottonwood	21	Healthy	Significant	Softwood Deciduous	Yes
4	Cottonwood	28	Healthy	Significant	Softwood Deciduous	Yes
5	Oa /Pin	13	Healthy	Significant	Hardwood Deciduous	Yes
6	Oa /Pin	10	Healthy	Significant	Hardwood Deciduous	Yes
7	Oa /Pin	22	Healthy	Significant	Hardwood Deciduous	
8	Oa /Pin	27	Healthy	Significant	Hardwood Deciduous	
9	Box Elder	13	Healthy	Significant	Softwood Deciduous	Yes
10	Cottonwood	18	Healthy	Significant	Softwood Deciduous	Yes
11	Cottonwood	22	Healthy	Significant	Softwood Deciduous	Yes
12	Box Elder	13	Healthy	Significant	Softwood Deciduous	Yes
13	Cottonwood	27	Healthy	Significant	Softwood Deciduous	Yes
14	Cottonwood	17	Healthy	Significant	Softwood Deciduous	Yes
15	EmAmerican	14	Healthy	Significant	Softwood Deciduous	Yes
16	Box Elder	13	Healthy	Significant	Softwood Deciduous	Yes
17	Cottonwood	27	Healthy	Significant	Softwood Deciduous	
18	Box Elder	17	Healthy	Significant	Softwood Deciduous	
19	Box Elder	13	Healthy	Significant	Softwood Deciduous	
20	A hGreen	9	Healthy	Significant	Hardwood Deciduous	
21	EmSiberian	12	Healthy	Significant	Softwood Deciduous	
22	Cottonwood	38	Healthy	Significant	Softwood Deciduous	
23	Box Elder	14	Healthy	Significant	Softwood Deciduous	
24	EmSiberian	12	Healthy	Significant	Softwood Deciduous	
25	Oa /Pin	10	Healthy	Significant	Hardwood Deciduous	
26	Oa /Pin	12	Healthy	Significant	Hardwood Deciduous	
27	Oa /Pin	8	Healthy	Significant	Hardwood Deciduous	
28	Oa /Pin	13	Healthy	Significant	Hardwood Deciduous	
29	Cottonwood	12	Healthy	Significant	Softwood Deciduous	
30	Oa /Pin	9	Healthy	Significant	Hardwood Deciduous	
31	Oa /Pin	7	Healthy	Significant	Hardwood Deciduous	
32	Oa /Pin	12	Healthy	Significant	Hardwood Deciduous	
33	Cottonwood	23	Healthy	Significant	Softwood Deciduous	
34	EmAmerican	13	Healthy	Significant	Softwood Deciduous	
35	Cottonwood	21	Healthy	Significant	Softwood Deciduous	
36	Cottonwood	13	Healthy	Significant	Softwood Deciduous	
37	Cottonwood	17	Healthy	Significant	Softwood Deciduous	
38	CherryBlac	10	Healthy	Significant	Hardwood Deciduous	
39	Oa /Pin	15	Healthy	Significant	Hardwood Deciduous	
40	A en	12	Healthy	Significant	Softwood Deciduous	
41	Oa /Pin	10	Healthy	Significant	Hardwood Deciduous	
42	A en	12	Healthy	Significant	Softwood Deciduous	
43	Cottonwood	12	Dead	Dead	Softwood Deciduous	
44	A en	13	Healthy	Significant	Softwood Deciduous	
45	A en	12	Healthy	Significant	Softwood Deciduous	
46	A en	13	Healthy	Significant	Softwood Deciduous	
47	A en	12	Healthy	Significant	Softwood Deciduous	
48	A en	12	Healthy	Significant	Softwood Deciduous	
49	Oa /Swam White	10	Healthy	Significant	Hardwood Deciduous	
50	A en	12	Healthy	Significant	Softwood Deciduous	
51	A en	15	Healthy	Significant	Softwood Deciduous	
52	A en	12	Healthy	Significant	Softwood Deciduous	
53	Oa /Pin	40	Healthy	Significant	Hardwood Deciduous	
54	Cottonwood	12	Healthy	Significant	Softwood Deciduous	
55	Cottonwood	19	Healthy	Significant	Softwood Deciduous	
56	Cottonwood	19	Healthy	Significant	Softwood Deciduous	
57	Cottonwood	12	Healthy	Significant	Softwood Deciduous	
58	Cottonwood	15	Healthy	Significant	Softwood Deciduous	
59	Cottonwood	16	Healthy	Significant	Softwood Deciduous	
60	EmAmerican	15	Healthy	Significant	Softwood Deciduous	
61	Box Elder	12	Healthy	Significant	Softwood Deciduous	
62	Cottonwood	23	Healthy	Significant	Softwood Deciduous	
63	Cottonwood	24	Healthy	Significant	Softwood Deciduous	
64	Cottonwood	18	Healthy	Significant	Softwood Deciduous	
65	Cottonwood	17	Healthy	Significant	Softwood Deciduous	
66	Cottonwood	24	Healthy	Significant	Softwood Deciduous	
67	Cottonwood	23	Healthy	Significant	Softwood Deciduous	
68	Cottonwood	18	Healthy	Significant	Softwood Deciduous	
69	Cottonwood	15	Healthy	Significant	Softwood Deciduous	
70	Box Elder	12	Healthy	Significant	Softwood Deciduous	
71	Cottonwood	20	Healthy	Significant	Softwood Deciduous	
72	Cottonwood	13	Healthy	Significant	Softwood Deciduous	
73	Cottonwood	12	Healthy	Significant	Softwood Deciduous	
74	Box Elder	12	Healthy	Significant	Softwood Deciduous	
75	Box Elder	13	Healthy	Significant	Softwood Deciduous	
76	Cottonwood	14	Healthy	Significant	Softwood Deciduous	
77	Box Elder	12	Healthy	Significant	Softwood Deciduous	
78	Cottonwood	15	Healthy	Significant	Softwood Deciduous	
79	Cottonwood	13	Healthy	Significant	Softwood Deciduous	
80	Cottonwood	21	Healthy	Significant	Softwood Deciduous	
81	Cottonwood	21	Healthy	Significant	Softwood Deciduous	
82	Cottonwood	13	Healthy	Significant	Softwood Deciduous	
83	Cottonwood	13	Healthy	Significant	Softwood Deciduous	
84	Cottonwood	14	Healthy	Significant	Softwood Deciduous	
85	Cottonwood	15	Healthy	Significant	Softwood Deciduous	
86	Box Elder	13	Healthy	Significant	Softwood Deciduous	
87	Cottonwood	13	Healthy	Significant	Softwood Deciduous	
88	Cottonwood	14	Healthy	Significant	Softwood Deciduous	
89	Cottonwood	15	Healthy	Significant	Softwood Deciduous	
90	Cottonwood	12	Healthy	Significant	Softwood Deciduous	
91	Box Elder	12	Healthy	Significant	Softwood Deciduous	
92	Cottonwood	20	Healthy	Significant	Softwood Deciduous	
93	Cottonwood	20	Healthy	Significant	Softwood Deciduous	
94	Cottonwood	15	Healthy	Significant	Softwood Deciduous	
95	Cottonwood	13	Healthy	Significant	Softwood Deciduous	
96	Cottonwood	14	Healthy	Significant	Softwood Deciduous	
97	Cottonwood	16	Healthy	Significant	Softwood Deciduous	
98	Cottonwood	12	Healthy	Significant	Softwood Deciduous	
99	Cottonwood	16	Healthy	Significant	Softwood Deciduous	
100	Cottonwood	20	Healthy	Significant	Softwood Deciduous	
101	Cottonwood	15	Healthy	Significant	Softwood Deciduous	
102	Cottonwood	13	Healthy	Significant	Softwood Deciduous	
103	Cottonwood	26	Healthy	Significant	Softwood Deciduous	
104	Box Elder	14	Healthy	Significant	Softwood Deciduous	
105	Cottonwood	23	Healthy	Significant	Softwood Deciduous	
106	Cottonwood	24	Healthy	Significant	Softwood Deciduous	
107	Cottonwood	16	Healthy	Significant	Softwood Deciduous	
108	Cottonwood	15	Healthy	Significant	Softwood Deciduous	
109	Cottonwood	18	Healthy	Significant	Softwood Deciduous	
110	Cottonwood	12	Healthy	Significant	Softwood Deciduous	
111	Cottonwood	20	Healthy	Significant	Softwood Deciduous	
112	Cottonwood	20	Healthy	Significant	Softwood Deciduous	
113	EmAmerican	16	Healthy	Significant	Softwood Deciduous	
114	Cottonwood	15	Healthy	Significant	Softwood Deciduous	
115	Cottonwood	19	Healthy	Significant	Softwood Deciduous	
116	Cottonwood	25	Healthy	Significant	Softwood Deciduous	
117	Cottonwood	19	Healthy	Significant	Softwood Deciduous	
118	Cottonwood	22	Healthy	Significant	Softwood Deciduous	
119	Box Elder	14	Healthy	Significant	Softwood Deciduous	
120	Cottonwood	23	Healthy	Significant	Softwood Deciduous	
121	Cottonwood	13	Healthy	Significant	Softwood Deciduous	
122	Cottonwood	14	Healthy	Significant	Softwood Deciduous	
123	Cottonwood	20	Healthy	Significant	Softwood Deciduous	
124	Cottonwood	23	Healthy	Significant	Softwood Deciduous	
125	Cottonwood	14	Healthy	Significant	Softwood Deciduous	
126	Box Elder	12	Healthy	Significant	Softwood Deciduous	
127	Cottonwood	13	Dead	Dead	Softwood Deciduous	
128	Cottonwood	15	Healthy	Significant	Softwood Deciduous	
129	Cottonwood	14	Healthy	Significant	Softwood Deciduous	
130	Cottonwood	24	Healthy	Significant	Softwood Deciduous	
131	Box Elder	12	Healthy	Significant	Softwood Deciduous	
132	Cottonwood	26	Healthy	Significant	Softwood Deciduous	
133	Cottonwood	19	Healthy	Significant	Softwood Deciduous	
134	Cottonwood	16	Healthy	Significant	Softwood Deciduous	
135	Cottonwood	16	Healthy	Significant	Softwood Deciduous	
136	Cottonwood	12	Healthy	Significant	Softwood Deciduous	
137	Cottonwood	22	Healthy	Significant	Softwood Deciduous	
138	Cottonwood	24	Healthy	Significant	Softwood Deciduous	
139	Cottonwood	22	Healthy	Significant	Softwood Deciduous	
140	Box Elder	12	Healthy	Significant	Softwood Deciduous	
141	Cottonwood	13	Healthy	Significant	Softwood Deciduous	
142	Cottonwood	14	Healthy	Significant	Softwood Deciduous	
143	Cottonwood	13	Healthy	Significant	Softwood Deciduous	
144	Cottonwood	23	Healthy	Significant	Softwood Deciduous	
145	Cottonwood	13	Healthy	Significant	Softwood Deciduous	
146	Cottonwood	17	Healthy	Significant	Softwood Deciduous	
147	Cottonwood	14	Healthy	Significant	Softwood Deciduous	
148	Cottonwood	22	Healthy	Significant	Softwood Deciduous	
149	Box Elder	12	Healthy	Significant	Softwood Deciduous	
150	Cottonwood	13	Healthy	Significant	Softwood Deciduous	
151	Cottonwood	19	Healthy	Significant	Softwood Deciduous	
152	Cottonwood	28	Healthy	Significant	Softwood Deciduous	
153	Cottonwood	12	Healthy	Significant	Softwood Deciduous	
154	Cottonwood	18	Healthy	Significant	Softwood Deciduous	
155	Cottonwood	15	Healthy	Significant	Softwood Deciduous	
156	Cottonwood	14	Healthy	Significant	Softwood Deciduous	
157	Cottonwood	21	Healthy	Significant	Softwood Deciduous	Yes
158	Cottonwood	23	Healthy	Significant	Softwood Deciduous	Yes
159	Cottonwood	12	Healthy	Significant	Softwood Deciduous	Yes
160	Cottonwood	23	Healthy	Significant	Softwood Deciduous	Yes
161	Box Elder	12	Healthy	Significant	Softwood Deciduous	Yes
162	Cottonwood	13	Healthy	Significant	Softwood Deciduous	Yes
163	Cottonwood	21	Healthy	Significant	Softwood Deciduous	Yes
164	Box Elder	13	Healthy	Significant	Softwood Deciduous	
165	Box Elder	13	Healthy	Significant	Softwood Deciduous	Yes
166	Cottonwood	14	Healthy	Significant	Softwood Deciduous	Yes
167	Cottonwood	15	Healthy	Significant	Softwood Deciduous	
168	Cottonwood	23	Healthy	Significant	Softwood Deciduous	Yes
169	Box Elder	13	Healthy	Significant	Softwood Deciduous	Yes
170	Cottonwood	25	Healthy	Significant	Softwood Deciduous	Yes
171	Cottonwood	15	Healthy	Significant	Softwood Deciduous	Yes
172	Cottonwood	14	Healthy	Significant	Softwood Deciduous	Yes
173	Cottonwood	24	Healthy	Significant	Softwood Deciduous	Yes
174	Cottonwood	23	Healthy	Significant	Softwood Deciduous	Yes
175	Box Elder	13	Healthy	Significant	Softwood Deciduous	Yes
176	Cottonwood	23	Healthy	Significant	Softwood Deciduous	Yes
177	Box Elder	12	Healthy	Significant	Softwood Deciduous	Yes
178	Cottonwood	21	Healthy	Significant	Softwood Deciduous	Yes
179	Box Elder	12	Healthy	Significant	Softwood Deciduous	Yes
180	Box Elder	12	Healthy	Significant	Softwood Deciduous	Yes
181	Cottonwood	19	Healthy	Significant	Softwood Deciduous	Yes
182	Cottonwood	39	Healthy	Significant	Softwood Deciduous	Yes
183	Box Elder	25	Dying	Dying	Softwood Deciduous	Yes
184	Box Elder	12	Healthy	Significant	Softwood Deciduous	Yes
185	Box Elder	12	Healthy	Significant	Softwood Deciduous	Yes
186	Box Elder	12	Healthy	Significant	Softwood Deciduous	Yes
187	Cottonwood	17	Healthy	Significant	Softwood Deciduous	Yes
188	EmAmerican	22	Healthy	Significant	Softwood Deciduous	Yes
189	Cottonwood	23	Healthy	Significant	Softwood Deciduous	Yes
190	Cottonwood	23	Healthy	Significant	Softwood Deciduous	Yes
191	Cottonwood	21	Healthy	Significant	Softwood Deciduous	Yes
192	Oa /Pin	10	Healthy	Significant	Hardwood Deciduous	Yes
193	Cottonwood	22	Healthy	Significant	Softwood Deciduous	Yes
194	Cottonwood	18	Healthy	Significant	Softwood Deciduous	Yes
195	Cottonwood	13	Healthy	Significant	Softwood Deciduous	Yes
196	Oa /Pin	8	Healthy	Significant	Hardwood Deciduous	
197	EmAmerican	14	Healthy	Significant	Softwood Deciduous	
198	Box Elder	13	Healthy	Significant	Softwood Deciduous	
199	EmAmerican	15	Dead	Dead	Softwood Deciduous	
200	Oa /Pin	14	Healthy	Significant	Hardwood Deciduous	
201	Cottonwood	26	Healthy	Significant	Softwood Deciduous	
202	Cottonwood	13	Healthy	Significant	Softwood Deciduous	
203	Cottonwood	22	Healthy	Significant	Softwood Deciduous	
204	Oa /Pin	8	Healthy	Significant	Hardwood Deciduous	
205	Box Elder	13	Healthy	Significant	Softwood Deciduous	
206	Cottonwood	22	Healthy	Significant	Softwood Deciduous	
207	Cottonwood	14	Healthy	Significant	Softwood Deciduous	
208	Cottonwood	12	Dead	Dead	Softwood Deciduous	
209	Box Elder	14	Dying	Dying	Softwood Deciduous	
210	Cottonwood	12	Healthy	Significant	Softwood Deciduous	
211	Box Elder	16	Healthy	Significant	Softwood Deciduous	
212	CherryBlac	15	Healthy	Significant	Hardwood Deciduous	
213	Oa /Pin	6	Healthy	Significant	Hardwood Deciduous	
214	Cottonwood	15	Healthy	Significant	Softwood Deciduous	
215	Cottonwood	20	Healthy	Significant	Softwood Deciduous	
216	Cottonwood	12	Healthy	Significant	Softwood Deciduous	
217	Box Elder	12	Healthy	Significant	Softwood Deciduous	
218	Cottonwood	12	Healthy	Significant	Softwood Deciduous	
219	Cottonwood	17	Healthy	Significant	Softwood Deciduous	
220	Cottonwood	12	Healthy	Significant	Softwood Deciduous	
221	Box Elder	16	Healthy	Significant	Softwood Deciduous	
222	Cottonwood	12	Healthy	Significant	Softwood Deciduous	
223	Cottonwood	14	Healthy	Significant	Softwood Deciduous	
224	Cottonwood	16	Healthy	Significant	Softwood Deciduous	
225	Cottonwood	23	Healthy	Significant	Softwood Deciduous	
226	Cottonwood	17	Healthy	Significant	Softwood Deciduous	
227	Box Elder	13	Healthy	Significant	Softwood Deciduous	
228	Box Elder	22	Healthy	Significant	Softwood Deciduous	
229	Box Elder	14	Healthy	Significant	Softwood Deciduous	Yes
230	Box Elder	13	Healthy	Significant	Softwood Deciduous	Yes
231	Cottonwood	22	Healthy	Significant	Softwood Deciduous	Yes
232	Cottonwood	13	Healthy	Significant	Softwood Deciduous	Yes
233	Cottonwood	13	Healthy	Significant	Softwood Deciduous	Yes
234	Box Elder	13	Healthy	Significant	Softwood Deciduous	Yes
235	Cottonwood	14	Healthy	Significant	Softwood Deciduous	Yes
236	Box Elder	12	Healthy	Significant	Softwood Deciduous	Yes
237	A en	12	Healthy	Significant	Softwood Deciduous	
238	Oa /Pin	14	Healthy	Significant	Hardwood Deciduous	
239	Box Elder	21	Healthy	Significant	Softwood Deciduous	
240	A en	14	Healthy	Significant	Softwood Deciduous	
241	A en	18	Healthy	Significant	Softwood Deciduous	
242	A en	13	Healthy	Significant	Softwood Deciduous	
243	A en	12	Healthy	Significant	Softwood Deciduous	
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245	A en	12	Healthy	Significant	Softwood Deciduous	
246	A en	13	Healthy	Significant	Softwood Deciduous	
247	A en	13	Healthy	Significant	Softwood Deciduous	
248	A en	13	Healthy	Significant	Softwood Deciduous	
249	A en	12	Healthy	Significant	Softwood Deciduous	
250	CherryBlac	9	Healthy	Significant	Hardwood Deciduous	
251	A en	12	Healthy	Significant	Softwood Deciduous	
252	A en	12	Healthy	Significant	Softwood Deciduous	
253	A en	12	Healthy	Significant	Softwood Deciduous	
254	CherryBlac	10	Healthy	Significant	Hardwood Deciduous	
255	A en	12	Healthy	Significant	Softwood Deciduous	
256	A en	13	Healthy	Significant	Softwood Deciduous	
257	A en	13	Healthy	Significant	Softwood Deciduous	
258	A en	12	Healthy	Significant	Softwood Deciduous	
259	Oa /Pin	22	Healthy	Significant	Hardwood Deciduous	
260	A en	12	Healthy	Significant	Softwood Deciduous	
261	EmAmerican	23	Healthy	Significant	Softwood Deciduous	
262	A en	12	Healthy	Significant	Softwood Deciduous	
263	Oa /Pin	8	Healthy	Significant	Hardwood Deciduous	
264	A en	16	Healthy	Significant	Softwood Deciduous	
265	A en	12	Healthy	Significant	Softwood Deciduous	
266	A en	12	Healthy	Significant	Softwood Deciduous	
267	A en	14	Healthy	Significant	Softwood Deciduous	
268	Oa /Pin	39	Healthy	Significant	Hardwood Deciduous	
269	A e	8	Healthy	Significant	Hardwood Deciduous	
270	A en	14	Healthy	Significant	Softwood Deciduous	
271	CherryBlac	15	Healthy	Significant	Hardwood Deciduous	
272	A en	12	Healthy	Significant	Softwood Deciduous	
273	A en	12	Healthy	Significant	Softwood Deciduous	
274	A en	12	Healthy	Significant	Softwood Deciduous	
275	A en	14	Healthy	Significant	Softwood Deciduous	
276	Oa /Pin	19	Healthy	Significant	Hardwood Deciduous	
277	A e	13	Healthy	Significant	Hardwood Deciduous	
278	A en	12	Healthy	Significant	Softwood Deciduous	
279	A en	12	Healthy	Significant	Softwood Deciduous	
280	A e	10	Healthy	Significant	Hardwood Deciduous	
281	Oa /Pin	9	Healthy	Significant	Hardwood Deciduous	
282	Box Elder	16	Healthy	Significant	Softwood Deciduous	
283	A e	14	Healthy	Significant	Hardwood Deciduous	
284	Oa /Pin	20	Healthy	Significant	Hardwood Deciduous	
285	A en	13	Healthy	Significant	Softwood Deciduous	
286	A en	13	Healthy	Significant	Softwood Deciduous	
287	Oa /Pin	6	Healthy	Significant	Hardwood Deciduous	
288	A en	13	Healthy	Significant	Softwood Deciduous	
289	A en	14	Healthy	Significant	Softwood Deciduous	
290	A en	12	Healthy	Significant	Softwood Deciduous	
291	Oa /Pin	7	Healthy	Significant	Hardwood Deciduous	
292	Oa /Pin	20	Healthy	Significant	Hardwood Deciduous	
293	Oa /Pin	19	Healthy	Significant	Hardwood Deciduous	
294	CherryBlac	14	Healthy	Significant	Hardwood Deciduous	
295	A en	13	Healthy	Significant	Softwood Deciduous	
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297	A en	12	Healthy	Significant	Softwood Deciduous	
298	Oa /Pin	40	Healthy	Significant	Hardwood Deciduous	
299	CherryBlac	7	Healthy	Significant	Hardwood Deciduous	
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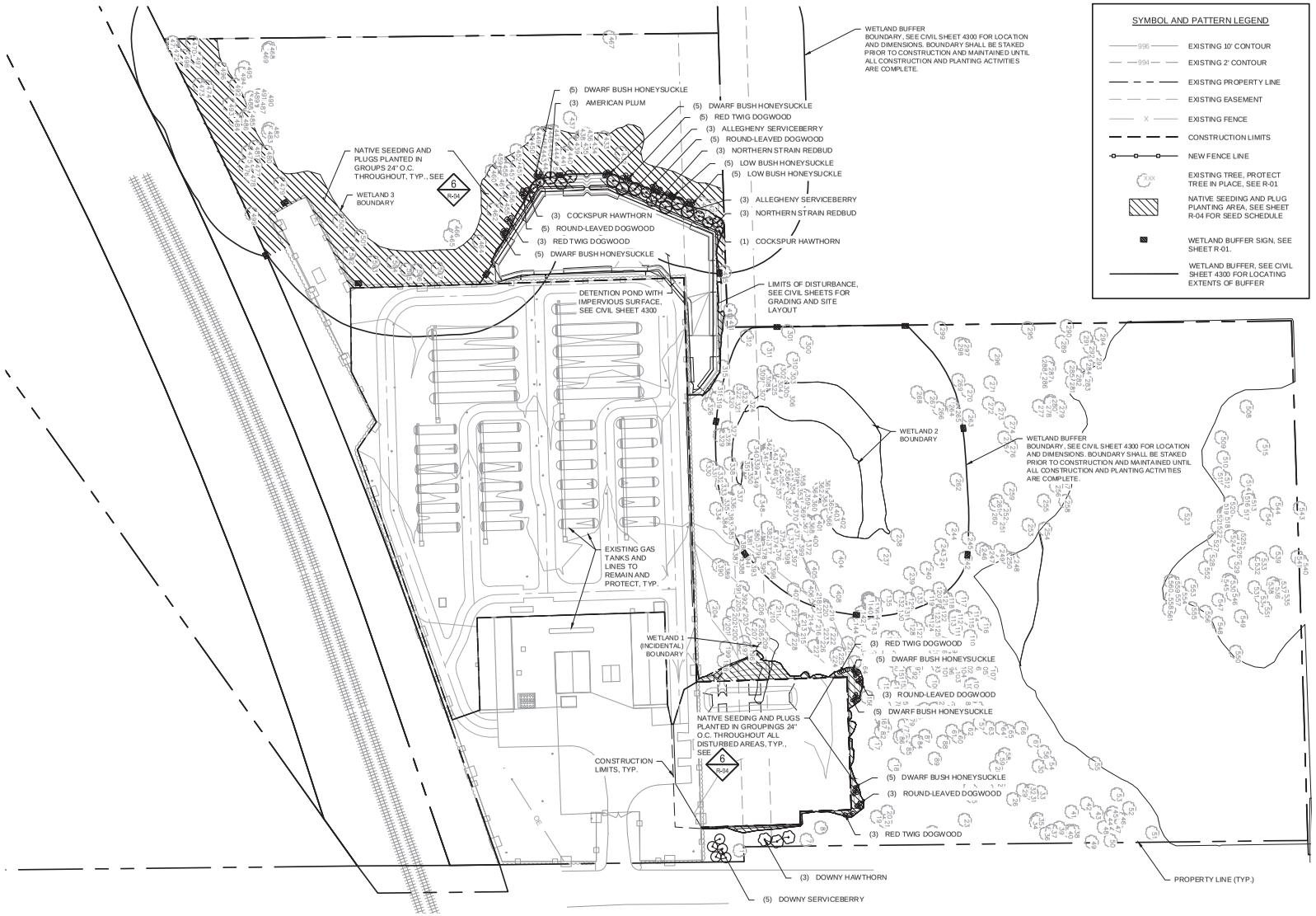
308	A en	12	Healthy	Significant	Softwood Deciduous	
309	Oa /Pin	21	Healthy	Significant	Hardwood Deciduous	
310	Oa /Pin	7	Healthy	Significant	Hardwood Deciduous	
311	A en	12	Healthy	Significant	Softwood Deciduous	
312	Oa /Pin	15	Healthy	Significant	Hardwood Deciduous	
313	Oa /Pin	9	Healthy	Significant	Hardwood Deciduous	Yes
314	Oa /Pin	8	Healthy	Significant	Hardwood Deciduous	Yes
315	Oa /Pin	14	Healthy	Significant	Hardwood Deciduous	Yes
316	Oa /Pin	10	Healthy	Significant	Hardwood Deciduous	Yes
317	Oa /Pin	13	Healthy	Significant	Hardwood Deciduous	Yes
318	Oa /Pin	17	Healthy	Significant	Hardwood Deciduous	
319	A en	12	Healthy	Significant	Softwood Deciduous	
320	Oa /Pin	8	Healthy	Significant	Hardwood Deciduous	
321	A en	17	Healthy	Significant	Softwood Deciduous	
322	A en	12	Healthy	Significant	Softwood Deciduous	
323	Oa /Pin	13	Healthy	Significant	Hardwood Deciduous	
324	Oa /Pin	9	Healthy	Significant	Hardwood Deciduous	
325	Oa /Pin	10	Healthy	Significant	Hardwood Deciduous	
326	Oa /Pin	17	Healthy	Significant	Hardwood Deciduous	
327	Oa /Pin	13	Healthy	Significant	Hardwood Deciduous	
328	Oa /Pin	18	Healthy	Significant	Hardwood Deciduous	
329	Oa /Pin	10	Healthy	Significant	Hardwood Deciduous	
330	Oa /Pin	16	Healthy	Significant	Hardwood Deciduous	
331	Oa /Pin	7	Healthy	Significant	Hardwood Deciduous	
332	Oa /Pin	10	Healthy	Significant	Hardwood Deciduous	
333	Oa /Pin	15	Healthy	Significant	Hardwood Deciduous	
334	Oa /Pin	20	Healthy	Significant	Hardwood Deciduous	
335	Oa /Pin	17	Healthy	Significant	Hardwood Deciduous	
336	Oa /Pin	17	Healthy	Significant	Hardwood Deciduous	
337	A hGreen	21	Healthy	Significant	Hardwood Deciduous	
338	Cottonwood	13	Healthy	Significant	Softwood Deciduous	
339	EmAmerican	13	Healthy	Significant	Softwood Deciduous	
340	Cottonwood	21	Healthy	Significant	Softwood Deciduous	
341	Cottonwood	12	Healthy	Significant	Softwood Deciduous	
342	Willow Blac	25	Healthy	Significant	Softwood Deciduous	
343	Cottonwood	19	Healthy	Significant	Softwood Deciduous	
344	Willow Blac	19	Healthy	Significant	Softwood Deciduous	
345	Cottonwood	20	Healthy	Significant	Softwood Deciduous	
346	Cottonwood	14	Healthy	Significant	Softwood Deciduous	
347	Cottonwood	12	Healthy	Significant	Softwood Deciduous	
348	Cottonwood	15	Healthy	Significant	Softwood Deciduous	
349	Cottonwood	14	Healthy	Significant	Softwood Deciduous	
350	Cottonwood	13	Healthy	Significant	Softwood Deciduous	
351	Box Elder	17	Healthy	Significant	Softwood Deciduous	
352	Cottonwood	21	Healthy	Significant	Softwood Deciduous	
353	Willow Blac	13	Healthy	Significant	Softwood Deciduous	
354	Cottonwood	16	Healthy	Significant	Softwood Deciduous	
355	Cottonwood	12	Healthy	Significant	Softwood Deciduous	
356	Cottonwood	13	Healthy	Significant	Softwood Deciduous	
357	Cottonwood	24	Healthy	Significant	Softwood Deciduous	
358	Cottonwood	13	Healthy	Significant	Softwood Deciduous	
359	Cottonwood	14	Healthy	Significant	Softwood Deciduous	
360	Willow Blac	13	Healthy	Significant	Softwood Deciduous	
361	Willow Blac	14	Healthy	Significant	Softwood Deciduous	
362	Willow Blac	14	Healthy	Significant	Softwood Deciduous	
363	Cottonwood	13	Healthy	Significant	Softwood Deciduous	
364	Cottonwood	20	Healthy	Significant	Softwood Deciduous	
365	Cottonwood	15	Healthy	Significant	Softwood Deciduous	
366	Cottonwood	16	Healthy	Significant	Softwood Deciduous	
367	Cottonwood	12	Healthy	Significant	Softwood Deciduous	
368	Cottonwood	12	Healthy	Significant	Softwood Deciduous	
369	Cottonwood	13	Healthy	Significant	Softwood Deciduous	
370	Cottonwood	12	Healthy	Significant	Softwood Deciduous	
371	Cottonwood	18	Healthy	Significant	Softwood Deciduous	
372	Cottonwood	16	Healthy	Significant	Softwood Deciduous	
373	Box Elder	12	Healthy	Significant	Softwood Deciduous	
374	Cottonwood	15	Healthy	Significant	Softwood Deciduous	
375	Box Elder	12	Healthy	Significant	Softwood Deciduous	
376	Cottonwood	19	Healthy	Significant	Softwood Deciduous	
377	Cottonwood	13	Healthy	Significant	Softwood Deciduous	
378	Cottonwood	12	Healthy	Significant	Softwood Deciduous	
379	Cottonwood	12	Healthy	Significant	Softwood Deciduous	
380	A en	12	Healthy	Significant	Softwood Deciduous	
381	Cottonwood	14	Healthy	Significant	Softwood Deciduous	
382	Box Elder	18	Healthy	Significant	Softwood Deciduous	
383	Oa /Pin	17	Healthy	Significant	Hardwood Deciduous	
384	Oa /Pin	10	Healthy	Significant	Hardwood Deciduous	
385	A en	12	Healthy	Significant	Softwood Deciduous	
386	A en	12	Healthy	Significant	Softwood Deciduous	
387	A en	14	Healthy	Significant	Softwood Deciduous	
388	Oa /Pin	11	Healthy	Significant	Hardwood Deciduous	
389	Oa /Pin	12	Healthy	Significant	Hardwood Deciduous	
390	Cottonwood	27	Healthy	Significant	Softwood Deciduous	
391	Box Elder	15	Healthy	Significant	Softwood Deciduous	
392	A en	12	Healthy	Significant	Softwood Deciduous	
393	A en	12	Healthy	Significant	Softwood Deciduous	
394	Cottonwood	14	Healthy	Significant	Softwood Deciduous	
395	Box Elder	15	Healthy	Significant	Softwood Deciduous	
396	Cottonwood	22	Healthy	Significant	Softwood Deciduous	
397	Box Elder	12	Healthy	Significant	Softwood Deciduous	
398	Cottonwood	14	Healthy	Significant	Softwood Deciduous	
399	Cottonwood	20	Healthy	Significant	Softwood Deciduous	
400	Cottonwood	16	Healthy	Significant	Softwood Deciduous	
401	Cottonwood	24	Healthy	Significant	Softwood Deciduous	
402	Willow Blac	17	Healthy	Significant	Softwood Deciduous	
403	CherryBlac	11	Healthy	Significant	Hardwood Deciduous	
404	Box Elder	13	Healthy	Significant	Softwood Deciduous	
405	Cottonwood	14	Healthy	Significant	Softwood Deciduous	
406	Box Elder	18	Dead	Dead	Softwood Deciduous	
407	A en	12	Healthy	Significant	Softwood Deciduous	
408	Oa /Pin	9	Healthy	Significant	Hardwood Deciduous	
409	Oa /Pin	8	Healthy	Significant	Hardwood Deciduous	Yes
410	Oa /Pin	14	Healthy	Significant	Hardwood Deciduous	Yes
411	Oa /Pin	6	Healthy	Significant	Hardwood Deciduous	Yes
412	Oa /Pin	6	Healthy	Significant	Hardwood Deciduous	
413	Oa /Pin	15	Healthy	Significant	Hardwood Deciduous	
414	Oa /Pin	16	Healthy	Significant	Hardwood Deciduous	Yes
415	Oa /Pin	20	Healthy	Significant	Hardwood Deciduous	Yes
416	Oa /Pin	9	Healthy	Significant	Hardwood Deciduous	Yes
417	Oa /Pin	14	Healthy	Significant	Hardwood Deciduous	Yes
418	Oa /Pin	21	Healthy	Significant	Hardwood Deciduous	Yes
419	CherryBlac	13	Healthy	Significant	Hardwood Deciduous	Yes
420	A en	12	Healthy	Significant	Softwood Deciduous	
421	A en	12	Healthy	Significant	Softwood Deciduous	
422	A hGreen	15	Healthy	Significant	Hardwood Deciduous	
423	Cottonwood	25	Healthy	Significant	Softwood Deciduous	Yes
424	Cottonwood	24	Healthy	Significant	Softwood Deciduous	Yes
425	Box Elder	23	Healthy	Significant	Softwood Deciduous	Yes
426	Box Elder	15	Healthy	Significant	Softwood Deciduous	Yes
427	Cottonwood	20	Healthy	Significant	Softwood Deciduous	Yes
428



SYMBOL AND PATTERN LEGEND

- EXISTING 10' CONTOUR
- EXISTING 2' CONTOUR
- EXISTING PROPERTY LINE
- EXISTING EASEMENT
- EXISTING FENCE
- CONSTRUCTION LIMITS
- NEW FENCE LINE
- EXISTING TREE, PROTECT TREE IN PLACE, SEE R-01
- NATIVE SEEDING AND PLUG PLANTING AREA, SEE SHEET R-04 FOR SEED SCHEDULE
- WETLAND BUFFER SIGN, SEE SHEET R-01.
- WETLAND BUFFER, SEE CIVIL SHEET 4300 FOR LOCATING EXTENTS OF BUFFER

GENERAL NOTES

1. SEE R-05 FOR ADDITIONAL SPECIFICATIONS AND PLANTING NOTES

PLANT MATERIAL

1. NO SUBSTITUTIONS OF PLANT MATERIAL SHALL BE ACCEPTED UNLESS APPROVED IN WRITING BY THE LANDSCAPE ARCHITECT. THE LANDSCAPE ARCHITECT RESERVES THE RIGHT TO REJECT ANY PLANTS WHICH ARE DEEMED UNSATISFACTORY.
2. ALL PLANTING STOCK SHALL CONFORM TO THE "AMERICAN STANDARD FOR NURSERY STOCK", ANSI-Z60. LATEST EDITION, OF THE AMERICAN ASSOCIATION OF NURSERYMEN, INC.
3. STAKE ALL PROPOSED PLANT BEDS AS SHOWN ON PLAN, DETAILS, AND PLANT SCHEDULE. SOME FIELD ADJUSTMENT MAY BE NECESSARY. LANDSCAPE ARCHITECT TO REVIEW PLANT LAYOUT PRIOR TO PLANTING. INFORM THE LANDSCAPE ARCHITECT OF PLANTING TWO DAYS PRIOR TO PLANT DELIVERY.

SEEDING

1. ANY EXOTIC INVASIVE PLANTS AND WEEDS WITHIN THE SEEDING AREAS SHALL BE SPRAYED WITH HERBICIDE 14 DAYS PRIOR TO SEEDING OR AS PER MANUFACTURE'S RECOMMENDATION. SIGNAGE INDICATING THE USE OF HERBICIDES MUST BE POSTED ON SITE.
2. ALL HERBICIDE APPLICATION SHALL BE APPLIED BY A LICENSED APPLICATOR WITHIN THE STATE OF MINNESOTA
3. SEED IN ACCORDANCE WITH THE SPECIFICATIONS. SEEDING IS TO TAKE PLACE IMMEDIATELY FOLLOWING FINAL GRADING AND TOPSOIL PLACEMENT TO PREVENT EROSION AND COMPACTION.
4. COVER CROP IS TO BE SEEDED WITHIN ALL AREAS.
5. AFTER SEEDING, TYPE 8 MULCH MATERIAL SHALL BE DISC-ANCHORED OVER ENTIRE SEEDING AREA IN ACCORDANCE WITH MNDOT STANDARD SPECIFICATION 3882.
6. REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATION. IN THE CASE OF ANY DISCREPANCIES BETWEEN THIS DETAIL, PLANS, OR SPECIFICATIONS, THE SPECIFICATIONS SHALL GOVERN.
7. ALL AREAS WITHIN THE CONSTRUCTION LIMITS SHALL BE MANAGED AND MAINTAINED PER THE EXTENDED LANDSCAPE MAINTENANCE SPECIFICATIONS.

MAINTENANCE AND CARE

1. MAINTENANCE SHALL BEGIN IMMEDIATELY AFTER EACH PORTION OF THE WORK IS IN PLACE. PLANT MATERIAL SHALL BE PROTECTED AND MAINTAINED UNTIL THE INSTALLATION OF PLANTINGS IS COMPLETE, INSPECTION HAS BEEN MADE AND PLANTING IS ACCEPTED EXCLUSIVE OF THE GUARANTEE. SEE ADDITIONAL SPECIFICATION NOTES ON R-04.
2. OWNER TO SIGN A WETLAND BUFFER MITIGATION AND MAINTENANCE AGREEMENT WITH THE CITY REQUIRING THAT THE APPLICANT ESTABLISH AND MAINTAIN THE REQUIRED MITIGATION WITHIN THE BUFFER FOR A THREE-YEAR PERIOD.
3. MAINTENANCE SHALL INCLUDE WATERING, WEEDING, MULCHING, REMOVAL OF DEAD MATERIAL PRIOR TO GROWING SEASON, RE-SETTING PLANTS AND PROPER GRADE, AND KEEPING PLANTS IN A PLUMB POSITION. AFTER ACCEPTANCE, THE OWNER SHALL ASSUME MAINTENANCE RESPONSIBILITIES. HOWEVER, THE CONTRACTOR SHALL CONTINUE TO BE RESPONSIBLE FOR KEEPING THE TREES PLUMB THROUGHOUT THE GUARANTEE PERIOD.
4. WATERING: MAINTAIN A WATERING SCHEDULE WHICH WILL THOROUGHLY WATER ALL PLANTS ONCE A WEEK. IN EXTREMELY HOT, DRY WEATHER, WATER MORE OFTEN AS REQUIRED BY INDICATIONS OF HEAT STRESS SUCH AS WILTING LEAVES. CHECK MOISTURE UNDER MULCH PRIOR TO WATERING TO DETERMINE NEED. CONTRACTOR SHALL MAKE THE NECESSARY ARRANGEMENTS FOR WATER.

PLANT SCHEDULE

TREES	COMMON NAME	SIZE	CONTAINER	QTY
AMELANCHIER ARBOREA	DOWNY SERVICEBERRY	2" CAL.	B B	5
AMELANCHIER LAEVIS	ALLEGHENY SERVICEBERRY	2" CAL.	B B	6
CERCIS CANADENSIS 'NORTHERN STRAIN	NORTHERN STRAIN REDBUD	2" CAL.	B B	6
CRATAEGUS CRUS-GALLI	COCKSPUR HAWTHORN	2" CAL.	B B	4
CRATAEGUS MOLLIS	DOWN HAWTHORN	2" CAL.	B B	3
PRUNUS AMERICANA	AMERICAN PLUM	2" CAL.	CONT.	3

SHRUBS	COMMON NAME	SIZE	CONTAINER	QTY
CORNUS RUGOSA	ROUND-LEAVED DOGWOOD	#3	CONT.	16
CORNUS SERICEA	RED TWIG DOGWOOD	#3	CONT.	14
DIERVILLA LONICERA	DWARF BUSH HONEYSUCKLE	#3	CONT.	40

Common Name	Scientific Name	Quant.	Spacing	Size
Perennials				
Obedient Plant	Physostegia virginiana	50	2.0' o.c.	Plug
Sweet Flag	Acorus americanus	50	2.0' o.c.	Plug
Canada Anemone	Anemone canadensis	100	2.0' o.c.	Plug
Jack-In-The-Pulpit	Arisaema triphyllum	50	2.0' o.c.	Plug
Flat-topped Aster	Aster umbellatus	50	2.0' o.c.	Plug
Cardinal Flower	Lobelia cardinalis	50	2.0' o.c.	Plug
Wild Golden Glow	Rudbeckia laciniata	30	2.0' o.c.	Plug
Brown-Eyed Susan	Rudbeckia triloba	30	2.0' o.c.	Plug
White Snakeroot	Ageratina altissima	100	2.0' o.c.	Plug
Solomon's Seal	Polygonatum biflorum	30	2.0' o.c.	Plug
Woodland Phlox	Phlox divaricata	50	2.0' o.c.	Plug
Meadow Garlic	Allium canadense	30	2.0' o.c.	Plug
Wild Leek	Allium tricoccum	30	2.0' o.c.	Plug
Wild Ginger	Asarum canadense	100	2.0' o.c.	Plug
Northern Bluebells	Mertensia paniculata	30	2.0' o.c.	Plug
Tall Bellflower	Campanula americana	50	2.0' o.c.	Plug
Grasses & Sedges				
Common Fox Sedge	Carex stipata	35	2.0' o.c.	Plug
Pennsylvania Sedge	Carex pensylvanica	1,000	2.0' o.c.	Plug
Cord Grass	Spartina pectinata	300	2.0' o.c.	Plug
Bottlebrush Sedge	Carex comosa	50	2.0' o.c.	Plug
Graceful Sedge	Carex gracillima	50	2.0' o.c.	Plug
Common Bur Sedge	Carex grayi	50	2.0' o.c.	Plug
Curly-Styled Wood Sedge	Carex rosea	50	2.0' o.c.	Plug
Sprengel's Sedge	Carex sprengelii	200	2.0' o.c.	Plug
		Total	2,500	

1 PLAN: RESTORATION PLAN

0 60 120

SCALE IN FEET

PRELIMINARY DRAFT
NOT FOR CONSTRUCTION

Xcel Energy®

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

PRINTED NAME _____

SIGNATURE _____

DATE _____ LICENSE # _____

BARR
4300 MARKET POINTE DRIVE
Suite 200
MINNEAPOLIS, MN 55435
Ph: 1-800-632-2277
Fax: (952) 832-2601
www.barr.com

HISTORY	DATE
DRAWN BY: AMW	09/07/2022
DESIGNED BY: BARR	09/07/2022
CHECKED BY: BHD	09/07/2022
APPROVED BY: BHD	09/07/2022
IN SERVICE DATE:	

REVISIONS			
NO.	DESCRIPTION	BY	DATE
A	ISSUED FOR REVIEW	BHD	09/07/2022

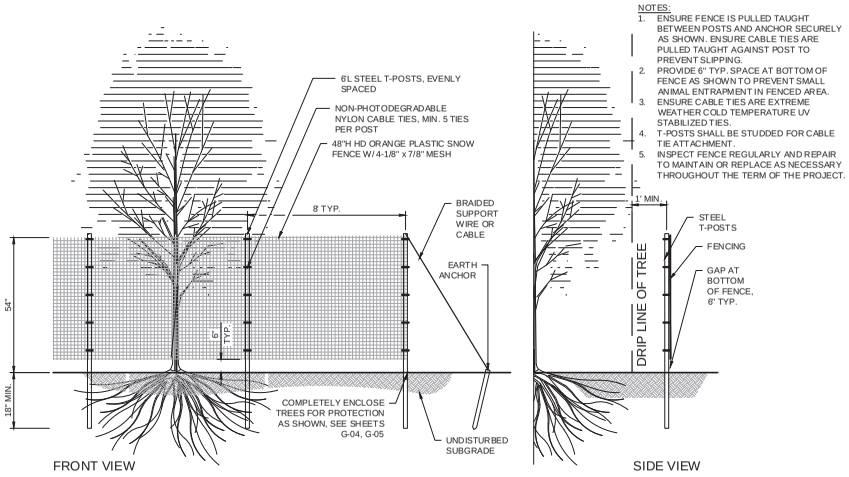
MAPLEWOOD PHASE II FIRE SUPPRESSION
RESTORATION PLAN

SERVICE CENTER: NORTHERN STATES POWER COMPANY | PROJECT: 4501038238

DIVISION: NORTH | CITY/COUNTY : MENDOTA HEIGHTS / DAKOTA | TYPE:

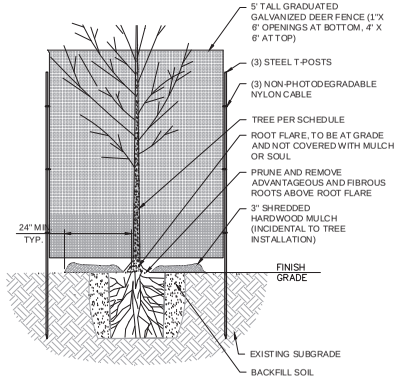
DRAWING
R-03
A

CADD USER: Brendan H. Dougherty FILE: M:\DESIGN\2382143B.00\MAPLEWOOD\2382143?_R-01_TREE PROTECTION PLAN.DWG PLOT SCALE: 1:2 PLOT DATE: 9/8/2022 4:29 PM



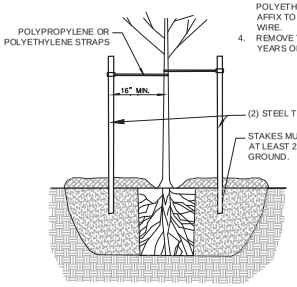
NOTES:
1. ENSURE FENCE IS PULLED TAUGHT BETWEEN POSTS AND ANCHOR SECURELY AS SHOWN. ENSURE CABLE TIES ARE PULLED TAUGHT AGAINST POST TO PREVENT SLIPPING.
2. PROVIDE 6' TYP. SPACE AT BOTTOM OF FENCE AS SHOWN TO PREVENT SMALL ANIMAL ENTRAPMENT IN FENCED AREA.
3. ENSURE CABLE TIES ARE EXTREME WEATHER COLD TEMPERATURE UV STABILIZED TIES.
4. T-POSTS SHALL BE STUDDED FOR CABLE TIE ATTACHMENT.
5. INSPECT FENCE REGULARLY AND REPAIR TO MAINTAIN OR REPLACE AS NECESSARY THROUGHOUT THE TERM OF THE PROJECT.

1 DETAIL: TREE PROTECTION FENCE
NOT TO SCALE



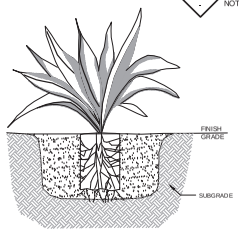
TREE PLANTING NOTES:
1. PROVIDE AND INSTALL PLANTS PER SCHEDULE.
2. ALL DECIDUOUS TREES SHALL BE ENCLOSED BY GALVANIZED DEER FENCING TO PROTECT FROM ANIMAL BROWSING. TREE PROTECTION SHALL BE CONSIDERED INCIDENTAL TO TREE PLANTING
3. REMOVE DEAD OR DAMAGED BRANCHES. RETAIN THE NATURAL FORM OF PLANT. DO NOT CUT THE LEADER
4. IF ROOT FLARE IS NOT EXPOSED WITHIN THE CONTAINER EXCAVATE SURFACE SOIL TO BASE OF ROOT FLARE.
5. DIG PLANT HOLES 6" MIN. LARGER THAN ROOT MASS, ALL SIDES.
6. SCARIFY BOTTOM AND SIDES OF HOLE PRIOR TO PLANTING
7. SET TREE ON LIGHTLY FIRMED BACKFILL SOIL SO ROOT FLARE IS EVEN WITH FINISH GRADE.
8. BACKFILL WITH PLANTING SOIL AND FIRM SOIL AROUND ROOT MASS TO MAINTAIN PLUMB AND ENSURE NO AIR GAPS AROUND ROOT MASS.
9. CONSTRUCT 3' WATERING BASIN. THOROUGHLY WATER WITHIN 3 HOURS OF INSTALLATION.
10. PLACE SHREDDED HARDWOOD MULCH (MN/DOT SPEC 3882.2 TYPE 6 - WEED SEED FREE SHREDDED HARDWOOD.) TO A RADIUS OF 24" AND TO A DEPTH OF 3" AROUND TREE (SOIL PREPARED AS PER PLAN).
11. NO MULCH TO BE IN CONTACT WITH BASE OF PLANT.
12. CONTRACTOR IS RESPONSIBLE FOR MAINTAINING TREES IN A PLUMB POSITION THROUGHOUT THE GUARANTEE PERIOD.
13. CONTRACTOR TO WATER AS NECESSARY THROUGHOUT GUARANTEE PERIOD (1-YEAR) TO MAINTAIN IN A HEALTHY CONDITION. AT THE END OF THE GUARANTEE PERIOD ALL TREES THAT ARE DEAD OR DETERMINED UNHEALTHY OR UNSIGHTLY SHALL BE REPLACED AT CONTRACTOR'S EXPENSE. SEE HERBACEOUS PLANT ESTABLISHMENT SPECIFICATIONS FOR ADDITIONAL DETAIL.

2 DETAIL: TREE PLANTING
NOT TO SCALE



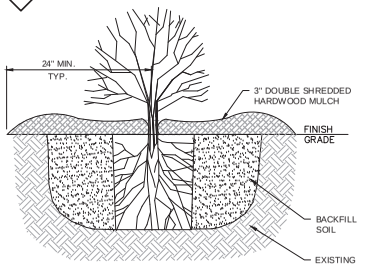
TREE STAKING NOTES:
1. ALL TREES SHALL BE STAKED AND TIED TO MAINTAIN VERTICALITY FOLLOWING PLANTING. TREE STAKING SHALL BE CONSIDERED INCIDENTAL TO TREE PLANTING.
2. INSTALL TWO (2) 8' STEEL T-POSTS, ANCHORED 2' INTO THE GROUND ON EITHER SIDE OF THE TRUNK.
3. INSTALL 16' LONG 40 MIL POLYPROPYLENE OR POLYETHYLENE STRAPS AROUND TRUNK AND AFFIX TO TO HOLES IN T-POST'S WITH 10 GAUGE WIRE.
4. REMOVE THE TREE STAKING AFTER TWO (2) YEARS OF MAINTAINED PLUMB POSITION.

3 DETAIL: TREE STAKING
NOT TO SCALE



HERBACEOUS PLUG PLANTING NOTES:
1. PROVIDE AND INSTALL PLANTS PER SCHEDULE.
2. EXCAVATE HOLE 3 TIMES WIDTH OF ROOTBALL.
3. BREAK BOTTOM OF ROOTBALL TO LOOSEN ROOTS.
4. PLANT THROUGH MULCH ALIGNING ROOTBALL TOP EVEN WITH SOIL - DO NOT PLANT TOO DEEP OR TOO SHALLOW. FIRM SOIL TO ENSURE GOOD CONTACT WITH ROOTS.
5. SCARIFY BOTTOM OF HOLE PRIOR TO PLANTING.
6. WATER THOROUGHLY AFTER PLANTING.
7. CONTRACTOR TO WATER AS NECESSARY THROUGHOUT GUARANTEE PERIOD TO MAINTAIN IN A HEALTHY CONDITION. AT THE END OF THE GUARANTEE PERIOD (1-YEAR)ALL PLANTS THAT ARE DEAD OR DETERMINED UNHEALTHY OR UNSIGHTLY SHALL BE REPLACED AT CONTRACTOR'S EXPENSE. SEE HERBACEOUS PLANT ESTABLISHMENT SPECIFICATIONS FOR ADDITIONAL DETAIL.

4 DETAIL: HERBACEOUS PLUG
NOT TO SCALE



SHRUB AND VINE PLANTING NOTES:
1. PROVIDE AND INSTALL PLANTS PER SCHEDULE.
2. REMOVE DEAD OR DAMAGED BRANCHES. RETAIN THE NATURAL FORM OF PLANT.
3. IF ROOT FLARE IS NOT EXPOSED WITHIN THE CONTAINER EXCAVATE SURFACE SOIL TO BASE OF ROOT FLARE.
4. DIG PLANT HOLES 6" MIN. LARGER THAN ROOT MASS, ALL SIDES.
5. SET SHRUB ON LIGHTLY FIRMED BACKFILL SOIL SO ROOT FLARE IS EVEN WITH FINISH GRADE.
6. BACKFILL WITH PLANTING SOIL FIRM SOIL AROUND ROOT MASS TO MAINTAIN PLUMB AND ENSURE NO AIR GAPS AROUND ROOT MASS.
7. CONSTRUCT 3' WATERING BASIN. THOROUGHLY WATER WITHIN 3 HOURS OF INSTALLATION.
8. PLACE SHREDDED HARDWOOD MULCH (MN/DOT SPEC 3882.2 TYPE 6 - WEED SEED FREE SHREDDED HARDWOOD.) TO A RADIUS OF 24" AND TO A DEPTH OF 3" AROUND PLANT.
9. NO MULCH TO BE IN CONTACT WITH PLANT.
10. CONTRACTOR TO WATER AS NECESSARY THROUGHOUT GUARANTEE PERIOD (1-YEAR) TO MAINTAIN IN A HEALTHY CONDITION. AT THE END OF THE GUARANTEE PERIOD ALL SHRUBS THAT ARE DEAD OR DETERMINED UNHEALTHY OR UNSIGHTLY SHALL BE REPLACED AT CONTRACTOR'S EXPENSE. SEE HERBACEOUS PLANT ESTABLISHMENT SPECIFICATIONS FOR ADDITIONAL DETAIL.

5 DETAIL: SHRUB PLANTING
NOT TO SCALE

36-211 Woodland Edge South & West

COMMON NAME	SCIENTIFIC NAME	RATE (LBS/AC)	RATE (KG/HA)	% OF MIX (BY WEIGHT)	SEEDS/SQ.FT. (PLS)
Kalm's brome	*Bromus kalmii*	1.50	1.68	4.34%	4.40
Nodding wild rye	*Elymus canadensis*	1.25	1.40	3.61%	2.38
Slender wheatgrass	*Elymus trachycaulus*	1.25	1.40	3.64%	3.18
Big bluestem	*Andropogon gerardii*	1.00	1.12	2.90%	3.68
Side-oats grama	*Bouteloua curtipendula*	1.00	1.12	2.89%	2.20
Indian grass	*Sorghastrum nutans*	1.00	1.12	2.89%	4.40
Little bluestem	Schi achyrium co arium	0.62	0.69	1.79%	3.40
Bottlebrush grass	*Elymus hystrix*	0.32	0.36	0.91%	0.88
Switchgrass	*Panicum virgatum*	0.06	0.07	0.17%	0.30
	Grasses Subtotal	8.00	8.97	23.14%	24.82
Black-eyed Susan	*Rudbeckia hirta*	0.18	0.20	0.52%	6.10
American vetch	*Vicia americana*	0.18	0.20	0.52%	0.14
White prairie clover	*Dalea candida*	0.17	0.19	0.50%	1.20
Canada tick trefoil	*Desmodium canadense*	0.14	0.16	0.42%	0.29
Early sunflower	*Heliopsis helianthoides*	0.13	0.15	0.38%	0.30
Golden Alexanders	*Zizia aurea*	0.11	0.12	0.33%	0.46
Blue giant hyssop	*Agastache foeniculum*	0.10	0.11	0.28%	3.20
Wild bergamot	*Monarda fistulosa*	0.06	0.07	0.18%	1.60
Stiff goldenrod	*Oligoneuron rigidum*	0.06	0.07	0.17%	0.90
Clayton's sweet Cicely	*Osmorhiza claytonii*	0.06	0.07	0.17%	0.06
Smooth wild rose	*Rosa blanda*	0.06	0.07	0.17%	0.06
Showy goldenrod	*Solidago speciosa*	0.06	0.07	0.18%	1.80
Smooth aster	*Symphyotrichum laeve*	0.06	0.07	0.19%	1.30
Lance-leaved figwort	*Scrophularia lanceolata*	0.05	0.06	0.14%	3.20
Common yarrow	*Achillea millefolium*	0.03	0.03	0.09%	2.00
White snakeroot	*Ageratina altissima*	0.03	0.03	0.09%	1.70
Zigzag goldenrod	*Solidago flexicaulis*	0.02	0.02	0.05%	0.50
	Forbs Subtotal	1.50	1.68	4.38%	24.80
Oats	*Avena sativa*	25.00	28.02	72.48%	11.14
	Cover Crop Subtotal	25.00	28.02	72.48%	11.14
	Total	34.50	38.67	100.00%	60.75

6 NATIVE SEED MIX: MN/DOT 36-211

PRELIMINARY DRAFT
NOT FOR CONSTRUCTION

Xcel Energy®

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.
PRINTED NAME
SIGNATURE
DATE LICENSE #

BARR
4300 MARKET POINTE DRIVE
Suite 200
MINNEAPOLIS, MN 55435
Ph: 1-800-632-2277
Fax: (952) 832-2601
www.barr.com

HISTORY	DATE
DRAWN BY: AMW	09/07/2022
DESIGNED BY: BARR	09/07/2022
CHECKED BY: BHD	09/07/2022
APPROVED BY: BHD	09/07/2022
IN SERVICE DATE:	

REVISIONS			
NO.	DESCRIPTION	BY	DATE
A	ISSUED FOR REVIEW	AMW	09/07/2022

MAPLEWOOD PHASE II FIRE SUPPRESSION
TREE PRESERVATION AND RESTORATION DETAILS

SERVICE CENTER: NORTHERN STATES POWER COMPANY | PROJECT: 4501038238
DIVISION: NORTH | CITY/COUNTY : MENDOTA HEIGHTS / DAKOTA | TYPE:

DRAWING
R-04
A

GENERAL NOTES

1. PLANTING SHALL CONFORM TO MNDOT SPEC 2571, PLANT INSTALLATION AND ESTABLISHMENT, EXCEPT AS INDICATED OTHERWISE IN THE PLANTING SHEETS.
2. INFORM THE LANDSCAPE ARCHITECT AND OWNER OF PLANTING TWO DAYS PRIOR TO PLANT DELIVERY.
3. CONTRACTOR SHALL COORDINATE LAYOUT OF ALL PLANTS WITH DIRECTION OF LANDSCAPE ARCHITECT IN THE FIELD.
4. ALL SLOPES GREATER THAN 3:1 SHALL BE COVERED WITH EROSION CONTROL BLANKET IMMEDIATELY AFTER SEEDING TO PREVENT EROSION.
5. TREES AND SHRUBS ARE TO BE PLANTED AND MULCHED FIRST, THEN SEEDING AND STRAW MULCHING IS TO OCCUR, THEN LASTLY PLUGS ARE TO BE PLANTED.
6. PLACE SHREDDED HARDWOOD MULCH (MN/DOT SPEC 3882.2 TYPE 6 - WEED SEED FREE SHREDDED HARDWOOD.) TO A RADIUS OF 24" AND TO A DEPTH OF 3" AROUND EACH TREE, AND SHRUB.
7. CONTRACTOR IS RESPONSIBLE FOR KEEPING TREES IN PLUMB AND UPRIGHT POSITION DURING ENTIRE ONE YEAR WARRANTY PERIOD.
8. CONTRACTOR WILL BE RESPONSIBLE FOR WATERING PLANTS (REGARDLESS OF NOTIFICATION) DURING ENTIRE ONE YEAR WARRANTY PERIOD. WATER PLANTS WITHOUT NOTIFICATION TO OWNER.
9. WATERING WILL BE CONSIDERED INCIDENTAL TO THE CONTRACT.
10. LOOSEN, RIP, OR ROTOTILL TOPSOIL TO A FULL 12" DEPTH AFTER FINAL GRADING. NO RUBBER TIRED EQUIPMENT IN SEEDING AREAS AFTER SOIL LOOSENING.
11. LOW GROUND PRESSURE TRACKED EQUIPMENT ONLY. ANY COMPACTION OF PREVIOUSLY LOOSENED SOIL MUST BE LOOSENED.
12. SEE SHEET R-04 FOR HERBACEOUS PLUG, SHRUB, AND TREE PLANTING DETAILS.
13. CONTRACTOR SHALL HAVE LOCATED BY GOPHER ONE ALL EXISTING UTILITIES LOCATED WITHIN THE PROJECT LIMITS BEFORE EARTHWORK AND PLANTINGS BEGINS.
14. PROTECT EXISTING CURBS, PAVEMENT, SIDEWALKS, AND OTHER SITE ELEMENTS FROM IMPACT BY SOIL PREPARATION, CONCRETE, AND PLANTING OPERATIONS. AVOID COMPACTING SOIL WITH HEAVY EQUIPMENT, ANY DAMAGE TO SITE TO BE REPAIRED AT CONTRACTOR'S EXPENSE.
15. THIS DRAWING DOES NOT CONSTITUTE AN OFFICIAL SURVEY OF THE SITE. CONFIRM ALL LOCATIONS OF SURFACE AND SUB-SURFACE FEATURES BEFORE BEGINNING INSTALLATION. ADVISE LANDSCAPE ARCHITECT OF ANY DISCREPANCIES.
16. THE CONTRACTOR SHALL AVOID DAMAGING EXISTING TREES. DO NOT STORE OR DRIVE HEAVY MATERIALS OVER TREE ROOTS. DO NOT DAMAGE TREE BARK OR BRANCHES.
17. CONTRACTOR TO MAINTAIN ALL EROSION CONTROL MEASURES PER REQUIREMENTS OF SWPPP THROUGHOUT CONSTRUCTION OPERATIONS. SEE G-01 SWPPP AND G-03 EROSION CONTROL PLAN.

CONSTRUCTION SITE

1. ALL EQUIPMENT MUST ARRIVE AT THE CONSTRUCTION SITE FREE OF SOIL, ORGANIC DEBRIS, AND SEEDS.
2. BEST MANAGEMENT PRACTICES FOR INVASIVE SPECIES CONTROL: THE APPLICANTS WILL BE REQUIRED TO CONSIDER THE USE OF THE FOLLOWING BEST MANAGEMENT PRACTICES (BMP'S) FOR REDUCING THE SPREAD OF INVASIVE SPECIES FOR ALL ACTIVITIES THAT INVOLVE INTENTIONAL MOVEMENT OF VEHICLES, EQUIPMENT, GEAR, AND/OR MATERIALS ONTO OR OFF THE WOODY BIOMASS PROJECT SITES. DUE TO THE TIMING OF THE PROJECT AND THE REQUIREMENT OF THE APPLICANTS TO INFLICT AS LITTLE SOIL DISTURBANCE AS POSSIBLE, SOME OF THE BMP'S MAY NOT APPLY, ESPECIALLY THOSE IN PLACE TO PREVENT THE SPREAD OF HERBACEOUS INVASIVE PLANTS. THE APPLICANTS' PROJECT MANAGER AND THE CITY OF MAPLEWOOD'S REPRESENTATIVE WILL DETERMINE THE APPLICABILITY OF BMP'S FOR THIS PROJECT.

BEST MANAGEMENT PRACTICES

1. INTENTIONAL MOVEMENT OF WOODY BIOMASS MATERIAL
   - 1.1. PER MN STATUTES CHAPTER 18, SECTIONS 18.75 TO 18.88, OBTAIN A WRITTEN PERMIT TO TRANSPORT PROPAGATING PARTS OF RESTRICTED NOXIOUS WEED IN INFESTED MATERIAL OR EQUIPMENT BY CONTACTING THE LOCAL WEED INSPECTOR OR COUNTY AGRICULTURAL INSPECTOR FOR ALL COUNTIES AFFECTED.
   - 1.2. ENSURE ALL MATERIALS REMOVED FROM THE PROJECT SITE ARE SECURED BEFORE TRANSPORT (E.G. TRUCK IS COVERED OR INVASIVE MATERIALS ARE WRAPPED).
2. INTENTIONAL MOVEMENT OF VEHICLES, LIGHT AND HEAVY EQUIPMENT (CHAINSAWS, BRUSH SAW, TRUCKS, TRACTORS, ATV'S, TRAILERS, ETC.), AND GEAR (BOOTS, CLOTHING, PERSONAL PROTECTIVE EQUIPMENT (PPE), VELCRO STRAPS, KEVLAR CHAPS, BACKPACKS/SPRAYERS, UTILITY BAGS, ETC.) TO/FROM PROJECT SITE
   - 2.1. SURVEY SITE BEFORE HARVEST/MANAGEMENT TREATMENT, NOTE/RECORD LOCATIONS OF EXISTING PATCHES OF TERRESTRIAL INVASIVE SPECIES OR INSECT OR DISEASE INFESTATIONS, AND EITHER AVOID MOVING THROUGH THESE PATCHES, OR TREAT THEM PRIOR TO MOVING THROUGH THEM.
   - 2.2. THE APPLICANTS MUST IDENTIFY A CLEANING SITE TO ENSURE ALL VEHICLES, EQUIPMENT, AND GEAR ARE CLEARED OF DIRT/DEBRIS/PLANT MATERIAL. ALERT ALL PARTIES INVOLVED IN PROJECT ACTIVITIES.
   - 2.3. INSPECT ALL VEHICLES, EQUIPMENT, AND GEAR AND REMOVE VEGETATION, SOIL, AND ORGANISMS PRIOR TO ENTERING AND LEAVING SITE. ENSURE ITEMS ARE FREE OF VISIBLE PLANTS/PLANT PARTS, SEEDS, MUD, SOIL AND ANIMALS, ETC. USE A STIFF BRISTLED BRUSH, SHOVEL, BOOT BRUSH, POWER WASHER OR AIR COMPRESSOR, OR OTHER APPROPRIATE TOOL. FOR CHAINSAWS, REMOVE CHAIN TO CLEAN OUT CLUTCH AND CLEAN OUT SAW CARRIER.
   - 2.4. WHEN POSSIBLE, DESIGNATE SPECIFIC VEHICLES, EQUIPMENT, AND GEAR FOR USE ON UNINFESTED VS. INFESTED SITES.
   - 2.5. DO NOT WORK UNDER WET CONDITIONS TO MINIMIZE RUTTING AND OTHER SOIL DISTURBANCES.
   - 2.6. MINIMIZE NUMBER OF ACCESS POINTS TO SITE.
   - 2.7. MINIMIZE AREA OF VEGETATION AND SOIL DISTURBANCE BY ACCESS ROADS AND SKID TRAILS.
   - 2.8. AVOID WORKING, PARKING, OR STORAGE IN PATCHES OF INVASIVE SPECIES. WHEN UNAVOIDABLE, TREAT AREA BEFORE USING AND CLEAN VEHICLES, EQUIPMENT AND GEAR AFTER WORK IS COMPLETE.
   - 2.9. POWER SPRAY VEHICLES AND EQUIPMENT AFTER RETURNING FROM THE SITE. DRY BEFORE USE IF FROM WORM-INFESTED SITES.
3. INTENTIONAL MOVEMENT OF MATERIALS (SOIL, ROCK, GRAVEL, STRAW, MULCH, SEED, PLANTS, ETC.) IN THE PROCESS OF CONSTRUCTING OR IMPROVING ACCESS ROADS
   - 3.1. INSPECT OUTSIDE OF TRANSPORT EQUIPMENT, STORAGE CONTAINERS AND MATERIALS FOR VISIBLE PRESENCE OF INVASIVE SPECIES.
   - 3.2. IF POSSIBLE, USE LOCAL ECOTYPE SEEDING MATERIAL, PLANTS, FILL, STRAW, GRAVEL, AND MULCH THAT IS CERTIFIED AS UNINFESTED.
   - 3.3. MONITOR AREAS OF SOIL DISTURBANCE FOR EVIDENCE OF INVASIVE SPECIES GERMINATION OR RESPROUTING AND TREAT IF FOUND.
   - 3.4. MINIMIZE THE USE OF OUTSIDE/OFFSITE MATERIALS.
4. PROCEDURES TO MINIMIZE THE RISK OF INCREASING THE DOMINANCE OF INVASIVE SPECIES. IN ADDITION TO THOSE ALREADY LISTED ABOVE
   - 4.1. IF WORKING ON MULTIPLE SITES OVER A PERIOD OF DAYS, WORK IN UNINFESTED SITES FIRST AND END IN INFESTED SITES.
   - 4.2. IF POSSIBLE WORK, ON FROZEN GROUND AND WITH ADEQUATE SNOW COVER.
   - 4.3. MINIMIZE ACCESS ROADS, SKID TRAILS AND STAGING AREAS.
   - 4.4. MONITOR ACCESS ROADS, SKID TRAILS, AND STAGING AREAS FOR EVIDENCE OF INVASIVE SPECIES GERMINATION OR RESPROUTING AND TREAT IF FOUND.
   - 4.5. WHEN PRACTICABLE, STAGE WOODY BIOMASS MATERIAL ON ALREADY DISTURBED SITE.
   - 4.6. REDUCE GROUND DISTURBANCE AS MUCH AS POSSIBLE DURING STAGING OF WOODY BIOMASS MATERIALS.
   - 4.7. CONSIDER TIMING OF PROJECT-RELATED ACTIVITIES SO THAT INVASIVE SPECIES ARE NOT BEARING SEED/FRUIT.

WARRANTY

1. TREES, SHRUBS, AND CONTAINER-GROWN HERBACEOUS PLANTS
   - 1.1. CONTRACTOR SHALL WARRANT ALL TREES, SHRUBS, AND HERBACEOUS PLANTS TO BE IN A HEALTHY AND VIGOROUS GROWING CONDITION FOR A PERIOD OF ONE (1) YEAR FROM THE TIME OF PRELIMINARY ACCEPTANCE BY OWNER.
   - 1.2. CONDITION AND COVERAGE STANDARDS
     - 1.2.1. ALL PLANTINGS SHALL BE HEALTHY, GREEN, AND OF VIGOROUS GROWING CONDITION.
       - 1.2.1.1. PLANTS SHALL: BEAR A MINIMUM OF 80% OF THE FOLIAGE PRESENT WHEN PLANTED; HAVE VEGETATIVE GROWTH DEMONSTRATING NORMAL DENSITY, SIZE, SHAPE, AND COLOR; AND, SHALL BE FREE OF DEAD, THIN, OR DYING PATCHES OR BRANCHES.
   - 1.3. INSPECTION AND REPORTING DURING WARRANTY PERIOD
     - 1.3.1. THE CONTRACTOR SHALL PERFORM MONTHLY SITE INSPECTIONS TO REVIEW THE WORK FOR THE DURATION OF THE WARRANTY PERIOD AND UNTIL NOTICE OF FINAL ACCEPTANCE HAS BEEN ISSUED. MONTHLY INSPECTIONS ARE CONSIDERED INCIDENTAL TO THE WORK SPECIFIED HEREIN AND NO ADDITIONAL COMPENSATION SHALL BE MADE.
     - 1.3.2. PROVIDE A REPORT FOR EACH SITE INSPECTION PERFORMED USING THE ATTACHED (AT END) SITE INSPECTION/ MAINTENANCE FORM. ENSURE FORM IS COMPLETED IN FULL PRIOR TO SUBMITTAL TO OWNER OR OWNER'S REPRESENTATIVE.
     - 1.3.3. REQUEST A SITE MEETING WITH OWNER OR OWNER'S REPRESENTATIVE SIXTY (60) DAYS AFTER HERBACEOUS PLANT INSTALLATION TO REVIEW PLANT ESTABLISHMENT SUCCESS. FOLLOWING THE SITE INSPECTION, THE OWNER OR OWNER'S REPRESENTATIVE WILL SUBMIT TO CONTRACTOR WRITTEN NOTIFICATION OF ACCEPTANCE OR IF ANY CORRECTIVE ACTION IS REQUIRED.
     - 1.3.4. REQUEST A SITE MEETING WITH OWNER OR OWNER'S REPRESENTATIVE AT THE END OF EACH GROWING SEASON TO REVIEW PLANT ESTABLISHMENT SUCCESS. FOLLOWING THE SITE INSPECTION, THE OWNER OR OWNER'S REPRESENTATIVE WILL SUBMIT TO CONTRACTOR WRITTEN NOTIFICATION OF ACCEPTANCE OR IF CORRECTIVE ACTION IS REQUIRED.
     - 1.3.5. REQUEST A MEETING WITH OWNER OR OWNER'S REPRESENTATIVE AT THE END OF THE WARRANTY PERIOD TO REVIEW ALL PLANTED AREAS FOR FINAL ACCEPTANCE. THE WORK WILL BE CONSIDERED COMPLETE AND ACCEPTED WHEN THE CONDITION AND COVERAGE CRITERIA LISTED ABOVE ARE MET IN FULL.
   - 1.4. CORRECTIVE WORK DURING WARRANTY PERIOD
     - 1.4.1. REPLANT, AND OTHERWISE PERFORM CORRECT WORK WHICH DOES NOT MEET THE CONDITION AND COVERAGE STANDARDS AT THE END OF THE WARRANTY PERIOD AT NO ADDITIONAL COST TO THE OWNER.
     - 1.4.2. PERFORM CORRECTIVE WORK IN CONFORMANCE WITH THE REQUIREMENTS OF THIS SPECIFICATION.
   - 1.5. REPLACEMENT
     - 1.5.1. AT THE END OF THE WARRANTY PERIOD, ALL PLANTS SHALL FULFILL ALL THE REQUIREMENTS OF THESE SPECIFICATIONS WITH REGARD TO QUALITY AND CONDITION. ANY PLANTS FAILING TO SATISFY ALL THESE CONDITIONS SHALL BE REPLACED WITHIN TEN (10) DAYS OF WARRANTY INSPECTION. PLANTS MAY BE REPLACED PRIOR TO THE END OF THEIR WARRANTY PERIOD IF SUCH AN AGREEMENT EXISTS BETWEEN CONTRACTOR AND OWNER OR OWNER'S REPRESENTATIVE.
     - 1.5.2. REPLACEMENT STOCK SHALL BE SUBJECT TO ALL REQUIREMENTS AS TO SELECTION, INSPECTIONS, PREPARATION, PLANTING AND MAINTENANCE OPERATIONS.
   - 1.6. REPLACEMENT WARRANTY
     - 1.6.1. REPLACEMENT STOCK SHALL NOT BE UNDER WARRANTY.
   - 1.7. DELAYS
     - 1.7.1. DELAYS IN COMPLETION OF PLANTING OPERATIONS, WHICH EXTEND THE PLANTING INTO MORE THAN ONE PLANTING SEASON, SHALL EXTEND THE WARRANTY PERIOD ACCORDINGLY.
   - 1.8. EXCEPTIONS
     - 1.8.1. CONTRACTOR SHALL NOT BE HELD RESPONSIBLE FOR FAILURES DUE TO VANDALISM, AND/OR LOSS OF PLANTS DUE TO SALT APPLICATION. THE DETERMINATION OF PLANT FAILURE DUE TO SALT APPLICATIONS WILL BE JUDGED BY A BOTANIST APPOINTED BY THE OWNER.
   - 1.9. FINAL ACCEPTANCE
     - 1.9.1. A FINAL INSPECTION IN ACCORDANCE WITH THIS SPECIFICATION WILL BE HELD TO REVIEW WORK AT THE END OF THE WARRANTY PERIOD AFTER ALL REPLACEMENTS ARE COMPLETED.
     - 1.9.2. UPON FINAL ACCEPTANCE, NOTIFICATION WILL BE SUBMITTED IN WRITING TO THE CONTRACTOR BY OWNER OR OWNER'S REPRESENTATIVE.
2. NATIVE VEGETATION SEEDING
   - 2.1. CONTRACTOR SHALL WARRANT THAT ALL SEEDING AREAS, WILL MEET THE CONDITION AND COVERAGE STANDARDS DEFINED HEREAFTER FOR A ONE (1) - YEAR PERIOD AFTER PRELIMINARY ACCEPTANCE BY OWNER.
     - 2.1.1. THIS WARRANTY PERIOD SHALL NOT INCLUDE THE DORMANT PERIOD OF NOVEMBER 1 THROUGH APRIL 30.
   - 2.2. CONDITION AND COVERAGE STANDARDS
     - 2.2.1. GROWTH AND COVERAGE OF NATIVE SEEDING SHALL MEET THE FOLLOWING STANDARDS: AREAS SEEDED WITH NATIVE PLANT SPECIES: CONTRACTOR SHALL GUARANTEE SEEDED AREAS THROUGH THE SPECIFIED WARRANTY PERIOD, AND UNTIL FINAL ACCEPTANCE. SUCCESS IS DEFINED AS MINIMUM 80% COVER OF NATIVE PLANT SPECIES AS DETERMINED BY OWNER'S REPRESENTATIVE AND MINIMUM OF 50% OF SEEDED SPECIES. AREAS UNSUCCESSFUL BECAUSE NATIVE PLANTS HAVE NOT BECOME SUCCESSFULLY ESTABLISHED OR BECAUSE NATIVE PLANTS HAVE BEEN CHOKED OUT BY EXOTIC SPECIES OR DESTROYED BY HERBICIDE DRIFT AT ANY TIME DURING THE ESTABLISHMENT PERIOD SHALL BE RE-SEEDED AT ½ THE ORIGINAL DENSITY. DEAD PATCHES GREATER THAN 25 SQUARE FEET SHALL BE RESEEDED IMMEDIATELY AT NO ADDITIONAL COST TO THE OWNER.
   - 2.3. INSPECTION AND REPORTING DURING WARRANTY PERIOD
     - 2.3.1. THE CONTRACTOR SHALL PERFORM MONTHLY SITE INSPECTIONS TO REVIEW THE WORK FOR THE DURATION OF THE WARRANTY PERIOD AND UNTIL NOTICE OF FINAL ACCEPTANCE HAS BEEN ISSUED. MONTHLY INSPECTIONS ARE CONSIDERED INCIDENTAL TO THE WORK SPECIFIED HEREIN AND NO ADDITIONAL COMPENSATION SHALL BE MADE.
     - 2.3.2. PROVIDE A REPORT FOR EACH SITE INSPECTION PERFORMED USING THE ATTACHED (AT END) SITE INSPECTION/ MAINTENANCE FORM. ENSURE FORM IS COMPLETED IN FULL PRIOR TO SUBMITTAL TO OWNER OR OWNER'S REPRESENTATIVE.
     - 2.3.3. REQUEST A SITE MEETING WITH OWNER OR OWNER'S REPRESENTATIVE SIXTY (60) DAYS AFTER SEED IS PLANTED TO REVIEW SEED ESTABLISHMENT SUCCESS. FOLLOWING THE SITE INSPECTION, THE OWNER OR OWNER'S REPRESENTATIVE WILL SUBMIT TO CONTRACTOR WRITTEN NOTIFICATION OF ACCEPTANCE OR IF ANY CORRECTIVE ACTION IS REQUIRED.
     - 2.3.4. REQUEST A SITE MEETING WITH OWNER OR OWNER'S REPRESENTATIVE AT THE END OF EACH GROWING SEASON TO REVIEW SEED ESTABLISHMENT SUCCESS. FOLLOWING THE SITE INSPECTION, THE OWNER OR OWNER'S REPRESENTATIVE WILL SUBMIT TO CONTRACTOR WRITTEN NOTIFICATION OF ACCEPTANCE OR IF CORRECTIVE ACTION IS REQUIRED.
     - 2.3.5. REQUEST A MEETING WITH OWNER OR OWNER'S REPRESENTATIVE AT THE END OF THE WARRANTY PERIOD TO REVIEW ALL SEEDED AREAS FOR FINAL ACCEPTANCE. THE WORK WILL BE CONSIDERED COMPLETE AND ACCEPTED WHEN THE CONDITION AND COVERAGE CRITERIA LISTED ABOVE ARE MET IN FULL.
   - 2.4. CORRECTIVE WORK DURING WARRANTY PERIOD
     - 2.4.1. RESEED, REPLANT, AND OTHERWISE CORRECT WORK WHICH DOES NOT MEET THE STATED CONDITION AND COVERAGE STANDARDS DURING EACH YEAR AND AT THE END OF THE WARRANTY PERIOD AT NO ADDITIONAL COST TO OWNER.
   - 2.5. REPLACEMENT
     - 2.5.1. REPLACEMENT SEEDING SHALL BE SUBJECT TO ALL REQUIREMENTS AS TO MIX DESIGN, SELECTION, INSPECTIONS, PREPARATION, SEEDING AND MAINTENANCE OPERATIONS.
   - 2.6. REPLACEMENT WARRANTY
     - 2.6.1. REPLACEMENT SEEDING SHALL BE UNDER WARRANTY.
   - 2.7. DELAYS
     - 2.7.1. DELAYS IN COMPLETION OF SEEDING OPERATIONS, WHICH EXTEND THE SEEDING INTO MORE THAN ONE PLANTING SEASON, SHALL EXTEND THE WARRANTY PERIOD ACCORDINGLY.
   - 2.8. EXCEPTIONS
     - 2.8.1. CONTRACTOR SHALL NOT BE HELD RESPONSIBLE FOR FAILURES DUE TO VANDALISM, AND/OR LOSS OF PLANTS DUE TO SALT APPLICATION. THE DETERMINATION OF PLANT FAILURE DUE TO SALT APPLICATIONS WILL BE JUDGED BY A BOTANIST APPOINTED BY THE OWNER.
   - 2.9. FINAL ACCEPTANCE
     - 2.9.1. A FINAL INSPECTION IN ACCORDANCE WITH THIS SPECIFICATION WILL BE HELD TO REVIEW WORK AT THE END OF THE WARRANTY PERIOD AND AFTER ALL REPLACEMENTS ARE COMPLETED.
     - 2.9.2. UPON FINAL ACCEPTANCE, NOTIFICATION WILL BE SUBMITTED IN WRITING TO THE CONTRACTOR BY OWNER OR OWNER'S REPRESENTATIVE.

THREE- YEAR MAINTENANCE PERIOD

1. UPON COMPLETION OF THE INITIAL PLANTING OPERATIONS, CONTRACTOR SHALL MAINTAIN THE WORK AND CARE FOR PLANTS INSTALLED UNTIL HE HAS BEEN RELIEVED OF THIS RESPONSIBILITY. THE DURATION OF WHICH SHALL BE KNOWN AS THE MAINTENANCE PERIOD. THE PLANT MAINTENANCE PERIOD SHALL BE FOR A THREE-YEAR DURATION OF THE CONTRACT PERIOD OR UNTIL PROJECT SUBSTANTIAL COMPLETION, WHICHEVER IS LATER.
2. AFTER STARTING PLANTING OPERATIONS AND UNTIL EXPIRATION OF PLANT MAINTENANCE PERIOD, CONTRACTOR SHALL KEEP PLANTS IN HEALTHY GROWING CONDITION, USING GOOD HORTICULTURAL PRACTICES PERFORMED DURING GROWING SEASON.
3. THE PLANT MAINTENANCE WORK SHALL CONSIST OF MAINTAINING ADEQUATE SOIL MOISTURE AT ALL TIMES; REPAIRING, ADJUSTING OR REPLACING AS NECESSARY THE MULCH MATERIAL, PLANTING SOIL, RODENT PROTECTION, AND OTHER INCIDENTAL ITEMS; APPLYING INSECTICIDE SPRAY AS NECESSARY; FURNISHING AND INSTALLING REPLACEMENT PLANTS AS NEEDED, INCLUDING NEW MULCH AND PLANTING SOIL; MAINTAINING THE PLANTS IN AN UPRIGHT POSITION; AND REMOVING ALL WEED GROWTH IN MULCHED AREAS. CONTRACTOR SHALL INSPECT AND MAINTAIN THE NEW PLANTINGS ON A MINIMUM BASIS OF EVERY 30 DAYS DURING THE GROWING SEASON OR ADDITIONALLY AS MAY BECOME NECESSARY. ALL COST OF PLANT MAINTENANCE WORK SHALL BE AT THE CONTRACTOR'S EXPENSE, INCLUDING THE COSTS OF ANY REPLACEMENT MATERIALS REQUIRED.
4. THE CONTRACTOR SHALL UTILIZE AN ADAPTIVE MANAGEMENT APPROACH FOR VEGETATION MAINTENANCE WITHIN AREAS SEEDED WITH NATIVE PLANT SPECIES.
   - 4.1.1. THE CONTRACTOR SHALL APPLY VEGETATION MANAGEMENT TECHNIQUES TO PROMOTE NATIVE SEED ESTABLISHMENT AND MANAGE ALL INVASIVE WEED SPECIES WITHIN THESE AREAS.
     - 4.1.1.1. MANAGEMENT TECHNIQUES MAY INCLUDE, BUT ARE NOT LIMITED TO, MOWING AND HERBICIDE TREATMENTS.
     - 4.1.2. THE CONTRACTOR SHALL COORDINATE TIMING AND METHODS FOR ERADICATION OF ALL HERBACEOUS WEEDS THROUGHOUT THE GROWING SEASON WITH THE LANDSCAPE ARCHITECT.
   - 4.2. NO NOXIOUS WEED SHALL BE ALLOWED TO GO TO SEED AT ANY POINT DURING THE GROWING SEASON. CONTRACTOR SHALL CUT, BAG, AND DISPOSE OF ANY NOXIOUS WEED ALLOWED TO GO TO SEED.
   - 4.3. THE CONTRACTOR WILL HAVE A QUALIFIED NATIVE RESTORATION ECOLOGIST MONITOR THE NATIVE SEED AREAS EVERY 4-6 WEEKS DURING THE GROWING SEASONS (MAY-OCTOBER).
     - 4.3.1. A MONITORING REPORT SHALL BE PRODUCED AND INCLUDE THE FOLLOWING:
       - 4.3.1.1. ISSUES WITH VEGETATION ESTABLISHMENT SUCH AS COMPACTED SOILS, FAILURE OF SEEDING AND INVASIVE SPECIES ENCROACHMENT
       - 4.3.1.2. PROPOSED MANAGEMENT ACTIVITIES.
       - 4.3.1.3. SCHEDULE OF MANAGEMENT ACTIVITIES
       - 4.3.1.4. ISSUES WITH SOIL SUCH AS COMPACTION AND EROSION
5. MONITORING REPORTS SHALL BE REVIEWED AND PROPOSED MANAGEMENT ACTIVITIES WILL BE APPROVED OF BY OWNER.

PRELIMINARY DRAFT
NOT FOR CONSTRUCTION

Xcel Energy®

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.
PRINTED NAME
SIGNATURE
DATE LICENSE #

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HISTORY		DATE
DRAWN BY:	AMW	09/07/2022
DESIGNED BY:	BARR	09/07/2022
CHECKED BY:	BHD	09/07/2022
APPROVED BY:	BHD	09/07/2022
IN SERVICE DATE:		

REVISIONS			
NO.	DESCRIPTION	BY	DATE
A	ISSUED FOR REVIEW	AMW	09/07/2022

MAPLEWOOD PHASE II FIRE SUPPRESSION
TREE PRESERVATION AND PLANTING SPECIFICATIONS

DRAWING
R-05

SERVICE CENTER: NORTHERN STATES POWER COMPANY | PROJECT: 4501038238
DIVISION: NORTH | CITY/COUNTY : MENDOTA HEIGHTS / DAKOTA | TYPE:

A

RAMSEY-WASHINGTON
METRO WATERSHED DISTRICT

MEMORANDUM

Date: October 5, 2022

To: Board of Managers and Staff

From: Nicole Soderholm, Permit Coordinator
Mary Fitzgerald, District Inspector

Subject: September Enforcement Action Report

During September 2022:

Number of Violations:	**15**
Install/Maintain Inlet Protection	2
Install/Maintain Perimeter Control	3
Install/Maintain Construction Entrance	1
Stabilize Exposed Soils	3
Contain/Dispose of Liquid and Solid Wastes	1
Remove Discharged Sediment	1
Implement Proper Dewatering	1
Maintain/Protect Permanent BMPs	1
Complete Required Site Inspections	2

Activities and Coordination Meetings:

Collaboration with private developers and public entities, miscellaneous resident inquiries, ongoing ESC inspections/reporting, non-compliance follow-up inspections and enforcement, WCA administration/procedures, new permit review with Barr Engineering, permit closure/final walk-throughs, vegetation establishment and 48-hour rainfall inspections, underground stormwater system permit inspections with Barr Engineering, inspections team meeting, closed permit routine BMP inspections, initial erosion control walk-throughs, pre-construction meetings, MN Water Workforce Pilot meeting

Project Updates:

Sites where active work is recently complete, but vegetation establishment requirements have not been met just yet:

#18-11 Whistler Pines (Shoreview)
#18-27 McKnight Road Development (North St. Paul)
#19-38 McKnight Road – Anchor Block Commons (North St. Paul)
#20-05 Frost Lake Elementary (St. Paul)
#20-07 John Glenn Middle School (Maplewood)
#20-39 Midland Terrace Phase I (Shoreview)
#21-06 Maplewood Fire Station County Road C (Maplewood)
#21-08 White Bear Lake High School South Phase 2 (White Bear Lake)
#21-22 748 Bielenberg Medical Office Building (Woodbury)
#21-30 Roseville Area High School Baseball Field (Roseville)
#22-02 Little Canada SIP (Little Canada)

Sites where active work is recently complete, vegetation establishment has been met, and remaining permit closure administrative items are needed:

#19-04 Hiway Federal Credit Union (Woodbury)
#20-01 Carver Elementary School Addition (Maplewood)
#20-02 Conway Recreation Center Athletic Fields (St. Paul)

Elsewhere in the District, projects are continuing to start construction even at this stage in the season, and active projects are being inspected by District staff on a regular basis.

The Metro Transit Gold Line project (Permit #21-16) began this month with some utility work. Staff scheduled an initial erosion control meeting with the contractor and will inspect the site on a regular basis. The multi-year project spans four cities and two watershed districts, resulting in 34 BMPs in RWMWD alone.

Single Lot Residential Permits Approved by Staff:

None

Permits Closed:

15-07	Academy Cesar Chavez (St. Paul)
19-07	Phalen Parking Lot Improvements (St. Paul)
19-22	Sterling Street Bridge Replacement (Maplewood)
20-10	NSP 7th Ave Reconstruction (North St. Paul)
20-30	Anchor View Apartments (North St. Paul)
21-03	Phalen Parking Lot Improvements Phase 2 (St. Paul)

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Stewardship Grant Program

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RAMSEY-WASHINGTON
METRO WATERSHED DISTRICT

Stewardship Grant Request

DATE: October 5, 2022

TO: Board of Managers and Staff

FROM: Paige Ahlborg, Watershed Project Manager

SUBJECT: 22-29 CS City of Woodbury Enhanced Street Sweeping

RWMWD staff and Barr Engineering are currently working on an Enhanced Street Sweeping study to determine how to best prioritize and provide funding for increased sweeping efforts to improve water quality. Results of this study will be shared with the Board of Managers at the December meeting. While we were just beginning our process, the City of Woodbury and South Washington Watershed District (SWWD) collaborated on development of a 2022 Enhanced Street Sweeping Plan, which identifies an enhanced program as a cost effective Best Management Practice (BMP) to reduce nutrient loading to City of Woodbury waterbodies and reduce maintenance needs of other BMPs. The SWWD plan looks at specific parameters to determine the benefit of enhanced sweeping within the entire City of Woodbury including the subwatershed areas of RWMWD (Carver Lake, Battle Creek Lake, and Battle creek) which are outside the SWWD boundary.

After sharing the SWWD plan and reviewing with District staff, the City of Woodbury submitted a request for grant funding to provide enhanced street sweeping in the RWMWD portion of their City. This is a one-time request that comes at a unique time as we work to complete our enhanced street sweeping study. Staff believes this proposal can provide valuable input in assisting staff and board managers to determine how to move forward with funding for an enhanced street sweeping program in the future.

The City of Woodbury has received quotes and will select the lowest bid sweeper to provide additional street sweeping in SWWD, and is looking to pursue the same coverage in RWMWD for a not-to-exceed cost of $50,000. SWWD is contributing $300,000 for enhanced sweeping in their area this fall. If RWMWD chooses not to participate in the program, our area will be swept prior to leaf drop, as has been done in the past, due to staffing and equipment availability. In contrast, the requested grant ensures that two sweepers would be dedicated to RWMWD for 3 weeks; October 10 through October 28. These sweepings will target picking up leaves that are in the streets.

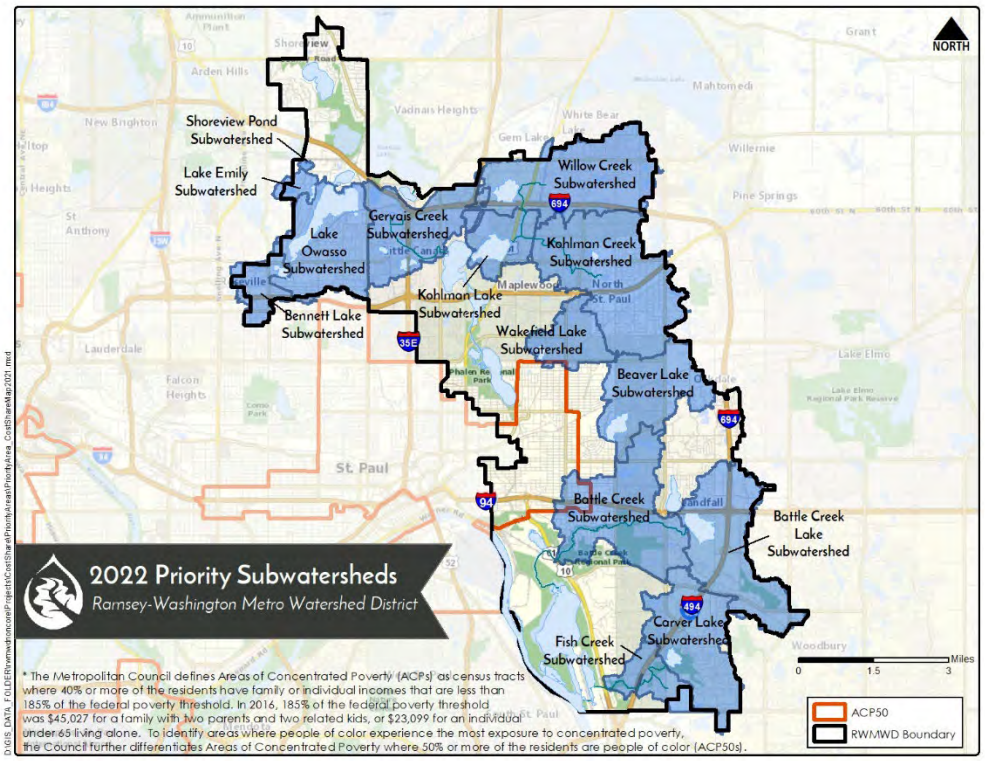
Summary of Woodbury review:

Reviewing the Woodbury street sweeping grant request has supported development of our street sweeping prioritization analysis in a number of ways. The request gave us our first opportunity to develop a cost-benefit analysis based on a street sweeping program request. The cost benefit analysis showed us that, within the City of Woodbury, street sweeping is a cost-efficient non-structural BMP; both in terms of total pollutant reduction and of pollutant reduction to downstream waterbodies. The

review process also gave us an opportunity to run quality assurance and control on our model reduction values against the new MPCA Street Sweeping Calculator to see that both models estimated a similar reduction total for the proposed condition.

Is Woodbury a "high priority" sweeping area?

Although our prioritization analysis is still in progress, there are likely to be high priority areas within all municipalities within the District. Our analysis will include a "heat map" of pollutant loading, as well as maps of high priority sweeping areas based on a number of prioritization criteria (e.g. total pollutant load reduction, pollutant loading prevented from reaching "impaired" or "at risk" waterbodies, etc.). Initial results show that Woodbury has higher average pollutant loading than neighboring municipalities, based on slightly higher development density in those areas within RWMWD. As outlined below, all major RWMWD managed waterbodies within Woodbury (Battle Creek, Battle Creek Lake, Carver Lake, and Fish Creek) are "at risk" or "impaired," and the entire City of Woodbury is currently considered a priority area for the Stewardship Grant Program (shown in blue on the map below). This further supports that many areas within the RWMWD portion of Woodbury will be considered high street sweeping priority areas within the Stewardship Grant Program.



Summary of the street sweeping analysis within Woodbury:

Below is a summary of key elements of our Woodbury street sweeping analysis. Note that from the perspective of total pollutant reduction and effective pollutant reduction, the enhanced street sweeping program produces highly cost-efficient removal of total phosphorus. Please also note the impairment

status of RWMWD managed waterbodies within the City, and the high number of "priority" ponds within the City.

The RWMWD street sweeping model (in development), calculates total pollutant reduction from the proposed Woodbury Enhanced Street Sweeping efforts at an additional 52 pounds total phosphorus per year compared to what they are currently providing (existing conditions removal = 65 lbs TP removal per year; enhanced sweeping program = 117 lbs TP removal per year). Current removal rates may be less than removal predicted by the model, as Woodbury has typically conducted fall sweeping efforts prior to leaf drop. The cost efficiency of the enhanced sweeping program is in the range of $700 to $1,550 per pound of total phosphorous removed, depending on the efficiency assumed.

According to the 2016 RWMWD Pond Prioritization Study, 11 of the 40 highest maintenance-priority ponds and 4 of the top 20 ponds are within the City of Woodbury (411 total ponds were evaluated within the study). The highest priority pond in Woodbury is ranked #11. A "high priority" pond from this study is one that prevents pollutant loading to downstream, RWMWD-managed waterbodies and is at risk of filling quickly over time. Enhanced street sweeping will reduce the amount of sediment going into these ponds and provide additional time before maintenance is needed.

The City will submit an annual report summarizing efforts for the year by the end of the year. The report will include summaries of labor, operation, and maintenance costs in addition to amount of material collected and disposed of, broken down by sweeping area. The collected material will be weighed and screened. This information will be useful in helping us determine future zoning and priority areas within Woodbury and help assess how priority areas should be determined in other municipalities. This is a one-time request and would not guarantee an Enhanced Street Sweeping grant will be funded by RWMWD in the future, nor that the City of Woodbury would be guaranteed such a grant in the future if a program is implemented.

Action Items

Staff is requesting action from the Board on the following items:

- Approve the City of Woodbury's request for a not-to-exceed amount of $50,000 for the implementation of the Enhanced Street Sweeping Plan in RWMWD.

City of Woodbury

Enhanced Street Sweeping Plan

FINAL DRAFT

June 2022

Prepared in Partnership with the

South Washington Watershed District

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EXECUTIVE SUMMARY

Street sweeping is the practice of removing particulates (salt, sand, and soil) and organic matter (leaves, seeds, flowers, etc.) from streets using mechanical broom or vacuum street sweeping vehicles to reduce the amount of pollutants and sediment discharged to stormwater conveyance systems. Traditional municipal street sweeping programs typically involve mechanically sweeping all City streets once in the spring and once in the fall. Enhanced municipal street sweeping programs typically involve sweeping streets with high efficiency sweepers (vacuum type or similar) at higher frequency based on the variable generation of particulates and organic matter to streets.

This Plan identifies road-specific street sweeping timing and frequency, quantifies expected phosphorus load reductions, itemizes costs of enhanced street sweeping (including purchase and subcontract options), and recommends funding options for an enhanced street sweeping program in the City of Woodbury, MN.

The City currently sweeps approximately 606 lane-miles of city-owned roads twice annually, 458 of which lie within South Washington Watershed District. Current sweeping practices improve road safety and appearance and recover (load taken out of the streets) approximately 296 lb of phosphorus (TP) and 277 tons of solids (TS) from City's roads surfaces each year. Key findings from this Street Sweeping Management Plan indicate enhancing the current baseline sweeping practices could increase pollutant recovery by 188 lb of TP and 270 tons of TS for one additional sweeping each in the spring and fall (4 sweeping per year total), and by 660 lb of TP and 776 tons of TS for twice monthly sweepings.

Pollutant recovery through street sweeping also results in a reduction (load prevented from discharging in a downstream waterbody) in TS and TP pollutant loading to stormwater practices and downstream waterbodies. Due to the complex nature of phosphorus transport and transformation, it is difficult to directly correlate recovery to specific load reductions for downstream waterbodies. However, the estimates provided in this report can provide a relative comparison for the sweeping scenarios evaluated. The analysis indicated that compared to estimated load reductions for the baseline effort, the enhanced sweeping scenario (4 sweepings per year) can further reduce TP loading to downstream waterbodies by 92 lb for the baseline effort and by 324 lb for the twice monthly scenario.

For this study, streets were aggregated into sweeping zones at a neighborhood scale considering water resource drainage boundaries, land use type, and tree canopy cover characteristics. Zones are shown in shown in Figure 5 and key characteristics for each sweeping zone are summarized in Table 1. Because much of the City's growth has occurred in recent decades, stormwater infrastructure includes stormwater BMPs that provide some level of protection for downstream resources. For these reasons, sweeping zones were prioritized based on water quality management goals for the downstream resource, (City of Woodbury, 2040 Surface Water Management Plan, SWWD 2018 Lake Management Plan), rather than a lack of existing infrastructure.

Recommendations for sweeping frequency by zone are outlined in Section 8 of this report. The analysis identified four priority zones which would benefit from increasing frequency of sweeping to twice monthly: SW-3, SW-4, SW-5, and SW-7. Sweeping in these zones will primarily benefit Wilmes Lake North, Wilmes Lake

South, Powers Lake, and Colby Lake. All other sweeping zones in the City of Woodbury Surface Water Management Plan, would benefit from monthly sweeping (7 sweepings per season) for protection of downstream water quality and BMP longevity. Recommendations are presented in a 2-tiered format to provide options for gradual implementation of an in-house Enhanced Street Sweeping Program for the City of Woodbury.

1. INTRODUCTION

This study was commissioned by the South Washington Watershed District (SWWD) to support the adoption of an enhanced street sweeping program by the City of Woodbury as part of their surface water management plan and regular Best Management Practice (BMP) maintenance program. The objectives of this study are to identify road-specific recommendations for the timing and frequency of street sweeping, quantify the resulting phosphorus and sediment load reductions to area lakes, itemize the costs of implementing an enhanced street sweeping program, and provide a cost-benefit analysis for recommendations with respect to water quality goals and current maintenance practices.

Enhanced street sweeping has been identified as a potential BMP for treating stormwater runoff to several large recreational lakes in the City of Woodbury: Colby, La, Markgrafs, Wilmes, and Powers Lakes in the SWWD and Battle Creek and Carver Lakes in the Ramsey-Washington Metro Watershed District (RWMWD). The SWWD and the City have discussed the benefits of modifying their existing street sweeping program from one spring and one fall sweep to more than two sweeps per year.

2. BENEFITS

Most cities do some amount of street sweeping each year to improve road safety and appearance, but recent research into the potential water quality benefits of street sweeping has shown that street sweeping is a cost-effective and efficient means to reduce pollutant loads to storm sewer infrastructure and downstream water resources (Selbig, 2016; Kalinosky et. al 2013, others). In response to this growing body of evidence, many cities across the country have implemented robust sweeping programs as an integral part of storm and surface water management (MN Stormwater Manual, Buranen, 2018):

- The City of Forest Lake, MN sweeps 120 miles of streets monthly at a minimum and twice monthly in sensitive areas.
- The City of Blaine, MN owns 4 street sweepers that are used to sweep 240 miles of street twice each spring and fall for a total of 4 times per year and weekly in downtown and lake water quality areas.
- The City of St. Cloud, MN operates 3 mechanical broom and 2 regenerative air sweepers during the snow-free season and, in addition to spring and fall cleanings, sweeps streets 1-4 times in the summer depending on stormwater management priority.

- The City of Englewood, CO's street sweeping program includes 121 miles of street that are swept curb-to-curb (parking ban) in the spring and fall with monthly 'routine' sweeping (no parking ban) during the summer.
- The City of Odessa, TX sweeps 490 miles using five sweepers, with streets swept twice per month and downtown areas swept minimally three times per month.

Stormwater management in older neighborhoods tends to be comprised mainly of catch basin and pipe networks that convey stormwater runoff directly from streets to surface waters with little or no structural BMPs in place to intercept and treat stormwater. Therefore, source control measures like street sweeping are the primary tools available to protect downstream water quality.

In newer neighborhoods, stormwater management systems tend to include structural BMPs such as detention ponds and infiltration basins which performance is highly sensitive to solids accumulation. While these BMPs provide water quality treatment for stormwater runoff from streets, they accumulate sediment which must be removed periodically to maintain BMP pollutant removal efficiency.

Additional benefits of street sweeping include reduced clogging and flooding of storm drains, reduced maintenance to downstream stormwater infrastructure, improved safety for pedestrians, and reduced presence of pests. Finally, street sweeping presents the advantages of ease of adaptation and preventative management, as opposed to reactive measures. Scheduling, frequency, and routes are easily altered and implemented to meet current needs and budget and experimented with to increasing efficiency.

2.1. Protection of Water Resources

Numerous waterbodies within the City of Woodbury receive runoff from Woodbury streets. These include eight DNR Public Waters that are identified as key water resources in the City's 2040 Local Surface Water Management Plan (WSB, 2019): Bailey Lake, Colby Lake, La Lake, Markgrafs Lake, Powers Lake, and Wilmes Lake, located within the SWWD; and Battle Creek Lake and Carver Lake, located within in the RWMWD. Some streets discharge their untreated runoff directly into receiving waters, while others enter the City's stormwater management systems prior to discharge.

All of Woodbury's lakes located within the SWWD have comprehensive diagnostics studies that identify total phosphorus (TP) and total solids (TS) as pollutants of concern and define reductions needed to ensure that beneficial uses are maintained. The 2018 South Washington Watershed District Six Lake Management Plan Study identified TP reduction goals of 1,303 lb/yr, or 63% of the total load, to Colby Lake, 17 lb/yr, or 28%, to La Lake, 209 lb/yr, or 63%, to Markgrafs Lake, 265 lb/yr, or 26%, to North Wilmes, and 108 lb/yr, or 14%, to South Wilmes Lake, respectively. Street sweeping was identified as a cost-effective BMP in all these lake studies. These same lakes are included on Minnesota's 2020 Impaired Waters List and are slated to undergo the TMDL process by 2024.

2.2. Compliance with Permits & Policies

2.2.1. MS4 Permit Requirements

The City of Woodbury is a Municipal Separate Storm Sewer System (MS4) community subject to stormwater regulation under the Clean Water Act and Minnesota Rule 7090. As such, the City is required to develop a Storm Water Pollution Prevention Plan (SWPPP) to reduce the discharge of pollutants from their storm sewer. Street sweeping can be used to fulfill some of the MS4 permit requirements. The City submitted a revised SWPPP to the state in April 2021 following issuance of a new MS4 General Permit (MNR040000) by the Minnesota Pollution Control Agency in November 2020.

Good Housekeeping and Maintenance

Under the terms of Permit MNR040000, MS4s are required to implement an Operations and Maintenance Program to prevent or reduce discharge of pollutant from any MS4-owned facilities. Source control measures like street sweeping are encouraged as part of this good housekeeping practice. Although not specifically identified as a housekeeping practice by the City in the current SWPPP, the sweeping that is completed each year does reduce the discharge of pollutants from City's streets and parking areas in compliance with the terms of the permit.

Impaired Waters and Approved TMDLs

Under item 22.1 of the General Permit – Discharges to Impaired Waters with a USEPA-Approved TMDL, MS4s must document progress towards Wasteload Allocations (WLAs) where the MS4 discharges to an impaired water with a USEPA-approved TMDL. There is one waterbody within the City's jurisdictional boundary with an active USEPA-approved TMDL: Fish Creek is impaired for aquatic recreation and an E.coli TMDL was approved in 2017. There are no applicable WLAs for this TMDL, but the City has identified removal of organic matter via street sweeping as an action that will be taken to reduce the amount of bacteria entering the creek. The City may have WLAs for other TMDLs in the near future. Several lakes within the City boundary are impaired for aquatic recreation due to excess nutrient with TMDL studies expected by 2025.

Education and Outreach

Street sweeping programs can provide opportunities for public engagement and education. The City of Forest Lake, MN added a colorful wrap with pollutant removal statistics and water quality themes to their street sweeper and implemented a 'spot the sweeper' program to garner public interest and support. Many cities, including Woodbury, use social media like Facebook, NextDoor, Twitter, or YouTube, to post educational segments on City's maintenance practices. Educational notices and articles are also commonly shared through municipal newsletters.

2.2.2. Non-degradation Policies

The City of Woodbury lies within the jurisdiction of three watershed districts: the South Washington Watershed District (SWWD), Ramsey-Washington Metro Watershed District (RWMWD), and Valley Branch Watershed District (VBWD). Stormwater management rules for these watersheds include non-degradation policies that apply to both water quality and volume control. Enhanced street sweeping provides additional assurance for non-degradation of water quality by reducing pollutant loads and contributes to non-degradation of stormwater volume by reducing loss of storage volume through decreased sediment loading

to stormwater ponds and other BMPs. RWMWD policies include requirements that cities within watershed jurisdiction provide descriptions of municipal maintenance practices and call out street sweeping as an example. Similarly, SWWD requires programs for BMP maintenance. A complete list of water resources related agreements and permits can be found in the Section 5 of the City's 2040 Local Surface Water Management Plan.

2.3. Safety, Aesthetics, and Public Relations

Historically, safety and aesthetics have been the primary reasons for municipal street sweeping. Accumulated sand and trash detract from curb appeal, may contribute to storm sewer clogging (and subsequent flooding), and may pose a safety risk to bicycles and pedestrians.

Several articles have detailed the popularity of street sweepers with City staff and residents, both as a public education opportunity for water resource protection and as a cleanliness and aesthetic public benefit (e.g., Buranen, 2017, 2018). In Milwaukee, for example, residents even called for increased sweeping, leading the City's Public Works Department to experiment with double sweeping to twice per month in test sites around the University (Stormwater Magazine, 2014).

2.4. Maintenance Benefits

2.4.1. Local Flood Protection

Regular sweeping can reduce clogging and flooding at storm drain inlets. In 2011-2012, the City of Prior Lake, MN participated in a 2-year study of intensive, targeted street sweeping. City staff reported that storm drain clogging was a non-issue in street sweeping zones, resulting in far fewer maintenance calls from residents (Bintner, 2012). Echoing this observation, Plaquemine, LA City staff recommended street sweeping as the "best tool" for preventing issues with flooding and in drainage systems that typically plague small Bayou towns (Buranen, 2015).

2.4.2. Roadway Maintenance Life

Sweeping can also play a part in a preventative maintenance plan to extend the life of pavement surfaces. Sweeping removes sand and fines which wear down pavement when vehicles pass over paved surfaces. Fine particles that collect in cracks provide a substrate for vegetation to colonize cracks, making pavement more susceptible to freeze/thaw damage and further cracking.

2.4.3. BMP Maintenance Life Cycles

The pollutant removal efficiency of structural BMPs that are designed to remove sediment such as settling ponds, filter strips, and catch basin sumps, decreases as sediment storage capacity is depleted. Eventually, sediment must be removed from the practice to restore removal capacity. By reducing sediment loading to structural BMPs, street sweeping can extend sediment storage capacity and improve pollutant removal efficiency.

3. CURRENT PRACTICES

3.1. Street Sweeping

The City of Woodbury currently sweeps its 606 curb miles of paved roads twice per year: once in the spring to clear salt and tracked sand from roads; and once in the fall to reduce leaf litter on streets. 458 of these lane miles lie within SWWD and the rest divided between RWMWD and VBWD. In addition, the City contains 81.6 miles of roads operated and maintained by the County which were not included in this analysis. The City owns two street sweepers: an Elgin Crosswind regenerative air sweeper and an Elgin Pelican mechanical boom sweeper with water spray for dust control. Both sweepers are used along with a fleet of contracted street sweepers during the spring and fall to complete city-wide street cleaning.

3.2. Other Maintenance Practices

3.2.1. Roadway Maintenance and Rehabilitation

The City's Public Works Department oversees pavement repair (e.g., filling potholes), preservation (e.g., seal-coating, rejuvenation), and rehabilitation (e.g., mill-and -overlay) projects. These road maintenance and rehabilitation practices contribute to the reduction of solids recovered from the City's streets surfaces. The City could benefit from street maintenance schedule coordination with street sweeping.

3.2.2. Storm Sewers and Catch Basins

Public Works staff inspect and clean city-owned catch basins on a regular basis. Sump catch basins and manholes are common practice in places (typically the fully developed areas in the City) where other BMPs are not available. The time and cost associated to cleaning catch basins and manholes would be significantly reduced by enhanced street sweeping.

3.2.3. Stormwater BMP Maintenance

Woodbury's Public Works staff inspects all stormwater ponds and outfalls once every four years and in response to resident concerns.

4. SWEEPING ZONES

Street surfaces are connected to surface waters via stormwater conveyance systems and can be a significant source of pollution to downstream water resources. Key factors that influence pollutant accumulation on streets include pavement type and condition, traffic volume, maintenance practices, adjacent land use, and right-of-way tree canopy.

Streets were aggregated into sweeping zones based on connectivity to downstream water resources, existing stormwater management practices, and right-of-way tree canopy cover characteristics. These considerations are discussed in Sections 4.1 through 4.3, and proposed sweeping zones are summarized in Section 4.4. While not designed as driving routes, zones are composed of contiguous street segments to the degree possible for route management.

4.1. Primary Water Resources

Estimated pollutant reduction benefits are quantified for the eight (8) lakes identified as key water resources in the City's 2040 SWMP: Bailey, Colby, La, Markgrafs, Powers, Wilmes, Battle Creek and Carver; four (4) large wetlands located upstream of a key resource: Tamarack east and west, Evergreen Park, and Marsh Creek Pond; and for watershed areas that discharge stormwater to resources outside the City's boundary.

Table 1. Summary of defining characteristics for street sweeping zones in the City of Woodbury.

Major Watershed		Primary Water Resources	Watershed Characteristics			Lane Miles[4]	
			Stormwater BMPs[1]	Primary Land Use[2]	Right-of-way Tree Canopy[3]	City	County[5]
SWWD	Central Draw	North Wilmes Lake	39	R-4, GW, B-1,2,3	5%	31.0	*2.0*
		South Wilmes Lake	25	R-4, GW, B-1,2,4	2%	40.6	*8.7*
		Evergreen Wetland[6]	19	R-4, B-2,3	6%	21.0	*1.3*
		Markgrafs Lake	20	B-1, 2, 3, MX, R-2	2%	14.3	*4.5*
		Powers Lake	37	R-2,4	4%	32.2	*0.0*
		Fish Lake[6]	16	R-2,4	5%	22.2	--
		Colby Lake	101	R-1,2,4	6%	129.0	*11.1*
		Bailey Lake	96	R-2,4, B-3, MX	4%	99.9	*22.7*
		Marsh Creek Pond[6]	35	R-4	9%	33.2	*3.9*
		Central Draw[7]	5	R-4; R-1	2%	11.6	*1.7*
	East Mississippi	La Lake	*n/a*	R-2	2%	0.9	*0.2*
		Ria Lake	3	R-2	<1%	n/a	*0.6*
		East Mississippi[7]	15	R-2	19%	8.3	*1.7*
	West Draw		27	R-2,4	6%	14.1	*7.3*
RWMWD	Battle Creek	Battle Creek Lake	32	R-2,4, GW, BCD, MX, B-1,2,3,4	11%	14.6	--
		Tamarack Wetland East	38	R-4, B-1	7%	23.9	*9.4*
		Tamarack Wetland West	9	R-4, MCD	<1%	6.6	*2.6*
		Battle Creek[7]	1	R-2,4, B-2	16%	14.9	--
	Carver Lake		83	R-2, R-4, BCD, B-1,2,3, MCD, GW, I-1	10%	74.7	*3.9*
VBWD	Valley Branch Creek		30	R-4, BCD, MX, GW, B-2,3	<1%	13.0	*2.7*

[1] Number of BMPs located within the resource drainage area based on City of Woodbury BMP digital inventory, does not include wetlands or DNR public waters.

[2] City of Woodbury Zoning Map, January 2022.

[3] Tree canopy cover over and within 20 feet of the curb or shoulder line.

[4] Turn lanes and merge lanes are not included.

[5] Century Avenue and Manning Avenue were not included in the study.

[6] This waterbody is a wetland located upstream of the primary water resource.

[7] Portion located within the Woodbury municipal boundary and downstream of primary water resources (Bailey Lake, Ria Lake, Battle Creek Lake).

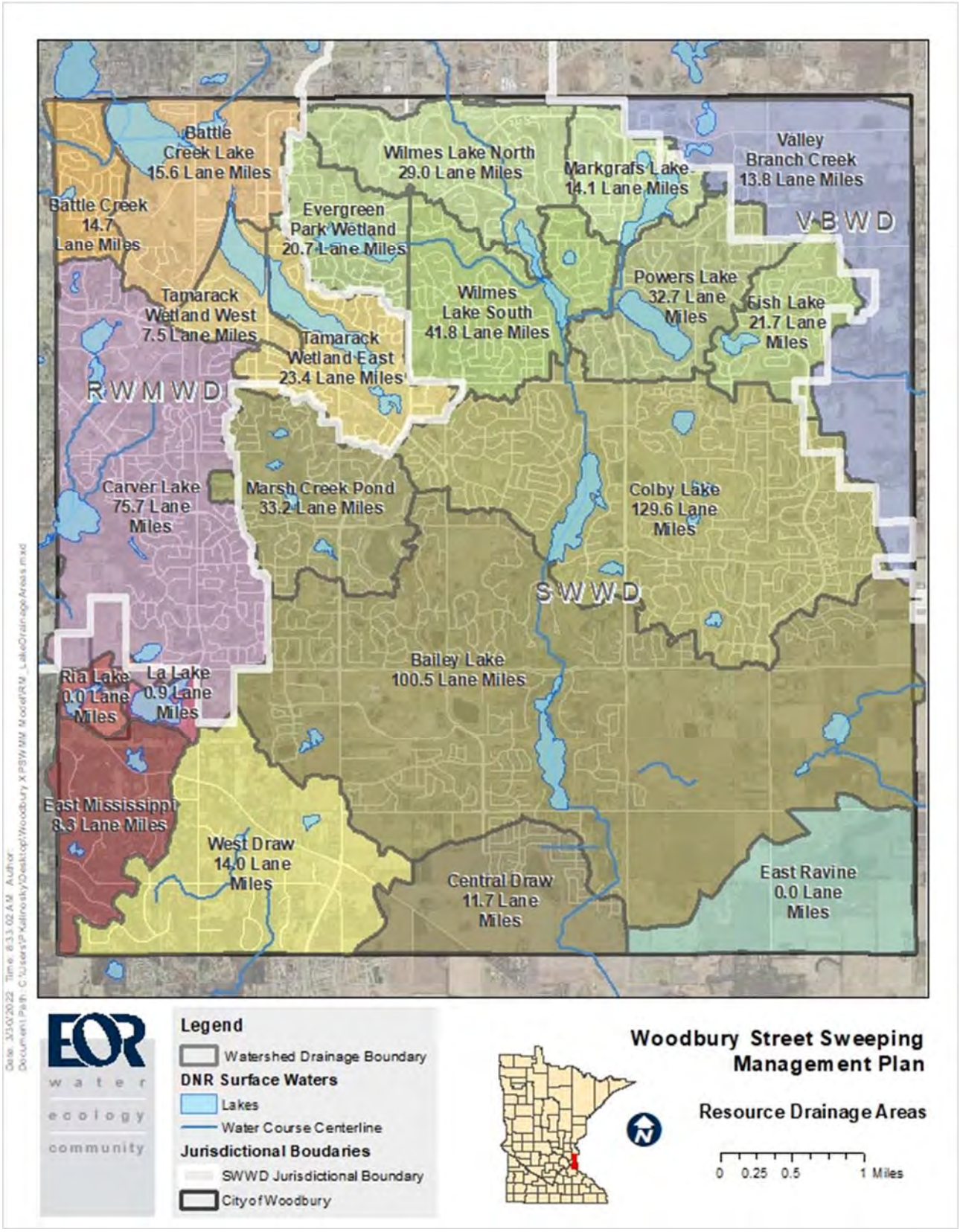

Figure 1. Drainage areas and total lane miles for Woodbury lakes and wetlands included in the study.

4.2. Tree Canopy

Tree canopy is particularly important when considering nutrient pollution. Organic litter from trees can be the primary source of total solids and nutrient loading on street surfaces during certain times of the year in areas of modest to dense tree canopy cover (Kalinosky, 2015). Older neighborhoods laid out in grid fashion tend to have more mature trees in front yard areas and denser right-of-way (ROW) canopy than newer neighborhoods or those with typical suburban street layout patterns. Trees located within front yard setback areas are more likely to contribute leaf litter and duff to road surfaces. Areas with denser tree canopy can act as pollutant 'hot spots' due to the large amount of accumulated organic litter on street surfaces.

Tree canopy cover was quantified over and within a 20-foot buffer of roadway curb lines for all paved public roads within developed portions of the City of Woodbury. The City of Woodbury maintains a geospatial dataset of their boulevard tree inventory. The tree inventory data were overlaid and merged with areas of deciduous tree canopy as identified in the TCMA 1- Meter Land Cover Classification dataset. The TCMA 1- is a high-resolution land cover dataset for the metropolitan area developed by the University of Minnesota in 2015.

Average tree canopy cover for individual street segments were estimated by intersecting deciduous canopy cover data with buffered road surface polygons created from roadway centerline data. Road segment canopy cover data were then aggregated using spatial weighting to calculate the average ROW tree canopy cover within the drainage area of primary water resources (Figure 2) and each proposed sweeping zone (Table 2).

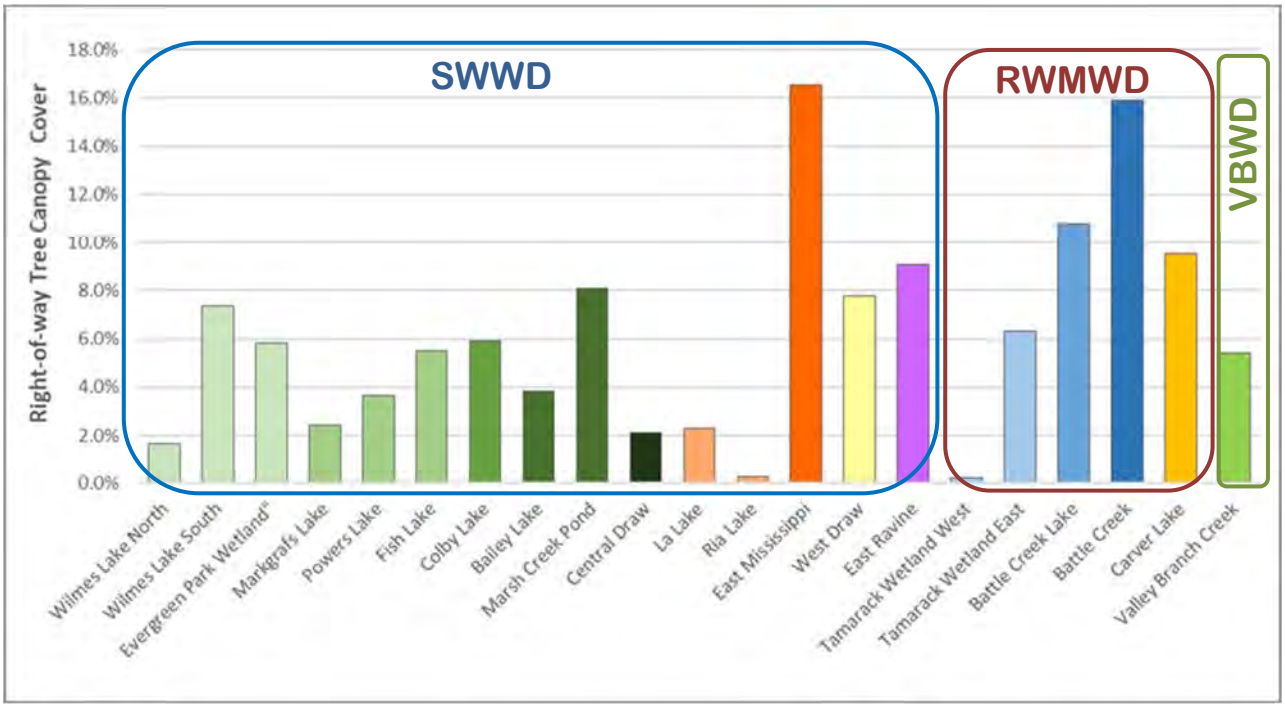

Figure 2. Average right-of-way tree canopy cover for City of Woodbury water resources by watershed district

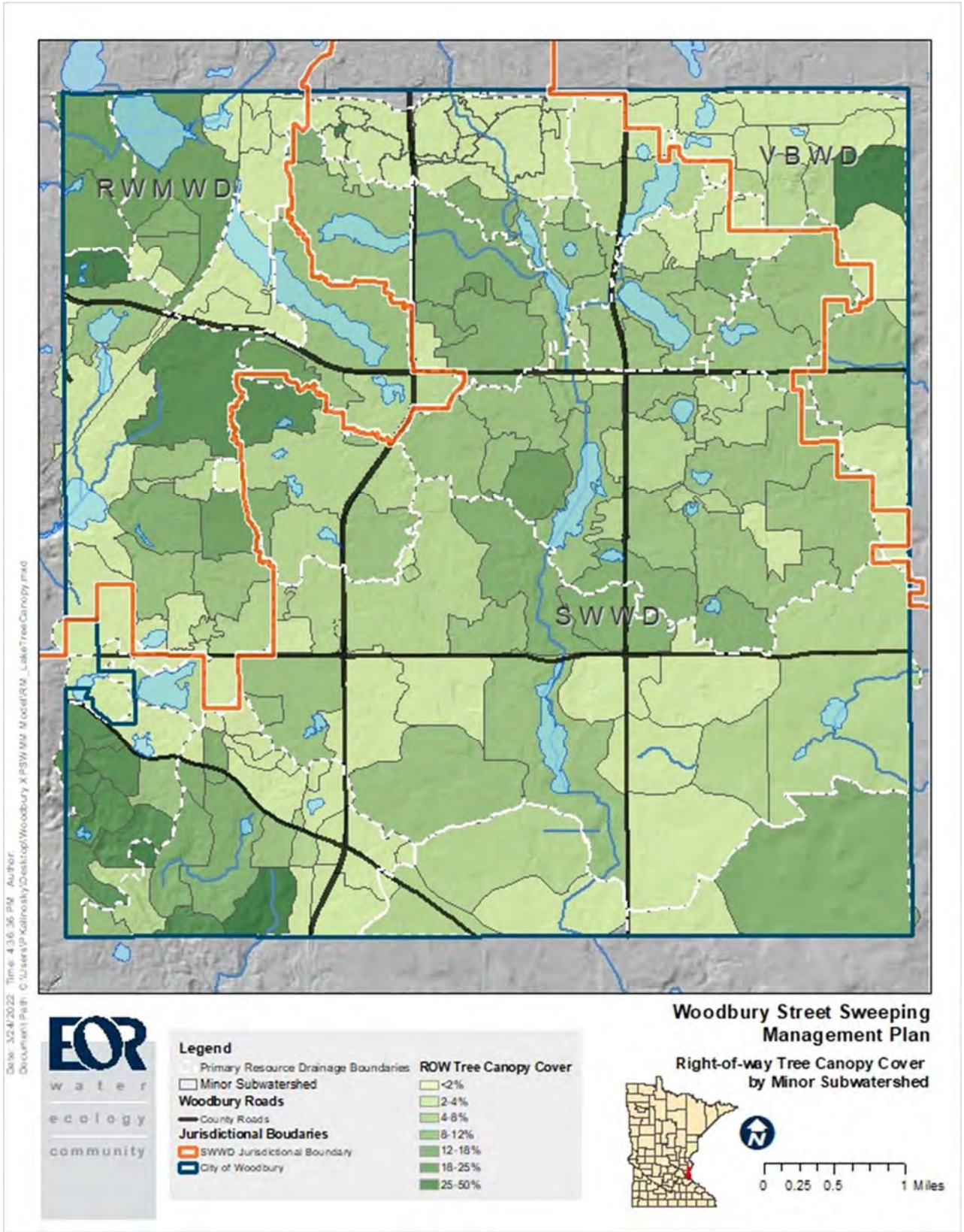

Figure 3. Average ROW tree canopy cover aggregated by minor subwatershed.

4.3. Lane-Miles

The length of street to be swept within each sweeping zone was estimated from road centerline data (Figure 4). The total 'lane-miles' to be swept in each zone is equal to the total length of paved City roadway (centerline) multiplied by the number of driving lanes. Length of turn lanes and merge lanes is a negligible percentage of the total length and difficult to accurately quantify. For these reasons, turn lanes and merge lanes are not included in lane-mile totals. Additionally, most turn and merge lanes are associated with county roads which are shown in grey in Figure 4. County roads were included in the study, but pollutant recovery was estimated separately due to differences in ownership and maintenance responsibility.

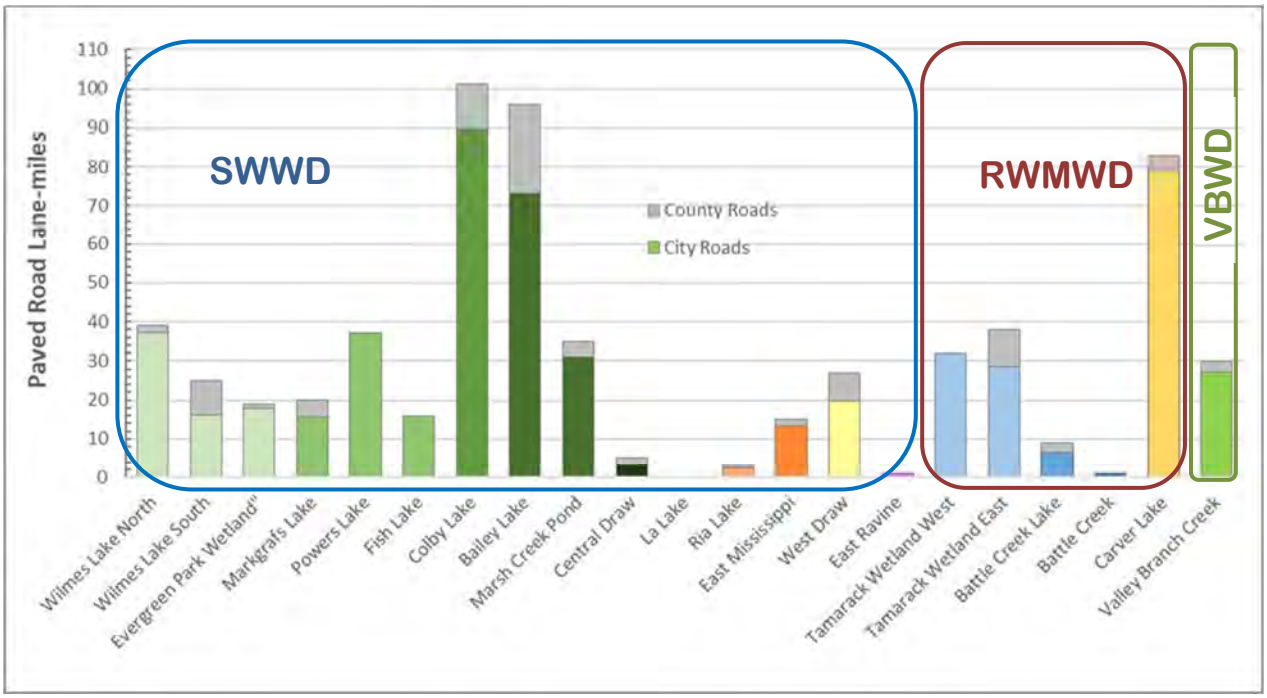

Figure 4. Paved road lane-miles within the City of Woodbury water resource drainage areas by watershed district.

4.4. Proposed Sweeping Zones

Streets were aggregated into sweeping zones based on connectivity to downstream water resources, storm water management type, and tree canopy cover characteristics. Sweeping zone characteristics are summarized in (Table 2) and sweeping zones are mapped in Figure 5. Maps of individual sweeping zones are included in Appendix A.

Table 2. Summary of Proposed Sweeping Zones

Zone ID	Downstream Resource	Lane Miles		Average ROW Tree Canopy (%)	Workdays Needed, Single Sweeper[1]
		Zone Total	% by Waterbody Drainage Area		
SW-1	Battle Creek Lake	0.6	3.8%	2.0	**0.9**
	Evergreen Wetland	9.2	55.0%		
	Wilmes Lake North	6.9	41.2%		
	SW-1 Total Lane Miles	**16.7**	*100%*		
SW-2	Markgraf's Lake	5.9	25.0%	4.0	**1.2**
	Wilmes Lake North	17.3	73.2%		
	Wilmes Lake South	0.4	1.8%		
	SW-2 Total Lane Miles	**23.6**	*100%*		
SW-3	Colby Lake	1.1	3.8%	5.0	**1.5**
	Markgraf's Lake	2.1	7.3%		
	Powers Lake	3.7	13.0%		
	Wilmes Lake North	6.8	23.9%		
	Wilmes Lake South	14.7	52.0%		
	SW-3 Total Lane Miles	**28.4**	*100%*		
SW-4	Colby Lake	0.3	0.6%	4.0	**2.2**
	Fish Lake	18.7	43.7%		
	Powers Lake	23.5	54.6%		
	Valley Branch Creek	0.5	1.1%		
	SW-4 Total Lane Miles	**43.0**	*100%*		
SW-5	Colby Lake	0.4	1.8%	9.0	**1.2**
	Wilmes Lake South	23.0	98.2%		
	SW-5 Total Lane Miles	**23.4**	*100%*		
SW-6	Bailey Lake	17.2	49.2%	4.0	**1.8**
	Colby Lake	6.2	17.4%		
	Marsh Creek Pond	7.8	22.3%		
	Tamarack Wetland East	2.2	6.2%		
	Wilmes Lake South	1.6	4.7%		
	SW-6 Total Lane Miles	**35.0**	*100%*		
SW-7	Bailey Lake	17.6	33.0%	8.0	**2.8**
	Colby Lake	35.1	65.5%		
	Wilmes Lake South	0.8	1.5%		
	SW-7 Total Lane Miles	**53.5**	*100%*		
SW-8	Colby Lake	53.1	97.2%	5.0	**2.8**
	Fish Lake	1.3	2.3%		
	Valley Branch Creek	0.3	0.5%		
	SW-8 Total Lane Miles	**54.7**	*100%*		
SW-9	Bailey Lake	11.6	26.0%	4.0	**2.3**
	Colby Lake	32.7	73.3%		
	Valley Branch Creek	0.3	0.73%		
	SW-9 Total Lane Miles	**44.6**	*100%*		
SW-10	East Mississippi	8.3	35.9%	14.0	**1.2**
	La Lake	0.9	4.1%		
	West Draw	13.9	60.1%		
	SW-10 Total Lane Miles	**23.1**	*100%*		
SW-11	Bailey Lake	47.4	80.1%	4.0	**3.0**
	Central Draw	11.6	19.6%		

Zone ID	Downstream Resource	Lane Miles		Average ROW Tree Canopy (%)	Workdays Needed, Single Sweeper[1]
		Zone Total	% by Waterbody Drainage Area		
	West Draw	0.2	0.3%		
	SW-11 Total Lane Miles	**58.2**	*100%*		
M-1	Battle Creek Lake	0.1	0.5%	4.0	**1.1**
	Evergreen Wetland	11.6	52.8%		
	Tamarack Wetland East	10.2	46.4%		
	Wilmes Lake South	0.1	0.3%		
	M-1 Total Lane Miles	**22.0**	*100%*		
M-2	Carver Lake	1.20	5.8%	14.0	**1.1**
	Marsh Creek Pond	9.09	44.2%		
	Tamarack Wetland East	10.29	50.0%		
	M-2 Total Lane Miles	**20.6**	*100%*		
M-3	Bailey Lake	7.10	19.6%	6.0	**1.9**
	Carver Lake	16.95	46.7%		
	Marsh Creek Pond	12.22	33.7%		
	M-3 Total Lane Miles	**36.3**	*100%*		
RMW-1	Battle Creek	14.89	66.8%	7.0	**1.2**
	Battle Creek Lake	2.37	10.6%		
	Carver Lake	5.02	22.5%		
	RMW-1 Total Lane Miles	**22.3**	*100%*		
RMW-2	Battle Creek Lake	11.53	35.7%	7.0	**1.8**
	Carver Lake	12.82	39.6%		
	Evergreen Wetland	0.23	0.71%		
	Tamarack Wetland East	1.18	3.7%		
	Tamarack Wetland West	6.58	20.4%		
	RMW-2 Total Lane Miles	**32.3**	*100%*		
RMW-3	Carver Lake	38.70	90.4%	6.0	**2.2**
	Marsh Creek Pond	4.10	9.6%		
	RMW-3 Total Lane Miles	**42.8**	*100%*		
VB-1	Fish Lake	2.20	8.6%	5.0	**0.9**
	Markgraf's Lake	6.32	24.8%		
	Powers Lake	5.08	19.9%		
	Valley Branch Creek	11.88	46.6%		
	VB-1 Total Lane Miles	**25.5**	*100%*		
	TOTAL	**606**			**31.6**

[1] Based on a single lane pass. Used to determine the number of sweepers needed to complete the sweeping scenario within the specified timeframe. For example, a single sweeper would not fulfill the sweeper demand for monthly city-wide street sweeping since 31.6 days. Two sweeper working full time could compete a single lane pass in 31.6 divided by 2, or about 16 workdays. Additional details provided in Appendix C.1.

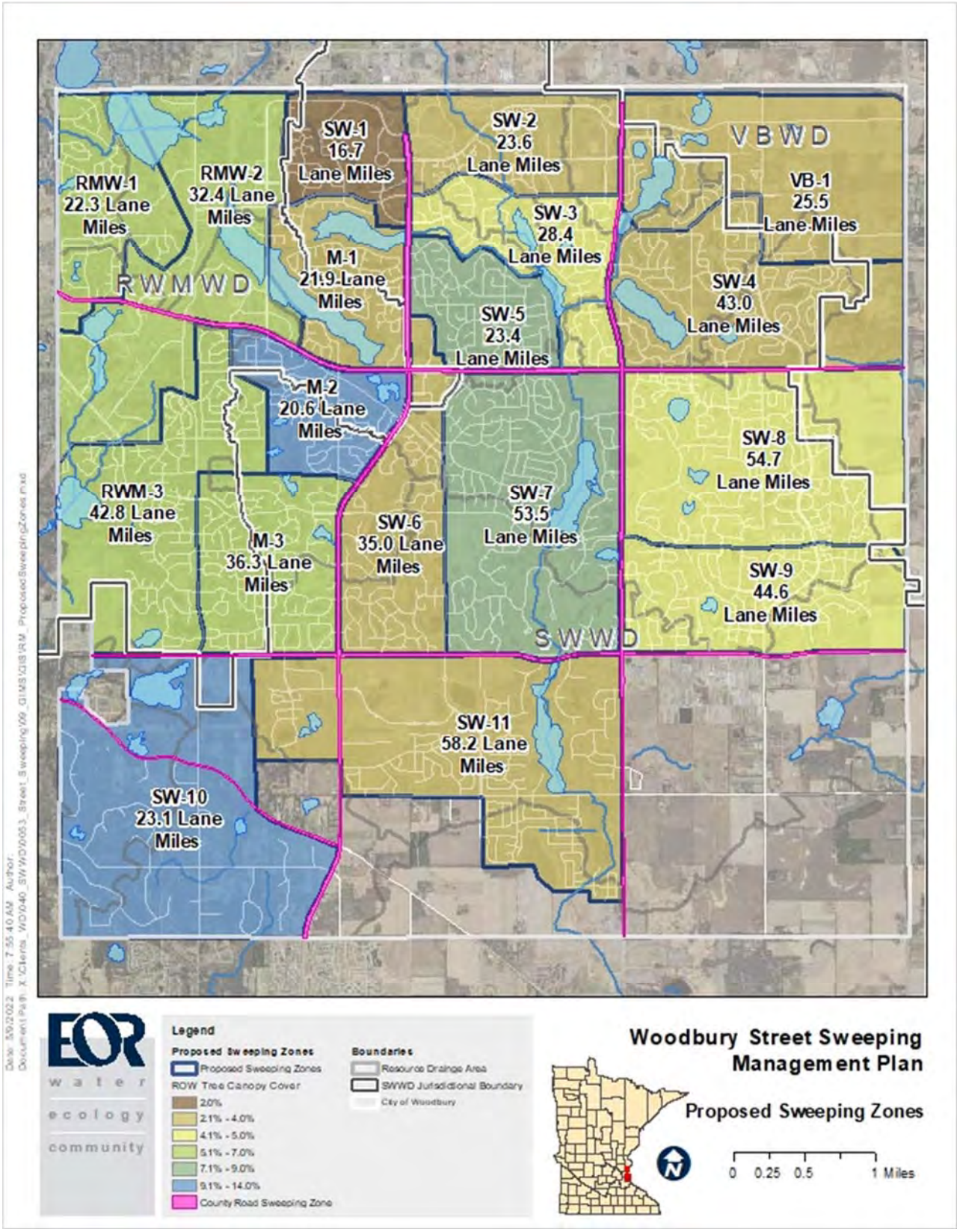

Figure 5. City of Woodbury sweeping zones. Maps of individual zones are included in Appendix A.

5. LOAD RECOVERY AND LOAD REDUCTION ESTIMATES

Pollutant reductions can be characterized in two ways for street sweeping: the total amount of pollutant collected from the street surface (load recovery); and the total reduction in load to a downstream surface water (load reduction). Load recovery is greater than load reduction due to treatment provided by BMPs that reduce pollutant loads along the flow network from street surface to water resources. For the purposes of this plan, load recovery and load reduction estimates were calculated for Total Solids (TS) and Total Phosphorus (TP), the pollutants of concern for BMP maintenance and lake water quality.

5.1. Load Recovery

To facilitate comparisons, potential pollutant recovery was estimated for the simplistic sweeping scenarios listed in Table 3 with all streets being swept during the snow-free season (April 1 – October 31). Average pollutant recovery was estimated for the sweeping scenarios using a street sweeping planning calculator tool developed by the University of Minnesota, 'Estimating Nutrient and Solids Load Recovery through Street Sweeping' (Kalinosky, et. al, 2014). The tool predicts the average annual mass of solids and nutrients that can be recovered from streets based on the length of street to be swept, the timing (month) and frequency of sweeping, and density of tree canopy cover over the street. The tool was calibrated using street sweeping data collected over a 2-year period in Prior Lake, MN and is intended for use in comparable settings (climate and geography). Actual pollutant recovery is expected to vary somewhat compared to estimates. Factors such as precipitation, climate, and land disturbing activities may affect solids loading to streets and typically vary somewhat from year to year.

Table 3. Street sweeping scenarios used in load recovery and load reduction estimates.

Sweeping Scenario	Number of Sweeps per Year	Description
Baseline	2	One sweeping each in the spring and fall
Enhanced Baseline	4	Two sweepings each in the spring and fall
Monthly	7	Once per month sweeping during the snow-free season
Bi-weekly	14	Twice per month sweeping during the snow free season
Weekly	28	Four sweepings per month during the snow free season

Pollutant recovery estimates (TS, TP) for each scenario are summarized by downstream resources in Table 4. The 'Baseline' scenario represents the City's current sweeping practice. Current practice is estimated to remove about 277 tons of gross solids containing 296 pounds of phosphorus each year.

Table 4. Summary of estimated annual total solids and phosphorus recovery by receiving waterbody for the street sweeping scenarios described in Table 3.

Watershed District | Major Watershed		Primary Water Resources	Sweeping Scenario | Predicted Pollutant Recovery from City Street Surfaces									
			Baseline		Enhanced Baseline		Monthly		2 X Per Month		Weekly	
			TS (tons)	TP (lb)	TS (tons)	TP (lb)	TS (tons)	TP (lb)	TS (tons)	TP (lb)	TS (tons)	TP (lb)
SWWD	Central Draw	Wilmes Lake North	13.0	13.8	25.6	22.5	44.5	33.0	49.4	44.5	76.8	79.8
		Wilmes Lake South	19.5	20.9	38.4	34.1	66.8	50.0	74.0	67.4	115.1	120.8
		Evergreen Park Wetland	8.6	9.1	17.0	14.9	29.6	21.9	32.8	29.6	51.0	53.0
		Markgrafs Lake	6.1	6.5	12.0	10.5	20.8	15.5	23.1	20.8	35.9	37.4
		Powers Lake	13.7	14.6	27.0	23.8	47.0	34.9	52.1	47.0	81.0	84.3
		Fish Lake	9.4	10.0	18.6	16.3	32.3	24.0	35.8	32.3	55.7	57.9
		Colby Lake	58.2	62.2	115.1	101.7	200.0	149.1	221.6	201.0	344.7	360.2
		Bailey Lake	43.8	46.7	86.6	76.3	150.5	112.0	166.8	150.9	259.4	270.5
		Marsh Creek Pond	16.3	17.5	32.2	28.6	55.9	41.9	61.9	56.5	96.3	101.3
		Central Draw	4.9	5.2	9.7	8.5	16.8	12.5	18.7	16.8	29.0	30.2
	East Mississippi	La Lake	0.6	0.6	1.1	1.0	2.0	1.5	2.2	2.0	3.4	3.6
		East Mississippi	5.1	5.5	10.0	9.0	17.4	13.2	19.3	17.9	30.0	32.0
	West Draw		8.6	9.3	16.9	15.3	29.4	22.4	32.6	30.2	50.7	54.1
	SWWD TOTAL		**207.6**	**221.9**	**410.4**	**362.7**	**712.9**	**531.9**	**790.2**	**717.1**	**1228.9**	**1285.1**
RWMWD	Battle Creek	Battle Creek Lake	6.8	7.3	13.5	11.9	23.4	17.5	26.0	23.6	40.4	42.3
		Tamarack Wetland West	3.1	3.3	6.1	5.4	10.7	8.0	11.8	10.8	18.4	19.3
		Tamarack Wetland East	12.1	13.0	23.8	21.3	41.4	31.2	45.9	42.0	71.4	75.4
		Battle Creek	7.0	7.5	13.9	12.3	24.1	18.1	26.8	24.3	41.6	43.6
	Carver Lake		34.5	36.9	68.1	60.3	118.4	88.4	131.2	119.2	204.0	213.5
	RWMWD TOTAL		**63.5**	**68.1**	**125.5**	**111.2**	**218.0**	**163.1**	**241.7**	**219.9**	**375.8**	**394.1**
VBWD	Valley Branch Creek **/TOTAL**		5.5	5.8	10.8	9.5	18.8	14.0	20.9	18.8	32.4	33.7
ALL			**276.6**	**295.8**	**546.7**	**483.4**	**949.8**	**709.0**	**1052.8**	**955.9**	**1637.2**	**1713.0**

Pollutant load recovery trends for the estimates in Table 4 are shown graphically in Figure 6 and Figure 7. The graphics show how the efficiency of TS and TP load recovery (lb per lane-mile) decreases as the number of sweepings per year is increased while total recovery (lb/yr) increases. As it pertains to water quality benefits, these trends should be interpreted as - 'even a few additional sweeping can increase recovery significantly' and 'sweeping frequency is directly correlated with annual pollutant recovery.'

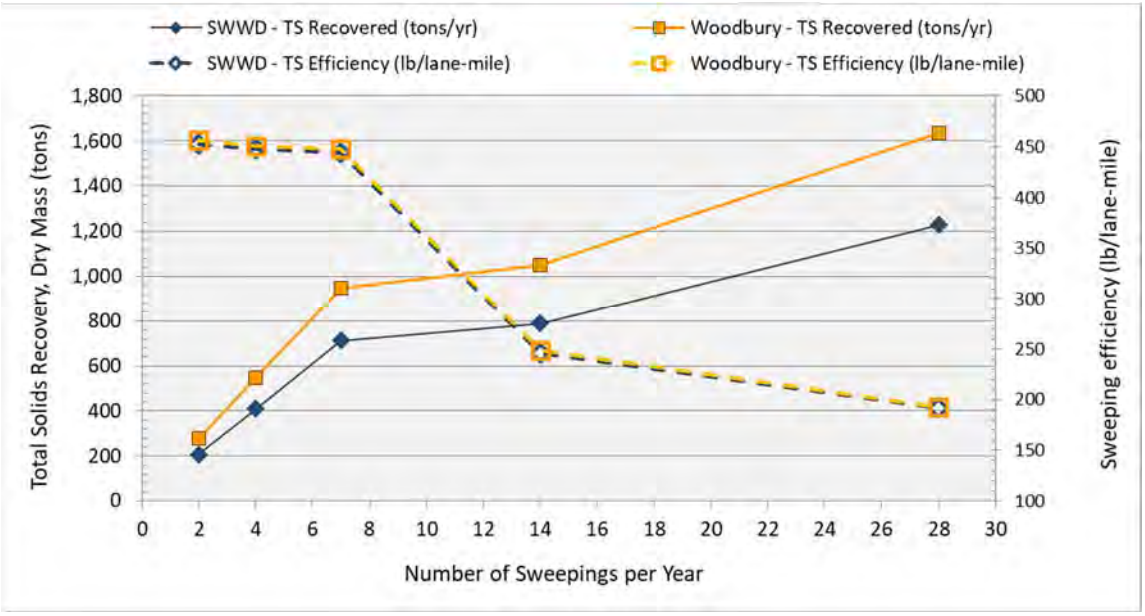

Figure 6. Cumulative total solids and average total solids recovery vs. number of sweepings per year for waterbodies in the SWWD and the City of Woodbury.

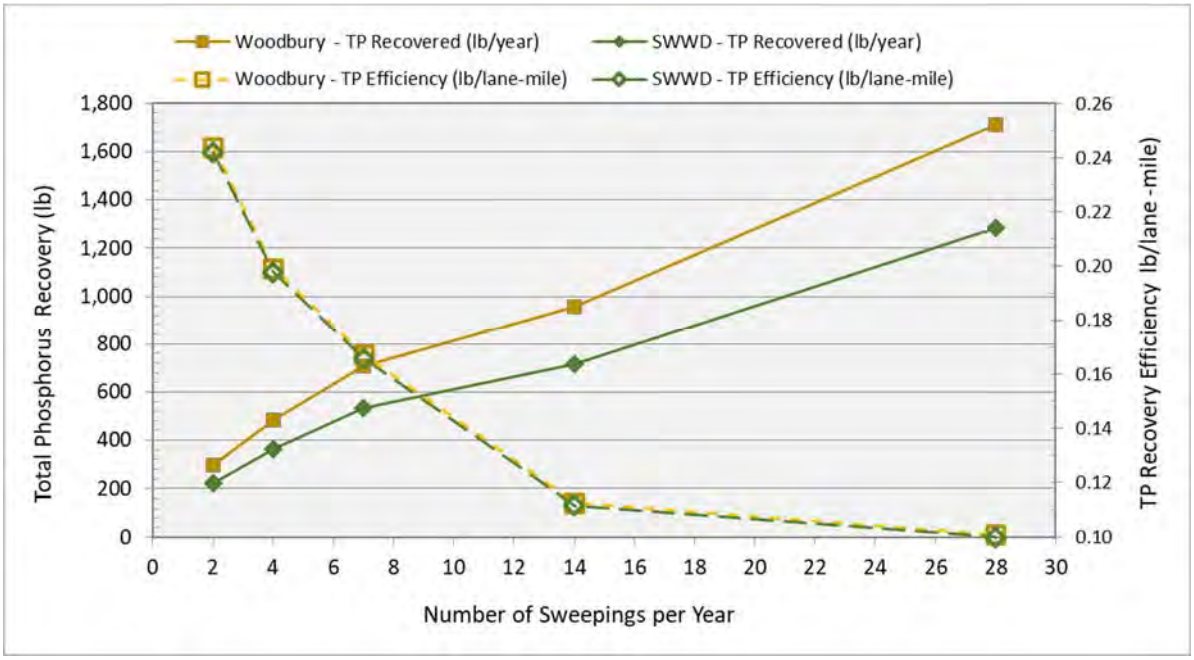

Figure 7. Cumulative total phosphorus and average total phosphorus recovery vs. number of sweepings per year for waterbodies in the SWWD and the City of Woodbury.

5.2. Load Reduction Potential

The potential load reductions reported in this study are equal to the estimated mass of pollutants recovered through street sweeping minus the estimated mass of pollutants retained in upstream BMPs based on modeled removal pollutant removal efficiencies. Uncertainties in this method stem include uncertain in recovery estimates (Section 5.1), uncertainty in BMP treatment efficiency estimates (Table 6), but also uncertainty in pollutant transport, especially phosphorus. A significant portion of the TP present in organic matter (e.g., leaves, grass clips) will not be released into the downstream water resource through decomposition or other mechanisms and will not be biologically available to impact the water resource. The effects of these complex interactions on load reduction estimates are beyond the scope of this study. Therefore, due to the limitation of the method used, the load reductions shown in this report should be used for relative comparisons of potential water quality benefits for different street sweeping scenarios; and should not be directly equated to the TP load reduction targets stablished in Lake Diagnostic studies, TMDLs, and other reports.

Estimated pollutant load reductions to downstream waterbodies are based on the following assumptions:

- Over time, all solids on the street surface will be transported to the storm sewer system and ultimately to downstream waterbodies.
- The design efficiency of modeled BMPs can be applied to solids which typically collect on street surfaces (including organic material).
- The design efficiency of modeled BMPs is preserved through regular maintenance.

The SWWD maintains water quality models (P8) of the district's primary water resources (Houston Engineering, 2010-2017) including Wilmes- (north and south segments), Markgrafs-, Powers-, and Fish Lake. For these resources, pollutant load reductions to downstream resources were estimated by applying the modeled removal efficiency of BMPs located upstream of the water resource of interest to load recovery estimates.

For water bodies outside the SWWD and those not represented in water quality models, estimates for the collective pollutant removal capacity of upstream BMPs were derived by applying median BMP removal efficiencies (MN Stormwater Manual, Table 5) to the City of Woodbury's BMP inventory. BMP removal efficiencies were assigned to the minor subwatershed containing each BMP. A weighted-average, based on the length of roadway contained within the minor subwatershed, was then used to aggregate minor subwatersheds and estimate collective removal efficiencies for BMPs within each water resource drainage area.

Estimated collective pollutant removal efficiencies for BMPs upstream of individual water resources are summarized in Table 6 and pollutant load reductions (total solids and total phosphorus) for each sweeping scenario are summarized in Table 7. Since the number and kind of structural BMPs vary among sweeping zones, sweeping appears to be more effective as a water quality BMP in areas with few structural BMPs (load reduction ≈ load recovery). However, sweeping in zones with many structural BMPs is still important to help preserve the removal efficiency of those BMPs and consequently protect downstream water quality.

Table 5. Median BMP removal efficiencies (Minnesota Stormwater Manual) used to estimate the collective pollutant removal efficiency of BMPs located upstream of resources for which water quality modeling data were not available.

Pollutant	No BMPs	Stormwater Wetland	Wet Pond*	Pervious Pavement	Dry Pond[1]	Infiltration Practices	
						Volume Infiltrated[2]	Overflow Volume[2]
TP	0%	40%	50%	45%	20%	100%	*n/a*
TSS	0%	55%	84%	72%	35%	100%	*n/a*

TP = total phosphorus; TSS = total suspended solids

[1]Value for wet swale

[2]Applied to RG BMP, 100% applied to 5 acres, overflow to remainder, underground 10 acres, permeable pavement – SA of pavement, 5-acres for dry swale : https://stormwater.pca.state.mn.us/index.php?title=Stormwater_infiltration_BMPs_-_contributing_drainage_area

*Medium Removal efficiency:
https://stormwater.pca.state.mn.us/index.php?title=Pollutant_removal_percentages_for_stormwater_pond_BMPs

Table 6. Estimated collective pollutant removal efficiency for existing stormwater BMPs within each resource drainage area.

Watershed District	Receiving Waterbody	Estimated Pollutant Removal Efficiency	
		TS	TP
SWWD	Wilmes Lake North	69%	52%
	Wilmes Lake South	83%	61%
	Evergreen Park Wetland	72%	45%
	Markgrafs Lake	88%	71%
	Powers Lake	96%	65%
	Fish Lake	93%	61%
	Colby Lake	94%	68%
	Bailey Lake	63%	38%
	Marsh Creek Pond	80%	47%
	Central Draw	53%	33%
	La Lake	55%	40%
	Ria Lake	100%	100%
	East Mississippi	59%	35%
	West Draw	71%	44%
RWMWD	Tamarack Wetland East	64%	42%
	Tamarack Wetland West*	62%	37%
	Battle Creek Lake	63%	41%
	Battle Creek	74%	40%
	Carver Lake	67%	41%
VBWD	Valley Branch Creek	69%	38%

Table 7. Theoretical annual pollutant load reductions (total solids and phosphorus) to waterbodies for street sweeping scenarios described in Table 3.

Watershed District | Major Watershed		Primary Water Resources	Sweeping Scenario | Predicted Pollutant Reduction to Downstream Waterbody									
			Baseline		Enhanced Baseline		Monthly		2 X Per Month		Weekly	
			TS (tons)	TP (lb)	TS (tons)	TP (lb)	TS (tons)	TP (lb)	TS (tons)	TP (lb)	TS (tons)	TP (lb)
SWWD	Central Draw	Wilmes Lake North	4.0	6.6	7.9	10.8	13.8	15.9	15.3	21.4	23.8	38.3
		Wilmes Lake South	3.3	8.1	6.5	13.3	11.4	19.5	12.6	26.3	19.6	47.1
		Evergreen Park Wetland	2.4	5.0	4.8	8.2	8.3	12.1	9.2	16.3	14.3	29.1
		Markgrafs Lake	0.7	1.9	1.4	3.1	2.5	4.5	2.8	6.0	4.3	10.8
		Powers Lake	0.5	5.1	1.1	8.3	1.9	12.2	2.1	16.5	3.2	29.5
		Fish Lake	0.7	3.9	1.3	6.4	2.3	9.3	2.5	12.6	3.9	22.6
		Colby Lake	3.5	19.9	6.9	32.5	12.0	47.7	13.3	64.3	20.7	115.3
		Bailey Lake	16.2	29.0	32.0	47.3	55.7	69.4	61.7	93.6	96.0	167.7
		Marsh Creek Pond	3.3	9.3	6.4	15.2	11.2	22.2	12.4	30.0	19.3	53.7
		Central Draw	2.3	3.5	4.6	5.7	7.9	8.4	8.8	11.3	13.6	20.2
	East Mississippi	La Lake	0.3	0.4	0.5	0.6	0.9	0.9	1.0	1.2	1.5	2.2
		East Mississippi	2.1	3.6	4.1	5.9	7.1	8.6	7.9	11.6	12.3	20.8
	West Draw		2.5	5.2	4.9	8.6	8.5	12.5	9.5	16.9	14.7	30.3
	SWWD TOTAL		**41.8**	**101.5**	**82.5**	**165.9**	**143.4**	**243.2**	**158.9**	**327.9**	**247.2**	**587.7**
RWMWD	Battle Creek	Tamarack Wetland East	2.5	4.2	4.9	6.9	8.4	10.2	9.3	13.7	14.5	24.5
		Tamarack Wetland West	1.2	2.1	2.3	3.4	4.1	5.0	4.5	6.8	7.0	12.2
		Battle Creek Lake	4.5	7.7	8.8	12.5	15.3	18.4	17.0	24.8	26.4	44.5
		Battle Creek	1.8	4.5	3.6	7.4	6.3	10.8	7.0	14.6	10.8	26.2
	Carver Lake		11.4	21.8	22.5	35.6	39.1	52.1	43.3	70.3	67.3	126.0
	RWMWD TOTAL		**21.3**	**40.3**	**42.1**	**65.8**	**73.2**	**96.6**	**81.1**	**130.2**	**126.1**	**233.3**
VBWD	Valley Branch Creek **/TOTAL**		1.7	3.6	3.4	5.9	5.8	8.7	6.5	11.7	10.1	20.9
ALL			**64.8**	**145.4**	**128.0**	**237.6**	**222.4**	**348.5**	**246.5**	**469.8**	**383.3**	**841.9**

6. MATERIAL MANAGEMENT

Once collected, swept material must be disposed of properly, a process which may incur additional costs to the City. These costs include the dump trucks and associated costs used to transport sweeper waste from sweeper operations to the landfill, the costs charged by the landfill for disposal, and any additional disposal costs required to compost organic material, including sorting, or separating the material into different waste streams. The City may wish to consider two disposal scenarios:

1. Dispose of all collected sweepings as solid waste without screening
2. Screen and separate sweepings by trash and debris, recycling, and composting and dispose of each category separately

Currently, the City owns three dump trucks which transport sweeper waste approximately 10-15 miles away from sweeper operations. According to City meeting minutes on November 17, 2021, the landfill charges $4 per cubic yard for leaves and $8 per cubic yard for dirt. The City does not maintain a municipal compost site so local options for composting leaf litter and other organic sweeping material will be explored in this section.

6.1. Non-Compostable

Non-compostable street sweepings include all material that do not qualify as compostable or recyclable. This typically includes particulate matter, trash and debris, metals, bits of road, and other various materials, all of which will likely reach its end point in the landfill. The City may wish to consider reuse opportunities for swept material: the MPCA lists a few common uses such as mixing with salt or sand for winter ice application, fill for engineered purposes on commercial industrial developments, and daily cover material for a permitted solid waste landfill able to accept alternate daily cover.

The first disposal scenario includes the disposal costs of solid waste to the landfill, measured by cubic yard. Additionally, the waste must be stored in accordance with solid waste storage standards which may contribute to additional costs if the City does not operate sufficient facilities with enough capacity for an increased amount of sweeping waste. These standards include providing a liner, run-on control systems to collect water, and inspections, as well as requiring that the storage site be located outside of floodplains, shorelands, wild or scenic river districts, wetlands, and areas where emissions from stored material would violate air quality standards.

However, screened sweeper waste does not require storage under solid waste storage standards; rather it only needs to meet MPCA industrial stormwater permit requirements. If the storage facility qualifies for a “no exposure” certification, costs can be further reduced. As such, the second scenario will cost the City hourly for the labor of screening and separating the sweepings; this scenario will also impose the costs charged per cubic yard by disposal facilities for accepting the various waste streams. These streams will likely include solid waste, recycling, and composting.

6.2. Compostable Material

A handful of studies in the Twin Cites metro area have quantified the coarse organic content of street sweepings over the snow-free season. On an annual basis, coarse organics make up about 25% of total the total mass of

sweeping collected. Coarse organic inputs will vary spatially and temporally depending on ROW tree canopy and local vegetation. During the fall leaf-drop season, coarse organic material generally comprised a majority of the solids collected from street surfaces, but summer sweeping can contain large amount of grass clipping, flower, pollen, or duff. As such, a local or on-site composting facility for coarse organic material would provide significant labor and disposal cost savings.

The cost of sweeper waste disposal operations is estimated in Appendix C.3. A detailed comparison of costs for material management alternatives was beyond the scope of this study; however, the following key findings may be useful in for planning material management in the future as the cost of individual components changes.

- The cost total associated with disposal of sweeping (Appendix C.3) make up about **1% of the total cost of sweeping** for all scenarios.
    - Fuel is the largest component of disposal costs (75%)
- Roughly 25% of the material collected from street is organic and could be composted if screened from sweepings. Hauling this material to a local facility would save money on fuel and disposal costs.
- Several municipalities in the TCMA reuse the non-compostable component of sweeping for fill. If the City finds that they have a shortage of fill material for City project, this object should be further investigated.

7. COST-BENEFIT ANALYSIS

Total annual program costs and cost-benefit ($/lb-P removed) were estimated for the sweeping scenarios summarized in Section 5. For a city-owned and operated sweeping program, the cost-basis ($/lane-mile) is not constant but rather depends on the sweeper type and financing and the cost of vehicle maintenance, labor, and fuel. Total costs for each sweeping scenario were calculated using the component costs and assumptions listed in Table 8 and the following assumptions:

- Sweepers are owned by the City of Woodbury
- Typical sweeper operational speed = 3 – 5 mph
- An additional 1 hour of labor is required for every 4 hours of sweeping time
- Total transit miles (brush off) are about 16 miles on average for travel to/from the sweeping route.
- On average, sweeper fuel consumption is 5 mpg
- The average bulk density of the material collected from streets is 80 lb/cf including water content
- The City has sufficient staffing to operate the sweepers as needed
- One city-wide sweep includes approximately 655 lane-miles of sweeping.
- The sweeper can be operational approximately 140 workdays between April 1st and October 31st each year (30 weeks total). This calculation accounts for federal holidays and 7 additional workday of non-operation due to maintenance, inclement weather, or staffing shortages.
- At high sweeping frequencies (greater than once per month), city-wide sweeping would require purchase of an additional sweeper(s).

Items not included in the cost calculation, but which may add cost to an enhanced street sweeping program, include:

- Administrative staff time
- Public outreach and notification
- Signage and installation

Table 8. Cost basis assumptions, in-house street sweeping program.

Category	Cost	Data Source(s)
Vehicle Depreciation		
Elgin Crosswind	$20,400	Dealer quote for similar sweeper ($269,000, Crosswind), ($209,000, Pelican); 10-year life span, 4% Interest, resale value after 10-year 25% to 30% of purchase price
Elgin Pelican	$15,100	
Vehicle Refurbishment & Maintenance		
Elgin Crosswind	$9,190	Maintenance and refurbishment schedule for Tymco regenerative air sweeper for 1, 000 – 2,000 hours of use per year.
Elgin Pelican	$6,892	
Labor (wages + benefits)	$75 per hour	
Fuel	$4.25 per gallon	Max daily average cost of diesel fuel across MN, February, 2022
Disposal Fees		
Non-compostable material	$8/CY	City of Woodbury Public Works
Compostable material	$4/CY	

Sections 7.1 and 7.2 show costs for in-house sweeping compared to costs for the same level of service using a contract sweeping service. For contract sweeping, the cost-basis ($/lane-mile) is assumed to be constant for all sweeping scenarios. The cost per lane-mile was calculated using the total cost of spring sweeping services divided by the total lane-miles swept.

Additional details for both in-house and contract sweeping cost estimates are provided in Cost Benefits – Detailed Calculations

7.1. Cost Efficiency Comparisons

The cost-efficiency estimates summarized in this section are focused mainly on in-house sweeping program options that include the purchase of 1 or 2 new street sweepers. Based on the number of municipal lane-miles to be swept (Table 2), it would take a single sweeper about 31.6 workdays to complete a single lane pass of all municipal roads. With two sweepers a single lane pass can be completed in about 16 workdays. Because spring and fall sweepings often require more than one lane pass to effectively reduce solids accumulation, and these cleanings are more time-sensitive than sweepings that occur between spring and fall, it is not feasible that even baseline sweeping could be completed using the sweepers currently owned by the City of Woodbury without putting a strain on the City's resources. If sweepers are needed for construction or road maintenance projects, there will likely be a shortage of vehicles at certain times of the year.

Based on the assumptions outlined in Table 8 and Appendix C, the cost-basis for baseline sweeping is $102 per lane-mile for a contract sweeper, and roughly $93 per lane-mile for a city-owned sweepers (Figure 8, Table 10). For baseline sweeping (spring/fall only) with city-owned sweepers, the total cost of sweeping is driven by capital outlay for sweepers (60% in Figure 9). Because capital outlay cost is essentially flat, the cost-efficiency ($/lane-mile) of in-house sweeping improves (lower cost basis, $/land-mile) as each vehicle is utilized for additional sweepings (24% for the 14 sweepings per year in Figure 9). Total labor costs follow the inverse pattern as more labor per sweeper is needed.

If additional sweepers are needed to complete the specified number of sweepings, the total cost increases by an increment equal to the vehicle depreciation and maintenance cost in Table 8; causing an initial decrease in cost-efficiency (higher $/lane-mile). These dynamics are shown in Table 10. For each of the vehicle purchase options listed under the 'Cost-basis of Sweeping,' the cost-efficiency improves as sweeping frequency is increased. For each of the sweeping scenarios, adding additional vehicles decreases the cost-efficiency, however, it should be noted then number of vehicles needed is dependent on the desired sweeping frequency.

In contrast, the cost-efficiency of contract sweeping is constant ($102/lane-mile), making additional sweepings no more cost effective than baseline sweeping.

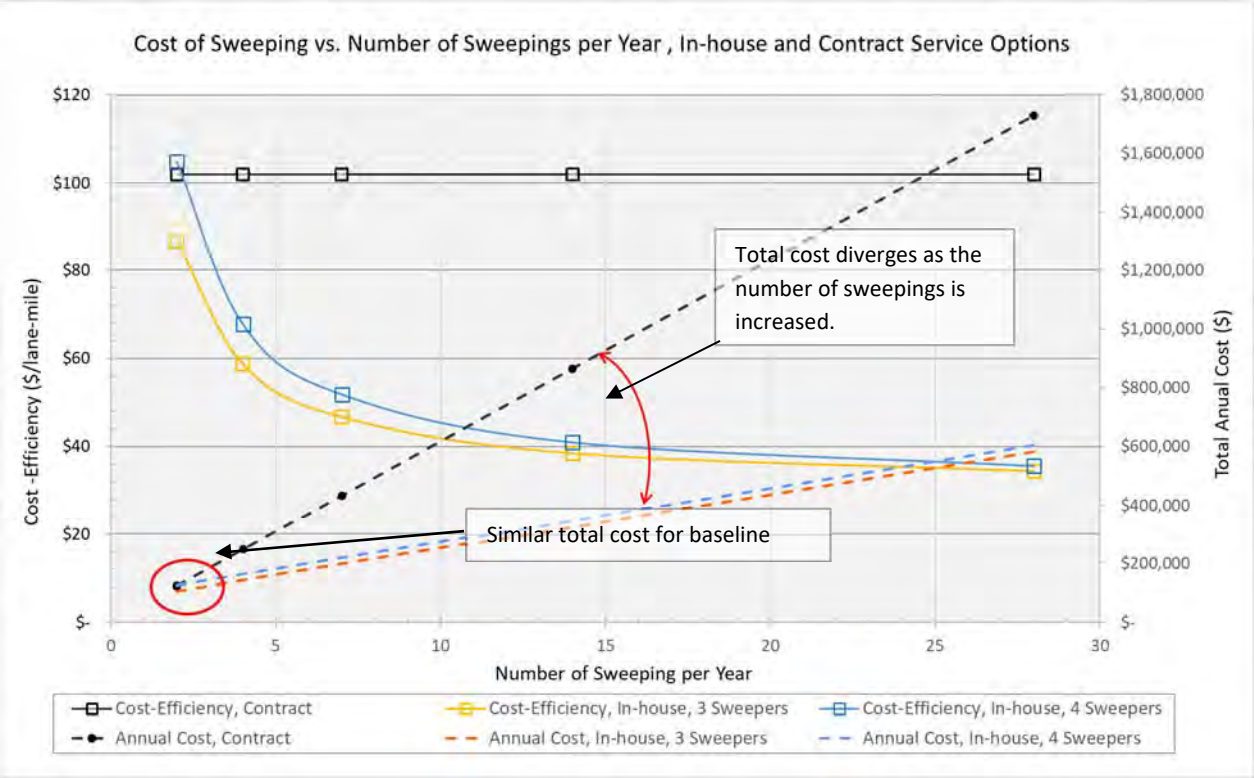

Figure 8. Cost of inhouse and contract sweeping for sweeping scenarios using 3 (1 new) and 4 (2 new) sweepers.

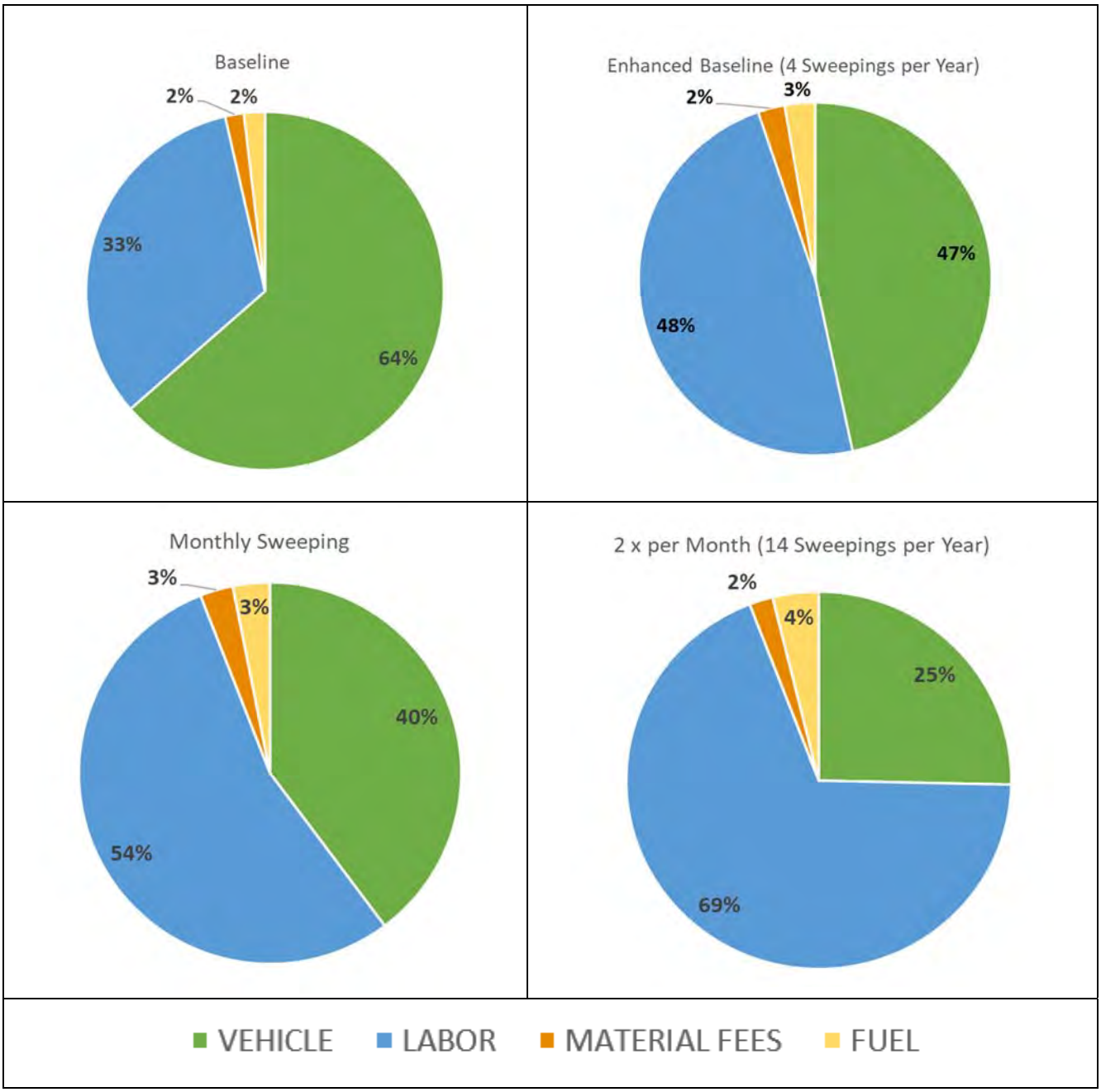

Figure 9. Vehicle (depreciation and maintenance), labor (sweeping and hauling operations), material disposal fees, and fuel costs as percent of the total cost of sweeping program options summarized in Table 10.

Table 9. Estimated total annual costs and cost-efficiencies for in-house street sweeping for the scenarios presented in Section 5 and different vehicle purchase options.

Sweeping Scenario	Total Lane-Miles Swept	ANNUAL COST for Different Sweeper Purchasing Options			Cost of basis of Sweeping ($/mi)		
		Option 1 (no purchase)	Option 2 (purchase 1)	Option 3 (purchase 2)	Option 1 (no purchase)	Option 2 (purchase 1)	Option 3 (purchase 2)
Baseline	1,212	$75,477	$105,067	$127,059	$62	$87	$105
Enhanced Baseline	2,424	$112,656	$142,246	$164,238	$46	$59	$68
Monthly	4,241	$168,423	$198,013	$220,005	$40	$47	$52
2X per Month	8,483	$296,411	$326,001	$347,993	$35	$38	$41
Weekly	16,965	$553,368	$582,958	$604,950	$33	$34	$36

1. Use sweepers currently owned by City of Woodbury - (1) Elgin Crosswind and (1) Elgin Pelican

2. Purchase one (1) additional high-efficiency sweeper

3. Purchase two (2) additional high-efficiency sweepers OR (1) additional high-efficiency sweeper and (1) broom sweeper

CELL SHADING KEY

	Numbers of sweepers is not a constrain in the scenario
	Number of sweepers could be a constraint if multiple lane passes are needed, or sweepers are in demand for other purposes like construction cleanup.
	Scenario Requires additional sweepers

Table 10. Comparison of estimated annual costs for in-house and contract service street sweeping for the street sweeping scenarios presented in Section 5.

Sweeping Scenario	Total Lane-Miles Swept	City of Woodbury Street Sweeping Program		Estimated Annual Cost for Contract Service Cost[2]
		Recommended Vehicle Purchase[1]	Estimated Annual Cost	
Baseline	1,212	Option 2: Purchase (1) additional sweeper	$105,067	$123,624
Enhanced Baseline	2,424		$142,246	$247,248
Monthly	4,241	Option 3: Purchase two (2) additional sweepers	$220,005	$432,582
2X per Month	8,483		$347,993	$865,266
Weekly	16,965		$604,950	$1,730,430

[1] Number of sweepers is not a constraint based on recommended purchase (see Table 9).

[2] Cost basis = $102 per lane-mile based on review of municipal bid awards. See Appendix C for cost-basis estimate details.

7.2. Pollutant Removal Cost Benefit

The primary objective of this study is to provide street sweeping recommendations to the City of Woodbury for the purpose of protecting water resources within the City's jurisdiction. To that end, we evaluated the cost benefit of each street sweeping scenarios with respect to total phosphorus management. Cost-effectiveness, measured as $ per pound of phosphorus recovered, tends to improve with cost-efficiency, but also depends on the timing of sweeping. Sweeping is most cost-effective in the spring and fall with total solids loading on street surfaces is greatest. Additional sweeping, during the late spring and summer months, does increase pollutant recovery on an annual basis; however, these sweepings are less productive (lower lb/lane-mile) when compared to spring and fall sweepings. Therefore, the cost-effectiveness for monthly sweeping is somewhat decreased when compared to the 'Enhanced Baseline' scenario in Table 11. Entries that are outlined in red correspond to scenarios that were used to develop sweeping recommendations (Section 8). For these scenarios, the cost-effectiveness of phosphorus recovery is roughly $300 - 350 per pound.

When quantified with respect to the estimated TP reductions to downstream water resources, the cost-effectiveness of sweeping is somewhat decreased (higher cost per pound). For the highlighted scenarios, the cost-effectiveness for pollutant reduction is about $650 per pound of TP. As discussed in Section 5.2, the TP load reductions presented in this report should be used for comparison of sweeping scenarios and not directly translated to reduction target quantified through other methods. Similarly, the cost-effectiveness estimates quantified for this study, do not capture the full scope of material benefits that sweeping can provide. Street sweeping reduces the mass of sediment as associated pollutants discharged to the City's stormwater infrastructure and, in doing so, can help preserve the treatment capacity or extend the maintenance life cycle of downstream BMPs. Due to the scarcity of research on this topic, a detailed cost-estimate of these benefits was beyond the scope of this study, nonetheless, co-benefits like this, if quantified would improve the cost-effectiveness of sweeping compared to the estimated provided here.

Table 11. Total costs and cost-efficiency with respect to phosphorus management for potential in-house sweeping scenarios.

	Total Costs		Average Cost-Efficiency ($/lb-TP)	
	Annual Cost	$/lane-mile	Pollutant Recovery	Pollutant Reduction
Sweeping Scenario	**Vehicle Purchase Option 2: (1) Additional High-Efficiency Sweeper**			
Baseline	$105,067	$87	$355	$723
Enhanced Baseline	$142,246	$59	$295	$599
Monthly	$198,013	$47	$279	$568
2X per Month	$326,001	$38	$337	$694
Weekly	$582,958	$34	$340	$692
	Vehicle Purchase Option 3: (2) Additional Sweepers (1 or both high-efficiency)			
Baseline	$127,059	$105	$429	$874
Enhanced Baseline	$164,238	$68	$340	$691
Monthly	$220,005	$52	$310	$631
2X per Month	$347,993	$41	$360	$741
Weekly	$604,950	$36	$353	$719

Number of sweeping vehicles could be a constrain depending on the need for more than one lane pass during period of heavy solids loading (spring, fall) and/or the demand for sweepers for construction projects.

8. RECOMMENDATIONS

Recommendations for sweeping by sweeping zone are listed in Table 12. In addition to prioritization of key water resources, the sweeping recommendations provided in this section were developed using the following guiding questions:

1) The City currently uses a contract service to complete spring and fall street cleanings.
    - What level of service can be provided for comparable cost if an in-house sweeping program is developed?
2) The City has expressed an interest in developing an enhanced street sweeping program for protection of Woodbury's key water resources.
    - Enhanced sweeping city-wide, would include 4 sweeping year minimally up to weekly sweeping. What level of service can be provided for comparable cost if an in-house sweeping program is developed when compared to contract sweeping?

The analyses completed for this study showed that for baseline sweeping, the cost of an in-house program is somewhat less than, but comparable to, using a contract service. However, as the frequency of sweeping is increased from 4 times per year, in-house sweeping is an increasingly more cost-effective option.

The recommended sweeping scenario is a hybrid of the scenarios outlined in red under the Vehicle Purchase Option 2 (purchase 2 additional sweepers) in Table 11. It prioritizes sweeping in zones SW-2, -3, -4, -5, and -7 with a frequency of twice monthly (12-14 sweepings per year). Sweeping in these zones will most benefit the following key water resources: Wilmes North and South -Lakes, Markgrafs Lake, Powers Lake, and Colby Lake. All other sweeping zones in the City would benefit from monthly sweeping (7 sweepings per season) for water quality and BMP longevity.

Estimated pollutant recovery and pollutant load reductions for downstream water resources for the recommended scenario are summarized in Table 13. For the fully implemented recommendations, the estimated pollutant recovery is 979 tons of total solids and 779 pounds of total phosphorus. Compared to baseline pollutant load reductions, sweeping at recommended frequency is estimated to reduce TP loads to key resources by the following amounts:

Key Water Resource	Pollutant Reduction Compared to Baseline Sweeping (lb-TP/yr)
Wilmes Lake (North and South)	13.6
Markgraf's Lake	3.5
Power's Lake	10.7
Colby Lake	33.0
Bailey Lake	45.3
Battle Creek Lake	5.9
Carver Lake	30.4
Valley Branch Creek	5.2

Recommendations for Program Implementation

It may be easiest to implement recommendation over a period of 2 to 3 years to adapt staffing and equipment schedules.

Year 1:

- Buy 1 high-efficiency sweeper and implement monthly sweeping in all zones
- If staffing limitations or sweeper demand for other needs (construction, road maintenance) limits the availability of sweeper for enhanced sweeping practices, prioritize sweeping zones that target key water resources.

The estimated annual cost for implementation of at this level of effort is **$198,013**. This cost is comparable to the cost of contract sweeping for the Enhanced baseline scenario (4X per year) in all zones ($247,248).

Year 2 or 3:

- Purchase an additional sweeper. Choose high-efficiency or mechanical sweeper depending on cross-over demand with other sweeping needs (construction, road maintenance projects).
- Add sweepings up to twice monthly in zones that target priority water resources.

The estimated annual cost for implementation at this level of effort is **$351,766** or about $65 per lane-mile swept. This cost is less than the cost of contract sweeping for monthly sweeping in all zones ($432,582).

Year 4 and beyond:

- Adapt sweeping practices to target key water resources as impacted by new development, BMP performance; changes in tree canopy or infrastructure, or other factors that influence watershed pollutant loads.

Table 12. Recommended Sweeping Scenario

Sweeping Zone	Primary Resource Targeted	Workdays Needed, Single Sweeper[1]	Total Lane-Miles	Proposed Sweeping Schedule	Estimated Annual Cost[2]
SW-1	Wilmes Lake North	0.9	16.7	Monthly	$7,552
SW-2	Wilmes Lake North	1.2	23.6	Twice Monthly	$21,344
SW-3	Wilmes Lake North	1.5	28.4	Twice Monthly	$25,685
SW-4	Powers Lake Markgraf's Lake	2.2	43	Twice Monthly	$38,889
SW-5	Wilmes Lake South	1.2	23.4	Twice Monthly	$21,163
SW-6	Bailey Lake	1.8	35	Monthly	$15,827
SW-7	Colby Lake	2.8	53.5	Twice Monthly	$48,385
SW-8	Colby Lake	2.8	54.7	Monthly	$24,735
SW-9	Colby Lake	2.3	44.6	Monthly	$20,168
SW-10	East Mississippi West Draw	1.2	23.1	Monthly	$10,446
SW-11	Bailey Lake	3.0	58.2	Monthly	$26,318
M-1	Tamarack Wetland Evergreen Wetland	1.1	22	Monthly	$9,948
M-2	Tamarack Wetland	1.1	20.6	Monthly	$9,315
M-3	Carver Lake Marsh Creek Pond	1.9	36.3	Monthly	$16,415
RMW-1	Battle Creek	1.2	22.3	Monthly	$10,084
RMW-2	Battle Creek Lake	1.8	32.3	Monthly	$14,606
RWM-3	Carver Lake	2.2	42.8	Monthly	$19,354
VB-1	Valley Branch Creek Markgrafs Lake	0.9	25.5	Monthly	$11,531
	TOTAL	**31.6**	**606**		$351,766

[1] Based on a single lane pass. Used to determine the number of sweepers needed to complete the sweeping scenario within the specified timeframe. For example, a single sweeper would not fulfill the sweeper demand for monthly city-wide street sweeping since 31.6 days. Two sweeper working full time could compete a single lane pass in 31.6 divided by 2, or about 16 workdays. In house street sweeping program, all sweepers city-owned and operated.

Table 13. Estimated pollutant load recovery and load reduction to downstream water resources for the sweeping recommendations summarized in Table 13.

Watershed District | Major Watershed		Primary Water Resources	Total Lane Miles		Sweeping Scenario | Recommended Sweeping Frequency					
					Estimated Pollutant Recovery			Estimated Pollutant Reduction		
			Zone	Scenario	TS (tons/yr)	TP (lb/yr)	$/lb-TP	TS (tons/yr)	TP (lb/yr)	$/LB-TP
SWWD	Central Draw	Wilmes Lake North	30.9	264	48.4	42.1	$405	15.0	20.2	$843
		Wilmes Lake South	40.7	555	73.8	66.8	$537	12.5	26.1	$1,376
		Evergreen Park Wetland	21	*147*	29.6	21.9	$433	8.3	12.1	$788
		Markgrafs Lake	14.3	114	22.1	18.5	$399	2.7	5.4	$1,374
		Powers Lake	32.3	416	51.3	45.1	$596	2.1	15.8	$1,702
		Fish Lake	22.2	287	35.3	31.0	$598	2.5	12.1	$1,533
		Colby Lake	128.9	1160	206.6	165.2	$454	12.4	52.9	$1,417
		Bailey Lake	100	823	153.7	119.7	$444	56.9	74.2	$716
		Marsh Creek Pond	33.2	232	55.9	41.9	$357	11.2	22.2	$674
		Central Draw	11.6	81.3	16.8	12.5	$420	7.9	8.4	$627
	East Mississippi	La Lake	0.9	6.6	2.0	1.5	$284	0.9	0.9	$474
		East Mississippi	8.3	57.9	17.4	13.2	$282	7.1	8.6	$434
	West Draw		14.1	98.4	29.4	22.4	$298	$284	12.5	$533
	SWWD TOTAL		**458.4**	**4242**	**742.1**	**602.0**	**$479**	$455	**271.3**	**$1,062**
RWMWD	Battle Creek	Battle Creek Lake	14.6	102	23.4	17.5	$376	17.2	10.8	$610
		Tamarack Wetland West	6.6	46.1	10.7	8.0	$373	4.1	2.6	$1,145
		Tamarack Wetland East	23.8	166.7	41.4	31.2	$345	16.1	10.1	$1,066
		Battle Creek	14.9	104.3	24.1	18.1	$373	3.6	3.3	$2,042
	Carver Lake		74.7	522.9	118.4	88.4	$402	$382	29.9	$1,187
	RWMWD TOTAL		**134.6**	**942**	**218.0**	**163.1**	$392	$373	**56.7**	**$1,128**
VBWD	Valley Branch Creek **/TOTAL**		13	94	18.9	14.2	$450	$429	7.2	$886
ALL			**606**	**5278**	**979.1**	**779.3**	**$460**	**240.1**	**$429**	**$1,069**

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APPENDIX A. STREET SWEEPING ZONE MAPS

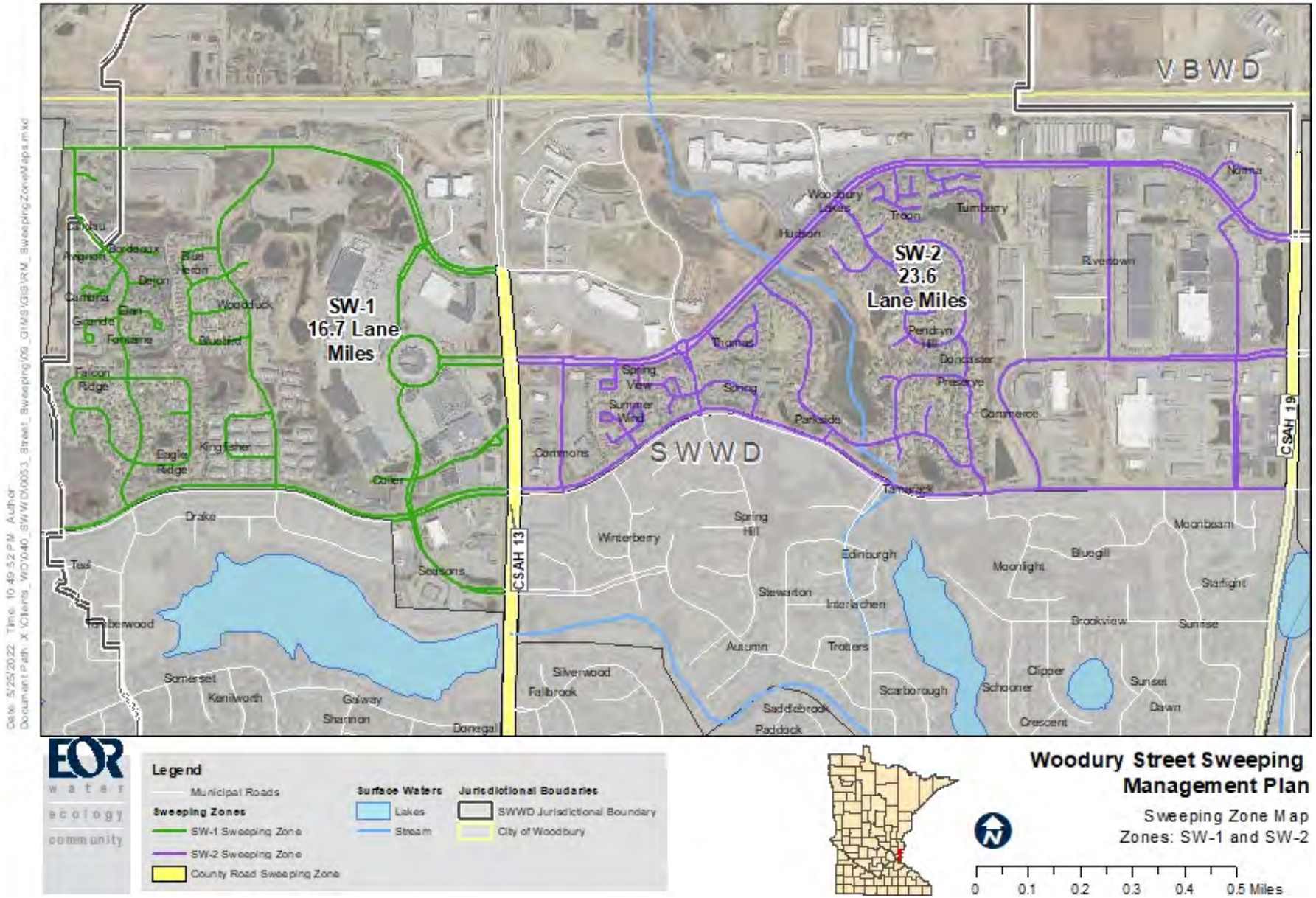


Figure 10. Sweeping Zones SW-1 and SW-2

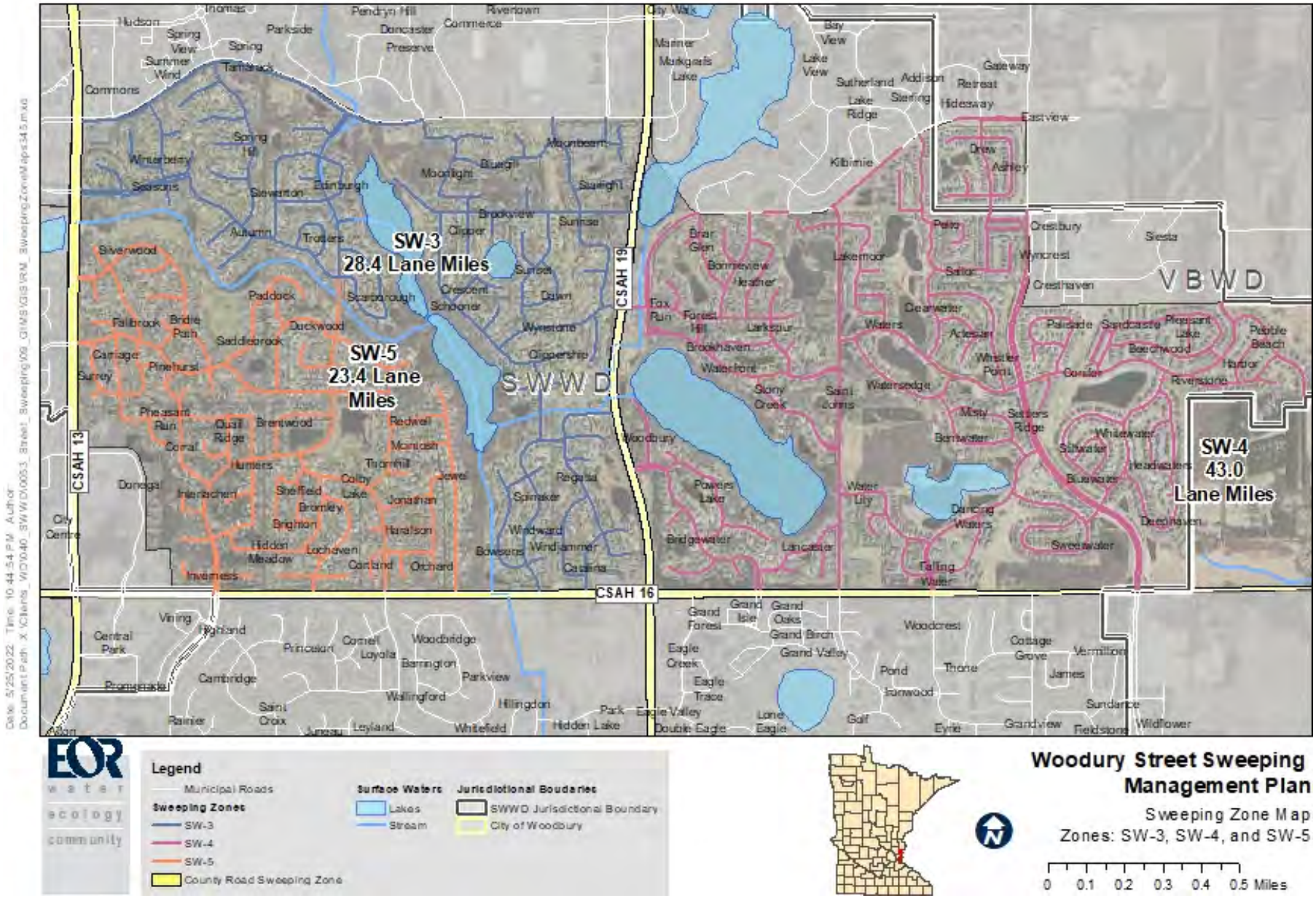


Figure 11. Sweeping Zones SW-3, SW-4, and SW-5.

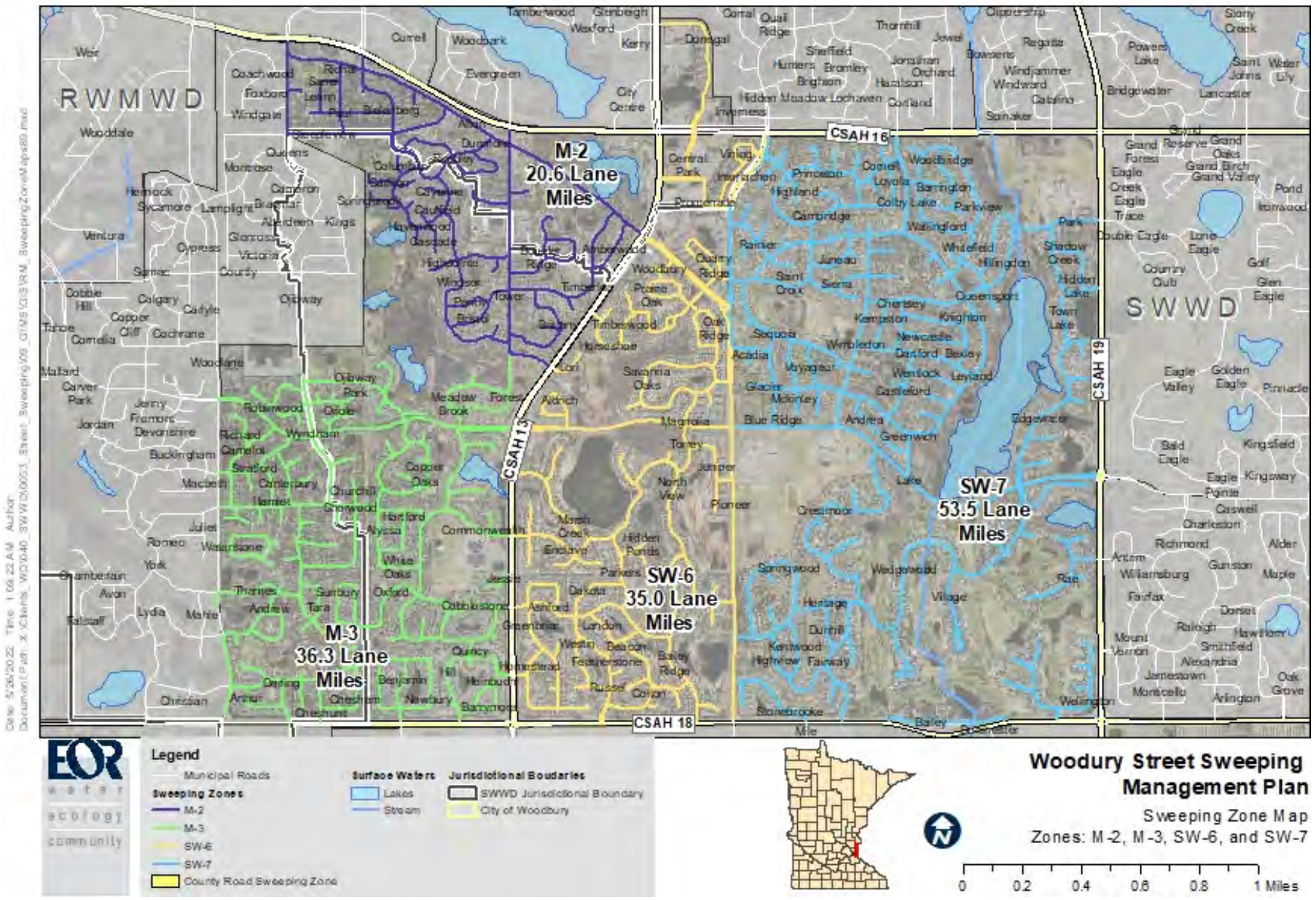


Figure 12. Sweeping Zones M-2, M-3, SW-6, SW-7.

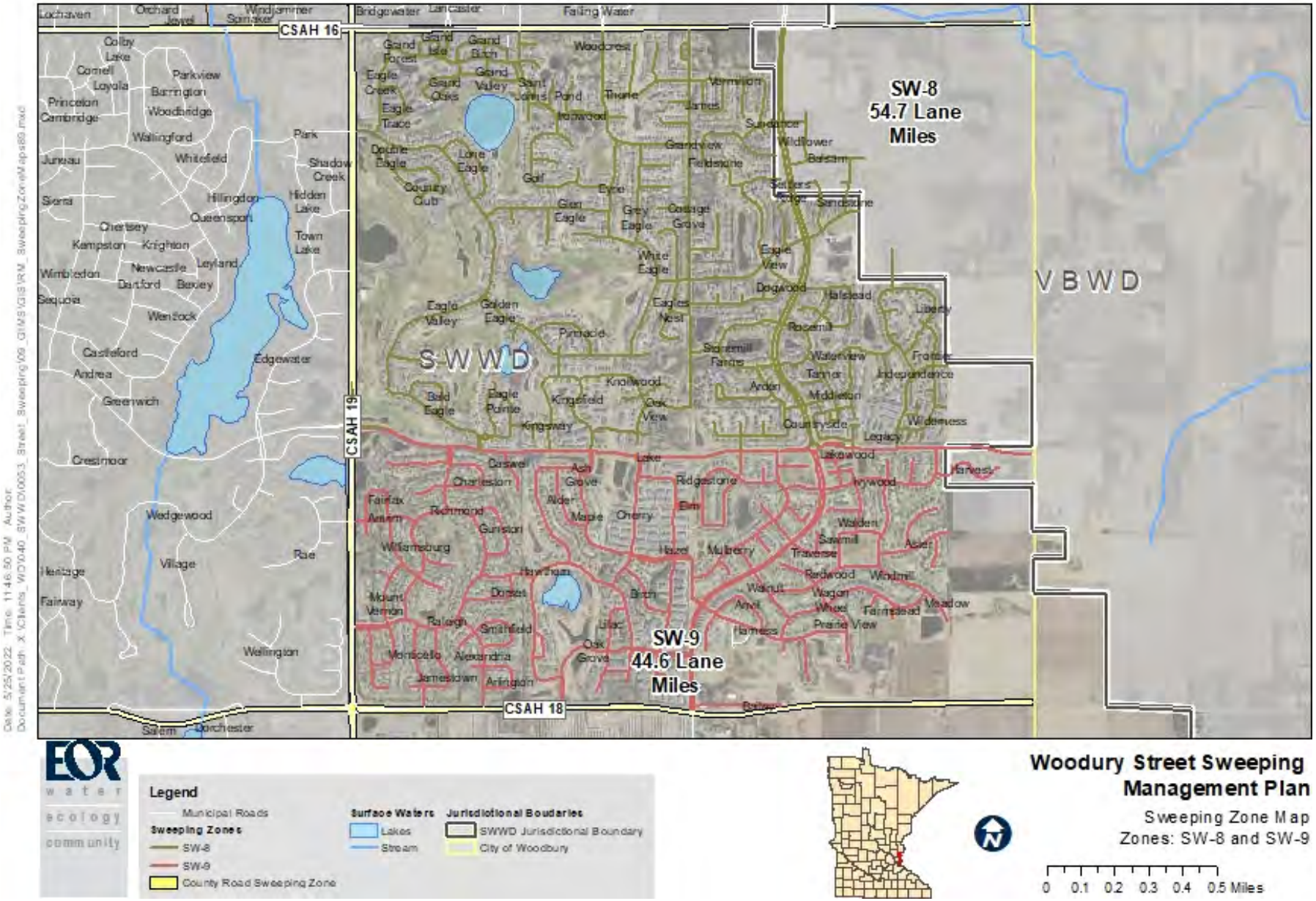


Figure 13. Sweeping Zones SW-8 and SW-9.

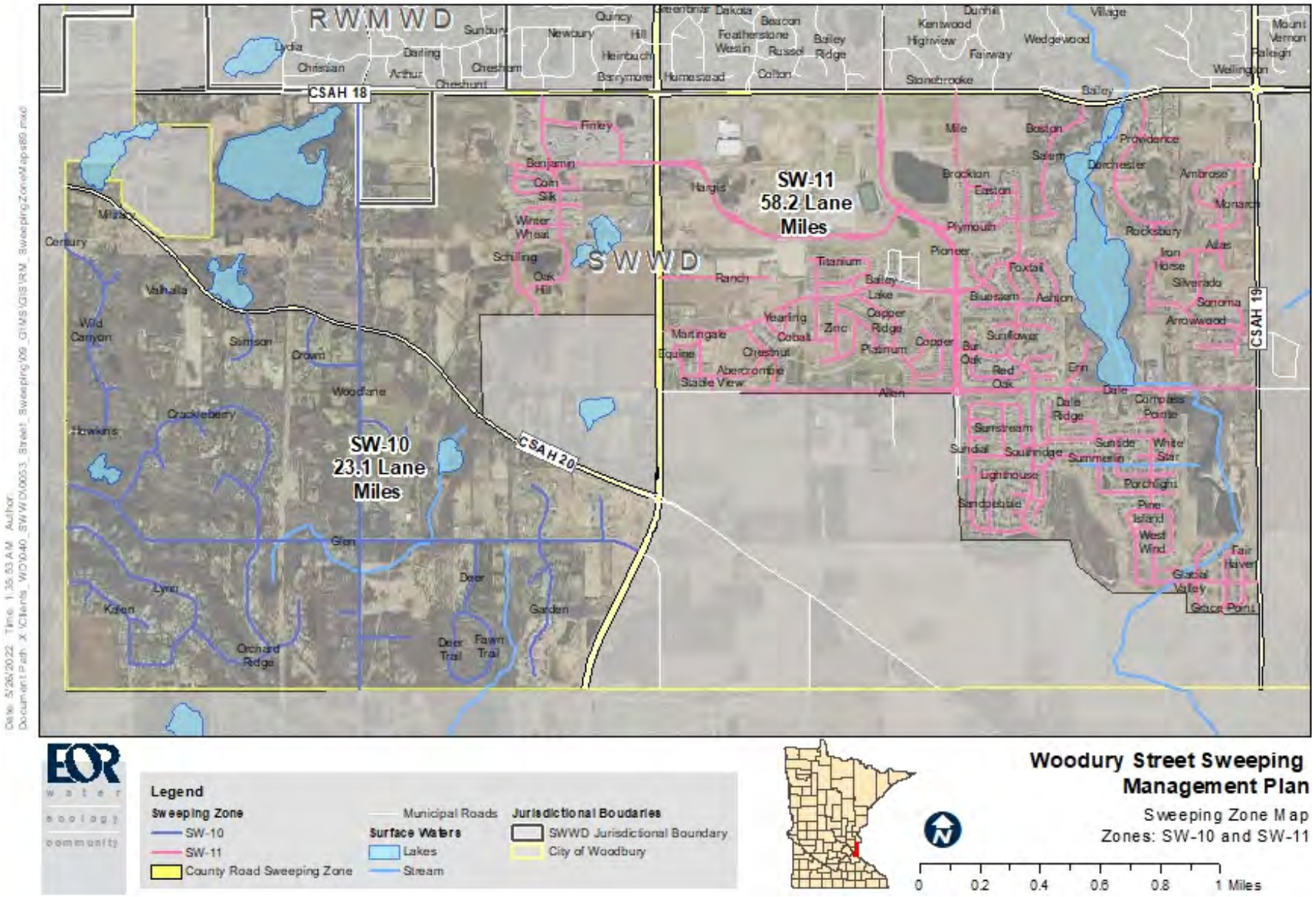


Figure 14. Sweeping Zones SW-10 and SW-11.

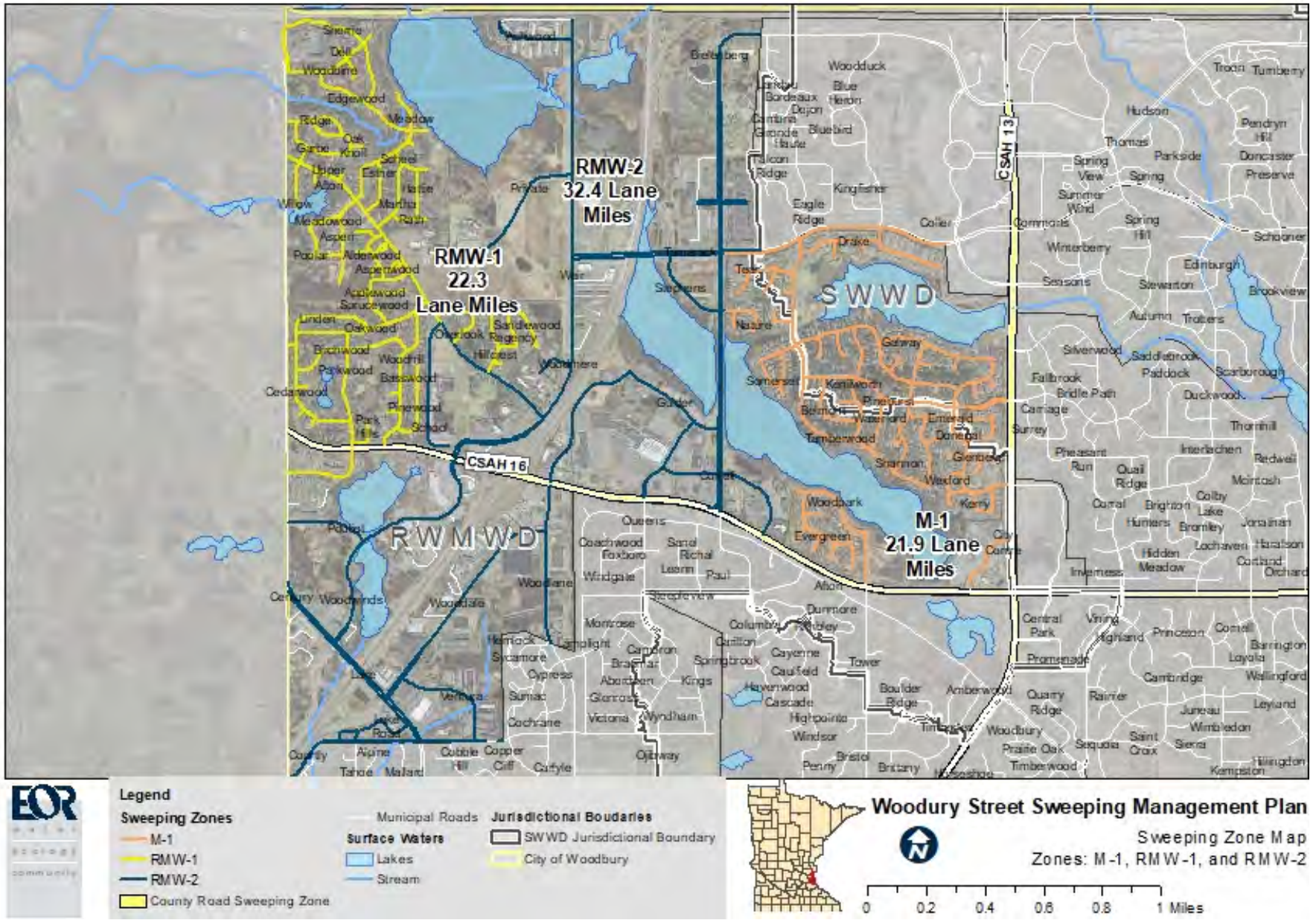


Figure 15. Sweeping Zones M-1, RMW-1, and RMW-2

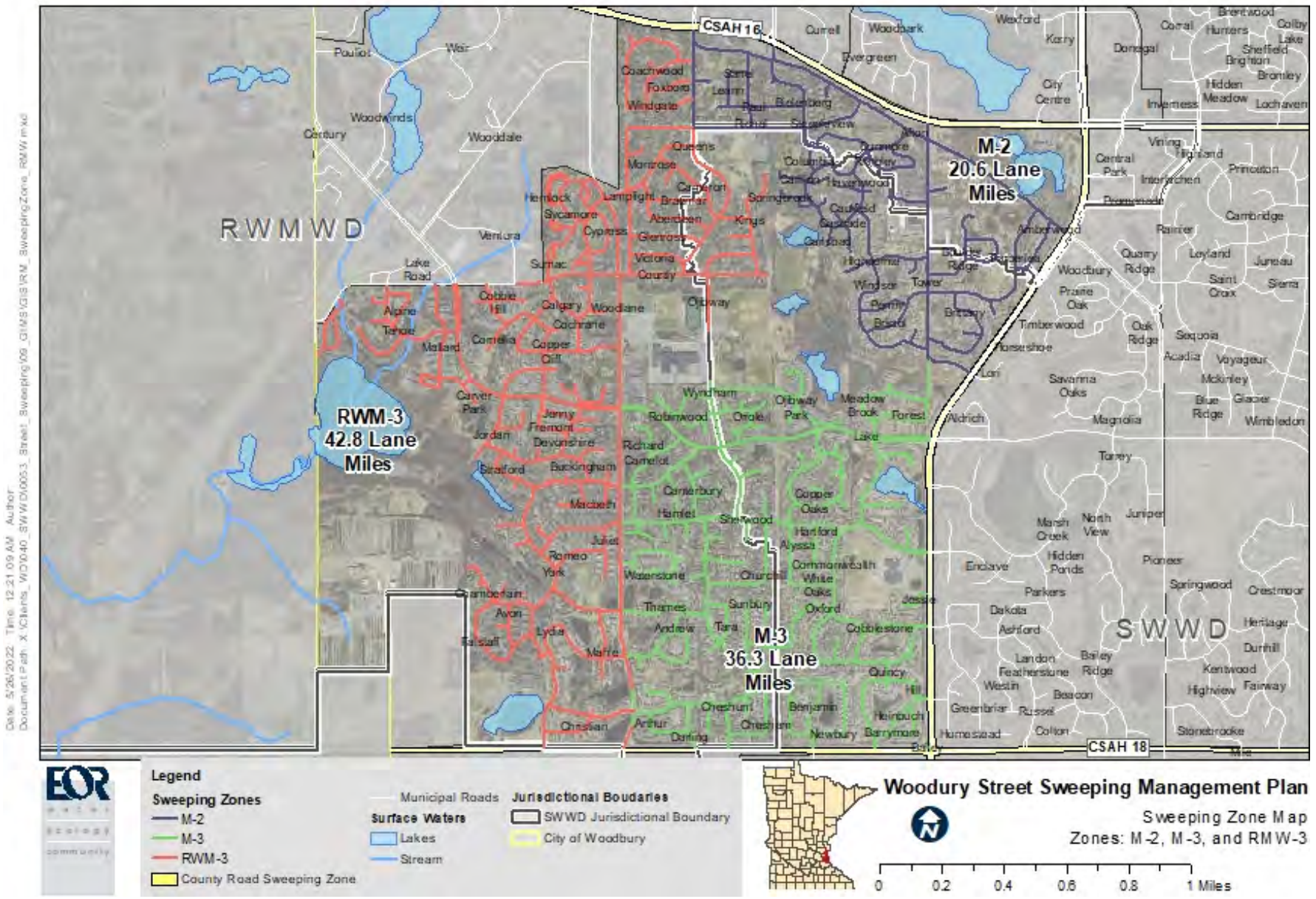


Figure 16. Sweeping Zones M-2, M-3, and RMW-3.

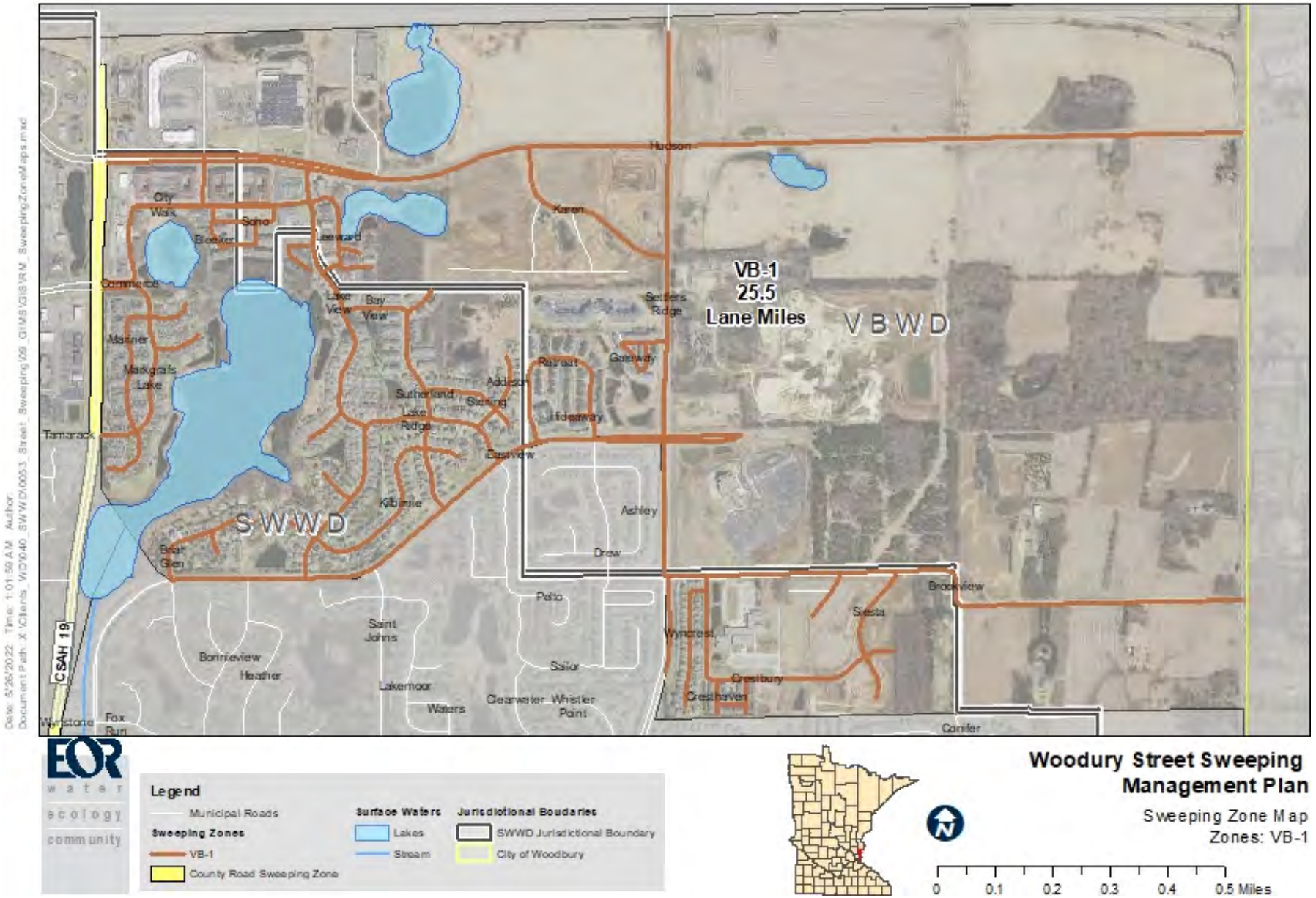


Figure 17. Sweeping Zones VB-1.

APPENDIX B. COLLECTIVE BMP REMOVAL EFFICIENCIES FOR LOAD REDUCTION CALCUATIONS

Modeled Resources

The SWWD provide water quality models (P8) for several lakes in the SWWD. Since street sweeping zones boundaries do not correspond to modeled subwatershed boundaries, a collective BMP removal efficiency was calculated at the watershed-scale applied and applied to pollutant recovery from street re-aggregated by water resource drainage area (as shown in Table 4 and Table 6).

The collective removal efficiency of BMPs was calculated as follows:

The total pollutant **load retained by BMPs** in the watershed = **Watershed Load** – **Lake Inflow Load**

The **collective removal efficiencies of BMPs** = (**Watershed Load** – **Load Retained by BMPs**) / **Watershed Load**

Table 14. Summary of TSS load estimates from SWWD P8 lake models used to calculate the collective TSS removal efficiency of modeled BMPs in the water resource drainage area.

	TSS Load (lb/yr)				
Waterbody	Watershed Load	Direct Drainage	Total Inflow	Retained by Upstream BMPs	**Collective BMP Removal Efficiency**
Wilmes North	247307	5184	82062	76878	69%
Wilmes South	268463	21156	65822	44666	83%
Markgrafs	160482	62617	81421	18804	88%
Powers Lake	981769	159777	203726	43949	96%
Fish Lake	392417	14522	42195	27673	93%
Colby Lake	544221	86410	121141	34731	94%

Table 15. Summary of TP load estimates from SWWD P8 lake models used to calculate the collective TP removal efficiency of modeled BMPs in the water resource drainage area.

	TP Load (lb/yr)				
Waterbody	Watershed Load	Direct Drainage	Total Inflow	Retained by Upstream BMPs	**Collective BMP Removal Efficiency**
Wilmes North	599	12.1	296.9	285	52%
Wilmes South	648	48.52	302.4	254	61%
Markgrafs	383	150.9	261.9	111	71%
Powers Lake	1146	183.3	583.3	400	65%
Fish Lake	460	17.7	196.6	179	61%
Colby Lake	2312	366.4	1104.1	738	68%

All Other Resources

Where modeled efficiencies were not available the median removal efficiencies reported in Table 5 were applied to the City's BMP inventory and area-weighted based on the district drainage area. A sample of the BMP inventory with median BMP removal efficiencies is shown in Table 16.

Table 16. Summary of BMPs by drainage district and downstream water resource for Tamarack East and Tamarack West wetland.

District	Downstream Waterbody	BMP Type	Count	District Area (ac)	Estimated Impervious (ac)	% Impervious Treated	SWS TSS Removal	SWS TP Removal
BC-18	Tamarack East	WET POND	1	183.2	64.1	100%	84%	50%
BC-18	Tamarack East	WETLAND	1	183.2	64.1	100%	55%	40%
BC-18.0.1	Tamarack East	DRY POND	2	135.2	47.3	21%	7%	4%
BC-18.1	Tamarack East	WET POND	1	17.3	6.1	100%	84%	50%
BC-18.10	Tamarack East	WET POND	1	10.2	3.6	100%	84%	50%
BC-18.11	Tamarack East	WET POND	1	9.8	3.4	100%	84%	50%
BC-18.12	Tamarack East	WET POND	1	3.8	1.3	100%	84%	50%
BC-18.3a	Tamarack East	WET POND	1	2.2	0.8	100%	84%	50%
BC-18.3b	Tamarack East	WET POND	1	3.8	1.3	100%	84%	50%
BC-18.3c	Tamarack East	WET POND	1	1.4	0.5	100%	84%	50%
BC-18.3d	Tamarack East	WET POND	1	1.8	0.6	100%	84%	50%
BC-18.3e	Tamarack East	WET POND	1	2.6	0.9	100%	84%	50%
BC-18.3f	Tamarack East	WET POND	1	5.9	2.1	100%	84%	50%
BC-18.3g	Tamarack East	WET POND	3	40.3	14.1	100%	84%	50%
BC-18.4	Tamarack East	WET POND	1	17.3	6.1	100%	84%	50%
BC-18.5	Tamarack East	WET POND	1	29.3	10.2	100%	84%	50%
BC-18.6	Tamarack East	WET POND	1	25.0	8.7	100%	84%	50%
BC-18.7	Tamarack East	WET POND	1	39.2	13.7	100%	84%	50%
BC-18.8	Tamarack East	WET POND	1	34.8	12.2	100%	84%	50%
BC-18.9	Tamarack East	WET POND	1	12.8	4.5	100%	84%	50%
BC-17	Tamarack West	RAIN GARDEN	5	52.7	18.4	100%	100%	100%
BC-17	Tamarack West	WET POND	1	52.7	18.4	100%	84%	50%
BC-17	Tamarack West	WETLAND	1	52.7	18.4	100%	55%	40%
BC-17.0.1	Tamarack West	DRY POND	5	104.9	36.7	68%	24%	14%
BC-17.0.1	Tamarack West	WET POND	1	104.9	36.7	100%	84%	50%
BC-17.1	Tamarack West	WET POND	1	5.6	2.0	100%	84%	50%
BC-17.2	Tamarack West	WET POND	1	31.4	11.0	100%	84%	50%
BC-17.3	Tamarack West	WET POND	2	23.2	8.1	100%	84%	50%
BC-17.4	Tamarack West	WET POND	1	15.7	5.5	100%	84%	50%

APPENDIX C. COST BENEFITS – DETAILED CALCULATIONS

For this study, cost estimates for street sweeping included the following three categories.

Total Cost = {Labor Cost} + {Equipment Cost} + {Material Management Cost}

Appendix C.1. Labor Cost

The following assumptions were used to calculate labor costs as part of the sweeping scenario cost estimates. All quantities are based on information collected from the City of Woodbury and/or City engineers from other Twin Cities municipalities for similar sweeping analyses.

Table 17. Summary of sweeping labor cost calculation assumptions.

Item	Rate
Labor Rate	
Average Labor Rate (wages + benefits)	**$75.00/hr**
Labor Time	
Sweeper Operation Time	
Average brush-on operational speed	3.5 mph
Average brush-off operational speed	35 mph
Non-driving time related to sweeping (maintenance, fueling, dumping, other)	1 hour for every 4 hours of driving
Hours available per 1.0 FTE	
Cost-basis, 1.0 FTE Baseline	8.0 hr/day (40 hr/wk.)[1]
Snow-free season weekdays	153 days (30.6 weeks)
Holidays and PTO	10 days (2 weeks)
Work-basis, hours available per day	7.5 hr/day (37.5 hr/week)[1]

[1]The time needed to sweep proposed zones was calculated using the average hours available per day (7.5 hr) and the associated cost for that work was calculated by applying the labor rate to an 8-hour day.

Table 18. Estimated annual cost of labor for street sweeping by sweeping scenario.

Scenario	Brush-on Time (hr/yr)	Brush-off Time (hr/yr)	Non- driving Time (hr/yr)	Labor Cost ($/yr)
Baseline (Spring/Fall 1 X each)	346	29	87	**$34,617**
Enhanced Baseline (Spring/Fall 2 X each)	692	58	173	**$69,234**
Monthly all Routes	1212	101	303	**$121,160**
2X Monthly all Routes	2424	201	606	**$242,321**
Weekly all Routes	4847	403	1212	**$484,641**

Appendix C.2. Equipment Cost

Table 19. Breakdown of vehicle purchase and maintenance cost, annualized.

Item	Elgin Crosswind[1] (or similar)		Elgin Pelican[2] (or similar)	
	Owned[3]	New	Owned[3]	New
Capital Outlay				
Purchase Price New	*($269,000)*	$279,000	*($201,000)*	$209,000
Applicable Grant Contribution (SWWD)	*$115,000*	---	---	---
Outlay = (Purchase Price New – Grant Contribution)	$154,000	$279/000	$201,000	$209,000
Annual Capital Depreciation				
Useful Lifespan of Vehicle	10 years			
Anticipated Resale Value	$75.000		$58,000	
Depreciation = (Outlay – Resale)/Lifespan	$15,296	$32,318	$14,300	$15,100
Yearly Maintenance, Refurbishment, and Fuel				
Dealer Estimate - based on 4-year maintenance cycle for standard high usage and wear items[4]	$9,190		$6,892	
Air filter and lubricants per 1000 hours of use[5]	~1,800[4]			
Average vehicle mileage[5, 6]	6.25 mph			
Cost of diesel fuel[5,7]	$5.50 per gallon			
Annualized Maintenance Cost	$9,190		$6,892	
Annualized Sweeper Cost				
= Depreciation + Annual Maintenance	**$24,486**	**$41,508**	**$21,192**	**$21,992**

[1]Regenerative Air or similar high efficiency sweeper

[2] Mechanical broom sweepers with dust spray

[3]Currently owner by the City – (1) Elgin Crosswind and (1) Elgin Pelican Sweeper

[4]See product information sheet from Tymco, Appendix C.5.

[5]The cost of fuel, filters, and lubricant is accounted for in the total cost of sweeping based on estimated hours or miles of use for each sweeping scenario.

[6]Prior Lake, MN sweeping study.

[7]Average cost of diesel in Minnesota for the period May 15th – Jun 15th, 2022, AAA.

Table 20. Summary of total vehicle-related costs for sweeping scenarios based on minimum number of sweepers needed to complete sweeping within the allotted timeframe.

Scenario	Sweeper Assumption	Annualized Vehicle Cost				
		# Sweepers	Total Operation Miles	Fuel & Other Consumables	Depreciation & Maintenance	TOTAL
Baseline (Spring/Fall 1 X each)	City -owned Crosswind City -owned- Pelican (1) New Elgin Crosswind (or similar)	3	1,212	$1,878	$67,872	$69,750
Enhanced Baseline (Spring/Fall 2 X each)		3	2,424	$3,755		$71,627
Monthly all Routes	City -owned Crosswind City -owned- Pelican (1) New Elgin Crosswind (or similar) (1) New Elgin Pelican (or similar)	4	4,241	$6,572	$89,872	$96,444
2X Monthly all Routes		4	8,483	$13,143		$103,015
Weekly all Routes	City -owned Crosswind City -owned- Pelican (3) New Elgin Crosswind (or similar) (1) New Elgin Pelican (or similar)	6	16,965	$26,287	$133,872	$160,159

Appendix C.3. Materials Management Cost

The following assumptions were used to calculate the disposal costs of sweeper waste.

Table 21. Summary of sweeper waste management assumptions.

Item	Rate
Vehicle Assumptions – Dump Truck (hauling)	
Maximum hauling capacity[1]	8 CY / 16 ton hoist capacity
Average vehicle fuel efficiency[2]	6.5 mpg
Cost of diesel fuel[3]	$4.25 per gallon
Sweeper Waste	
Average bulk density (lb/ft) – Inorganic[4]	88 lb/cf
Average bulk density (lb/ft) - Coarse Organic[5]	15 lb/cf
Average annual composition by solids type[6]	75% inorganic/25% organic
Sweeper hopper capacity[7]	8 CY (Elgin Crosswind)/3.5 CY (Elgin Pelican)
Sweeper Waste Management Labor Costs	
Labor Time = transit time + related non-driving time	
Distance to disposal site[8]	36 miles
Average transit speed	45 mph
Non-drive time required per haul	0.5 hour
Labor Rate	
(Same as sweeping operations, see Appendix C.1).	
Disposal Fees	
Non-compostable (inorganic) material[8]	$8 /CY
Compostable (organic) material[8]	$4 /CY
Mass-weighted disposal fee (75% inorganic/25% organic)	$7 /CY

[1] Typical value for truck with box length 10 – 12 feet, Monroe Municipal Equipment, All Season Bodies - Monroe Municipal Truck Equipment (monroetruck.com).

[2] Trux, Inc, *How to Effectively Reduce Fuel Consumption*.

[3] Average cost of diesel in Minnesota for the period Feb 15th – March 15th, AAA.

[4] Bulk density of silty sand, MN Stormwater Manual

[5] Bulk density of yard waste, average for leaves (Minnesota, 342 lb/CY) and uncompacted yard waste (250 lb/CY), and compacted yard waste (640 lb/CY), USEPA Volume-to-Weight Conversion Factors, April 2016.

[6] Sweeper waste composition, Prior Lake Street Sweeping Study (Kalinosky, et al, 2013).

[7] Vehicle specifications, vendor website.

[8] Project communications, City of Woodbury Public Works staff.

Table 22. Estimated annual cost of disposal-related costs for street sweeping scenarios.

Scenario	Total Material Volume (CY/yr)	Disposal Fees	Fuel ($/yr)	Labor ($/yr)	Disposal Cost ($/yr)
Baseline (Spring/Fall 1 X each)	12	$151	$1,927	$466	$2,544
Enhanced Baseline (Spring/Fall 2 X each)	24	$299	$3,508	$920	$4,727
Monthly all Routes	41	$519	$6,218	$1,597	$8,334
2X Monthly all Routes	45	$574	$6,893	$1,765	$9,232
Weekly all Routes	70	$894	$10,863	$2,752	$14,509

Appendix C.4. Contract Sweeping Cost Estimate

The cost of sweeping using a contract service was estimated using public bid tabulations for municipal street sweeping services and data collected by EOR for previous street sweeping studies (Table 23). Only quotes for annual or city-wide street cleaning were included in comparisons. The cost-basis for other sweeping services – e.g., construction site maintenance and parking lot sweeping – was not reviewed since this cost-basis tends to be hourly rather than by distance swept and lighter-duty sweepers are often used. Quoted rates for street sweeping services varied significantly among the bids reviewed, from a low rate of approximately $28.33 per lane-mile to a high of $147.84. Variation in bids is due in part to local economic factors. Other less transparent factors include:

- Number, type, and condition of sweepers – sweepers come in different sizes, and some are more effective than others when targeting grit vs. leaves. vs. trash, etc.
- Operational speed and number of sweeper passes per lane – assumptions regarding the number of lane passes requested/needed to clean streets may vary among service providers.
- Distance to municipality – mobilization costs were not quantified explicitly in any of the bid tabulations that were reviewed but may be accounted for in unit pricing.
- Disposal-related costs –It is not clear how sweeper waste management responsibilities may factor into pricing for other bids. Only the Oak Park Heights quote (2014) included an explicit item for disposal.
- Reimbursable expenses – It was not clear in the bid tabulations whether expenses were included or if some quotes included reimbursement for fuel costs.

Based on the surveyed rate, a value of $102 per lane-mile was used to estimate the cost of contract services. This value represents the median cost of all entries in Table 23.

Table 23. Summary of municipal street sweeping bids reviewed for contract sweeping service cost estimates.

#	City	Year	Proposed Lane Miles	Quote	Cost per lane mile
1	Cottage Grove, MN	2020	(City -wide)	$85.00/hr	~$28.33[1]
2	Forest Lake, MN	2017	239 x 2	$66,500	$139
3	Oak Park Heights, MN	2014	Spring/Fall Sweeping	$115/hr + $1.20/CY disposal fee	$32.85[1] + disposal fees ($44.95 adjust for 4% annual inflation)
4	Downer's Grove, IL (Greater Chicago)	2022	224 x 12 sweepings	$143,673.60 spring	$53.45 Spring
5			240 x 3 sweepings	$73,526.40 fall	$102.12 fall
6	St. Charles, IL (4 bids)	2021	276 x 8 sweepings	$211,372 average	$95.73
7				$82,481 low	$35.36
8				$280,120 high	$127.32
9	Westerville, OH	2020	Annual street sweeping	$0.028/curb-foot	$147.84
10	Fairfield, OH	2018-20	City streets 1x, 2x, or 4x per month	$0.01339/curb-foot	$70.70
11	Laude, MO	2022	21 centerline miles x 12	$70,560	$280/centerline mile *$70 - $140/ lane-mile*
12	Victoria, TX (3 bids)	2020	648 highway, 375 arterial, 740 local, 400 extra lane pass for heavy debris	$251,784.30 (low bid)	$116.41

[1]Based on a single lane pass at an average operational speed of 3.0 mph

Appendix C.5. Detailed Costs - Vehicle Maintenance

Sample Manufacturer's Data Sheet, Tymco Model 600

REGENERATIVE AIR SWEEPERS

TYMCO MODEL 600
PROJECTED PARTS USAGE/STOCKING REQUIREMENTS
BASED ON 1000-1200 HOURS USE PER YEAR

Prices based on TYMCO 2021 published price list

	PART NO	DESCRIPTION	UNIT LIST PRICE	QUANTITY 1ST YR.	2ND YR.	3RD YR.	4TH YR.	4 YR TOTALS
1	11221	Power Band, Blower - Std	$523.00				1	$523.00
	11108	Tapor Lock Bushing	$66.00			1	1	$132.00
	5010937	Seal, Blower Housing	$17.00		1	1	1	$51.00
	502556	Water Pump, Electric ('95 & Later)	$278.00		1	1	1	$834.00
	20809	Tip, Water Spray	$16.00			5		$80.00
	10837	Strainer, Spray Nozzle	$11.00			5		$55.00
	5010839	Pickup Head Spring (Light Duty)	$28.00				2	$56.00
	5010840	Pickup Head Spring (Heavy Duty)	$30.00				2	$60.00
	12910	Gutter Broom Lock Valve Assy	$153.00			1	1	$306.00
	500360	Seal, Hopper Transition	$56.00		1	1	1	$168.00
	500902	Seal, Dump Door	$334.00				1	$334.00
	500362	Seal, Inspection Door	$43.00			1	1	$86.00
	5013731	Seal Kit, Torque Motor	$139.00			1	1	$278.00
	5012771	Seal Kit, G.B. & PUH Cylinder	$84.00			1	1	$168.00
	5014244	Seal Kit, Dump Cylinder	$166.00				1	$166.00
	505172	Cartridge Valve	$257.00			1		$257.00
	504622	Valve Assembly, Hydraulic	$420.00				1	$420.00
	5010960	Spring, Gutter Broom	$31.00			1	1	$62.00
	503014	Check Valve	$121.00			1	1	$242.00
	504459	Vickers Coil - 12 V DC w/Deut.	$147.00		1	1	1	$441.00
		YEARLY COST PROJECTION TOTALS		$0.00	$498.00	$1,527.00	$2,694.00	**$4,719.00**
2	501513	Blower Wheel (Coated)	$3,928.00			1		$3,928.00
	KT1102	Liner Kit, Blower Housing	$1,550.00		1	1	1	$4,650.00
	501020	Curtain Set, Pickup Head	$400.00	2	2	2	2	$3,200.00
	500392	Wire Segments, Vertical Digger	$300.00	10	10	10	10	$12,000.00
	5010785	Liner, Separator	$2,228.00				1	$2,228.00
	5011671	Hose, Pressure (Heavy Duty)	$624.00				1	$624.00
	5011671	Hose, Suction (Heavy Duty)	$624.00			1		$624.00
	502116	Transition, Urethane - w/Seal	$695.00		1		1	$1,390.00
	5010265	Skid Guard - Left Hand	$52.00		1		1	$104.00
	5010266	Skid Guard - Right Hand	$52.00		1		1	$104.00
	502569	2" Wide Duo Skid® Plate Assembly	$793.00		2		2	$3,172.00
		YEARLY COST PROJECTION TOTALS		$3,800.00	$7,735.00	$9,902.00	$10,587.00	**$32,024.00**

SECTION 1 = STANDARD HIGH USAGE PARTS SECTION 2 = WEAR ITEMS

*****Verify parts prices with TYMCO Parts Department before quoting.*****

1 of 2 TIL-006 / 3/12/2021

COSTS FOR THE FOLLOWING LISTED ITEMS MUST ALSO BE TAKEN INTO CONSIDERATION

3

1. FILTERS

Auxiliary Engine	Truck (per manufacturer's suggestion)	Sweeper Hydraulic System
Oil Filter (every 100 hrs) **Air Filter** (per restriction indicator) **Fuel Filter** (as required)	**Oil Filter** **Air Filter** **Fuel Filter** **Transmission Filter**	(per restriction indicator)

2. LUBRICANTS

Sweeper	Truck (Interval twice factory recommendation)
1. Auxiliary Engine Oil **2. Hydraulic Oil** (Approximate 25 Gallons Capacity) After first 2000 hrs & every 2000 hrs thereafter **3. Grease** **4. Coolants**	**1. Grease** **2. Engine Oil** (every 100 hrs) **3. Differential Oil** **4. Transmission** **5. Coolants**

4

LABOR	**OVERHEAD**
DEPRECIATION	**MISCELLANEOUS REPAIRS**
FUEL	(Flats, Light Bulbs, etc.)

SECTION 3 = MISCELLANEOUS MAINTENANCE SECTION 4 = VARIABLE EXPENSES

NOTE: All Sweeper replacement parts are based on TYMCO list prices.

The above is a projected parts usage list for a TYMCO Model 600 covering four years under normal use. This document is intended to provide a general projection for planning purposes based on our own experience and feedback from the field over the years, but should not be interpreted as being totally accurate. The format is separated into four sections showing, first, the standard parts that are considered to possibly fail over the periods shown. Secondly, the parts that we consider to be wear items on which monies should be routinely budgeted. The third section is a statement concerning miscellaneous expenditures related to maintenance and upkeep of the sweeper. Dollar amounts shown in this section are based on current prices in our locale and will, no doubt, vary in different parts of the country. A Model 600 mounted on a FC Freightliner Cargo truck with a 5.9 Liter engine was used to collect this data. The fourth section contains variables such as local labor rates, overhead costs, etc. and it is mentioned only as a reminder of factors to be considered and no attempt has been made to establish a dollar figure on it.

In working up a cost proposal on a TYMCO Model 600, it must be taken into account that the first 1000 hours or one year, whichever comes first, is covered under warranty and non-wear parts failures are provided at no charge FOB Waco, Texas.

Proper care and operation of the machine play a large role in such projections as does the environment in which it is used. Negligent operation, cleaning and shoddy maintenance practices have the potential of increasing cost 25% or more over a year's period. In addition, the unnecessary use of the pickup head broom will further add cost. The figures in this document reflect the acerave use of the broom at approximately 20%.

The environmental aspect that comes into play primarily concerns the type of material and surface that the sweeper encounters. Constant exposure to sand, chip seal, rotomill and stripe grindings tend to accelerate wear and, of course, increase cost.

Another major consideration is the number of hours the sweeper is used in a year's time. This projection is based on 1000-1200 hours of operation per year, and cost can be expected to increase proportionally with the increased usage beyond that figure.

Stewardship Grant Program Budget Status Update

October 5, 2022

Homeowner	Coverage	Number of Projects: 17	Funds Allocated
Habitat Restoration and rain garden w/o hard surface drainage	50% Cost Share $15,000 Max	12	$36,800
Rain garden w/hard surface drainage, pervious pavement, green roof	75% Cost Share $15,000 Max	4	$48,125
Master Water Steward Project	100% Cost Share $15,000 Max	0	$051
Shoreland Restoration	100% Cost Share $15,000 Max	1	$15,000

Commercial, School, Government, Church, Associations, etc.	Coverage	Number of Projects: 12	Funds Allocated
Habitat Restoration	50% Cost Share $15,000 Max	3	$25,500
Shoreland Restoration (below 100-year flood elevation w/actively eroding banks)	100% Cost Share $100,000 Max	1 (Lake Owasso)	$160,000
Priority Area Projects	100% Cost Share $100,000 Max	5	$378,540*
Non-Priority Area Projects	75% Cost Share $50,000 Max	1	$50,000
Public Art	50% Cost Share $15,000 Max	0	$0
Aquatic Veg Harvest/LVMP Development	50% Cost Share $15,000 Max	2	$12,430

Maintenance	50% Cost Share $5,000 Max for 5 Years	73	$51,375
Consultant Fees			$32,766
Total Allocated			**$810,536**

2022 Stewardship Grant Program Budget	
Budget	$1,000,000
Total Funds Allocated	$810,536
Total Available Funds	**$189,464**

**Includes $50,000 enhanced street sweeping request pending approval at the October 5, 2022 board meeting.*

****

Action Items

****

Request for Board Action

Board Meeting Date: October 5, 2022 **Agenda Item No:** 7A

Preparer: Tina Carstens, Administrator

Item Description: Watershed Excellence Awards Approval.

Background:
Annually, the District seeks out nominations for the Watershed Excellence Awards. This year's awards will be held on Tuesday, November 15th at Keller Golf Course. A formal invitation will be sent.

Nominations were received by staff and then were reviewed by the citizen advisory committee (CAC) at their September 27th meeting and suggested winners were selected for approval from the board.

The suggested award winners will be sent ahead of the October board meeting for discussion and approval.

Applicable District Goal and Action Item:

Goal: Inform and empower communities – The District will inform and empower communities to become partners in improving and protecting the watershed through their own efforts.

Action Items: Hold events to celebrate community connections and participation, showcase partner accomplishments, and educate youth, families, and residents about clean water.

Staff Recommendation:
Staff recommends approval of the proposed Watershed Excellence Award winners.

Financial Implications:
The Watershed Excellence Awards event is included in this year's budget under education events.

Board Action Requested:
Recommend and approve the proposed Watershed Excellence Award winners.

****

New Reports/ Presentations

****

District Inspection Standardization Update

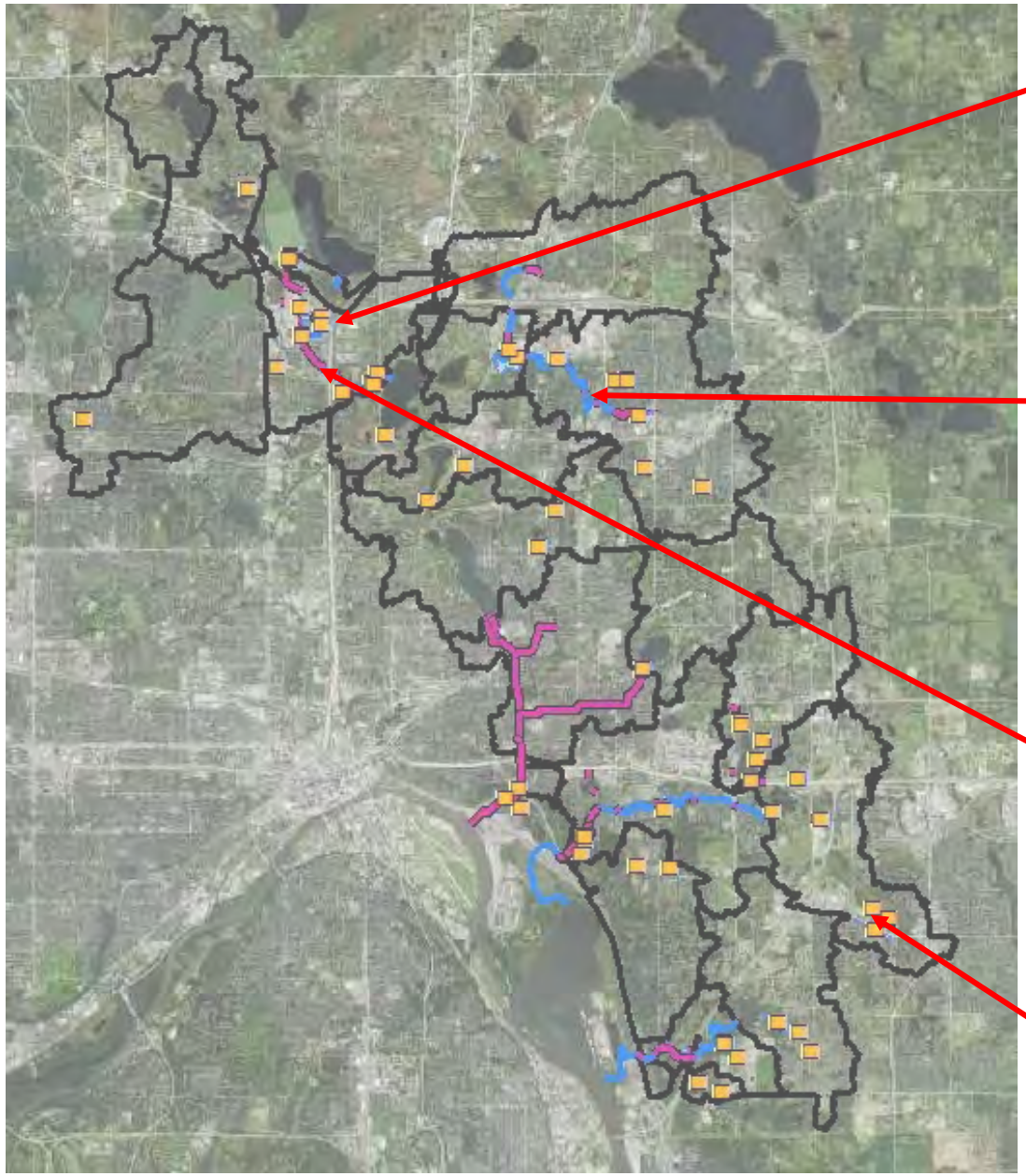
October 5, 2022 – Tyler Olsen

Purpose

- Standardization of inspection process for:
  - Creek systems
  - Facilities
  - Infrastructure
- Prioritization framework for selection of next year's maintenance projects

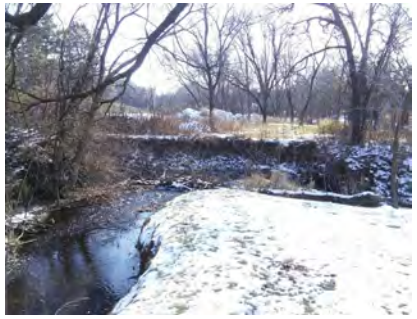
Methodology Overview

- Obtain and review previous inspection data
- Categorize types of facilities
  - i.e. BMPs, pipes, outlet structures
- Develop a scoring system for inspections
- Create mobile data collection application (iPad) with ArcGIS Field Map



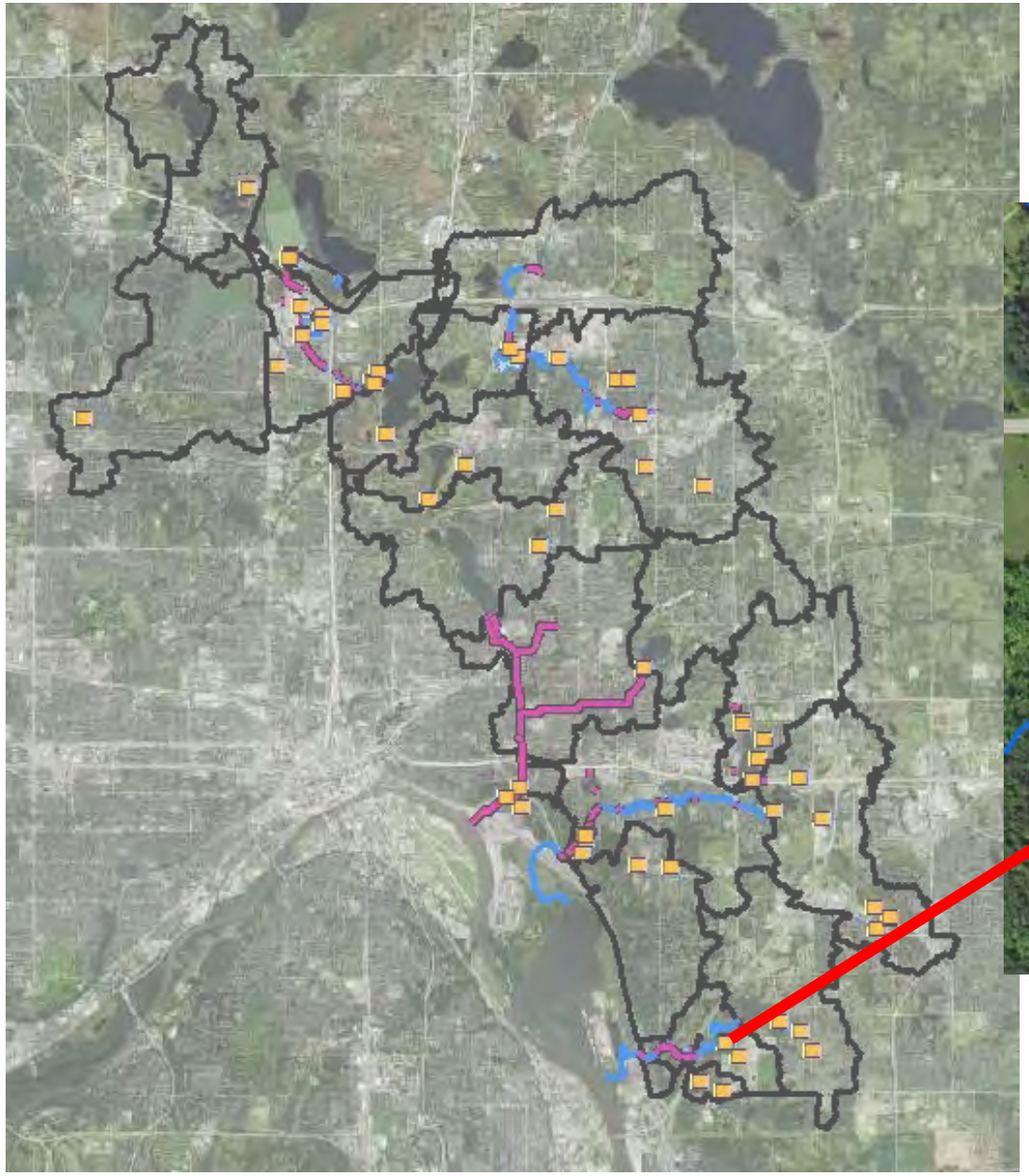
Water Quality Ponds

Creeks

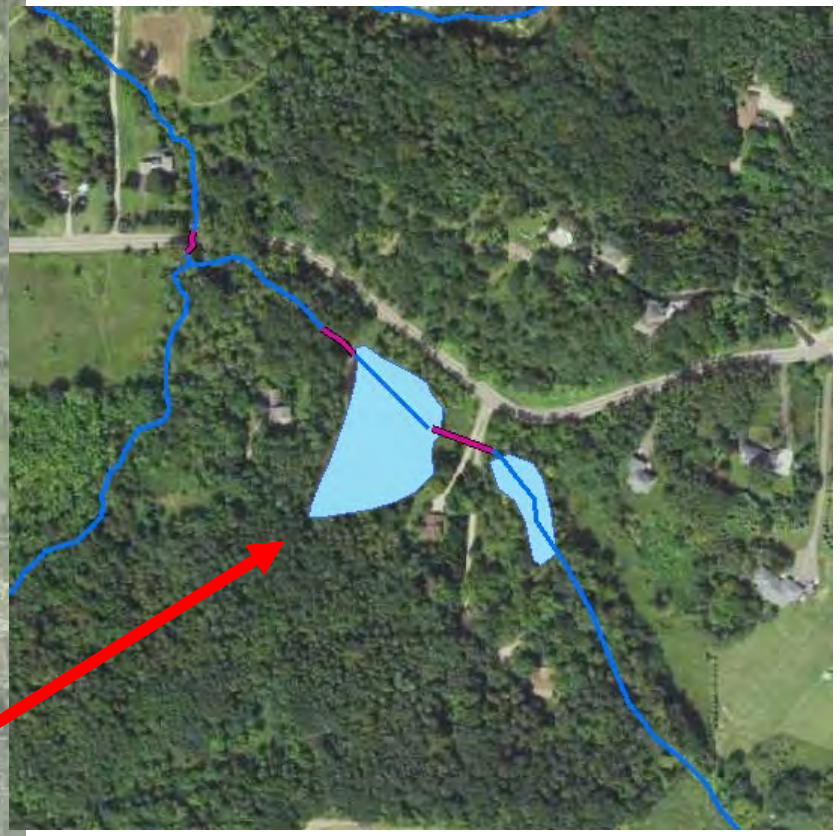


Pipes (non-tunnel)

Misc. inspection sites (outlets, weirs, slopes, filters, etc.



Double Driveway Pond (Fish Creek)
CATEGORY: POND



Category Development

- Reviewed several data sets for creating categories
  - Past CIPs
  - Current inspection spreadsheet/notes
  - GIS files
  - Other tools (WQ project prioritization tool, developed in 2020)
- Created larger categories that encompass all inspected infrastructure
- Included “catch-all” categories to help capture miscellaneous inspections

Criteria Development

- For each category, created inspection items
  - i.e. erosion, damage to infrastructure, sediment build-up, etc.
- Range of criteria developed for each inspection item
  - Covers a range of conditional assessment
  - Based on field experience/input from RWMWD and Barr staff

- **Pond Criteria**
  - Deltas
    1. No sediment accumulation below surface
    2. Delta formation between 0 and 20 cubic yards
    3. Delta formation 20-50 cubic yards
    4. Delta formation >50 cubic yards
  - Erosion
    1. None
    2. Small channel under 1 foot wide and/or 4 inches deep
    3. Medium channel, 1-2 feet wide and/or 8 inches deep
    4. Large channel, over 2 feet wide and/or 8 inches deep
  - Cattail formation
    1. None or under 50 square yards
    2. Mat between 50 and 200 square yards
    3. Mat between 200 and 500 square yards
    4. Mat >500 square yards
  - Pond storage
    1. Recently cleaned out
    2. Under 25% full of sediment
    3. 25% to 50% full of sediment
    4. >50% full of sediment
  - Last known survey

Scoring System

- Conditional assessment score for each criteria (1-4)
- Time frame score assigned to each project/location (1-4)
  - "How soon does this need to be repaired"
- Total score is added up for each category/criteria within a project → normalized based on number of "components" → top scorers in list are prioritized for maintenance

  *prioritization occurs at a desktop level after field inspections/follow-up is complete

Pond Scoring

- Deltas score
  - Delta formation 20-50 cubic yards: **3**
  - Time score: **2** (2-3 year need)
- Erosion score
  - None: **1**
  - Time score: **1** (No Threat)
- Cattail formation score
  - None or under 50 square yards: **1**
  - Time score: **1** (No Threat)
- Pond storage score
  - Under 25% full of sediment: **2**
  - Time score: **2** (2-3 year need)
- Last known survey: 2019

- Risk score: **1** (low risk)

Field Maps/ Survey 123 (iPad) application development

- Development of a Field Map (ArcGIS) basemap to be used for inspections
- Map includes points for each piece of infrastructure inspected
  - Drop down menus for each point's category/criteria
  - Note taking, attaching photos abilities
  - Tracking if infrastructure owned by RWMWD or other entity
- Past inspections will be available for each point
- Flags for further desktop review
- Attach plans and other useful info to each point
- Survey123 tied to each inspection point – automatic switching between apps to collect data

Field Maps/ Survey 123 (iPad) application development

- Live Demo!

Scoring/ Prioritization

- Raw data downloaded from GIS database
- Microsoft Excel macro to format data and apply scoring
- List of inspection records sorted and ranked by score
- “Threshold” score set each year to determine which sites are evaluated for maintenance

Scoring/ Prioritization

- Raw data downloaded from GIS database
- Microsoft Excel macro to format data and apply scoring
- List of inspection records sorted and ranked by score
- "Threshold" score set each year to determine which sites are evaluated for maintenance
  - Sites above threshold will be reviewed by RWMWD/Barr staff

2022 Annual Inspection

- Test run completed May 2022, minor updates made to categories/criteria
- Full CIP inspection completed August 2022
- Normalized scores ranged from 1 to 8.5 this year
- 21 sites reviewed by RWMWD/Barr staff

Future Updates

- Annual maintenance
  - Updates to criteria
  - Add/remove sites
  - Track past years' data
- Review meetings with RWMWD/Barr staff
- Application updates (ESRI)
- Incorporate additional prioritization metrics (i.e. flood risk)

resourceful. naturally.
engineering and environmental consultants

BARR

Technical memorandum

To: Tina Carstens, David Vlasin, and Carrie Magnuson
From: Gabrielle Campagnola, Tyler Olsen, and Brad Lindaman
Subject: District inspection standardization and mobile data collection
Date: September 28, 2022
Project: 23-62/0282.39
c: Ramsey-Washington Metro Watershed District board of managers

1 Introduction

The Ramsey-Washington Metro Watershed District (RWMWD) has a long history of maintaining and improving its owned and operated infrastructure to enable proper function for water quality improvement, conveyance, and flood risk reduction. Proper maintenance is critical to operating stormwater infrastructure to ensure public safety as well as increase the longevity of the infrastructure's lifecycle. The objective of this work was to standardize the district's facilities (capital improvements) inspection process and prioritization of capital improvements project maintenance items. To accomplish this goal, Barr developed an inspection tool that can be used in the field to identify infrastructure or project sites that should be prioritized for maintenance. In addition, this effort provides more transparency to the public, improves efficiency of the annual inspection process, and reduces risk associated with delaying needed maintenance.

Results of this work led to an integrated tool for collecting data in the field and prioritization of maintenance needs. The integrated tool includes two ArcGIS applications (Field Maps and Survey123), which enable inspectors to score infrastructure and document notes during annual inspections from an iPad tablet while in the field. The applications use preset forms and inspection questions to identify potential failures or defects for different infrastructure types. The integrated tool also includes a scoring and prioritization spreadsheet, which uses the data collected in the ArcGIS applications to assign scores to and prioritize identified maintenance needs. This memorandum outlines the methodology used to develop the integrated tool, the process for using the tool during annual inspections, a summary of the 2022 annual inspection, and future recommendations.

2 Methodology

2.1 Review previous inspection data and process

At the beginning of tool development, Barr participated in the RWMWD's 2021 capital improvement program (CIP) annual inspection over the course of three days to better understand what data is collected in the field. We then reviewed the CIP inspection notes from the past three years to understand the types of projects that were selected for maintenance and what criteria triggered a need for maintenance. Barr also reviewed the *CIP Maintenance Inspection Sites* and the *RWMWD Stormwater Infrastructure* GIS files to understand all the types of infrastructure that are inspected and owned in the district. Finally, we reviewed

other prioritization methodologies from the district (i.e., water quality project prioritization tool) as well as other sources (other watershed districts, municipalities, and national associations) to develop a framework for the tool.

2.2 Categorize types of inspections

The next step in developing the inspection tool was to categorize all infrastructure that is inspected and maintained in the RWMWD. Barr used the previously described sources to create categories that include pipes and culverts, infiltration basins, engineered filtration systems, and more. In total, 14 infrastructure categories were developed. In addition, an "other" category was added to capture all infrastructure that does not fit well into the 14 developed categories. Specific scoring criteria were developed for the 14 categories (see section 2.3). The "other" category does not include a scoring system due to the varied nature of these systems.

2.3 Develop scoring system

To evaluate the data collected in the annual CIP inspections, a conditional assessment scoring system was developed for the categories described in section 2.2. Each category of infrastructure includes multiple conditional assessment criteria based on the components of the system and the types of defects or failures that may be encountered in the field. For example, ponds are inspected for deltas, erosion, cattail formation, and loss of pond storage. To maintain consistency across various infrastructure categories in the tool, each conditional assessment criteria is assigned a score ranging from 1 to 4, where 1 represents a minimal maintenance need and a 4 represents a significant maintenance need. For example, a pond delta that is assigned a score of 1 represents no sediment accumulation below the pond surface, while a score of 4 represents a delta formation that is greater than 50 cubic yards or 50 percent of the pond surface area.

In addition to the conditional assessment score, a score representing the immediacy of the maintenance need is assigned to each conditional criteria to represent how soon the estimated maintenance will be needed prior to the system failing. This score is nicknamed the "time frame score." Similar to the conditional assessment score, the time frame score will be a value of 1 through 4. A time frame score of 1 represents no immediate maintenance need or threat (within the next three years), while a score of 4 indicates that maintenance must be completed within a year.

2.4 Develop GIS application

Using the inspection categories and scoring systems, Barr created a GIS-based field inspection integrated application that incorporates this information into a user-friendly form for inspectors to fill out in the field. A GIS SQL server database was first developed for seamless integration with web- and mobile-based inspection applications such as ArcGIS Online, Field Maps, and Survey123. Various GIS layers provided by the district, such as CIP locations, were migrated into the database, and the scoring system developed by Barr was incorporated into the mobile inspection system.

Following GIS database and desktop mapping, an online mapping service was published to render the GIS layers and scoring system available via web and mobile platforms. ArcGIS Enterprise was utilized to facilitate web publishing, and the resulting map and feature service layers were migrated to ArcGIS Online for secure sharing with Barr and the RWMWD.

During initial phases of the scoring system design, Barr determined that an integrated application involving ArcGIS Field Maps and Survey123 would provide the best possible experience for field inspection staff while also meeting the needs of the underlying scoring system. An ArcGIS Online basemap was created with relevant map service layers for viewing and reference in the field. This basemap was then configured for mobile consumption via the ArcGIS Field Maps application. With Field Maps, staff were able to view map layers, navigate to specific locations, and evaluate basic information about each CIP inspection site.

To facilitate CIP inspections, a hyperlink was made available within each CIP location pop-up window in the Field Maps application. This hyperlink was established to guide staff to a customized CIP inspection form in the Survey123 application. In Survey123, conditional questions and dropdown lists were designed to appear in the form based on the applicable infrastructure category, with the goal of providing as streamlined an experience as possible while standardizing data collection methods for scoring. All forms and data submitted from Survey123 were made available in real time within the GIS database for additional post-processing, scoring, and photo log development.

3 Inspection tool processes

The following sections describe the methodology for collecting an inspection record, scoring the site, and prioritizing maintenance needs.

3.1 Field inspection tools process

To start the field inspection process, the inspector will open Field Maps and view the prepopulated CIP inspection locations with their status. The CIP locations will show a status of "inspection required," "inspection complete," or "follow-up inspection required." The CIP inspection status will help inspectors visually track inspection progress and remaining required inspections.

Once an inspector navigates to the location of the CIP infrastructure, the inspector can view information about the inspection site, such as feature, subwatershed, nearby infrastructure, etc. To launch the inspection form, the inspector will select the hyperlink in the Field Maps application to open Survey123. The first item in the inspection form is the category of the inspection feature. These categories are prepopulated based on the RWMWD-maintained CIP location database, but the category can be changed as needed in the field. Once the category is selected, the inspector will input the conditional assessment and time frame scores and add notes as needed. Figure 1 provides an example of what this form looks like in Survey123.

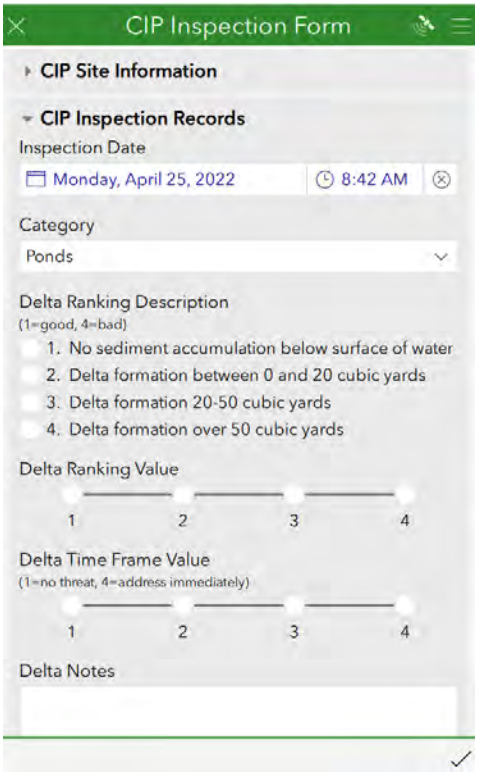


Figure 1: A screenshot of a section of the pond inspection template from Survey123

Once all the criteria are scored and entered into the application, the inspector will be prompted with four more entry fields, as seen in figure 2. At the end of each inspection, the inspector should first answer if the RWMWD owns the infrastructure; while inspectors are in the field, they may notice maintenance needs for infrastructure not owned by the district. The inspection tool allows inspectors to add a new feature, score the feature, and identify that the feature is not RWMWD-owned. Once the inspection is complete, the district can send inspection results to the owner of the infrastructure.

Secondly, the inspector will be prompted to note whether the infrastructure should be flagged for further review. Infrastructure marked for further review will be automatically evaluated for CIP maintenance the following year, regardless of how the inspected feature scores in the inspection prioritization tool—allowing for further desktop review after the inspection is completed and for additional QA/QC if a determination cannot be made in the field.

The third prompt is inspection notes, which can be used to indicate the overall site condition, environmental factors, or anything not disclosed in the criteria scoring notes. The final prompt is to submit photos of the infrastructure. Photos can be used to document issues and can be referenced in future years during inspections.

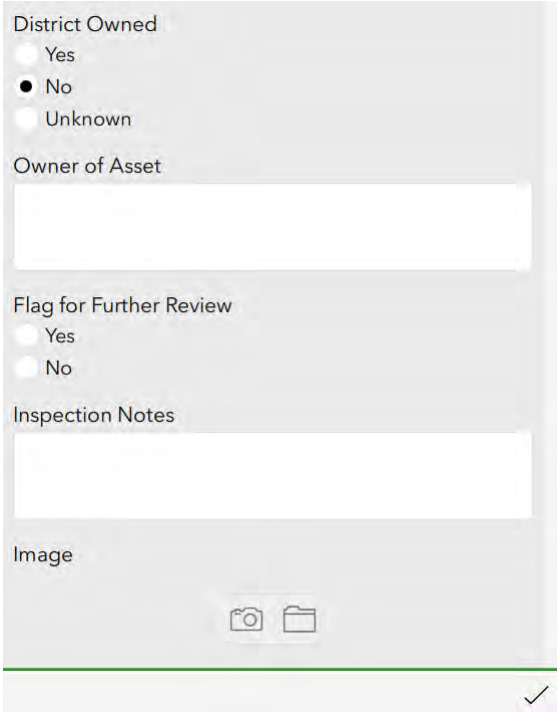


Figure 2: Four prompts for the inspector at the end of each inspection

3.2 Prioritization process

Following field CIP inspections, the data is compiled from the back end of the GIS database and downloaded for scoring and prioritization. The data is downloaded in a large database format and requires scripting in Microsoft Excel to automate the process of formatting the data from its raw form to a useful format for scoring.

Once the data is formatted, the scoring process is applied to the inspection records collected in the field. The process multiplies the conditional assessment score by the time frame score to calculate a total score. This total score is then normalized (divided) by the number of records collected for each site. Using this system, the normalized scores can range from 1 to 16. A score of 1 indicates that the inspector did not find any structural defects or maintenance needs, nor were any needs time sensitive for addressing. A score of 16 indicates that the inspector found significant structural defects and that maintenance/repairs need to be made as soon as possible.

3.3 Determining maintenance priorities

Once the data is compiled and scored, projects can be identified for CIP maintenance the following year. As a first step in determining maintenance priorities, Barr recommends reviewing all sites that were flagged for further review. The second step is to compile the normalized scores for infrastructure and sort them from highest to lowest. Depending on the year, the range of scores for the inspected infrastructure may vary. Therefore, it is recommended that a threshold score be set each year and that sites that rank above the threshold be reviewed for inclusion in the CIP.

One benefit of the GIS application is that it can produce a one-page summary, as seen in appendix A. Each summary includes scoring results from the inspection, whether a site was flagged for review, inspection notes, and images, and the summaries can be reviewed by inspection staff to determine which sites should be on the following year's CIP maintenance schedule.

4 Field collection 2022

Following completion of the integrated tools and process definitions in spring 2022, a field verification of the integrated tool test was conducted. In May 2022, four Barr and RWMWD staff members visited nine test sites that were recommended by either the RWMWD managers, district staff, or Barr. The goal of the small field test was to collect inspection records for the different sites to test the tool's variability and to identify any needed improvements. After the field verification test was conducted, Barr processed the data and determined that the tool functioned as intended.

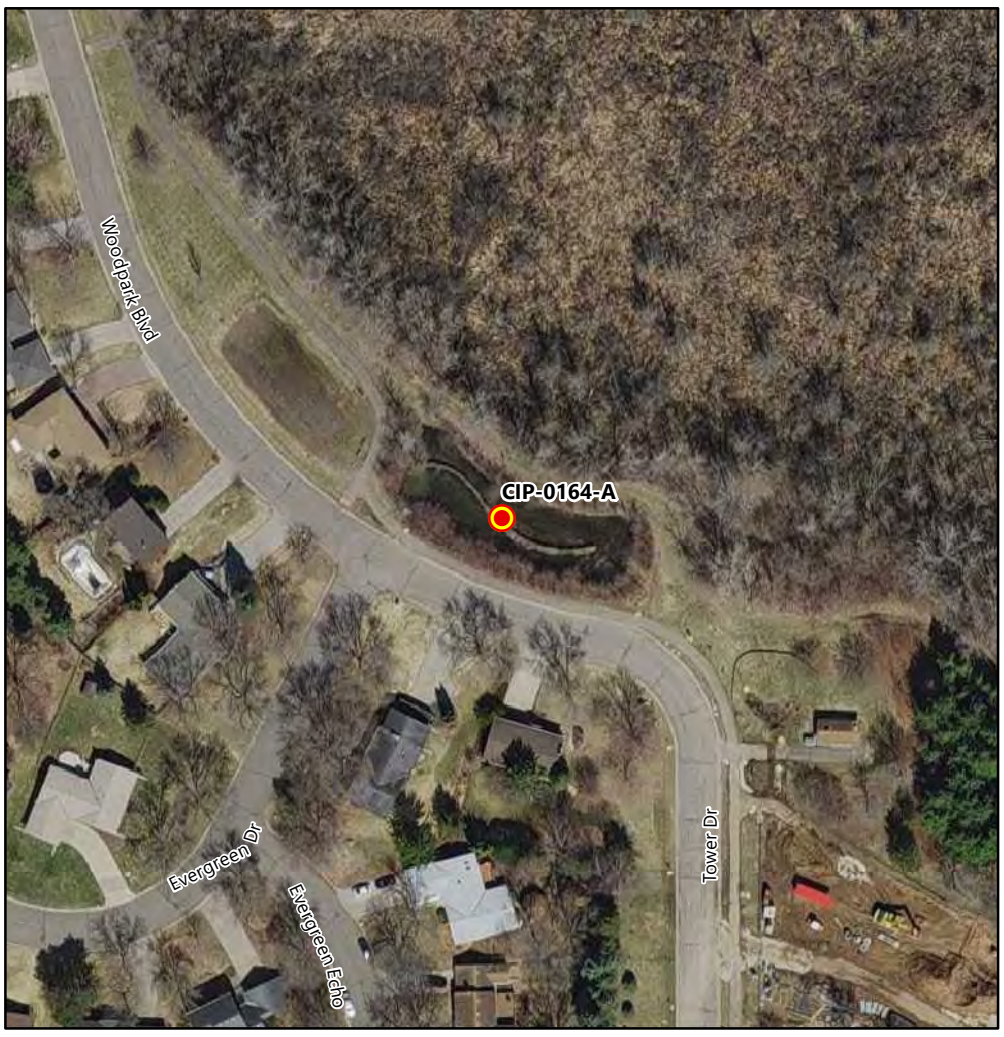
In August 2022, the same four staff members completed the full annual CIP inspection using the inspection tool. The 2022 CIP inspection took course over three and a half days and was overall successful. After, the data was downloaded and processed.

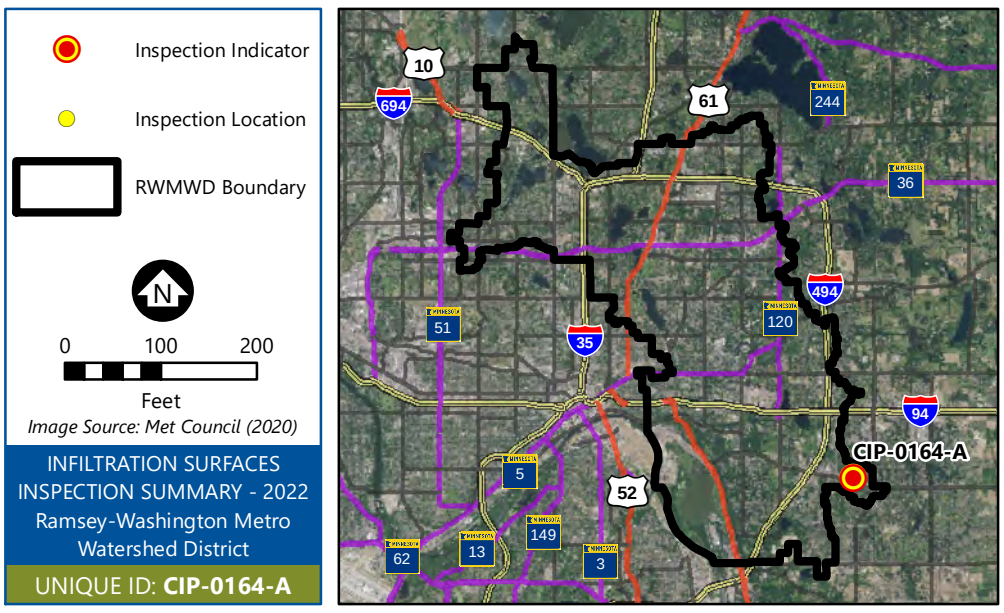
Normalized scores for the 2022 CIP inspection ranged from 1 to 8.5. A threshold score of 2 was chosen, and Barr and the RWMWD would review any inspected item that scored over a 2. Eleven inspected items scored over a 2, and 19 were flagged for review. Multiple inspected features both scored over a 2 and were flagged for review, so the total list of features to be reviewed was 21. One-page summaries were created to help compare and evaluate the 21 identified sites, which Barr and RWMWD are currently reviewing for inclusion in the CIP. Additionally, a few non-district sites were identified as needing maintenance. The results of these inspections will be sent to the respective owners.

The one-page summaries for the 2022 inspections are included in appendix A.

5 Future recommendations

Barr suggests that the RWMWD budget for annual maintenance of this tool to keep it up to date and incorporate improvements. These updates may include integrating new infrastructure into the database, removing infrastructure from the database, and tracking maintenance needs identified in the previous year. Additionally, improvements to the tool may be identified in the annual CIP inspection process and should be incorporated prior to the start of the next inspection. These improvements may include refining the tool to confirm that inspector bias is reduced, and that the scoring system is consistent regardless of the individual inspector using the tool. Potential changes could include updates to categories, scoring, one-page summaries, etc. Once annual inspections are complete and CIP projects are selected for the following year, we recommend holding working meetings between Barr and the RWMWD to determine any tool maintenance needs. The number of necessary changes from year to year is predicted to decrease as the tool is used.





Unique ID: CIP-0164-A
Site ID: 164
Section: PFS Basins
Name: PFS Basin East

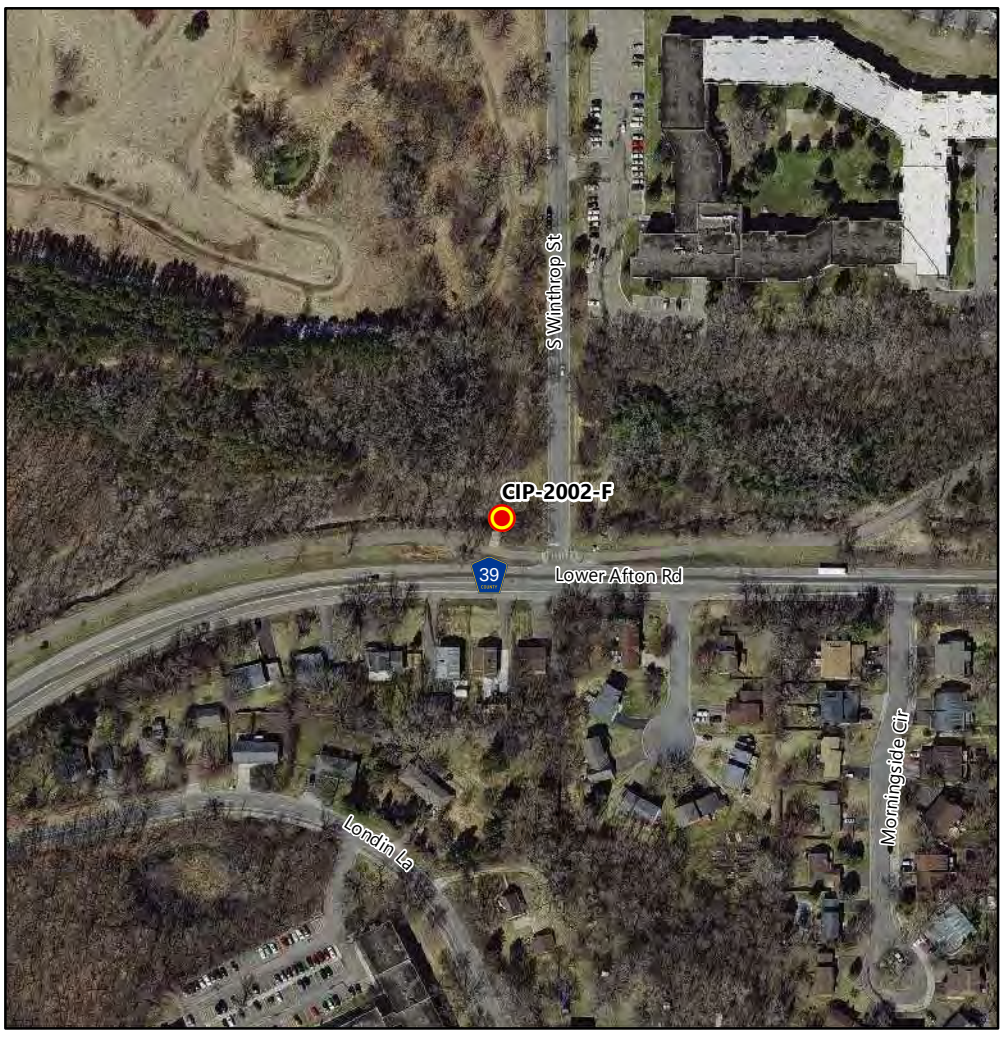
Inspection Date: 8/17/2022 11:57:00 AM
Inspector Name: Vlasin
Category: Infiltration surfaces
Sediment Accumulation Ranking Description: 3. 1-2 inches
Sediment Accumulation Ranking Value: 3
Sediment Accumulation Time Frame Value: 3
Sediment Accumulation Notes:
Mounding Beneath the Surface Ranking Description: 3. 1-2 inches
Mounding Beneath the Surface Ranking Value: 3
Mounding Beneath the Surface Time Frame Value: 3
Mounding Beneath the Surface Notes:
Structural Damage Ranking Description: 1. 0-10 pavers out of place, or 0-10 cracked pavers
Structural Damage Ranking Value: 1
Structural Damage Time Frame Value: 1
Structural Damage Notes:
Last Known Survey Notes:

District Owned: Yes
Flag for Further Review: Yes
Inspection Notes: Clean pavers just like every year … clean/replace outlet rock as well
Total Score: 19
Normalized Score: 6.333333333

Ranking Value (1 - 4): 1 = good condition, 4 = needs attention/repair
Time Frame Value (1 - 4): 1 = no immediate repair needed or repair is not time sensitive, 4 = immediate repair needed

BARR

RAMSEY-WASHINGTON METRO WATERSHED DISTRICT



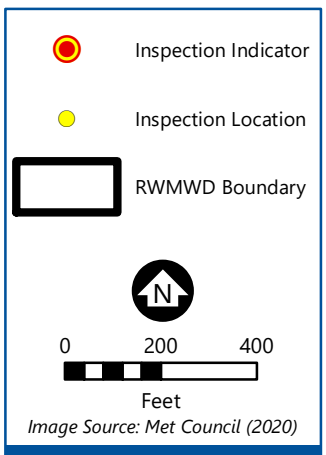
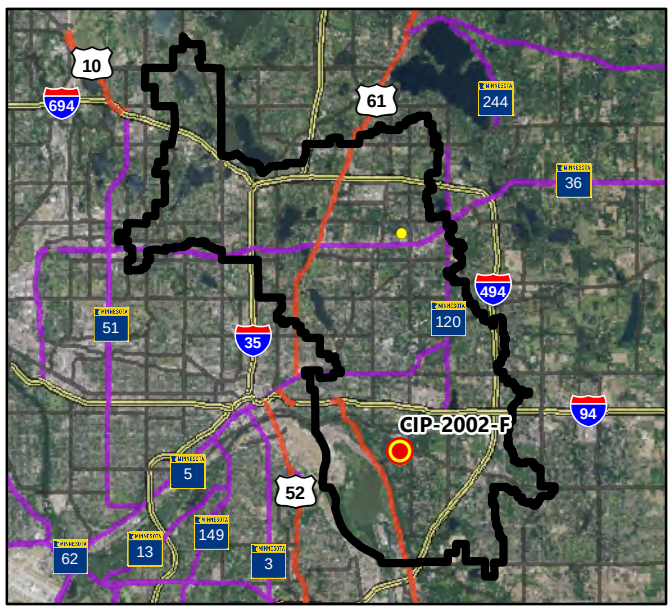


Image Source: Met Council (2020)

PONDS
INSPECTION SUMMARY - 2022
Ramsey-Washington Metro Watershed District

UNIQUE ID: **CIP-2002-F**



Unique ID: CIP-2002-F
Site ID:
Section: Battle Creek, Upper/Lower Ravine
Name: Lower Afton Rd Drainageway at Winthrop; Basin and Rock Channel

---

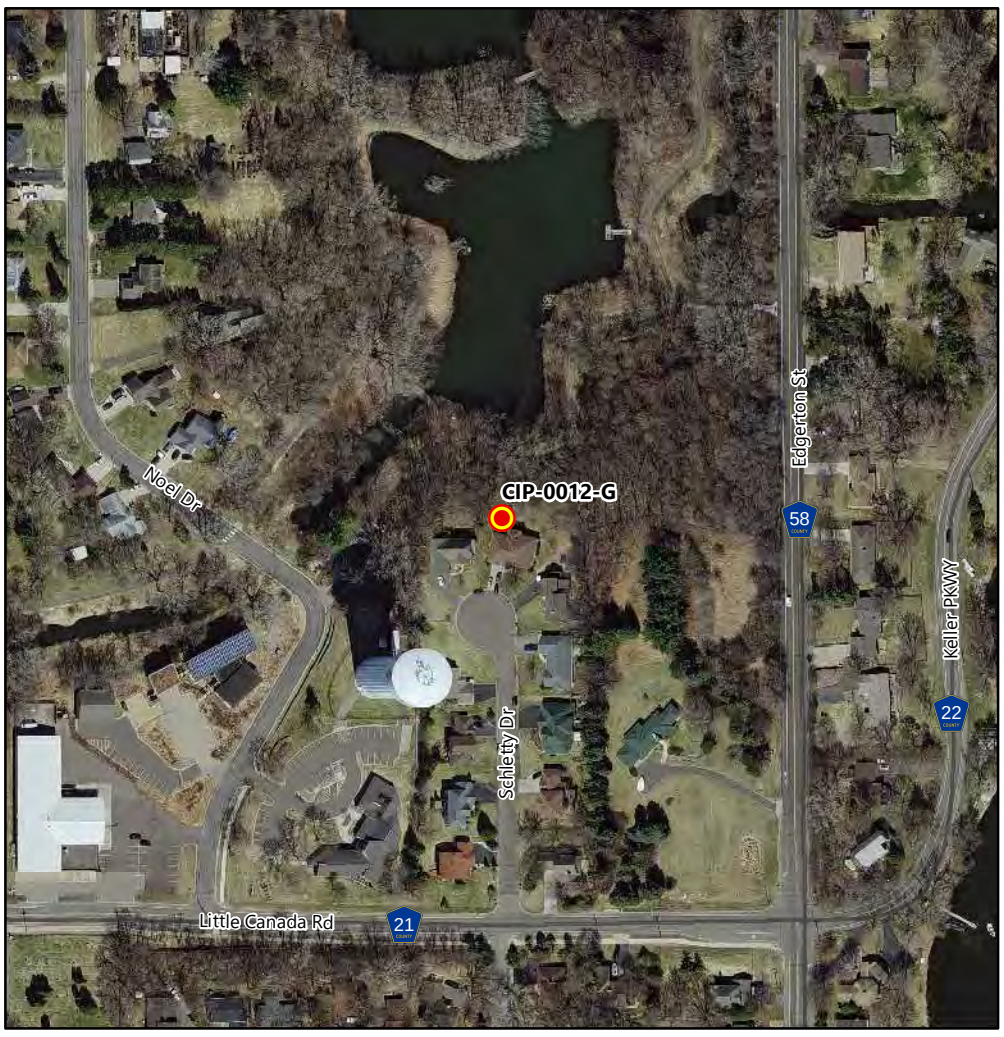
Inspection Date: 8/17/2022 1:44:00 PM
Inspector Name: Vlasin
Category: Ponds
Delta Ranking Description: 4. Delta formation over 50 cubic yards
Delta Ranking Value: 4
Delta Time Frame Value: 4
Delta Notes:
Erosion Ranking Description: 1. None
Erosion Ranking Value: 1
Erosion Time Frame Value: 1
Erosion Notes:
Cattail Ranking Description: 1. None or under 50 square yard area
Cattail Ranking Value: 1
Cattail Time Frame Value: 1
Cattail Notes:
Pond Storage Ranking Description: 4. Over 50% full of sediment
Pond Storage Ranking Value: 4
Pond Storage Time Frame Value: 4
Pond Storage Notes: Needs to be cleaned
Last Known Survey Notes:

District Owned: Yes
Flag for Further Review: Yes
Inspection Notes: Adding a “pool 2” in 2923 cip
Total Score: 34
Normalized Score: 8.5

Ranking Value (1 - 4): 1 = good condition, 4 = needs attention/repair
Time Frame Value (1 - 4): 1 = no immediate repair needed or repair is not time sensitive, 4 = immediate repair needed

BARR

RAMSEY-WASHINGTON METRO WATERSHED DISTRICT



Unique ID: CIP-0012-G
Site ID: 12
Section: Gervais Creek
Name: Gervais Mill Pond, steep slope repair by watertower

Inspection Date: 8/12/2022 1:57:00 PM
Inspector Name: Vlasin
Category: Turf reinforcement mat
Vegetation Establishment Ranking Description: 4. Under 50%
Vegetation Establishment Ranking Value: 4
Vegetation Establishment Time Frame Value: 3
Vegetation Establishment Notes:
Proper Location Ranking Description: 1. Properly installed/functioning
Proper Location Ranking Value: 1
Proper Location Time Frame Value: 1
Proper Location Notes:
Last Known Survey Notes:

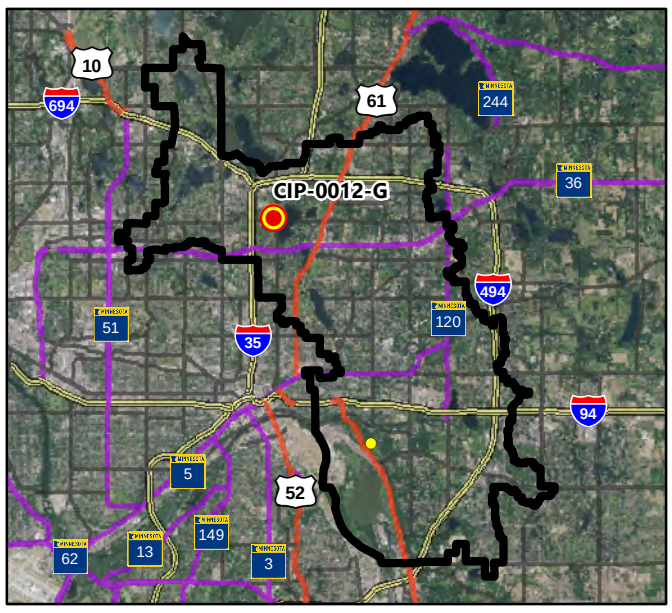
District Owned: Yes
Flag for Further Review: Yes
Inspection Notes: Some erosion under TRM. Pipe visible about 1/4 way down. Should repair add soil .... Complete redo?
Total Score: 13
Normalized Score: 6.5

Inspection Indicator
Inspection Location
RWMWD Boundary

N

0 200 400
Feet

Image Source: Met Council (2020)



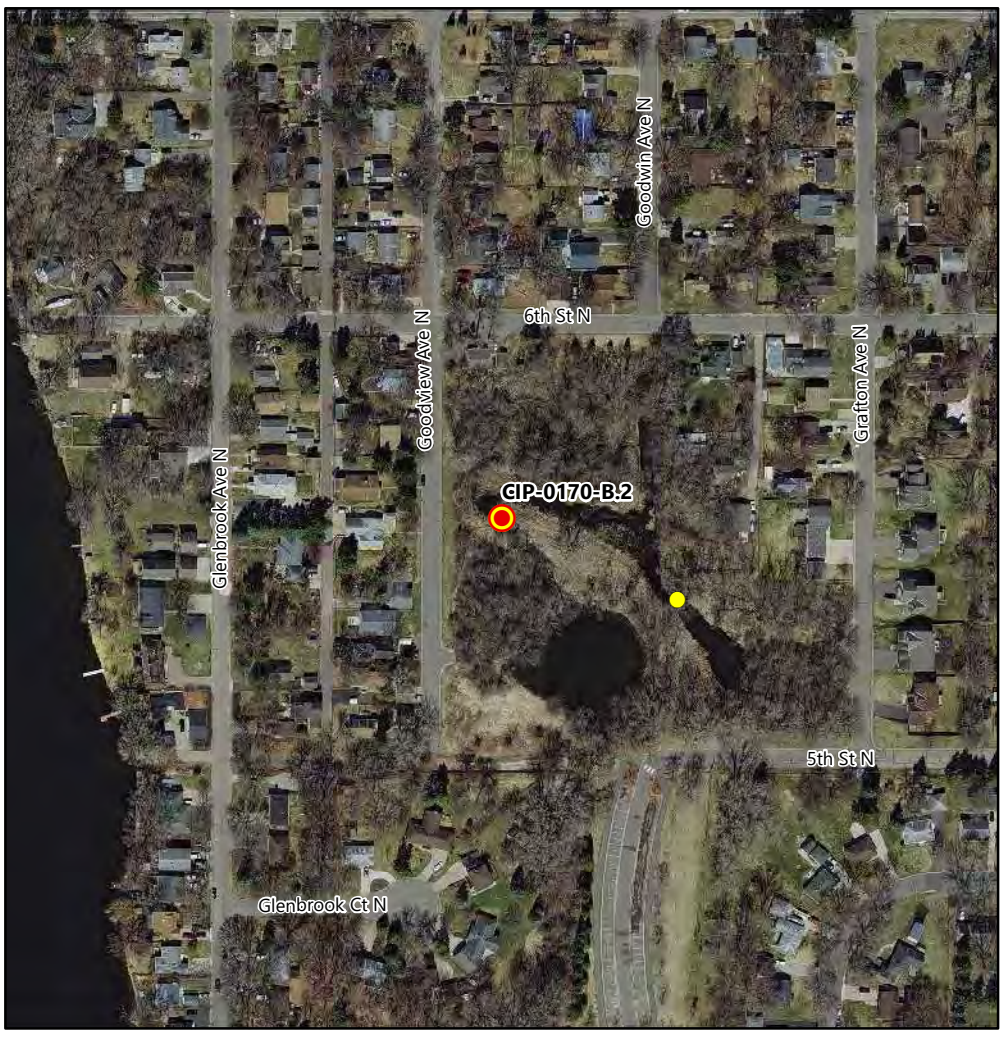
TURF REINFORCEMENT MATS
INSPECTION SUMMARY - 2022
Ramsey-Washington Metro
Watershed District

UNIQUE ID: **CIP-0012-G**

Ranking Value (1 - 4): 1 = good condition, 4 = needs attention/repair
Time Frame Value (1 - 4): 1 = no immediate repair needed or repair is not time sensitive, 4 = immediate repair needed

BARR

RAMSEY-WASHINGTON
METRO WATERSHED DISTRICT



Unique ID: CIP-0170-B.2
Site ID:
Section: Tanners Lake
Name: 5th Street Wetland Weirs - west

Inspection Date: 8/15/2022 1:38:00 PM
Inspector Name: Vlasin
Category: Weir
Structural Damage Ranking Description: 1. 0-3 cracks, bends, or dings on structure
Structural Damage Ranking Value: 1
Structural Damage Time Frame Value: 1
Structural Damage Notes:
Blockages Ranking Description: 3. 26-50% of slots in permeable weir or weir structure
Blockages Ranking Value: 3
Blockages Time Frame Value: 2
Blockages Notes:
Last Known Survey Notes:

District Owned: Yes
Flag for Further Review: Yes
Inspection Notes: Clean upstream side of downstream weir— sed is 18inches below top of weir in pool 2. maybe remove 50yard?
Total Score: 7
Normalized Score: 3.5

Inspection Indicator
Inspection Location
RWMWD Boundary

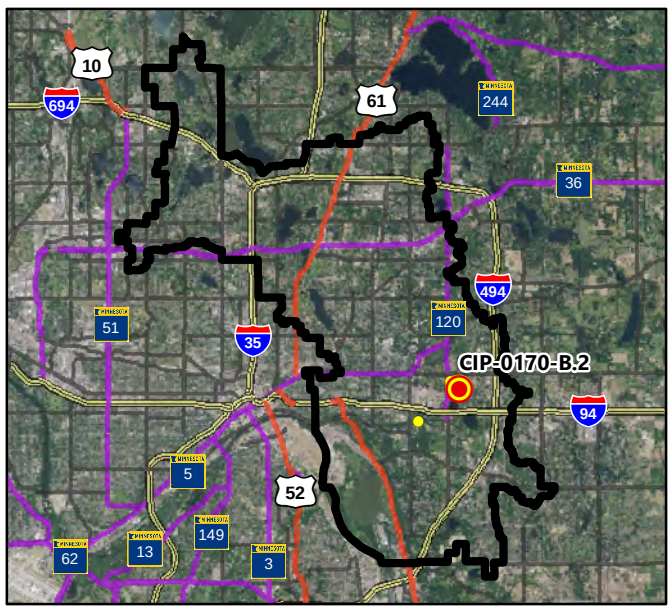
N

0 200 400
Feet

Image Source: Met Council (2020)

WEIRS
INSPECTION SUMMARY - 2022
Ramsey-Washington Metro Watershed District

UNIQUE ID: **CIP-0170-B.2**



Ranking Value (1 - 4): 1 = good condition, 4 = needs attention/repair
Time Frame Value (1 - 4): 1 = no immediate repair needed or repair is not time sensitive, 4 = immediate repair needed

BARR

RAMSEY-WASHINGTON METRO WATERSHED DISTRICT

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Project Work Plan

Date: September 21, 2022

Project: Target Stormwater Retrofits - Woodbury / 236214XX.00

Project Team

District Staff: Paige Ahlborg
Barr Staff: Erin Anderson Wenz, Katie Turpin-Nagel, Gareth Becker, Tyler Olsen, Marcy Bean

Barr Team Roles

Principal-in-charge	Erin Andersen Wenz
Project Management:	Katie Turpin-Nagel
Design Engineers:	Katie Turpin-Nagel, Tyler Olsen
Design Technician:	Gareth Becker
Landscape Architecture:	Marcy Bean
Communications:	Katie Turpin-Nagel

District Staff

Project Manager: Paige Ahlborg

Target Corp. Staff

Stormwater Program Manager: Dan Latham

Scope of Work

The first phase of this project consists of developing concept designs for stormwater retrofit projects at the Target retail location at Valley Creek Plaza in Woodbury, MN. The stormwater retrofits may alter the surface parking layout of the existing parcels owned by Target (e.g., removal of approved number of parking spaces approved by Target) and may utilize existing open space for surface projects and underground treatment systems. The approximate area that will be assessed for the incorporation of stormwater retrofits is approximately 6.5 acres of parking lot and open green space. Treatment systems will be designed and selected to be economical, similar to those selected by private developers in the district. The deliverables for Phase 1 of the project will be conceptual plans and planning level opinions of cost. After Phase 1 is complete, Barr will present the concept design and planning level opinion of cost to the RWMWD managers for their review and approval to continue to Phase 2 of the project.

Phase 2 of this project will proceed after Board approval and will consist of preparing final plans, specifications, and an engineer's opinion of cost, conducting project bidding, and assisting with construction observation. Phase 2 deliverables will consist of final plans and specifications, presentation of bids, weekly construction updates, and submittal of monthly payment applications during active construction. Construction will not begin until spring 2024 at the earliest.

Budget

Barr will complete Phase 1 of the work outlined above and below on a time and expense basis, for an estimated **$46,900.** At the same time the Phase 1 tasks are presented to the Board, Barr will provide an estimated budget for Phase 2 for Board approval.

Schedule

We propose the following schedule, milestones and deliverables.

Phase 1 Tasks:

Task 1 (November 2022): **Topographic Survey.** A topographic survey will be conducted to establish existing grades and elevations and locations of existing infrastructure and utilities. The survey will be conducted using a total station and/or survey grade GPS with horizontal and vertical accuracy of +/- 0.2 feet.

Task 2 (October - January 2022): Conceptual Designs. Conceptual design options will be developed and presented to district staff, the board of managers, and Target representatives.

Task 3 (January 2022): Soil Borings. Soil borings will be done at prospective BMP locations to evaluate infiltration capacity of the existing soils. Soil borings will need to be scheduled outside of the busy holiday shopping season. Soil borings could be scheduled as early as January 2023, if Target approves the temporary bituminous patching technique applied by a geotechnical subcontractor (needed for patching pavement during cold weather conditions).

Phase 2 Tasks:

Task 1 (TBD based on Phase 1 approval): **Engineering and Design.** All contract documents and bidding documents will be completed. This task includes all hydrologic and hydraulic modeling and calculations, design development, and opinion of probable construction costs. Intermediate milestones will include 50% and 90% design review and 100% design approval from RWMWD Board.

Task 2 (TBD based on Phase 1 approval): **Project Bidding.** The project will be publicly bid and a contractor will be recommended to the board.

Task 3 (TBD based on Phase 1 approval): **Construction Observation.** Construction oversight and administration will be provided during construction of the project.

Project Tracking - Project Milestones

Milestone	Estimated Completion Date	Actual Completion Date
Phase 1		
Design Team Kickoff	October 2022	
Topographic Survey Completed	November 2022	
Conceptual Designs Completed	December 2022	
Conceptual Design Wrap-up Meeting with Target	January 2022	
Soil Borings Completed	January 2022	
Phase 2		
50% Draft Plans (Internal)	Phase 2 timeline to be determined pending Phase 1 approval	
90% Draft Plans and Specifications (Internal)		
90% Plans, Specs, Cost Estimate for Target and District Review		
90% Comments Due from Target and District		
100% Plans and Cost Estimate for Board Approval		
Public Bid Release		
Bids Received		
Contractor Recommendation to Board		
Notice to Proceed		
Construction Substantial Completion/Plant Establishment Period Begins		
Plant Establishment Period Ends		

Phase 1 Budget Tracking (Engineering)

Project Objectives	Estimated Budget*	Spent to Date
Task 1: Topographic Survey	$16,500	
Task 2: Conceptual Design	$20,000	
Task 3: Soil Borings	$10,400	
Total	**$46,900**	

*Barr budget only- these totals do not include RWMWD project budgets.

Phase 2 Budget Tracking (Engineering)

Project Objectives	Estimated Budget*	Spent to Date
Task 1: Engineering and Design	Phase 2 budget to be determined pending Phase 1 approval	
Task 2: Project Bidding		
Task 3: Construction Observation		
Total		

*Barr budget only- these totals do not include construction or RWMWD project budgets.

Monthly Updates

Month	Budget Spent $ / %
	$0.00 (0%)

Project Budget Tracking (2023 Construction - *Contractor*)

Item	Cost
Original Bid (from *Contractor*)	
Final Contract Price	

Partial Payment Tracking (2023 Construction – *Contractor*)

Item	Cost
Payment Application #1 (Date)	
Payment Application #2 (Date)	
Payment Application #3 (Date)	
Total Paid to Date	

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Administrator's Report

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MEMO

TO: Board of Managers and Staff

FROM: Tina Carstens, Administrator

SUBJECT: September Administrator's Report

DATE: September 29, 2022

A. **Meetings Attended**

Wednesday, September 7	11:30 AM	MAWD Events Committee Meeting
	6:30 PM	Board Meeting
Thursday, September 8	2:00 PM	Purple Line BRT Project
Monday, September 12	11:30 AM	Pioneer Park Project Meeting
Tuesday, September 13	1:00 PM	MCWD Land Management Meeting
	4:00 PM	Prior Lake-Spring Lake WD Meeting for MAWD
Wednesday, September 14	9:00 AM	MAWA Executive Committee
Thursday, September 22	8:00 AM	Hodgson Road Project Update
Monday, September 26	8:00 AM	MAWD Board Meeting
Wednesday, September 28	3:00 PM	Purple Line BRT Meeting

B. **Upcoming Meetings and Dates**

Water Resources Conference	October 18-19, 2022
November Board Meeting	November 2, 2022
Watershed Excellence Awards	Tuesday, November 15, 2022
MAWD Annual Meeting	Thursday, Dec 1, 2022 – Saturday, Dec 3, 2022
December Board Meeting	December 7, 2022

C. **Ongoing Project Update**

Land Acquisition and Use Policy – I have met with the administrator and staff of Minnehaha Creek Watershed District to discuss their policies and implementation around land acquisition and use. And I have collected some other information from watersheds around the state. I am finding there are various policies relating to land acquisition for project implementation vs. for flood protection vs. for open space preservation. I will be compiling the information collected and share with the board next month.

Ponds of Battle Creek – I have connected with the Ramsey County staff person in Property Management that is responsible for this property. We had a meeting scheduled that had be to be rescheduled when I was sick. I hope to be able to update you at the meeting.

West Vadnais Lake Boundary Change – information on the suggested boundary has been sent to VLAWMO for review. Once approval notification is received, I will move forward with the next steps. I would anticipate that approval coming in the next week.

D. **WEFTEC Conference**

Next week, Monday-Wednesday, I will be attending the WEFTEC conference in New Orleans, LA. I have attended this conference twice in the past. This conference pulls together water professionals from around the world and has a great format that is interactive and brings forward results and solutions. There are various concurrent session tracks that focus on stormwater management, flood risk, water quality, watershed management, and future issues. At the November meeting, I will give some highlights to the board of my time at the conference and how it relates to our work here.

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Project and Program Status Reports

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RAMSEY-WASHINGTON METRO WATERSHED DISTRICT

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Memorandum

To: Board of Managers and Staff

From: Tina Carstens and Brad Lindaman

Subject: Project and Program Status Report – September 2022

Date: September 29, 2022

Note: The location, brief description, and current status of each project described below can be found on the 2022 RWMWD engineering services story map.

Project feasibility studies

A. Interim emergency response planning for district areas at risk of flooding (Barr project manager: Gareth Becker; RWMWD project manager: Tina Carstens)

The purpose of this project is to provide information and guidance to cities throughout the district about how to protect low-lying habitable structures from flooding during the 100-year storm event. These emergency response plans address areas for which there is 1) not currently a feasible project that has been identified to protect structures or 2) a project that cannot be implemented in the near future due to logistical and/or budgeting reasons. This effort is an outcome of the Beltline resiliency study. This project will extend into 2022.

This month and through the fall, Barr is creating plan sheets for placing emergency flood risk mitigation measures. We anticipate completing the plans this winter and working directly with city representatives to communicate the plans to potentially impacted individuals and answer questions about implementation.

B. Kohlman Creek flood risk reduction feasibility study (Barr project manager: Brandon Barnes; RWMWD project manager: Tina Carstens)

The purpose of this study is to complete a feasibility evaluation of modifications to reduce flood risk along Kohlman Creek to remove structures from the 100-year floodplain. Work includes coordination with the cities of Maplewood and North Saint Paul, evaluation of alternatives to reduce flood risk, preparation of cost estimates for each alternative, and identification of permitting requirements. This project focused primarily on areas surrounding PCU Pond and the wetland complex west of White Bear Avenue. This feasibility study is a follow-up study of flood-prone areas identified in the Beltline resiliency study.

The Kohlman Creek flood risk reduction feasibility study will focus on concept development of the types of system improvements near PCU Pond that the city would support and that would complement North Saint Paul's other ongoing studies. This study is being conducted in parallel with the Kohlman Creek/Wakefield Lake diversion study (upstream of PCU Pond and the North Saint Paul Urban Ecology Center), so system modifications around PCU Pond will not be further developed until next year when the Kohlman Creek/Wakefield Lake diversion concept is better defined and resulting design flows are determined.

Last month, Barr provided the district's stormwater model to the City of North Saint Paul for reference in the city's flood risk reduction study. After learning about the city's planned approach for flood risk mitigation in these areas and better understanding the change in peak flow rates following the Kohlman Creek-Wakefield Lake diversion study, Barr will begin evaluating potential flood risk mitigation options for PCU Pond and the wetland complex west of White Bear Avenue.

Next month and through the end of the year, Barr will continue working with the city to identify flood risk reduction opportunities that accomplish both RWMWD and city goals and objectives.

C. Kohlman Creek/Wakefield Lake diversion feasibility study (Barr project manager: Brandon Barnes; RWMWD project manager: Tina Carstens)

The purpose of this study is to complete a feasibility evaluation of modifications to reduce flood risk on Kohlman Creek by diverting high flows to the historic County Ditch 17. Work includes coordination with stakeholders, evaluation of alternatives to reduce flood risk, preparation of cost estimates for each alternative, and identification of permitting requirements. This feasibility study is a follow-up study of a flood-prone area identified in the Beltline resiliency study.

This month, Barr and the RWMWD met with Ramsey County and the county's contractor to review the proposed locations and sizes of potential flood storage basins in Goodrich Golf Course. The county indicated that, in general, three of the four basins could be feasible but that the proposed basin along hole 15 would impact pace of play and difficulty of the hole. The county requested that the basin be modified and asked whether increasing the existing irrigation pond would offset reductions in size to the hole 15 pond.

Following the meeting, Barr began evaluating how Ramsey County's comments impacted the size of the diversion and downstream peak water levels. On October 7, the county will review other changes within Goodrich Golf Course (not associated with this project). We agreed to meet again in October to discuss how the county's initial comments as well as new information the county receives on October 7 may impact the basin size.

Barr had planned a design charet with stakeholders for this fall. While we will still reconvene the stakeholder group, discussions with the county are guiding modifications to basin size and location.

Next month, Barr anticipates collecting additional survey information needed for the feasibility evaluation of system improvements. We also expect to start reviewing the water quality monitoring data that the RWMWD collected this summer. Water quality information will inform whether additional treatment is required before diverting stormwater from Kohlman Creek into Wakefield Lake. We will continue evaluating and refining alternatives through the winter. The feasibility study is scheduled to continue through summer 2023.

D. County Ditch 17 improvements feasibility study (Barr project manager: Brandon Barnes; RWMWD project manager: Tina Carstens)

The purpose of this study is to complete a feasibility evaluation of modifications to reduce flood risk northeast of Wakefield Lake along historic County Ditch 17 to remove structures from the 100-year floodplain. Work includes coordination with the City of Maplewood, evaluation of alternatives to reduce flood risk, preparation of cost estimates for each alternative, and identification of permitting

requirements. This feasibility study is a follow-up study of a flood-prone area identified in the Beltline resiliency study.

This month, Barr and the RWMWD met with the City of Maplewood to review potential system modifications to reduce flood risk along County Ditch 17. The city requested that the RWMWD evaluate an alternative that does not include impacts to Frost Avenue, as it was recently reconstructed. An additional alternative, which includes modifications to the outlet structure north of Frost Avenue and either site-specific modifications or emergency response plans, will be considered for this location in addition to system modifications that include changes to the storm sewer system between Frost Avenue and Wakefield Lake.

After the meeting, Barr began preparing a memorandum to document the methodology, alternatives for system modifications for flood risk reduction, and opinions of probable construction cost. Later this month, we will share a draft memorandum with the RWMWD and the city to confirm that recommended system modifications would have stakeholder support. Following review, Barr will revise the memorandum and will provide an updated version to the RWMWD managers later this fall.

E. Phalen Village feasibility study (Barr project manager: Brandon Barnes; RWMWD project manager: Tina Carstens)

The purpose of this study is to complete a feasibility evaluation of modifications to reduce flood risk near Phalen Village north of Lake Phalen to remove structures from the 100-year floodplain. Work includes coordination with the City of Maplewood, evaluation of alternatives to reduce flood risk, preparation of cost estimates for each alternative, and identification of permitting requirements. This feasibility study is a follow-up study of a flood-prone area identified in the Beltline resiliency study.

This month, Barr and the RWMWD met with the City of Maplewood to solicit input on potential system modifications. The city suggested evaluating two additional modifications to the storm sewer system, noting that the planned street improvement project for this area includes a complete reconstruction of the road, presenting an opportunity to include a larger modification to the storm sewer system. Following the meeting, Barr completed hydraulic evaluation of the additional two alternatives and began preparing a memorandum that summarizes the methodology, potential system modifications, and opinion of construction costs for each alternative.

Next month, we anticipate sharing the draft memorandum with the RWMWD and the City of Maplewood. We will request comments on the summary and confirm that the city would support system modifications. The Phalen Village feasibility study will extend through the fall.

F. Ames Lake area flood risk reduction planning study (Barr project manager: Brandon Barnes; RWMWD project manager: Tina Carstens)

The purpose is to complete a planning-level evaluation of modifications to reduce flood risk near Ames Lake, supported by the City of Saint Paul. Work includes coordination discussions with Saint Paul; review of potential pipe alignments, land acquisition costs, utility conflicts, and permitting issues; and related design. If the planning study identifies projects that impact regional drainage, a feasibility study will be completed in 2023. This planning study is a follow-up study that was identified in the Beltline resiliency study.

This month, Barr and the RWMWD met with the Saint Paul Housing and Redevelopment Authority (HRA) about potentially using vacant parcels near Ames Lake for flood risk reduction best management practices (BMPs). Specifically, two HRA-owned parcels south of Ames Lake are primarily located within

the 100-year floodplain. As a follow-up to conversations with the Saint Paul Water Resources Working Group (WRWG) last month, Barr, the RWMWD, and the HRA discussed the possibility of using these parcels for flood mitigation infrastructure such as ponds or basins that would provide regional flood risk reduction for the surrounding area. The HRA is currently reviewing the concepts and will determine in October whether further evaluation of conceptual flood risk reductions is desired for this site.

Barr and the RWMWD met with Saint Paul Parks about expanding a planned water quality basin in Sackett Park, which would also provide some flood risk reduction for the surrounding area. Construction of the basin is awaiting MPCA notification of a grant application that the city submitted. Saint Paul Parks indicated that the proposed footprint of the basin has been maximized given planned programming needs for the park, so further expansion is not feasible at this time. This discussion also resulted from conversations with the WRWG last month.

Finally, Barr and the RWMWD met with the City of Saint Paul to review our understanding of existing opportunities for flood risk reduction near Ames Lake. Based on input from the WRWG, we grouped locations by the potential for city support. Locations where support is likely were identified based on positive feedback from the WRWG and alignment with other city projects and goals. Areas categorized as "unknown" are locations where the city would potentially support a project, but the support is contingent on others' approval and stakeholder coordination. Finally, areas identified as "not likely" are locations where WRWG members identified a conflict or other city plans that would prevent system modifications. Last month, Barr shared a figure showing site locations and corresponding classifications (based on WRWG comments) with the city. This month, we discussed the classifications with city staff, who confirmed that our general characterization of vacant parcels was consistent with the city's understanding of opportunities within the watershed. Many of the sites have constraints (such as planned future uses) or impacts (such has upland impacts to existing trees) that will require further evaluation in the form of a site-specific feasibility study prior to final design of system modifications.

This planning-level study will extend through the fall. The next step is to prepare a memorandum summarizing stakeholder coordination and possible opportunities for flood risk reduction projects near Ames Lake. If a potential site is identified, a detailed feasibility study for a specific site would be completed in 2023. We anticipate preparing the memorandum later this fall following additional discussions with the HRA about opportunities and future uses of vacant parcels near Ames Lake.

G. Owasso Basin area/North Star Estates improvements (Barr project manager: Sam Redinger; RWMWD project manager: Tina Carstens)

The purpose of this study is to evaluate the benefit-cost of flood risk reduction strategies in the Owasso Basin/North Star Estates area by reviewing potential pipe and berm alignments, land acquisition costs, utility conflicts, permitting issues, and related design as well as construction and long-term maintenance costs associated with each alternative that achieves the project objective of removing habitable structures from the floodplain in this area. Stakeholder outreach with the City of Little Canada is an important part of this effort. This study is a continuation of the Owasso Basin bypass study, which laid out several phases of implementation and areas of further study.

This period, Barr finished evaluating alternatives for flood risk reduction in and around North Star Estates and Owasso Basin. We are currently drafting a technical memorandum to summarize the findings and provide recommendations for the district and board of managers to consider. Barr will share the technical memorandum first with RWMWD staff for review and comment, followed by the City of Little Canada, and then distribute to the board at the November meeting.

H. Double Driveway Pond optimization study (Barr project manager: Tyler Olsen; RWMWD project manager: Tina Carstens)

The purpose of this study is to evaluate the benefit-cost of water quality improvements in Double Driveway Pond in the Fish Creek subwatershed. These improvements will be targeted at sediment reduction strategies that will benefit downstream Fish Creek, which is considered impaired by excess sediment. An important part of this study is tying strategies to the findings of a current Department of Agriculture study (currently under review) that is assessing the water quality of runoff from upstream areas.

This study saw no new activity. Barr will continue monitoring any remediation action outlined by the MDA and look for opportunities to partner to address total maximum daily load (TMDL) issues in downstream Fish Creek. We expect to hear details of the MDA's work before the end of the year. The next report to the managers will likely be in December.

I. Carver Ponds improvements study (Barr project manager: Tyler Olsen; RWMWD project manager: Tina Carstens)

The purpose of this study is to characterize the water quality in the Carver Ponds in the Fish Creek subwatershed and to evaluate the benefit-cost of water quality improvements to the ponds. These improvements will be targeted at internal loading of nutrients in the pond, as well as potential external sediment and nutrient loading. The goal will be to inform design solutions to be implemented in the ponds.

Barr completed one water quality sampling event in August and sent the samples to Pace Analytical for testing. A final water quality sampling will take place in September. Sediment sampling and release rate experiments will occur in September or October, and the results will help inform next steps for improving the pond's water quality.

J. Evaluation of compliance with South Metro Mississippi River total suspended solids (TSS) total maximum daily load (TMDL) (Barr project manager: Tyler Olsen; RWMWD project managers: Eric Korte, Nicole Soderholm)

The purpose of this study is to evaluate the RWMWD's compliance with the South Metro Mississippi River TSS TMDL. As a regulated municipal separate storm sewer system (MS4), the district is required to meet the waste load allocations (WLA) of 154 pounds of TSS per acre per year. The WLA is applicable to the RWMWD for the Saint Paul Beltline Interceptor and its contributing drainage area, as the district owns and operates the infrastructure.

This period, the RWMWD received Saint Paul Beltline flow data from the Metropolitan Council. The district shared this data with Barr for review and analysis to determine TSS loading from the Beltline's tributary drainage area. The goal is to inform TMDL reporting in 2023 for the South Metro Mississippi River TSS TMDL. Additionally, the RWMWD and Barr will meet with the Metropolitan Council in October to review the flow data and discuss transfer of the WOMP station to the district.

Monitoring water quality and special projects

K. Annual water quality report assistance (Barr project manager: Keith Pilgrim; RWMWD project manager: Eric Korte)

The purpose is to update and report on lake and stream water quality, monitoring of selected best management practices (BMPs), and other water quality improvement projects that highlight district efforts.

Primary activities during this period included organizing water quality data for lakes, streams, and BMPs; developing tables and graphs for the 2021 report; writing the report; and adding project activities for 2021. The draft report was delivered to the RWMWD for review earlier this month.

Research projects

L. Kohlman permeable weir test system (Barr project manager: Keith Pilgrim; RWMWD project manager: Bill Bartodziej)

The objective of this current investigation is to design a full-scale permeable weir treatment system for installation in the Kohlman Basin.

Barr and the RWMWD are proceeding with broader implementation of the permeable weir pilot project as part of the CIP maintenance and repairs project for 2023. During this period, floodplain modeling confirmed that no changes in flood elevation are expected with the planned permeable weir modifications. We also completed a site visit and continued developing the preliminary design.

In September, Barr prepared the wetland permit application and continued discussing permitting requirements with the Department of Natural Resources (DNR). Since Kohlman Basin is considered a state "public waters," a DNR permitting process is associated with the modifications.

M. Shallow lake aeration study (Barr project manager: Keith Pilgrim; RWMWD project manager: Bill Bartodziej)

The purpose of this study is to evaluate the potential effectiveness of aeration in shallow lakes by studying the effect of aeration in three smaller shallow systems (Markham Pond, Bennett Lake, and Gervais Mill Pond) in detail during 2021 and 2022. This approach is being pursued as an alternative to whole-lake alum treatments.

Markham Pond, Bennett Lake, and Gervais Mill Pond are serving as the study sites. The aerator in Markham Pond operated all winter and will continue to do so through the fall. The City of Roseville installed a limited aeration system in the east bay of Bennett Lake, and Gervais Mill Pond will have an aerator installed in the north bay in 2022 when equipment is available (currently backordered). Dissolved oxygen meters have been installed, and monitoring is underway. As a reminder, this experimental design will provide comparison of:

- Internal loading in Markham Pond without (2021) and with (2022) aeration
- Internal loading in Gervais Mill Pond for a bay with aeration to a bay without aeration (2022)
- Internal loading in the west bay of Bennett Lake (no aeration) to the east bay of Bennett Lake (with aeration) in 2022

Recent activities have included collecting August sampling data, reviewing and planning for September sampling, organization and review of May to August data for completeness and accuracy, and data management.

Capital improvements

N. Target store stormwater retrofit projects (Barr project manager: Katie Turpin-Nagel; RWMWD project manager: Paige Ahlborg)

The purpose of this project is to design, provide bid assistance for, and oversee construction of BMP retrofits at two Target retail stores.

The one-year plant warranty expired in June at the East Saint Paul Target site. Some plants were replaced in July, and Barr is working with the contractor to complete replacements this fall to satisfy the warranty. The RWMWD coordinated a watering schedule with Ramsey Conservation District to support the plantings through the dry season.

The one-year plant warranty will expire in early November at the North Saint Paul Target site. To increase the probability of success of the replacement plants, Barr contacted the Contractor 1.5 months early so that the replacement plants could be installed between September 15 and October 15, 2022. Barr met the Contractor onsite on September 13 to review the plant and tree health. The plants marked for replacement were replaced by the Contractor on September 20. This project is now complete, and no further updates are anticipated.

For the Woodbury Target store, a scope of work is included in this month's Board packet, which outlines the proposed tasks, schedule, and budget for the project. Barr will begin work on the Woodbury Target Stormwater Retrofits project in October, pending Board approval.

O. Targeted retrofit projects (Barr project manager: Marcy Bean; RWMWD project manager: Paige Ahlborg)

The purpose of this project is to design, provide bid assistance for, and oversee construction of BMP retrofits on previously identified commercial, school, and faith-based properties throughout the district.

Planting is finished at Mounds Park Academy, completing this portion of the project. Pay application 2 is included for payment.

St. Pascal Baylon Catholic Church began construction just before Labor Day, with completion of the subcontracted work in the Saint Paul right of way that was noted at the September board meeting in change order 2. Since then, excavation and installation of the tree trench has been underway, as shown below. We anticipate that the project will be finished in early October.

Preliminary design and owner coordination is underway for Roosevelt Homes (owned by the Saint Paul Public Housing Authority), a potential project for 2023 construction. Barr and the RWMWD are coordinating with the City of Saint Paul to help inform improvements.

New potential targeted retrofit project: Pioneer Park Stormwater Reuse

In 2021, Barr completed a stormwater reuse assessment for Ramsey County. The objective of the project was to perform a county-wide assessment to identify opportunities for stormwater reuse for irrigation in order to conserve groundwater and protect/improve surface water quality. This assessment was funded by a Board of Water and Soils Resources (BWSR) Clean Water Fund Watershed Based Funding Grant and Ramsey County. The various parcels across the county were initially prioritized using a desktop assessment approach. Ramsey County then contacted landowners for the highest-ranking sites. Based on landowner interest, conceptual reuse designs were ultimately developed and evaluated for seven sites. These planning level concepts were based on site visits and information provided by the property owners/representatives. Five of the seven sites were located within the Ramsey-Washington Metro Watershed District.

Based on the information compiled as part of the Ramsey County assessment, the projects were input into the RWMWD water quality project prioritization tool and all projects fell within the top 10 projects for the District. One of the highest-ranking parcels for stormwater reuse potential identified by the Ramsey County assessment is Pioneer Park, a public site located at 2950 Centerville Rd., in the City of Little Canada. Pioneer Park is drains to Gervais Creek and ultimately Gervais Lake. The site currently irrigates 11.2 acres, including several athletic fields from an irrigation well, using an average of approximately 2.2 million gallons per year of groundwater for irrigation. The stormwater reuse assessment for Ramsey County outlined a conceptual stormwater reuse system that would pump and treat (filtration and UV disinfection) the top one foot of water within the existing two constructed stormwater ponds on the east side of the site, which is estimated to meet 85-90% of the average annual irrigation demand for the site. The existing well will be used for backup water supply if water is not available from the defined storage in the basins.

RWMWD staff have been working with City staff regarding potential implementation of the reuse project in Pioneer Park. A scope summary and budget for the Pioneer Park Stormwater Reuse Project will be included in the November Board packet for the managers' consideration.

P. Stewardship grant program – street sweeping (Barr project manager: Marcy Bean and Michael McKinney; RWMWD project manager: Paige Ahlborg)

The purpose of this project is to is to a) provide BMP design and review services to cost-share applicants throughout the RWMWD on as-needed basis and b) support development of the stewardship grant program.

Barr continued working on the street sweeping prioritization study. We finished all data processing and initial runs of the district-wide model, and QA/QC is underway. The project abstract for this work was accepted for a presentation at the Minnesota Association of Watershed Districts fall conference. We plan to complete initial prioritization calculations by the end of this month.

Q. Lake Emily subwatershed regional BMP (Barr project manager: Leslie DellAngelo; RWMWD project manager: Paige Ahlborg

The purpose of this project is to complete final design, plans, and specifications for a regional stormwater BMP in the Lake Emily subwatershed with the purpose of decreasing phosphorus loads to Lake Emily, which is deemed to be at risk of impairment from excess nutrients.

This period, Barr conducted the design survey, which included topographic survey, utility locations, detailed storm sewer survey, and staking of the proposed soil boring locations. Filtration medias for both the Arbogast Street and Vivian Avenue/Cobb Street BMPs were selected based on performance of existing filtration BMPs in the district and other locations in the Twin Cities. We have begun final design and 30-percent plans for both designs and will prepare updated cost estimates and water quality benefits for the November meeting.

CIP project repair and maintenance

R. Beltline five-year inspection (Barr project manager: Sam Redinger, RWMWD project manager: Dave Vlasin)

The purpose of this project is to maintain the existing Beltline and Battle Creek tunnel systems and infrastructure owned and operated by the RWMWD.

Over the next few periods, Barr will evaluate findings to develop the inspection report. The report will likely be complete in early 2023.

S. District inspection standardization (Barr project manager: Tyler Olsen; RWMWD project manager: Tina Carstens)

The purpose of this project is to standardize the district's creek and facilities inspection process, evaluation, and related data collection effort. Work includes review of current methods, development of a scoring system, and implementation of mobile data collection.

This period, Barr and the RWMWD reviewed results from the annual CIP inspection to create a draft list of CIP projects for next year. Barr also drafted a summary memorandum for the inspection standardization tool, which summarizes the methodology used to create the tool and recommended future actions. Tyler Olsen will attend the October board meeting to demonstrate the tool and summarize results.

T. New technology report: Miyawaki Mini-Forest Assessment (MFA) (Barr project manager: Marcy Bean; RWMWD project manager: Tina Carstens)

Definition	The Miyawaki Forest Assessment is a method to restore a high-functioning forest successfully and quickly in depleted landscapes
Takeaways	▪ The Miyawaki Method is a technique pioneered by Japanese botanist Akira Miyawaki that helps build dense, diverse, multi-layered native forests. ▪ The technique is based on natural reforestation principles (i.e., using trees native to the area and replicating natural forest regeneration processes). ▪ It has some significant benefits over more traditional forestry methods when used in smaller afforestation projects and is particularly effective in the urban environment. ▪ One of the most noticeable differences between a Miyawaki Forest and traditional methods is that the seedlings are planted at very high densities. ▪ In context of the current climate change emergency and stark warnings about the global loss of biodiversity, being able to create diverse, healthy forests quickly could prove vital to tackle these issues.
Application	▪ Survey local forest for potential natural vegetation (PNV, or vegetation in an area without human intervention) tree species ▪ Determine forest community structure: identify main canopy trees, companion tree species, shrub, and ground cover ▪ Source seed and tree saplings (growing saplings from native seed sources) ▪ Assess soil health and potential soil amendments (natural amendments, i.e., compost) ▪ Plant tree seedlings randomly at a high density (tree spacing every 2 to 3 feet instead of traditional methods of every 10.5 feet) ▪ Apply mulch, which should be sourced from local materials ▪ Water and weed for two to three years
Benefits	▪ Fast urban forest or landscape restoration ▪ Grows 10 times faster and is 30 times denser ▪ Restores high-functioning and diverse forest (multistrata, or layered forest) ▪ Planting in high density creates competition (faster growth rate) ▪ Planting in high density encourages plant collaboration (subgrade interactions), increasing resiliency ▪ High tree success rate (proven around the world with a 97-percent success rate for tree survival) ▪ Becomes maintenance-free after two to three years (due to increased interaction and support through subgrade plant collaboration) ▪ Chemical-free, sustains itself, and supports local biodiversity ▪ 30 times better noise and dust reduction than traditional reforestation methods ▪ Fast and increased carbon sequestration in the soil ▪ Reduces air pollution and soil contamination in urban environments ▪ Improves water absorption to buffer against flooding and erosion in degraded landscapes ▪ Cools the surrounding area to mitigate urban heat island effect in urban environments ▪ Encourages native biodiversity ▪ Creates habitat

Drawbacks	▪ Utilizes PNV, an outdated concept describing what vegetation might be in a given place without human intervention ▪ PNV methodology does not incorporate the concept of climate change, and incorporating selective (non-hyperlocal) trees may be useful depending on project goals
Conclusion	▪ Very productive for quick and successful forest ecosystem restoration ▪ Proven to work around the globe as a tool for native forest regeneration ▪ Could be a critical tool in our fight against the climate crisis and global loss of habitat and biodiversity

Description

A Miyawaki Forest is an ultra-dense, biodiverse pocket forest that recreates the complexity, relationships, and processes of natural forests that help them grow strong and resilient. At the core of the concept, Miyawaki Forest Assessment is a strategy for fast and effective ecosystem restoration. The planting of dense, diverse, and native plant communities allows for utilization of the basic principles of forest ecology and ecological succession, creating an opportunity for competition and cooperation between vegetation.

Many scientific studies have shown positive interactions within plant communities that can impact the success of a forest or an individual within a forest. Within a plant community, direct positive plant interactions and complex indirect positive plant interactions lead to overall enhanced community development and increased plant resiliency. In many cases, such as with the Miyawaki Method, plant communities become a physical entity instead of multiple single plants acting as isolated individuals. A plant community acting as a single entity allows the diversity of a forest to weather times of drought and disease that an individual plant could not.

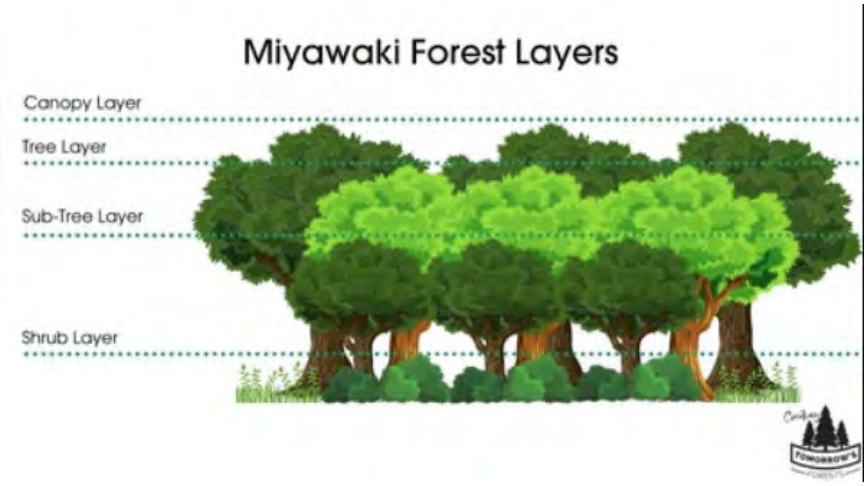
The Miyawaki Method utilizes also notably utilizes ecological succession. When a clearing in a forest canopy opens due to a larger tree falling, the saplings grow very fast to compete for the newfound light and space. Natural selection favors the fastest growing individuals. The result is a densely packed pioneer forest that grows in 20 to 30 years instead of the same result but over a longer period (closer to 150 to 200 years). The Miyawaki Method utilizes this principle in combination with plant cooperation to create a dynamic and fast-growing forest.

The outcome of these interactions allows the Miyawaki Method to create advanced and thriving forests—forests that can boost natural ecosystem functions and provide pockets of pollinator habitat. They can sequester carbon in the soil, reduce air pollution and soil contamination, improve water absorption to buffer against flooding, reduce erosion rates and increase water quality, and cool the surrounding area to mitigate the urban heat island effect. The Miyawaki Method has obvious benefits for projects that aim to maximize a forest's carbon sequestration, recreation, habitat, biodiversity, wildlife, or water quality.

Background

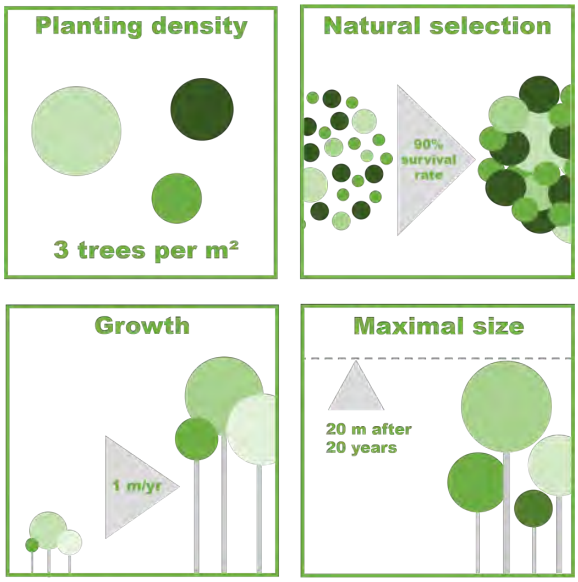
Akira Miyawaki developed the Miyawaki Method for planting trees in the late 1950s as a graduate student. He took the concept of potential natural vegetation (PNV) and merged it with his studies of phytosociology, or the way plants interact. PNV was a new concept at the time that used the most adapted species or species at an expected state of maturity within an ecosystem without or in the absence of human intervention. PNV states that these adapted species are native species, are built to optimize ecological resilience, and provide the most biodiversity on a site.

After studying both PNV and phytosociology, Miyawaki visited old growth forests and observed stratification of layered vegetation within the ecosystems. Vegetation fell into four groups: main tree species, subspecies, shrubs, and ground-covering herbs. He used these observed layered categories along with his knowledge of PNV and phytosociology to develop the Miyawaki Method for planting forests.



The Miyawaki Method

The Miyawaki Method is a simple, site-specific concept. It starts with an assessment of the soil. Soil texture helps determine water-holding capacity, water infiltration, root perforation capacity, nutrient retention, and erodibility. Amendments can then be added to enhance poor or unsuitable soil, including to improve soil perforation, water retention, organic fertilizers, or the addition of mulch as a soil cover.



Next, a selection of planting species creating a plant community would be made based on the four observed vegetation categories (main tree, subspecies, shrubs, ground cover). This selection would be based off native plant material—what would be naturally growing if humans had not impacted the site.

The Miyawaki Mini-Forest should be a minimum of 10 feet in width (15 feet is preferred) and about 1,000 square feet, incorporating the equivalent of approximately 350 trees. Seedlings would be planted densely (two to seven trees per square meter, or about 30 times as dense as commercial forestry) and watered, weeded, and monitored for a period of two to three years. During this process of initial growth, plantings compete, subsequently encouraging faster growth. The density of the plantings also promotes the growth of complex community structures and positive interactions leading to plant cooperation and greater resiliency. After two to three years of maintenance, plant communities can become self-sustaining and continue to function as advanced forest communities without human intervention.

Steps

- Survey local forest fragments and identify PNV tree species that are best suited to the conditions.

- Determine the forest community structure. Identify the main canopy and tree layer species and select companion species, shrubs, and ground cover based on their compatibility with the key species.
- Conduct a soil survey to help determine the required type of mulch and soil nutrients.
- Source seeds and tree saplings. Check the availability of native species saplings at your local nursery as well as their age and height. The ideal height is 2 to 2.5 feet.
- Treat the soil and seedlings with soil improvers or a mycorrhizal improver.
- Plant the seedlings randomly and at high density (every 2 to 3 feet) with stakes for support.
- Apply a mulch made from local materials to protect and nourish the seedlings. This simulates the protection offered by humus and leaf litter in a natural forest.
- Water regularly and keep the site weed free for the first two years.

Growth benefits

- Trees in a Miyawaki Forest grow up to 10 times faster at around a meter per year, reaching a stable multi-layered forest community in 20 to 30 years instead of hundreds of years.
- The growing trees absorb more carbon in a Miyawaki Forest than in a plantation or in standard afforestation projects because there are thirty times as many trees and they grow more quickly.
- The Miyawaki Method has been successful where other planting projects have failed, such as in arid Mediterranean habitats, due to high survival rates within the growing method.
- Native trees thrive in the conditions to which they are adapted and are more resilient to environmental changes.
- Miyawaki Forests have been found to have far higher biodiversity than neighboring woodland—on average, 18 times higher.

Ecological, climate, and human benefits

The Miyawaki Forest provides numerus benefits and multiple ecosystem services. All services and benefits are dependent on site and location. Many benefits can be amplified when the forests are planted in urban environments where natural systems are greatly disturbed. General benefits can include air pollution removal, oxygen production, climate management (cooling through evapotranspiration and shade), carbon sequestration, stormwater management (runoff/stormwater reduction, increased water quality, reduced erosion rates), habitat creation (pollinator habitat and habitat pockets or creation of habitat corridors), and energy savings through reduction in heating or cooling costs or protection from wind. Non-direct human-specific benefits can also occur from producing more habitable urban environments. Reduced urban heat island and mitigated pollution levels can create more pedestrian friendly environments, which can directly translate to reduced pollution or heat-related illness or health complications or increased pedestrian transportation such as walking and biking.

Case studies

The Miyawaki Method has been used successfully around the world. Akira Miyawaki has planted over 40 million trees using his method in more than 15 countries. The ability to quickly create a dense native forest has made the technique useful around the world. Below is an image from a company called SUGi, which has utilized the Miyawaki Method around the globe. One reason that the Miyawaki Method has

been successful is its simple ecological-based framework that focuses on site-specific conditions. A few additional U.S. case studies are highlighted below.

SUGi https://www.sugiproject.com/

Franconia Sculpture Park Forest (Shafer, MN): https://www.franconia.org/lu-xu/ and https://www.naturalurbanforests.com/franconia

This project, Liang's Tears, was implemented in 2016 as part of an art installation by Lu Xu. The art installation connects Beijing and the forest using the Miyawaki Method. Little is known about the current status of the installation. The images below show the process through the first three years.

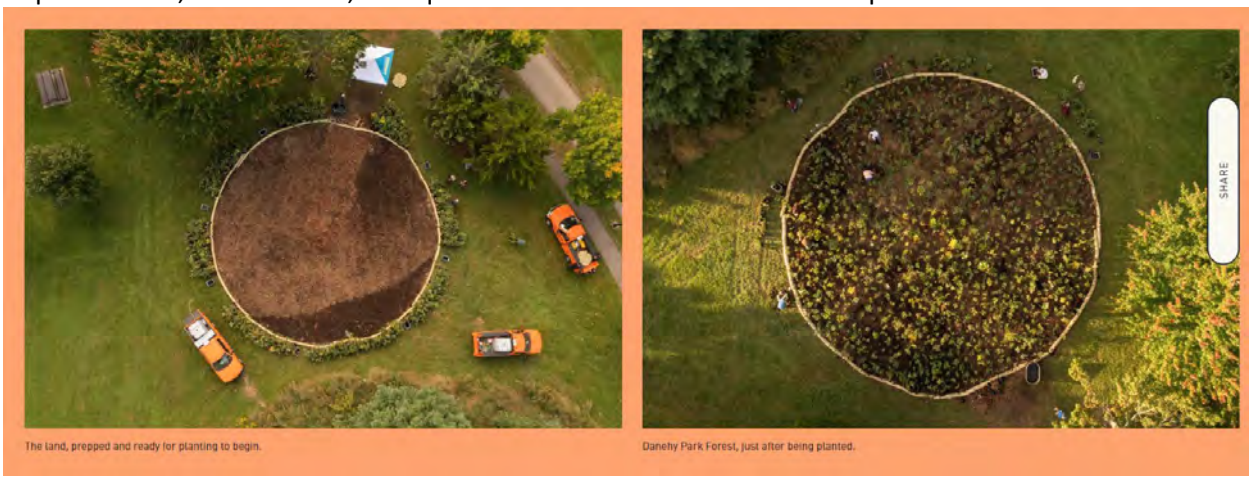
FOREST AT 2 MONTHS

FOREST AT 2 YEARS

FOREST AT 3 YEARS

Danehy Park Forest (Cambridge, MA): https://www.sugiproject.com/projects/danehy-park-forest

Danehy Park is a 50-acre recreational facility built on the site of a former city landfill, which was closed to active dumping in the early 1970s. The city subsequently reclaimed what would have been a wasteland and turned it into a community resource. At Danehy Park, the Miyawaki Method was utilized to plant over 1,400 trees in 4,300 square feet with more than 32 native species.



The land, prepped and ready for planting to begin.

Danehy Park Forest, just after being planted.

Tu'paxin (Yakama Nation, USA): https://www.sugiproject.com/projects/tu-paxin
This forest is named after Debra, a member of the Yakama Nation in central Washington State. Debra grew up going to the mountains every weekend with her family to camp, hike, fish, gather, and hunt. Her Indian name is Tu'paxin; she is named after her great grandmother, a strong and protective figure for the tribe. Tu'paxin will be an inspirational and educational forest for the Yakama community in the shape of a medicinal wheel. The Miyawaki Method was utilized to plant over 1,400 trees in 4,400 square feet with more than 42 native species.

Conclusion

The Miyawaki Forest is a very productive method for quick and successful forest ecosystem restoration. A significant number of benefits are associated with the growth of a forest, especially in an urban or otherwise degraded environment. The Miyawaki Method provides a reliable and fast forest with very little associated maintenance and becomes self-sustaining after only a few years of growth. This restoration method could be a successful tool for watershed districts.

There are very few drawbacks associated the Miyawaki Method for forest revegetation. The only minor flaw is the method's reliance on PNV—a theory that requires the use of native vegetation and does not incorporate the changing climate. However, the Miyawaki Method can easily be adjusted to modern day realities and include vegetation that might be better suited for a changing climate. Even without a climate change modification, the Miyawaki Method has been incredibly successful (an approximately 97-percent success rate) and a useful tool around the globe to restore native forests.

The Miyawaki Forest could be a productive tool in the context of our current climate crisis and stark warnings about global loss of biodiversity. The Miyawaki Method provides a high-functioning, diverse, and healthy forest quickly and could be a vital method in our fight against today's challenges.

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U. Natural Resources Update – Bill Bartodziej and Matt Doneux

Volunteer and Supplemental Plantings at Several Restoration Sites

Late summer - early fall is an excellent time to install native plants. Lower temperatures and soaking rainfall events typically result in high plant survival rates. Over the last month, the NR team was able to conduct supplemental plantings in numerous restoration areas, including Lake Phalen, Keller Lake, Keller Golf Course, Keller Creek, and Wetland A. Watershed staff also had the opportunity to work with a volunteer team from 3M. The main focus of this volunteer planting event was to install 2,500 prairie and wetland plants in a no-play area on Goodrich Golf Course. Although the weather was less than ideal, a group of around 20 volunteers got their hands a bit muddy and had a good time in taking part to create high quality habitat on the course. Below are a few photos and descriptions from our late season planting efforts.

NR staff restored the old Lake Phalen boat ramp (concrete slabs were removed last year). The soil was mechanically tilled, a gravel layer was redistributed, and then covered with a compost-soil mixture.

A custom native seed mix was spread over the site and then a degradable erosion control blanket was installed. Over 20 prairie and wetland shore species were then introduced via 3" containers.

After completing the installation, the site was fenced off to limit foot traffic. Educational signage was placed on the fence to let park users know of the new buffer restoration area.

Throughout the growing season, NR staff has battled weeds along the southern end of the Wetland-A restoration. After a substantial weeding event last week, staff installed additional prairie plants amongst the already established one-year-old native plants. This will provide additional plant community diversity, and shows of color throughout future growing seasons.

The northern buffer (phase I) restoration of Wetland-A was a visual treat this year.

On a chilly, damp September morning, volunteers from 3M joined NR and Ramsey County Park staff at Goodrich Golf Course, assembled to assist with our ongoing efforts to restore native habitat to no-play areas. The group cheerfully worked for several hours through intermittent showers, installing 2400 wildflowers and grasses in a nearly quarter-acre site between two fairways. This planting, combined with other project areas at Goodrich, will provide food and shelter to butterflies, bees and songbirds, while improving infiltration and reducing runoff.

The 3M crew was really enthusiastic to take part in the restoration. Although events like these take additional time in planning, it really helps to educate and get the word out regarding watershed projects in our community.

V. Public Involvement and Education Program – Sage Passi

Re-engaging with Lionsgate Academy in the Classroom and Gardens

Our education team made a huge comeback at Lionsgate Academy this fall, teaching fourteeen classrooms in September. That is a record number of classes at one school! Located in Shoreview, Lionsgate Academy focuses on educating youth on the autism spectrum. In 2019, the school moved into a commercial area, removed a huge area of parking lot and converted it into a large rain garden and open space with native gardens with support from our watershed. When we began this partnership, we interfaced with several science classes throughout the school year and engaged them in growing native plants, a field trip and planting the rain garden as a culminating service learning experience. The science teacher who had been the champion for our successful engagement, retired after we "finished" this large-scale project. Then Covid hit and we were not able to go into the school. Over the last three years, since this project was planted, we have helped care for this huge retrofit project on their site with the assistance of maintenance contractors, a Master Naturalist and a former Farnsworth teacher.

We wanted to reconnect with classes at this school this year, so we sat down with three science teachers before school started and made plans for engaging their students this fall and in coming months. In September, over a span of 10 days, we taught 14 science classes (grades 7-12) covering various watershed topics (What is a watershed? What is run-off? How does water flow through our Watershed District?) and introduced them to the projects on their site. We plan to return for further lessons this coming year. Four of the science classes will be doing supplemental plantings in their "open space" native gardens on September 29 and 30. We are planning a field trip with one of the classes to our watershed demo office site on October 14.

The open space at Lionsgate Academy is heavily used by all classes at the school. While we were spending time at the school, we generated a lot of interest in exploring the plants and wildlife and explaining the purpose of the rain garden. We enjoyed engaging youth in learning about the plants growing on the site, augering the soil to determine its capacity to infiltrate and explaining the reasons why we did this project. We did experiments with many of the classes to compare run-off from pervious and impervious surfaces (see photo on previous page). We are spending the last days of summer getting this site up to shape. Alternative turf was intentionally planted in the main area to reduce the need for irrigation, but it has moved into the perimeter native gardens (the seeds blow into the side gardens)

necessitating its removal. Some student have helped with that too. We look forward to the planting in late September.

L'Etoile du Nord 4th Graders Help Us Finish the Boys and Girls Club Project

Nick Gasho's fourth grade class from L'Etoile du Nord in St. Paul learn about plants that are growing at the Boys and Girls Club and their relationship to pollinators through this activity on September 21.

Last fall two L'Etoile du Nord fifth grade classes stepped up to the plate to help us install native plants at the East Side Boys and Girls Club large-scale native memorial garden in St. Paul. Similar to last year, we were facing the end of the season and had limited availability of youth from the club to help us finish this first phase of this project. It is an inevitable challenge in the fall.

Luckily, this year we did not have the added pressure and limitations of Covid impinging upon school involvement, but we were still up against limited numbers of youth at the Club who could assist us. We needed to complete the last part of this project before cold weather and do some supplemental plantings and mulching around the newly installed split rail fence and other areas of the garden planted last year to complete this grant-funded project. Over the summer youth from the Club helped keep the garden watered, a Kohl's team helped do some weeding and additional planting and watershed staff did some occasional weeding. But youth availability at the Club decreases when school starts so to finish projects we have to turn to other options. Just as school was starting this fall, we contacted one of our long-time teachers, Nick Gasho and asked for his fourth grade class' planting assistance at the Boys and Girls Club on September 27. We knew they could help us get the job done because of our successful history of collaboration with this school over many years and the class' previous exposure to native plantings as third graders in Henriette Bissoy's science classes.

We arranged to do a pre-lesson in Nick's class on September 23 and said we would find another opportunity to engage the other 3rd/4th grade class so they could also have a service learning experience in October. After providing background in the classroom about the Boys and Girls Club project the week before, we met up with Nick's fourth grade class on September 27 at the garden site to do a round robin of three activities. These included a hillside planting and supplemental planting in the main garden and an introduction to the benefits of the pervious pavers in the Boys and Girls Club parking lot with the assistance of Paige Alhborg through a hands-on experiment comparing run-off volume from imperious versus impervious surfaces.

For the third activity, we invited Dana Boyle, a Master Naturalist to lead an art activity. Dana is a member of the St.Paul Garden Club who provided funding for this planting project. She invited students to do chalk drawings on the sidewalks to illustrate their awareness of the role of pollinators in the garden and the plants we chose to include in the garden. Three Ramsey County Master Gardeners and a Master Naturalist provided planting assistance for the students. Bette Danielsen and Stuart Knappmiller, two Water Stewards helped with set-up and planting. Below are photos from the day. We had great weather! Thanks, everyone!






W. Communications and Outreach Program Report – Lauren Hazenson

Video and Content

Education Program Documentation and Assistance

Lauren filmed and photographed in-class activities and outdoor gardening projects the Education program completed with L'Etoile Du Nord and Lionsgate Academy schools over several weeks. The goal of gathering this content is to create article features, and videos showcasing the range of school-based programming and document the history of the Eastside Boys and Girls Club project as it nears completion. Video content at the Boys and Girls Club is planned as a short feature to be shown as part of the sculpture unveiling celebration next spring.

Volunteer Planting Documentation and Assistance

This past month 3M volunteers assisted with the Goodrich Golf Course restoration planting. Due to the rain, volunteer numbers were lower than expected. Lauren assisted with the planting in addition to photographing the event. We also took and posted pictures of Keller Golf Course maintenance this month to illustrate the importance of ongoing restoration maintenance in our management plan.

Water Steward Recruitment

Our water steward recruitment campaign will launch in early October with a short film on steward projects, blog posts, and social media ads. Much of this content is already completed and is entered into the communications calendar for optimal visibility.

Website Updates

Lake level station page

The design for the lake level one-stop page for the "Data" section of the site has been completed. We will post it on the website and send an update to the Board as soon as the link is available.

Online permit payment system update

Our current payment processing requirements are a significant obstacle to permitting applicants to submit their payments online; therefore, the online payment system has been delayed until credit card

payments are more established at RWMWD. In the meantime, applicants will be provided the option to call our office and submit a credit card payment on the phone or in person when the office reopens to the public.

Recognition Dinner

Lauren is acting as the event project manager for the second year, which involves creating the event preparation schedule, scheduling update meetings and key deadlines, and connecting with staff to ensure event planning stays on target. She will complete the registration form, event invitation, and nine awards videos in September and October. The recognition dinner is scheduled for Tuesday, November 15th, at 6 pm.

E-newsletter

Audience: 1,574
Opens:
Link clicks:

Social Media (Facebook, Twitter, Instagram)

Numbers as of 9/26 :
Facebook
Reach: 4,125
Engagement (likes, shares, comments): 865
Audience: 1,307

Note: We gained 62 new followers this month thanks to a brief ad campaign encouraging those who live in the District to follow us on Facebook. Our follower count has increased 72% since August 2020.

Instagram
Reach: 449
Engagement: 48
Audience: 708

Twitter
Reach: 494
Engagement: 14
Audience: 1,023

Resident Communications/Professional Development/ Public Meetings, Misc.

- Staff public communications support

X. Citizen Advisory Committee Report – Carrie Magnuson

The Citizen Advisory Commission met on September 27th, 2022. The group included staff members Carrie Magnuson, Sage Passi and Lauren Hazenson, board member Val Eisele, and fourteen CAC members. The following initiatives were discussed and further developed:

- Watershed Excellence Awards – Selection of awardees and program planning: The CAC reviewed twelve nominations, and is recommended awardees for the Board to review. Those recommendations will be sent to the board ahead of the meeting and the action is listed in the October board packet under item 7A. Following Board approval of candidates, a formal letter will go out to each individual.

  The group also discussed the logistics of the Recognition Dinner including award presenters, commissioning the physical award, and managing time effectively.
  The CAC also reviewed projects being done by RWMWD staff and partners.

Future 2022 CAC meetings: October 25th, December 13th

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Board Action Log

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RAMSEY-WASHINGTON
METRO WATERSHED DISTRICT

Board of Managers Action Log

Wednesday, September 7, 2022

Date Added	Item	Anticipated Action Date	Means of Action	Completed
July 2022	Alum use for internal load control along with information on alternative solutions.	Fall/Winter 2022	Memo/Presentation	
July 2022	PFAS (Per- and polyfluoroalyl substances) in MN and RWMWD's role.	Fall/Winter 2022	Presentation – invite MPCA representative	
July 2022	Miyawaki Mini-Forest Assessment	Fall 2022	Barr new technology report	Oct 2022 PSR

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