RAMSEY-WASHINGTON
METRO WATERSHED DISTRICT

November 2018 Board Packet

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Agenda

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RAMSEY-WASHINGTON
METRO WATERSHED DISTRICT

Regular Board Meeting Agenda

Wednesday, November 7, 2018
6:30 P.M.
District Office Board Room
2665 Noel Drive, Little Canada, MN

1. Call to Order – 6:30 PM
2. **Approval of Agenda**
3. **Consent Agenda**
    A. Approval of Minutes October 10, 2018
4. **Treasurer's Report and Bill List**
5. Visitor Presentations
6. Permit Program
    A. Applications
        i. **18-27 McKnight Road Development, North St. Paul**
    B. Enforcement Action Report
7. Stewardship Grant Program
    A. Applications
        i. **18-26 CS Kosobayashi, rain gardens and native planting**
    B. Budget Status Update
8. Action Items
    A. 2019 CIP Maintenance and Repair Project Approval of Plans & Authorization to Advertise for Bid
9. Administrator's Report
    A. Meetings Attended
    B. Upcoming Meetings and Dates
    C. 2019 Board Meeting Dates
    D. MAWD Annual Meeting
10. Project and Program Status Reports
    A. Presentation: Preliminary Results for the Kohlman Basin Treatment Test Cells, Keith Pilgrim – Barr Engineering
    B. Project Memo: Wakefield Lake Sediment Management Analysis

C. Ongoing Project and Program Updates
   i. Owasso Park Stormwater Master Plan
   ii. Beltline Resiliency Study
   iii. At Risk Subwatershed Feasibility Studies
   iv. District Office Parking Lot Retrofit
   v. Emergency Response Planning
   vi. Snail, Grass and West Vadnais Lakes Outlet Permitting
   vii. West to East Vadnais Gravity Flow Evaluation
   viii. Auto Lake Monitoring Systems
   ix. Maplewood Mall Monitoring
   x. Wakefield Park/Frost Avenue Project
   xi. Targeted Retrofit Projects
   xii. Roseville High School Campus Retrofit Feasibility Study
   xiii. BMP Design Assistance and Review
   xiv. Willow Pond CMAC Project
   xv. Frost/Kennard Spent Lime Project
   xvi. Beltline/Battle Creek Tunnel
   xvii. CIP Maintenance/Repair 2018
   xviii. New Technology Case Study: ProCom NEPTUN System
   xix. Natural Resources Program
   xx. Education Program
   xxi. Communications Program

11. Informational Items
12. Report of Managers
13. **Adjourn**

Items in **bold signify that an action needs to be taken by the Board.*

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Consent Agenda

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RAMSEY-WASHINGTON
METRO WATERSHED DISTRICT

Ramsey-Washington Metro Watershed District
Minutes of Regular Board Meeting
October 10, 2018

The Regular Meeting of October 10, 2018, was held at the District Office Board Room, 2665 Noel Drive, Little Canada, Minnesota, at 6:30 p.m.

PRESENT:
Cliff Aichinger, Vice President
Dianne Ward, Treasurer
Dr. Pam Skinner, Secretary
Lawrence Swope, Manager

ABSENT:
Marj Ebensteiner, President

ALSO PRESENT:
Tina Carstens, District Administrator
Brad Lindaman, Barr Engineering
Chris O'Brien, Communications Coordinator
Paige Ahlborg, Project Manager
Simba Blood, Natural Resources Specialist
Tracey Galowitz, Attorney for District

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

2. APPROVAL OF AGENDA
Tina Carstens requested to add two items to the agenda, Item 8A Watershed Excellence Awards Approval and Item 8B Change Order No. 1 for Willow Pond CMAC Project.

Motion: Dr. Pam Skinner moved, Lawrence Swope seconded, to approve the agenda as amended. Motion carried 4-0. (President Ebensteiner absent)

3. CONSENT AGENDA
A. Approval of Minutes from September 5, 2018
B. City of Maplewood Local Water Management Plan – Resolution 18-07
C. Change Order No. 7 – Beltline and Battle Creek Tunnel Repair Project

Motion: Dr. Pam Skinner moved, Dianne Ward seconded, to approve the consent agenda as presented. Motion carried 4-0. (President Ebensteiner absent)

4. TREASURER'S REPORT AND BILL LIST
Motion: Dr. Pam Skinner moved, Lawrence Swope seconded, to approve the October 10, 2018, bill list as submitted. Motion carried 4-0. (President Ebensteiner absent)

5. VISITOR PRESENTATIONS
There were none.

6. PERMIT PROGRAM

A. Applications
None.

B. Monthly Enforcement Report
During September, 12 notices were sent to address: install/maintain inlet protection (3), install/maintain perimeter control (3), install/maintain construction entrance (2), sweep streets (1), contain liquid/solid wastes (1), and remove discharged sediment (2).

Manager Swope asked for details on some ongoing projects. Tina Carstens stated that Barr Engineering is working with Roseville High School to identify additional opportunities which could include underground storage. Paige Ahlborg provided additional details on a townhome project.

7. STEWARDSHIP GRANT PROGRAM

A. Applications

Permit #18-21 CS: McGuire – Rain Garden and Native Planting

Motion: Dianne Ward moved, Dr. Pam Skinner seconded, to approve Permit #18-21 CS. Motion carried 4-0. (President Ebensteiner absent)

Permit #18-22 CS: Biga – Rain Gardens and Native Planting

Vice President Aichinger noted that this project has great visibility.

Motion: Dr. Pam Skinner moved, Lawrence Swope seconded, to approve Permit #18-22 CS. Motion carried 4-0. (President Ebensteiner absent)

Permit #18-23 CS: Finsness – Pervious Driveway

Paige Ahlborg noted that this resident was first interested in a rain garden, but his property was not appropriate, and because his driveway needed repair, it was determined that this would be a better project.

Motion: Dr. Pam Skinner moved, Dianne Ward seconded, to approve Permit #18-23 CS. Motion carried 4-0. (President Ebensteiner absent)

Permit #18-24 CS: Richardson Elementary Addition – Filtration Basin

Paige Ahlborg stated that this project came forward last month for a permit and the District staff discussed additional projects that would go above and beyond. She stated that the applicant was interested in stormwater reuse, which will provide additional treatment and is in line with other similar projects. She stated that there is a good operation and maintenance schedule proposed. She advised that this funding would come from the school retrofit funds. Vice President Aichinger asked which ponds would be infiltration basins and which would be reuse ponds. Paige noted that two basins would be filtration basins and two would be for the reuse.

Motion: Dr. Pam Skinner moved, Lawrence Swope seconded, to approve Permit #18-24 CS. Motion carried 4-0. (President Ebensteiner absent)

Permit #18-25 CS: Adam's Food and Fuel – Rain Garden

Paige Ahlborg stated that the applicant was interested in a rain garden and after discussions with staff, the project would qualify for use of the retrofit funds.

Motion: Dianne Ward moved, Dr. Pam Skinner seconded, to approve Permit #18-25 CS. Motion carried 4-0. (President Ebensteiner absent)

B. Budget Status Update

Paige Ahlborg stated that a line item was added for the 2017 carryover and provided a summary of the budget status. She stated that staff has begun telling potential applicants that staff is holding off on new projects until 2019 as staff already has a large workload and most contractors are not accepting additional projects for 2018.

8. ACTION ITEMS

A. Watershed Excellence Awards Approval

Tina Carstens stated that the list of proposed award recipients was provided to the Board for review. Vice President Aichinger commented that this is a good list of recipients.

Motion: Lawrence Swope moved, Dr. Pam Skinner seconded, to approve the recipients for the Watershed Excellence Awards. Motion carried 4-0. (President Ebensteiner absent)

B. Change Order No. 1 for the Willow Pond CMAC Project

Brad Lindaman stated that the contractor felt the retainage language in the contract was out of date with current statute. Tracey Galowitz stated that the law was changed in 2016, noting that although the District was not in violation, this will clean up the language. She noted that she has also provided suggested language for contracts going forward.

Motion: Lawrence Swope moved, Dianne Ward seconded, to approve Change Order No. 1 for the Willow Pond CMAC Project. Motion carried 4-0. (President Ebensteiner absent)

9. ADMINISTRATOR'S REPORT

A. Meetings Attended

Vice President Aichinger asked about the O&M Conference Planning items in the meetings attended section of the report. Tina Carstens advised of a conference hosted by ASCE that will be held in the metro area in August of 2019 and noted that a planning meeting was recently held.

B. Upcoming Meetings and Dates

Manager Skinner stated that she will be gone the first week of January.

C. MAWD Annual Meeting

Tina Carstens stated that if any Managers plan on attending and need hotel rooms, those should be booked soon. Vice President Aichinger stated that he will be attending, but will not require a hotel room. Managers Ward and Skinner noted that they will not be attending. Manager Swope commented that he is unsure if he will be attending. Tina provided a summary of some of the new aspects of the annual meeting this year.

D. Spent Lime Pond Treatment Grant Proposal

Tina Carstens advised of the partnership project that will be submitted for grant funds. Vice President Aichinger stated that the proposals are divided into categories and there are 21 big projects competing for four or five spots, therefore, it will be competitive. He stated that the year before there were less funds available and two or three smaller scale projects were approved. He stated that the big projects in review will be two to three-year research projects.

10. MANAGER SWOPE REQUESTED BOARD ITEM – PRESERVATION AND RESTORATION OF WETLANDS

Tina Carstens noted that Manager Swope made a request at the last meeting that the Board discuss the restoration of wetlands and put together a packet for the Board and staff to review. Manger Swope stated that at the meetings that he has attended as a Board member and as a resident the discussions around wetlands were not as focused as he would have liked to have seen. He stated that next year the Board will be looking at wetlands that need improvement and therefore he thought this was good timing. He referenced a newspaper article which discussed the use of the wetland bank. He stated that there are a number of older wetlands in the District and the permitting process looks to ensure there is adequate infiltration and that the water is used properly. He noted that there are areas that may need more restoration and believed that the Board should begin the thought process on how to go about that, whether there is support for others to do that, or whether the District looks to do it themselves.

Vice President Aichinger provided background information on the process the District has undergone in the past to classify the wetlands and review wetland mitigation potential. He stated that most of the wetlands in the District have been used for stormwater discharge, which began long before any wetland rules, therefore most of the wetlands are degraded.

Manager Skinner stated that when there is a red colored wetland that is pristine and there is a larger setback that wetland should be protected. Vice President Aichinger agreed that some wetlands have potential for restoration and mitigation. Tina stated that the District is currently going through the process to determine how screening will occur to identify potential restoration and mitigation opportunities. Manager Ward agreed that the first step will be the survey. She stated that this really fits well with the flood work that the District is completing with Barr Engineering. Manager Skinner stated that she agrees that it would be helpful to know what restoration of a wetland would look like and what would make the wetland function better. Tina agreed that could be a good exercise for the Board and staff to do together to identify potentials.

Vice President Aichinger stated that the District is a highly urbanized area and there are limited potentials as stormwater will need to discharge to certain wetlands, but agreed that there could be additional opportunities investigated for treatment of water prior to discharge. Brad Lindaman provided additional restoration opportunities that could improve the function and values associated with a wetland. Manager Ward stated that the given is that the wetlands will continue to receive stormwater, but perhaps the functionality could be improved.

Manager Skinner asked about the potential that sediment and tree removal could occur within a wetland. Vice President Aichinger stated that as long as the District can prove that this is restoration being done to restore the original condition, agency approval could be gained. Manger Skinner also suggested looking into preservation or enhancement of wildlife corridors.

Manager Swope stated that his intention was simply to get the discussion started as this will be a topic in the coming year. Manager Skinner noted that perhaps this would be a good topic for a future tour, as seeing the different value wetlands in person helps to put the topic more into context. Tina noted that she will work with Brad Lindaman to determine when the discussion for scoping of the study could occur.

11. PROJECT AND PROGRAM STATUS REPORTS

B. Ongoing Project and Program Updates

i. Owasso Park Stormwater Master Plan

Vice President Aichinger stated that he likes the pictures from the Owasso Park item and asked if a similar plan is being considered for the District parking lot. Brad Lindaman stated that option is being reviewed. He stated that Barr Engineering is reviewing the option to determine if a small top layer could be milled off to return the function, while still providing a smooth driving surface. He stated that vibration tends to drive the sediment further into the pores and the District has tried to use vacuuming as well.

Vice President Aichinger stated that there is proof that using water and high suction machines regularly will adequately clean the pores, but noted that equipment was not readily available in the past and at this point the sediment is stuck and that method alone would not be sufficient.

Manager Skinner asked if the parking lot is still functioning, noting that it does not appear to flood. Tina Carstens noted that there is a large section that bypasses and goes directly to the catch basin. She confirmed that the water is still being treated, but there is an issue of pavement management as well at this time.

ii. Beltline Resiliency Study

iii. At Risk Subwatershed Feasibility Studies

Brad Lindaman noted that the Battle Creek Lake Feasibility Study looked further into doing work in the intersection of 694/94/494, but he did not have confidence that it would be worth the effort. He noted that MnDOT stated that it is too late in the process to get into the project schedule. He stated that a lot of the flow coms from the northeast and runs under the intersection and therefore there is not the opportunity that they originally believed was there. He stated that the study will be finalized and presented in December along with two other studies.

iv. District Office Permeable Asphalt Parking Lot Retrofit

v. Emergency Response Planning

Tina Carstens noted that there was a meeting on Monday with Twin Lake residents, District staff and Barr Engineering and provided an update. She stated that there is a desire from the residents to know how this happened. She noted that perhaps East Vadnais Lake overflowed at some point into Twin Lake. She stated that the residents are also interested in submitting time-stamped photos in an attempt to piece together a starting elevation before the water started rising in order to assist in the modeling process. She stated that the City Engineer for Little Canada is taking the lead with assistance from the District. Brad Lindaman stated that, because of elevations, there is still a long ways to go before there would be potential for flooding or damage to homes.

vi. FEMA Flood Mapping Updates

Tina Carstens noted that survey data was received from the DNR.

vii. Snail Lake and Grass Lake Study and Berm Raise Project

Brad Lindaman noted that the berm is complete, but there has been some erosion with the recent rains. He stated that rather than doing a change order with the contractor, it was determined to be more efficient for staff to complete the additional seeding and blanketing.

viii. Snail, Grass and West Vadnais Lakes Outlet Permitting

Brad Lindaman noted that not much has happened as staff is still attempting to connect to the right individuals to get additional information on permitting. He provided an estimate on the potential timeline for permitting, noting that there are a number of factors that would impact the permitting timeline.

Manager Skinner stated that pollutants in the lake are being evaluated and asked which pollutants are being monitored, as typically things like phosphorus and nitrogen would be monitored. Tina Carstens noted that there are a number of factors being monitored above the typical factors. Manager Skinner stated that perhaps this is something the District should monitor more often, referencing a list of 126 contaminants that she learned of at a recent conference. She also suggested that groundwater become more of a focus. Tina noted that groundwater is sprinkled in with different projects, but agreed that there could be additional opportunities. Manager Skinner stated that she would be interested in knowing more about what contaminants are in the groundwater. She stated that perhaps that begins with collecting data that is already available. Vice President Aichinger stated that the reason that the District has not done much with groundwater is because the District does not have the authority to management that.

ix. West to East Vadnais Gravity Flow Evaluation

Brad Lindaman noted that the piezometer installation was completed, and it was his understanding that there was not interaction with the concrete rubble that was believed to be there.

x. 500-Year Atlas 14 Modeling

xi. Auto Lake Monitoring Systems

xii. Maplewood Mall Monitoring

Vice President Aichinger asked and received confirmation that this will include monitoring of the trees and the success rate of the different types of trees. He asked if they will be able to determine

if the trees are being flooded with too much water. Brad Lindaman commented that he believed that information would be made available during this process. Vice President Aichinger asked and received confirmation that there is a possibility to remove a tree that is not doing well in order to observe the condition of the roots.

xiii. 2018 Grant Applications

xiv. Wakefield Lake Sediment Removal

xv. Kohlman Weir Test System

Brad Lindaman provided details on the presentation that will be provided to the Board at the next meeting.

xvi. Wakefield Park/Frost Avenue Project

Paige Ahlborg stated that they are in the draft phase, noting that there is an upcoming neighborhood meeting and the process will begin with review by the Parks Commission.

xvii. Targeted Retrofit Projects

Tina Carstens stated that the District received approval for the Watershed-Based Funding. Paige Ahlborg noted that the contractors plan to start the following day and finish this year.

xviii. Roseville High School Campus Retrofit Feasibility Study

xix. BMP Design Assistance and Review

Vice President Aichinger noted that the Sunray Shopping Center would be a good location. Tina Carstens confirmed that is being looked at in conjunction with another project.

xx. Willow Pond CMAC Project

xxi. Beltline/Battle Creek Tunnel

Tina Carstens noted that the final payment for the contractor was approved tonight in the Consent Agenda.

xxii. CIP Maintenance/Repair 2018

Brad Lindaman noted that this is the same contractor that worked on the Grass Lake Berm project and staff has been pushing very hard to get things wrapped up. He stated that there are still two outstanding items for the CIP project, noting that one is due to an improper order of a transition pipe. He noted that the other element is the last bit of cleanout for a project area. He stated that a letter was sent out from legal counsel providing until October 16th for the contractor to finish. He stated that if the items are not completed by that time, staff would suggest using the retainer to find someone else that could complete the work. He estimated that the contractor could complete the remaining work in about 1.5 days if the proper effort were put forth.

Vice President Aichinger asked if it would cost more for the District to end the contract and pay someone else to complete the work. Brad confirmed that the retainage would be used to pay someone else to complete the work and, while the District would look for a reasonable price, it would not be limited to the contract prices. Tracey Galowitz stated that it may be beneficial to advise the contractor that the Board will consider this in future projects, should the contractor choose to submit bids for a future project.

Brad stated that if the last correspondence with the contractor is correct, the pipe should be installed by Monday, but is unsure whether the cattail removal would be completed by the contractor prior to the deadline. He stated that it was explained to the contractor that although he may have completed one third of the work on the element, payment would not be provided for that item unless all the work is completed. Tina asked if action is required from the Board should the contract need to be terminated and another contractor needed to complete the work.

Motion: Dr. Pam Skinner moved, Lawrence Swope seconded, to authorize staff to take the necessary steps to enforce the terms of the contract and move forward with any justified penalties if the demands are not met. Motion carried 4-0. (President Ebensteiner absent)

xxiii. Natural Resources Program

xxiv. Education Program

Manager Skinner stated that perhaps there is a market for the burdock that is removed. Simba Blood commented that the yard burdock is different than the species that is grown for consumption.

Manager Ward asked how something would be chosen for the MAWD display. Tina Carstens noted that she, Chris O'Brien and Sage Pasi will be meeting to discuss that.

xxv. Communications Program

Manager Skinner stated that she likes the addition of the communications program report, but she does not like the pop-up for subscribing on the website. Vice President Aichinger stated that the pop-up is useful in gaining new contacts. He noted that once you close the pop-up once it will not reappear. Tina Carstens stated that staff can do analysis to determine the number of new subscribers that are gained through that method.

Vice President Aichinger asked where the shallow lakes video is on the website. Chris O'Brien stated that it is available on the bottom of the front page. He noted that he can follow up to ensure that the video can be found when searched for. Tina noted that the video has been linked in other areas too, using the example of social media.

12. INFORMATIONAL ITEMS

No additional comments.

13. REPORTS OF MANAGERS

No additional comments.

14. ADJOURN

Motion: Dr. Pam Skinner moved, Dianne Ward seconded, to adjourn the meeting at 8:10 p.m. Motion carried 4-0. (President Ebensteiner absent)

Respectfully submitted,

Dr. Pam Skinner, Secretary

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Bill List

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RWMWD BUDGET STATUS REPORT
Administrative & Program Budget
Fiscal Year 2018
10/31/2018

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	$6,500.00	-	1,475.00	3,925.00	$2,575.00	60.38%
	Manager expenses	4360	3,500.00	-	-	782.59	2,717.41	22.36%
Committees	Committee/Bd Mtg. Exp.	4365	3,500.00	-	276.28	2,581.24	918.76	73.75%
Employees	Staff salary/taxes/benefits	4010	1,300,000.00	-	96,636.57	987,964.01	312,035.99	76.00%
	Employee expenses	4020	10,000.00	-	354.05	4,319.21	5,680.79	43.19%
	District training & education	4350	25,000.00	-	1,320.48	16,296.94	8,703.06	65.19%
Administration/ Office	GIS system maint. & equip.	4170	15,000.00	-	342.00	4,101.02	10,898.98	27.34%
	Data Base/GIS Maintenance	4171	15,000.00	-	-	1,300.00	13,700.00	8.67%
	Equipment maintenance	4305	3,000.00	-	-	1,430.83	1,569.17	47.69%
	Telephone	4310	8,000.00	-	358.22	2,976.56	5,023.44	37.21%
	Office supplies	4320	5,000.00	-	203.90	3,815.63	1,184.37	76.31%
	IT/Internet/Web Site/Software Lic.	4325	42,000.00	-	2,349.79	26,833.06	15,166.94	63.89%
	Postage	4330	10,000.00	-	1,000.00	3,274.59	6,725.41	32.75%
	Printing/copying	4335	8,000.00	-	285.67	3,975.23	4,024.77	49.69%
	Dues & publications	4338	11,000.00	-	111.00	9,808.00	1,192.00	89.16%
	Janitorial/Trash Service	4341	17,000.00	-	738.02	11,190.46	5,809.54	65.83%
	Utilities/Bldg.Contracts	4342	18,000.00	-	502.24	13,507.84	4,492.16	75.04%
	Bldg/Site Maintenance	4343	70,000.00	-	455.61	27,668.89	42,331.11	39.53%
	Miscellaneous	4390	5,000.00	-	-	325.19	4,674.81	6.50%
	Insurance	4480	35,000.00	-	-	33,814.00	1,186.00	96.61%
	Office equipment	4703	40,000.00	-	112.64	14,578.27	25,421.73	36.45%
	Vehicle lease, maintenance	4810-40	43,000.00	-	342.60	32,991.73	10,008.27	76.72%
Consultants/ Outside Services	Auditor/Accounting	4110	50,000.00	-	0.00	43,188.94	6,811.06	86.38%
	Engineering-administration	4121	93,000.00	-	5,572.23	58,491.07	34,508.93	62.89%
	Engineering-permit I&E	4122	15,000.00	-	-	3,155.00	11,845.00	21.03%
	Engineering-eng. review	4123	55,000.00	-	4,012.50	46,910.56	8,089.44	85.29%
	Engineering-permit review	4124	50,000.00	-	2,544.50	32,067.00	17,933.00	64.13%
	Project Feasibility Studies	4129	735,000.00	-	14,598.26	262,489.04	472,510.96	35.71%
	Attorney-permits	4130	10,000.00	-	-	1,161.28	8,838.72	11.61%
	Attorney-general	4131	40,000.00	-	2,065.47	12,053.47	27,946.53	30.13%
	Outside Consulting Services	4160	40,000.00	-	-	7,832.00	32,168.00	19.58%
Programs	Educational programming	4370	60,000.00	-	3,097.38	28,194.15	31,805.85	46.99%
	Communications & Marketing	4371	25,000.00		1,063.09	6,455.20	18,544.80	25.82%
	Events	4372	50,000.00	-	49.43	31,801.45	18,198.55	63.60%
	Water QM-Engineering	4520-30	513,000.00	-	50,214.40	131,812.69	381,187.31	25.69%
	Project operations	4650	140,000.00	-	1,432.12	90,771.80	49,228.20	64.84%
	SLMP/TMDL Studies	4661	115,000.00	-	359.50	18,642.67	96,357.33	16.21%
	Natural Resources/Keller Creek	4670-72	100,000.00	-	509.25	83,953.96	16,046.04	83.95%
	Outside Prog.Support/Weed Mgmt.	4683-84	70,000.00	-	4,300.89	37,266.46	32,733.54	53.24%
	Research Projects	4695	100,000.00	-	790.00	37,802.13	62,197.87	37.80%
	Health and Safety Program	4697	2,000.00	-	-	2,747.54	(747.54)	137.38%
	NPDES Phase II	4698	20,000.00	-	1,367.06	8,484.06	11,515.94	42.42%
	Atlas 14 Watershed Modeling	4732	-	-	-	-	-	0.00%
GENERAL FUND TOTAL			**$3,976,500.00**	**$0.00**	**$198,840.15**	**$2,152,740.76**	**$1,823,759.24**	54.14%
CIP's	CIP Project Repair & Maintenance	516	1,000,000.00	-	158,487.27	863,807.15	136,192.85	86.38%
	Targeted Retrofit Projects	518	800,000.00	-	8,770.43	71,187.34	728,812.66	8.90%
	District Office Building Solar Energy Retrofit	519	150,000.00	-	-	96,818.00	53,182.00	64.55%
	Flood Damage Reduction Fund	520	2,000,000.00	-	6,657.29	81,674.15	1,918,325.85	4.08%
	Debt Services-96-97 Beltline/MM/Battle Creek	526	448,951.00	-	-	387,618.43	61,332.57	86.34%
	Stewardship Grant Program Fund	528-529	800,000.00	-	12,131.99	409,391.88	390,608.12	51.17%
	Impervious Surface Volume Reduction Opportunity	531	1,500,000.00	-	-	-	1,500,000.00	0.00%
	Beltline & Battle Creek Tunnel Repair	549	-	-	1,800.50	1,628,583.58	(1,628,583.58)	---
	Frost/Kennard Enhanced WQ BMP	550	400,000.00	-	8,337.00	33,665.71	366,334.29	8.42%
	Markham Pond Dredging & Aeration	551	25,000.00	-	-	-	25,000.00	0.00%
	Wakefield Park Project	553	1,100,000.00	-	4,398.00	48,724.93	1,051,275.07	4.43%
	Willow Pond CMAC	554	400,000.00		153,460.30	330,038.83	69,961.17	82.51%
	District Office Bond Payment	585	194,885.00	-	-	196,983.53	(2,098.53)	101.08%
CIP BUDGET TOTAL			**$8,818,836.00**	**-**	**$354,042.78**	**$4,148,493.53**	**$4,670,342.47**	47.04%
TOTAL BUDGET			**$12,795,336.00**	**$0.00**	**$552,882.93**	**$6,301,234.29**	**$6,494,101.71**	**49.25%**

Current Fund Balances:

Fund:	Beginning Fund Balance @ 12/31/17	Fund Transfers	Year to date Revenue	Current Month Expenses	Year to Date Expense	Fund Balance @ 10/31/18
101 - General Fund	$4,329,903.56	-	1,538,460.77	198,840.15	2,152,740.76	3,715,623.57
516 - CIP Project Repair & Maintenance	615,041.00	-	576,098.50	158,487.27	863,807.15	327,332.35
518 - Targeted Retrofit Projects	836,989.00	-	171,505.91	8,770.43	71,187.34	937,307.57
519 - District Office Building Solar Energy Retrofit	129,623.00	-	-	-	96,818.00	32,805.00
520 - Flood Damage Reduction Fund	1,118,749.00	-	451,178.86	6,657.29	81,674.15	1,488,253.71
526 - Debt Services-96-97 Beltline/MM/Beltline-Battle Creek Tunnel Repair	359,578.00	-	234,211.69	-	387,618.43	206,171.26
528/529 - Stewardship Grant Program Fund	561,388.00	-	223,674.61	12,131.99	409,391.88	375,670.73
531 - Impervious Surface Volume Reduction Opportunity	1,484,215.00	-	-	-	-	1,484,215.00
549 - Beltline & Battle Creek Tunnel Repair	2,407,984.00	-	-	1,800.50	1,628,583.58	779,400.42
550 - Frost/Kennard Enhanced WQ BMP	119,513.00	-	13,042.17	8,337.00	33,665.71	98,889.46
551 - Markham Pond Dredging & Aeration	110,411.00	-	-	-	-	110,411.00
553 - Wakefield Park Project	351,874.00	-	391,264.88	4,398.00	48,724.93	694,413.95
554 - Willow Pond CMAC	-	-	208,674.61	153,460.30	330,038.83	(121,364.22)
580 - Contingency Fund	476,100.94	-	-	-	-	476,100.94
585 - Certificates of Participation	133,637.00	-	101,668.87	-	196,983.53	38,322.34
Total District Fund Balance	**$13,035,006.50**	**-**	**$ 3,909,780.87**	**$ 552,882.93**	**$6,301,234.29**	**$10,643,553.08**

Ramsey Washington Metro Watershed Dist.
Check Register
For the Period From Oct 1, 2018 to Oct 31, 2018

Check #	Date	Payee ID	Payee	Description	Amount
EFT	10/10/18	hea002	HealthPartners	Employee Benefits	$10,094.01
70313	10/23/18	ada002	Adam's Pest Control, Inc.	Utilities/Bldg. Contracts	158.00
70314	10/23/18	all004	allstream	Project Operations	64.97
70315	10/23/18	aws001	AWS Service Center	Janitorial/Trash Service	188.02
70316	10/23/18	ben002	Benefit Extras, Inc.	Employee Benefits	129.00
70317	10/23/18	bro001	Brock White, Inc.	Construction Expense	3,948.86
70318	10/23/18	int003	Intereum, Inc.	Office Equipment	112.64
70319	10/23/18	qwe001	CenturyLink	Project Operations	461.70
70320	10/30/18	ahl001	Paige Ahlborg	Employee Reimbursement	445.42
70321	10/30/18	att002	AT & T Mobility - ROC	IT/Website/Software	43.22
70322	10/30/18	bar001	Barr Engineering	Sept/October Engineering	80,555.23
70323	10/30/18	bar004	Deborah Barnes	Employee Reimbursement	25.45
70324	10/30/18	blo001	Simba Blood	Employee Reimbursement	274.67
70325	10/30/18	cit001	City of Little Canada	Utilities/Bldg. Contracts	140.93
70326	10/30/18	cit011	City of Roseville	Telephone/IT/Website	2,513.82
70327	10/30/18	cla001	Classic Construction, Inc.	Dev. Escrow	1,880.00
70328	10/30/18	fit001	Fitzgerald Excavating & Trucking, Inc.	Construction-Pay #2 & #5	126,744.00
70329	10/30/18	fre003	Stephen & Nicole Frethem	Stewardship Grant Fund	1,146.99
70330	10/30/18	gal001	Galowitz Olson, PLLC	October Legal Expense	3,385.47
70331	10/30/18	ger003	Carole Gernes	Employee Reimbursement	211.41
70332	10/30/18	gop002	Gopher Sign Company	Communications & Marketing	165.10
70333	10/30/18	hom001	Home Depot Credit Services	Natural Resources Proj.	1.96
70334	10/30/18	inn002	Innovative Office Solutions LLC	Office Supplies	161.69
70335	10/30/18	int001	Office of MN, IT Services	Telephone Expense	55.40
70336	10/30/18	lan009	Landbridge Ecological	Construction-Maint. & Rep.	447.18
70337	10/30/18	lea003	L. Tracy Leavenworth	Educationl Program	3,091.40
70338	10/30/18	mel001	Michelle L. Melser	Employee Reimbursement	32.14
70339	10/30/18	min008	Minnesota Native Landscapes, Inc.	Construct.-Frost/Maint. & Rep.	19,047.50
70340	10/30/18	nsp001	Xcel Energy	Utilities/Bldg. Contracts	203.31
70341	10/30/18	obr001	Christopher O'Brien	Employee Reimbursement	163.08
70342	10/30/18	omo001	Nicholas D. Omodt	Employee Reimbursement	13.63
70343	10/30/18	out001	Outdoor Lab Landscape Design, Inc.	Construction-Maint. & Rep.	1,155.00
70344	10/30/18	pac001	Pace Analytical Services, Inc.	Water QM	2,193.00
70345	10/30/18	pas002	Sage Passi	Employee Reimbursement	294.98
70346	10/30/18	pet001	Peterson Companies, Inc.	Construction-#2/Willow Pond	144,487.21
70347	10/30/18	pro003	Lyndsey R. Provos	Employee Reimbursement	279.80
70348	10/30/18	ram002	Ramsey County	Stewardship/Water QM	50,583.21
70349	10/30/18	res001	Pitney Bowes - Reserve Account	Postage	1,000.00
70350	10/30/18	sel001	Select Synthetics	Bldg/Site Maintenance	200.00
70351	10/30/18	she003	Shepherd of the Hills Lutheran Church	Stewardship Grant Fund	450.00
70352	10/30/18	sod001	Nicole Soderholm	Employee Reimbursement	90.90
70353	10/30/18	spe001	Kari Sperry	Stewardship Grant Fund	1,115.00
70354	10/30/18	stu001	Studio Lola	Communications & Marketing	18.75
70355	10/30/18	tes001	The Tessman Company	Natural Resources Proj.	80.00
70356	10/30/18	tim002	Timesaver Off-Site Secretarial, Inc.	Committee/Board Meeting	211.00
70357	10/30/18	usb002	U.S. Bank	Monthly Credit Card Expense	7,398.86
70358	10/30/18	usb005	US Bank Equipment Finance	Printing Expense	285.67
70359	10/30/18	van001	Vanguard Cleaning Systems of Minnesota	Janitorial/Trash Service	550.00
70360	10/30/18	voy001	US Bank Voyager Fleet Sys.	Vehicle Expense	323.82
70361	10/30/18	was002	Washington Conservation District	Outside Program Support	3,062.50
70362	10/30/18	wil007	Patrick Williamson	Employee Reimbursement	10.90
70363	10/30/18	win002	Windmill Design Incorporated	Communications & Marketing	490.00
Total					**$470,186.80**

Ramsey Washington Metro Watershed Dist.
Cash Disbursements Journal
For the Period From Oct 1, 2018 - Oct 31, 2018

Date	Check #	Vendor ID	Name	Account ID	Account Description	Amount	Check Detail
10/10/18	EFT	hea002	HealthPartners			10,094.01	
				4040-101-000	Employee Benefits-General		8,123.52
				2015-101-000	Employee Health-General		1,970.49
10/23/18	70313	ada002	Adam's Pest Control			158.00	
				4342-101-000	Utilities/Bldg. Contracts		79.00
				4342-101-000	Utilities/Bldg. Contracts		79.00
10/23/18	70314	all004	allstream	4650-101-000	Project Operations-General	64.97	
10/23/18	70315	aws001	AWS Service Center	4341-101-000	Janitorial/Trash Service	188.02	
10/23/18	70316	ben002	Benefit Extras, Inc.	4040-101-000	Employee Benefits-General	129.00	
10/23/18	70317	bro001	Brock White, Inc.			3,948.86	
				4630-520-000	Construction-Flood Damage		2,052.01
				4630-520-000	Construction-Flood Damage		1,562.41
				4630-520-000	Construction-Flood Damage		334.44
10/23/18	70318	int003	Intereum, Inc.	4703-101-000	Office Equipment-General	112.64	
10/23/18	70319	qwe001	CenturyLink	4650-101-000	Project Operations-General	461.70	
10/30/18	70320	ahl001	Paige Ahlborg			445.42	
				4040-101-000	Employee Benefits-General		40.00
				4020-101-000	Employee Expenses-General		57.61
				4338-101-000	Dues & Publications-General		45.00
				4350-101-000	Training & Education-General		302.81
10/30/18	70321	att002	AT & T Mobility - ROC	4325-101-000	IT/Website/Software	43.22	
10/30/18	70322	bar001	Barr Engineering			80,555.23	
				4121-101-000	Engineering Admin-General Fund		5,572.23
				4698-101-000	Engineering-NPDES Phase II		1,367.06
				4123-101-000	Engineering-Review		4,012.50
				4129-101-000	Project Feasability-General		3,227.80
				4129-101-000	Project Feasability-General		8.50
				4129-101-000	Project Feasability-General		1,120.00
				4129-101-000	Project Feasability-General		2,295.00
				4129-101-000	Project Feasability-General		1,006.50
				4129-101-000	Project Feasability-General		20.71
				4129-101-000	Project Feasability-General		26.00
				4129-101-000	Project Feasability-General		6,452.75
				4129-101-000	Project Feasability-General		441.00
				4170-101-000	GIS System Maint. & Equipment		342.00
				4520-101-000	Water QM-Engineering		167.00
				4520-101-000	Water QM-Engineering		2,943.98
				4124-101-000	Engineering-Permit Review		2,544.50
				4661-101-000	SLMP/TMDL Studies		359.50
				4695.101-000	Research Projects-General		678.00
				4695.101-000	Research Projects-General		112.00
				4650-101-000	Project Operations-General		677.50

Ramsey Washington Metro Watershed Dist.
Cash Disbursements Journal
For the Period From Oct 1, 2018 - Oct 31, 2018

Date	Check #	Vendor ID	Name	Account ID	Account Description	Amount	Check Detail
				4128-553-000	Engineering-Wakefield		4,398.00
				4128-518-000	Engineering-School/Commer Retrofit		765.00
				4128-518-000	Engineering-School/Commer Retrofit		935.00
				4128-518-000	Engineering-School/Commer Retrofit		2,717.43
				4128-518-000	Engineering-School/Commer Retrofit		4,353.00
				4682-529-000	Stewardship Grant Program		2,470.00
				4128-554-000	Engineering-Willow Pond		8,173.09
				4128-520-000	Engineering-Flood Damage		2,548.43
				4128-549-000	Engineering-Beltline/Battle Creek		1,800.50
				4128-516-000	Engineering-Projects Maint. & Repair		14,939.36
				4128-516-000	Engineering-Projects Maint. & Repair		4,080.89
10/30/18	70323	bar004	Deborah Barnes			25.45	
				4040-101-000	Employee Benefits-General		20.00
				4020-101-000	Employee Expenses-General		5.45
10/30/18	70324	blo001	Simba Blood			274.67	
				4040-101-000	Employee Benefits-General		40.00
				4020-101-000	Employee Expenses-General		103.55
				4670-101-000	Natural Resources Project-General		84.83
				4350-101-000	Training & Education-General		46.29
10/30/18	70325	cit001	City of Little Canada			140.93	
				4342-101-000	Utilities/Bldg. Contracts		13.50
				4342-101-000	Utilities/Bldg. Contracts		127.43
10/30/18	70326	cit011	City of Roseville			2,513.82	
				4325-101-000	IT/Website/Software		2,211.00
				4310-101-000	Telephone-General		302.82
10/30/18	70327	cla001	Classic Construction, Inc.	2024-101-000	Dev Escrow-General	1,880.00	
10/30/18	70328	fit001	Fitzgerald Excavating & Trucking, Inc.			126,744.00	
				4630-516-000	Construction Imp-Maint. & Rep.		72,441.00
				4630-516-000	Construction Imp-Maint. & Rep.		54,303.00
10/30/18	70329	fre003	Stephen & Nicole Frethem	4682-529-000	Stewardship Grant Program	1,146.99	
10/30/18	70330	gal001	Galowitz Olson, PLLC			3,385.47	
				4131-101-000	Attorney General-General Fund		2,065.47
				4131-516-000	Attorney General-Maint. & Repair		360.00
				4131-554-000	Attorney General-Willow Pond		800.00
				4131-520-000	Attorney General-Flood Damage		160.00
10/30/18	70331	ger003	Carole Gernes	4684-101-000	Weed Management Program	211.41	
10/30/18	70332	gop002	Gopher Sign Company	4371-101-000	Communications & Marketing	165.10	
10/30/18	70333	hom001	Home Depot Credit Services	4670-101-000	Natural Resources Project-General	1.96	
10/30/18	70334	inn002	Innovative Office Solutions, LLC	4320-101-000	Office Supplies-General	161.69	
10/30/18	70335	int001	Office of MN, IT Services	4310-101-000	Telephone-General	55.40	
10/30/18	70336	lan009	Landbridge Ecological	4630-516-000	Construction Imp-Maint. & Rep.	447.18	
10/30/18	70337	lea003	L. Tracy Leavenworth	4370-101-000	Educational Program-General	3,091.40	
10/30/18	70338	mel001	Michelle Melser			32.14	
				4020-101-000	Employee Expenses-General		24.53
				4343-101-000	Bldg./Site Maintenance		7.61

Ramsey Washington Metro Watershed Dist.
Cash Disbursements Journal
For the Period From Oct 1, 2018 - Oct 31, 2018

Date	Check #	Vendor ID	Name	Account ID	Account Description	Amount	Check Detail
10/30/18	70339	min008	Minnesota Native Landscape, Inc.			19,047.50	
				4630-550-000	Construction Imp-Frost		8,337.00
				4650-516-000	Project Operations-Maint. & Repair		10,460.50
				4650-516-000	Project Operations-Maint. & Repair		250.00
10/30/18	70340	nsp001	Xcel Energy	4342-101-000	Utilities/Bldg. Contracts	203.31	
10/30/18	70341	obr001	Christopher O'Brien			163.08	
				4371-101-000	Communications & Marketing		44.74
				4040-101-000	Employee Benefits-General		80.00
				4040-101-000	Employee Benefits-General		38.34
10/30/18	70342	omo001	Nicholas Omodt	4020-101-000	Employee Expense-General	13.63	
10/30/18	70343	out001	Outdoor Lab Landscape Design, Inc.	4630-516-000	Construction Imp-Maint. & Rep.	1,155.00	
10/30/18	70344	pac001	Pace Analytical Services, Inc.			2,193.00	
				4530-101-000	Water QM Staff-General		287.00
				4530-101-000	Water QM Staff-General		426.00
				4530-101-000	Water QM Staff-General		408.00
				4530-101-000	Water QM Staff-General		287.00
				4530-101-000	Water QM Staff-General		323.00
				4530-101-000	Water QM Staff-General		132.00
				4530-101-000	Water QM Staff-General		242.00
				4530-101-000	Water QM Staff-General		88.00
10/30/18	70345	pas002	Sage Passi			294.98	
				4040-101-000	Employee Benefits-General		118.00
				4370-101-000	Educational Program-General		5.98
				4020-101-000	Employee Expense-General		121.57
				4372-101-000	Events		49.43
10/30/18	70346	pet001	Peterson Companies, Inc.	4630-554-000	Construction Imp.-Willow Pond	144,487.21	
10/30/18	70347	pro003	Lyndsey R. Provos			279.80	
				4020-101-000	Employee Expenses-General		9.81
				4040-101-000	Employee Benefits-General		269.99
10/30/18	70348	ram002	Ramsey County			50,583.21	
				4682-529-000	Stewardship Grant Program		6,950.00
				4670-101-000	Natural Resources Project-General		43,633.21
10/30/18	70349	res001	Pitney Bowes - Reserve Account	4330-101-000	Postage-General	1,000.00	
10/30/18	70350	sel001	Select Synthetics	4343-101-000	Bldg./Site Maintenance	200.00	
10/30/18	70351	she003	Shepherd of the Hills Lutheran Church	4682-529-000	Stewardship Grant Program	450.00	
10/30/18	70352	sod001	Nichole Soderholm			90.90	
				4040-101-000	Employee Benefits-General		83.90
				4020-101-000	Employee Expenses-General		7.00
10/30/18	70353	spe001	Kari Sperry	4682-529-000	Stewardship Grant Program	1,115.00	
10/30/18	70354	stu001	Studio Lola	4371-101-000	Communications & Marketing	18.75	
10/30/18	70355	tes001	The Tessman Company	4670-101-000	Natural Resources Project-General	80.00	
10/30/18	70356	tim002	Timesaver Off-Site Secretarial, Inc.	4365-101-000	Committee/Board Meeting Expense	211.00	

Ramsey Washington Metro Watershed Dist.
Cash Disbursements Journal
For the Period From Oct 1, 2018 - Oct 31, 2018

Date	Check #	Vendor ID	Name	Account ID	Account Description	Amount	Check Detail
10/30/18	70357	usb002	U.S. Bancorp			7,398.86	
				4670-101-000	Natural Resources Project-General		9.61
				4820-101-000	Vehicle Maintenance		18.78
				4320-101-000	Office Supplies-General		9.96
				4670-101-000	Natural Resources Project-General		16.02
				4338-101-000	Dues & Publications-General		36.00
				4670-101-000	Natural Resources Project-General		18.96
				4320-101-000	Office Supplies-General		19.26
				4343-101-000	Building/Site Maintenance		248.00
				4325-101-000	IT/Website/Software		95.57
				4530-101-000	Water QM Staff-General		69.84
				4338-101-000	Dues & Publications-General		30.00
				4630-516-000	Construction Imp-Maint. & Rep.		50.34
				4365-101-000	Committee/Board Meeting Expense		46.40
				4365-101-000	Committee/Board Meeting Expense		18.88
				4040-101-000	Employee Benefits-General		6.50
				4320-101-000	Office Supplies-General		12.99
				4670-101-000	Natural Resources Project-General		71.90
				4040-101-000	Employee Benefits-General		135.85
				4350-101-000	Natural Resources Project-General		250.00
				4350-101-000	Dues & Publications-General		225.00
				4371-101-000	Communications & Marketing		245.00
				4040-101-000	Employee Benefits-General		84.95
				4040-101-000	Employee Benefits-General		3,649.83
				4670-101-000	Natural Resources Project-General		28.50
				4670-101-000	Natural Resources Project-General		197.47
				4350-101-000	Training & Education-General		181.38
				4371-101-000	Communications & Marketing		19.50
				4350-101-000	Natural Resources Project-General		300.00
				4350-101-000	Natural Resources Project-General		15.00
				4371-101-000	Communications & Marketing		80.00
				4530-101-000	Water QM Staff-General		998.04
				4350-101-000	Training & Education-General		209.33
10/30/18	70358	usb005	US Bank Equipment Finance	4335-101-000	Printing-General	285.67	
10/30/18	70359	van001	Vanguard Cleaning Systems of Minnesota	4341-101-000	Janitorial/Trash Service	550.00	
10/30/18	70360	voy001	US Bank Voyager Fleet Sys.	4830-101-000	Vehicle Expense-Fuel	323.82	
10/30/18	70361	was007	Washington Conservation District	4683-101-000	Outside Program Support	3,062.50	
10/30/18	70362	wil007	Patrick Williamson	4020-101-000	Employee Expense-General	10.90	
10/30/18	70363	win002	Windmill Design Incorporated	4371-101-000	Communications & Marketing	490.00	
						$470,186.80	

Summary of Professional Engineering Services During the Period
September 22, 2018 through October 19, 2018

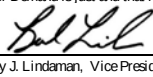
	Total Budget* (2018)	Total Fees to Date (2018)	Budget Balance (2018)	Fees During Period	District Accounting Code	Plan Implementation Task Number
Engineering Administration						
General Engineering Administration	$76,000.00	$58,491.07	$17,508.93	$5,572.23	**4121-101**	DW-13
RWMWD Health and Safety/ERTK Program	$2,000.00	$1,385.43	$614.57		**4697-101**	DW-13
Educational Program/Educational Forum Assistance	$20,000.00	$8,084.06	$11,915.94	$1,367.06	**4698-101**	DW-11
Engineering Review						
Engineering Review	$55,000.00	$46,910.56	$8,089.44	$4,012.50	**4123-101**	DW-13
Project Feasibility Studies						
Aquifer Recharge Site Search and Feasibility Study	$15,000.00	$0.00	$15,000.00		**4129-101**	DW-10
Owasso County Park Stormwater Master Plan and Detailed Design: Phase 1 and Phase 2	$75,000.00	$7,087.50	$67,912.50		**4129-101**	DW-5
Beltline Resiliency and Phalen Chain Water Level Management	$250,000.00	$32,401.23	$217,598.77	$3,227.80	**4129-101**	BELT-3
Beaver Lake Subwatershed Feasibility Study	$15,000.00	$11,482.35	$3,517.65	$8.50	**4129-101**	BL-1
Owasso Lake Subwatershed Feasibility Study	$15,000.00	$14,001.85	$998.15		**4129-101**	LO-3
Battle Creek Lake Subwatershed Feasibility Study	$15,000.00	$17,495.23	-$2,495.23	$1,120.00	**4129-101**	BCL-3
Create an Emergency Response Plan for Twin Lake	$15,000.00	$12,078.56	$2,921.44	$2,295.00	**4129-101**	DW-19
Create an Emergency Response Plan for Grass Lake	$15,000.00	$2,018.00	$12,982.00	$1,006.50	**4129-101**	DW-19
Create an Emergency Response Plan for Snail Lake	$15,000.00	$2,741.21	$12,258.79	$20.71	**4129-101**	DW-19
Create an Emergency Reponse Plan for Lake Owasso	$5,000.00	$5,224.50	-$224.50	$26.00	**4129-101**	LO-2
FEMA Flood Mapping Update	$100,000.00	$1,494.16	$98,505.84		**4129-101**	DW-9
West Vadnais Lake to East Vadnais Lake Water Quality Treatment	$24,400.00	$36,601.80	-$12,201.80		**4129-101**	DW-9
West Vadnais Lake to East Vadnais Lake Gravity Flow	$66,000.00	$17,772.25	$48,227.75	$6,452.75	**4129-101**	DW-9
Snail Lake to Sucker Lake Reverse Pumping Evaluation	$9,100.00	$9,715.50	-$615.50		**4129-101**	DW-9
Snail, Grass, and West Vadnais outlet permitting with the MnDNR	$10,000.00	$35,412.42	-$25,412.42	$441.00	**4129-101**	DW-9
Modeling of 95% Confidence Limit Atlas 14 District-wide (Climate Change Scenario); Flood Map Generation for Future Outreach	$129,500.00	$56,962.48	$72,537.52		**4129-101**	DW-9
GIS Maintenance						
GIS Maintenance	$5,000.00	$1,564.00	$3,436.00	$342.00	**4170-101**	DW-13
Monitoring Water Quality/Project Monitoring						
Lake Water Quality Monitoring (Misc QA/QC)	$10,000.00	$878.50	$9,121.50		**4520-101**	DW-2
Grass Lake WOMP station	$10,000.00	$0.00	$10,000.00		**4520-101**	DW-3
Battle Creek longitudinal monitoring of TSS	$15,000.00	$843.00	$14,157.00		**4520-101**	BC-3
Auto Lake monitoring systems (5)	$50,000.00	$12,769.58	$37,230.42	$167.00	**4520-101**	DW-18
Maplewood Mall Monitoring	$20,000.00	$18,088.95	$1,911.05	$2,943.98	**4520-101**	DW-12
Permit Processing, Inspection and Enforcement						
Permit Application Inspection and Enforcement	$15,000.00	$3,155.00	$11,845.00		**4122-101**	DW-7
Permit Application Review	$50,000.00	$32,067.00	$17,933.00	$2,544.50	**4124-101**	DW-7
Lake Studies/WRPPs/TMDL Reports						
2018 Grant Applications	$30,000.00	$1,270.50	$28,729.50		**4661-101**	--
Tanners Flood Response Tool Model Update	$3,000.00	$2,232.00	$768.00		**4661-101**	TaL-1
Evaluate water quality benefit of removing accumulated sediment from south end of Wakefield Lake to improve Lake Phalen water quality	$10,000.00	$15,140.17	-$5,140.17	$359.50	**4661-101**	WL-5
Research Projects						
New Technology Mini Case Studies (average 6 per year)	$12,000.00	$4,091.00	$7,909.00	$678.00	**4695-101**	DW-12
Kohlman Permeable Weir Test System - Implement Monitoring Plan	$15,000.00	$9,084.13	$5,915.87	$112.00	**4695-101**	DW-12
Project Operations						
2018 Tanners Alum Facility Monitoring	$15,000.00	$14,337.62	$662.38	$677.50	**4650-101**	TaL-3
Capital Improvements						
Wakefield Park/Frost Avenue Stormwater Project	$75,000.00	$48,724.93	$26,275.07	$4,398.00	**4128-553**	WL-1
Frost Kennard Spent Lime BMP	$24,000.00	$25,328.71	-$1,328.71		**4128-550**	WL-1
Commercial Sites Retrofit Projects 2018	$55,000.00	$21,070.43	$33,929.57	$765.00	**4128-518**	DW-6
School Sites Retrofit Projects 2018	$55,000.00	$20,858.23	$34,141.77	$935.00	**4128-518**	DW-6
Church Sites Retrofit Projects 2018	$55,000.00	$19,139.68	$35,860.32	$2,717.43	**4128-518**	DW-6
Roseville High School Campus Stormwater Retrofit (Bennett Lake Subwatershed)	$30,000.00	$12,179.00	$17,821.00	$4,353.00	**4128-518**	DW-6
BMP Incentive Fund: General BMP Design Assistance and Review	$30,000.00	$43,944.88	-$13,944.88	$2,470.00	**4682-529**	DW-6
BMP Incentive Fund: Faith-Based Organizations	$20,000.00	$3,074.93	$16,925.07		**4128-528**	DW-6
Willow Pond CMAC Implementation	$100,000.00	$124,586.11	-$24,586.11	$8,173.09	**4128-554**	BeL-4
Grass Lake Berm Construction Administration	$75,000.00	$58,013.37	$16,986.63	$2,548.43	**4128-520**	GrL-1
Phase 1 implementation from Owasso Basin Improvements Feasibility Study	$75,000.00	$9,420.00	$65,580.00		**4128-520**	GC-3
District Office Solar Energy Retrofit	$20,000.00	$12,899.00	$7,101.00		**4128-519**	DW-13
CIP Project Repair & Maintenance						
2017-2018 Beltline Repairs Construction Services	$360,000.00	$448,073.07	-$88,073.07	$1,800.50	**4128-549**	BELT-2
Routine CIP Inspection and Unplanned Maintenance Identification	$75,000.00	$36,123.68	$38,876.32	$14,939.36	**4128-516**	DW-5
2018 CIP Maintenance and Repairs	$90,000.00	$87,913.19	$2,086.81	$4,080.89	**4128-516**	DW-5
2019 CIP Maintenance and Repairs	$150,000.00	$0.00	$150,000.00		**4128-516**	DW-5

*For projects carried over from previous years, the total budget reflects the total project budget, and not just the 2018 portion.

Subtotal **$80,555.23**

TOTAL PAYABLE FOR PERIOD 9/22/2018 - 10/19/2018 **$80,555.23**

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

Capital Improvement Project Maintenance/Repairs 2018
Progress Payment Number 5_Final

1.0	Total Completed Through This Period:		$258,352.00	
2.0	Total Completed Previously Completed:		$199,802.00	
3.0	Total Completed This Period:			$58,550.00
4.0	Amount Previously Retained:		$13,891.00	
5.0	Amount Retained This Period (See Note 1):			$0.00
6.0	Total Amount Retained (See Note 2):		$13,891.00	
7.0	Retainage Released Through This Period:			$13,891.00
8.0	Total Retainage Remaining:		$0.00	
9.0	Amounts Previously Paid:	$185,911.00		
10.0	Amount Due This Estimate:			$72,441.00

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 ($277,822.00)

SUBMITTED BY:

Name: Jason Fitzgerald Date: _____

Title: President

Contractor: Fitzgerald Excavating & Trucking, Inc.

Signature: _____

RECOMMENDED BY:

Name: Brad Lindaman Date: _____

Title: District Engineer

Engineer: Barr Engineering Company

Signature: _____

APPROVED BY:

Name: Marj Ebensteiner Date: _____

Title: President

Owner: Ramsey-Washington Metro Watershed District

Signature: _____

Capital Improvement Project Maintenance/Repairs 2018
Ramsey-Washington Metro Watershed District
Summary of Work Completed Through October 23, 2018 for Progress Payment Number 5_Final

						(1) Total Completed Through This Period		(2) Total Completed Previous Period		(3) Total Completed This Period	
1.04 Item	Description	Unit	Estimated Quantity	Unit Price	Extension	Quantity	Amount	Quantity	Amount	Quantity	Amount
A	Mobilization/Demobilization	L.S.	1	20,000.00	20,000.00	1	$20,000.00	0.65	$13,000.00	0.35	$7,000.00
Site 1 – Lower Afton Road, St. Paul											
B	Sediment/Muck Cleanout of Drainageway (Landfill Disposal)	L.S.	1	4,000.00	4,000.00	1	$4,000.00	1	$4,000.00	0	$0.00
B	Site Restoration (Seeding and Erosion Control Blanket)	S.Y..	220	4.00	880.00	0	$0.00	0	$0.00	0	$0.00
Site 2 – Tanners Boat Ramp, Oakdale											
B	Sediment/Muck Cleanout from Pond (Landfill Disposal)	L.S.	1	8,000.00	8,000.00	1	$8,000.00	1	$8,000.00	0	$0.00
D	Construction of Sedimentation Barrier (Mn/DOT Super Duty Silt Fence 3886.1)	L.F.	80	15.00	1,200.00	80	$1,200.00	80	$1,200.00	0	$0.00
C	Site Restoration (Seeding and Erosion Control Blanket)	S.Y.	150	4.00	600.00	100	$400.00	100	$400.00	0	$0.00
Site 3 – Tanners Wetland Weir Maintenance, Oakdale											
E	Permeable Weir Maintenance (Reopening Drainage Slots and Remove all Brush and Debris)	L.F.	580	10.00	5,800.00	580	$5,800.00	580	$5,800.00	0	$0.00
Site 4 – 5TH Street Wetland, Oakdale											
F	Excavation/Dredging and Removal of Sediment from Treatment Basin (Disposal on Site)	L.S.	1	20,000.00	20,000.00	1	$20,000.00	1	$20,000.00	0	$0.00
E	Permeable Weir Maintenance (Reopening Drainage Slots and Remove all Brush and Debris)	L.F.	65	10.00	650.00	65	$650.00	65	$650.00	0	$0.00
C	Site Restoration (Seeding and Erosion Control Blanket)	S.Y.	210	4.00	840.00	500	$2,000.00	500	$2,000.00	0	$0.00
Site 5 – Hills & Dales/County Road B, Maplewood											
G	Pipe and Structures Cleanout Sediment/Muck Removal (Disposal at Landfill)	L.S.	1	4,000.00	4,000.00	1	$4,000.00	1	$4,000.00	0	$0.00
C	Site Access Restoration (Seeding and Erosion Control Blanket, Repair Wood Chip Path)	S.Y	50	4.00	200.00	0	$0.00	0	$0.00	0	$0.00
Site 6 – Tamarac Swamp PFS Basins Paver Cleaning and Sweeping, Woodbury											
H	Sediment Log (6-Inch Diameter)	L.F.	60	4.00	240.00	202	$808.00	0	$0.00	202	$808.00
B	Sediment/Muck Cleanout (Tier 2 & 3 Landfill Disposal)	L.S.	1	2,000.00	2,000.00	1	$2,000.00	1	$2,000.00	0	$0.00
I	Paver Sweeping	S.Y.	1400	2.00	2,800.00	1400	$2,800.00	1400	$2,800.00	0	$0.00
C	Site Restoration (Native Seeding and Erosion Control Blanket)	S.Y.	100	4.00	400.00	45	$180.00	45	$180.00	0	$0.00
Site 7 – Gervais Creek, Little Canada											
J	Removal of Trees, Brush, Deadfalls, and Debris (Disposal Off Site)	L.S.	1	5,000.00	5,000.00	1	$5,000.00	1	$5,000.00	0	$0.00
B	Sediment/Muck Cleanout (Disposal at Landfill)	L.S.	1	5,000.00	5,000.00	1	$5,000.00	1	$5,000.00	0	$0.00
C	Site and Access Restoration (Seeding and Erosion Control Blanket)	S.Y.	650	4.00	2,600.00	207	$828.00	207	$828.00	0	$0.00
Site 8 – Owasso Basin, Little Canada											
B	Sediment/Muck Cleanout (Disposal at Landfill)	L.S.	1	6,000.00	6,000.00	1	$6,000.00	1	$6,000.00	0	$0.00
L	Excavate and Regrade Channel Inlet Basin (Landfill Disposal)	L.S.	1	8,000.00	8,000.00	1	$8,000.00	1	$8,000.00	0	$0.00
M	Riprap Channel Basin and Inlet Pipe, MnDOT Class 4	Ton	14	50.00	700.00	14	$700.00	14	$700.00	0	$0.00
C	Site and Access Restoration (Seeding and Erosion Control Blanket)	S.Y.	300	4.00	1,200.00	118	$472.00	118	$472.00	0	$0.00
Site 9 – Johnson Pond, Maplewood											
N	Remove and Replace Existing Guardrail for Access	L.S.	1	500.00	500.00	0	$0.00	0	$0.00	0	$0.00
H	Cleanout Debris, Sediment/Muck From Structures and Pipe (Disposal at Landfill)	L.S.	1	4,000.00	4,000.00	1	$4,000.00	1	$4,000.00	0	$0.00
C	Site Access Restoration (Seeding and Erosion Control Blanket)	S.Y.	244	4.00	976.00	0	$0.00	0	$0.00	0	$0.00
Site 10 – Maplewood Mall, Maplewood											
O	Repair Catch Basin and Sinkhole	L.S.	1	2,000.00	2,000.00	1	$2,000.00	1	$2,000.00	0	$0.00

Capital Improvement Project Maintenance/Repairs 2018
Ramsey-Washington Metro Watershed District
Summary of Work Completed Through October 23, 2018 for Progress Payment Number 5_Final

						(1) Total Completed Through This Period		(2) Total Completed Previous Period		(3) Total Completed This Period	
1.04 Item	**Description**	**Unit**	**Estimated Quantity**	**Unit Price**	**Extension**	**Quantity**	**Amount**	**Quantity**	**Amount**	**Quantity**	**Amount**
Site 11 – Battle Creek Lower Ravine Park, St. Paul											
H	Cleanout/Remove Debris from Pipe and Structures	L.S.	1	6,000.00	6,000.00	1	$6,000.00	1	$6,000.00	0	$0.00
P	Televise and Inspect Storm Sewer Pipe (12", 15", 18" RCP)	L.F.	768	2.00	1,536.00	768	$1,536.00	768	$1,536.00	0	$0.00
Q	Repair Manhole and Pipe with Cured-In-Place Pipe Liner	L.S.	1	4,000.00	4,000.00	~~0~~	$0.00	0	$0.00	0	$0.00
R	Remove and Replace One (1) Trash Rack and Install Fasteners on The New Trash Rack and Two (2) Existing Trash Racks	L.S.	1	3,000.00	3,000.00	1	$3,000.00	0	$0.00	1	$3,000.00
S	MnDOT Common Borrow 2105.1A.6 "Select Grading Material"	Ton	140	15.00	2,100.00	140	$2,100.00	0	$0.00	140	$2,100.00
T	MnDOT 3149.2H Coarse Filter Aggregate	Ton	140	50.00	7,000.00	140	$7,000.00	0	$0.00	140	$7,000.00
U	Topsoil Borrow	C.Y.	50	15.00	750.00	50	$750.00	0	$0.00	50	$750.00
V	Futerra R45 HP Turf Reinforcement Mat	S.Y.	422	10.00	4,220.00	422	$4,220.00	0	$0.00	422	$4,220.00
K	Site Restoration (Seeding and HP-FGM Hydro Mulch)	S.Y.	1125	4.00	4,500.00	628	$2,512.00	0	$0.00	628	$2,512.00
Site 12 – Grass Lake, Shoreview											
B	(Site 12A) – Sediment/Muck and Vegetation Cleanout, Grass Lake Area (Unregulated Fill	L.S.	1	18,000.00	18,000.00	1	$18,000.00	1	$18,000.00	0	$0.00
B	(Site 12B) - Sediment/Muck and Vegetation Cleanout, Wetland Triangle Area (Unregulated	L.S.	1	18,000.00	18,000.00	1	$18,000.00	1	$18,000.00	0	$0.00
B	(Site 12C) - Sediment/Muck and Vegetation Cleanout, West Vadnais Lake Channel	L.S.	1	18,000.00	18,000.00	1	$18,000.00	0	$0.00	1	$18,000.00
X	Remove and Replace Bituminous Trail	S.Y.	26	50.00	1,300.00	50	$2,500.00	0	$0.00	50	$2,500.00
X	Remove and Replace Bituminous Roadway	S.Y.	80	88.00	7,040.00	102	$8,976.00	102	$8,976.00	0	$0.00
Y	Remove Existing 12" CPEP	L.F.	60	15.00	900.00	120	$1,800.00	60	$900.00	60	$900.00
Y	Remove existing 15" RC Pipe Apron	Each	1	200.00	200.00	1	$200.00	0	$0.00	1	$200.00
Z	RC Transition Pipe Reducer	Each	2	1,500.00	3,000.00	2	$3,000.00	0	$0.00	2	$3,000.00
AA	24" RC Pipe Apron and Trash Rack	Each	1	3,500.00	3,500.00	1	$3,500.00	0	$0.00	1	$3,500.00
AB	44" Span RC Pipe Arch	L.F.	312	90.00	28,080.00	144	$12,960.00	144	$12,960.00	0	$0.00
AC	44" Span RC Pipe Arch Apron	Each	6	2,000.00	12,000.00	4	$8,000.00	4	$8,000.00	0	$0.00
M	Random Riprap Class III Fieldstone with Type 4 Filter Fabric	Ton	159	90.00	14,310.00	34	$3,060.00	0	$0.00	34	$3,060.00
C	Site restoration (Seeding and Erosion Control Blanket)	S.Y.	3200	4.00	12,800.00	7350	$29,400.00	7350	$29,400.00	0	$0.00
				Total of Extensions =	**$ 277,822.00**		**$258,352.00**		**$199,802.00**		**$58,550.00**
					GRAND TOTALS		**$258,352.00**		**$199,802.00**		**$58,550.00**

Grass Lake Berm Raise
Progress Payment Number 2_Final

1.0	Total Completed Through This Period:	$114,193.60		
2.0	Total Completed Previously Completed:		$65,263.60	
3.0	Total Completed This Period:			$48,930.00
4.0	Amount Previously Retained:		$5,373.00	
5.0	Amount Retained This Period (See Note 1):			$0.00
6.0	Total Amount Retained (See Note 2):		$5,373.00	
7.0	Retainage Released Through This Period:			$5,373.00
8.0	Total Retainage Remaining:		$0.00	
9.0	Amounts Previously Paid:	$59,890.60		
10.0	Amount Due This Estimate:			$54,303.00

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 ($107,479.00)

SUBMITTED BY:

Name: Jason Fitzgerald Date: _____

Title: President

Contractor: Fitzgerald Excavating & Trucking, Inc.

Signature: _____

RECOMMENDED BY:

Name: Brad Lindaman Date: _____

Title: District Engineer

Engineer: Barr Engineering Company

Signature: _____

APPROVED BY:

Name: Marj Ebensteiner Date: _____

Title: President

Owner: Ramsey-Washington Metro Watershed District

Signature: _____

Grass Lake Berm Raise
Ramsey-Washington Metro Watershed District
Summary of Work Completed Through October 23, 2018 for Progress Payment Number 2_Final

						(1) Total Completed Through This Period		(2) Total Completed Previous Period		(3) Total Completed This Period	
1.04 Item	**Description**	**Unit**	**Estimated Quantity**	**Unit Price**	**Extension**	**Quantity**	**Amount**	**Quantity**	**Amount**	**Quantity**	**Amount**
A	Mobilization/Demobilization	L.S.	1	15,000.00	15,000.00	1	$15,000.00	0.5	$7,500.00	0.5	$7,500.00
B	Topsoil Stripping and Stockpiling	C.Y.	810	5.00	4,050.00	810	$4,050.00	810	$4,050.00	0	$0.00
C	Bituminous Removal	S.Y.	1,475	3.00	4,425.00	1313	$3,939.00	1313	$3,939.00	0	$0.00
D	Sandbag Removal	L.S.	1	3,000.00	3,000.00	1	$3,000.00	1	$3,000.00	0	$0.00
E	Culvert Removal – 12” Corrugated Metal Pipe (CMP)	L.F.	50	6.00	300.00	50	$300.00	50	$300.00	0	$0.00
F	Culvert Removal - Backfill (clay)	C.Y.	17	12.00	204.00	17	$204.00	17	$204.00	0	$0.00
G	Clay Embankment	C.Y.	700	12.00	8,400.00	700	$8,400.00	700	$8,400.00	0	$0.00
H	Sand Embankment	C.Y.	970	16.00	15,520.00	970	$15,520.00	970	$15,520.00	0	$0.00
I	Aggregate Base	C.Y.	245	20.00	4,900.00	245	$4,900.00	0	$0.00	245	$4,900.00
J	Asphalt Pavement	TON	226	85.00	19,210.00	304	$25,840.00	0	$0.00	304	$25,840.00
K	Topsoil Placement	C.Y.	685	4.00	2,740.00	685	$2,740.00	0	$0.00	685	$2,740.00
L	Seeding and Mulching	AC	1	2,000.00	2,000.00	1	$2,000.00	0	$0.00	1	$2,000.00
M	Turf Reinforced Mat (TRM)	S.Y.	580	8.00	4,640.00	580	$4,640.00	580	$4,640.00	0	$0.00
N	Emergency Overflow (EOF) Common Excavation	C.Y.	595	7.00	4,165.00	595	$4,165.00	595	$4,165.00	0	$0.00
O	28” Span RC Pipe Arch	L.F.	72	50.00	3,600.00	72	$3,600.00	72	$3,600.00	0	$0.00
P	28” Span RC Pipe Arch Apron	EA	2	700.00	1,400.00	2	$1,400.00	2	$1,400.00	0	$0.00
Q	Silt Fence	L.F.	2,625	1.80	4,725.00	1692	$3,045.60	1692	$3,045.60	0	$0.00
R	Inlet Protection - Filter Sack	EAC	4	150.00	600.00	~~0~~	$0.00	0	$0.00	0	$0.00
S	Rock Construction Entrance	EAC	2	500.00	1,000.00	~~0~~	$0.00	0	$0.00	0	$0.00
T	Control of Water	L.S.	1	3,000.00	3,000.00	1	$3,000.00	1	$3,000.00	0	$0.00
U	Traffic Control	L.S.	1	5,000.00	5,000.00	0.5	$2,500.00	0.5	$2,500.00	0	$0.00
				Total of Extensions =	**$ 107,879.00**		**$108,243.60**		**$65,263.60**		**$42,980.00**
Change Orders											
C.O.1.A	Contract Time, Substantial Completion Revised to be April 30, 2018										
C.O.2.A	Contract Time, Substantial Completion Revised to be May 31, 2018										
C.O.3.A	Contract Time, Final Completion Revised to be July 6, 2018										
C.O.4.A	Wetland Replacement [18-hrs x $225 ($75 laborer, $150 equip/operator) = $4050]	L.S.	1	4,050.00	4,050.00	1	$4,050.00	0	$0.00	1	$4,050.00
C.O.4.B	Gramsie Road Subgrade Excavation	L.S.	1	700.00	700.00	1	$700.00	0	$0.00	1	$700.00
C.O.4.C	Gramsie Road Subgrade Stabilization Rock	L.S.	1	1,200.00	1,200.00	1	$1,200.00	0	$0.00	1	$1,200.00
					GRAND TOTALS		**$114,193.60**		**$65,263.60**		**$48,930.00**

CMAC FILTRATION BMP AT WILLOW POND
Progress Payment Number 2

1.0	Total Completed Through This Period:	$214,076.55		
2.0	Total Completed Previously Completed:		$65,428.35	
3.0	Total Completed This Period:			$148,648.20
4.0	Amount Previously Retained:		$6,542.84	
5.0	Amount Retained This Period (See Note 1):			$4,160.99
6.0	Total Amount Retained (See Note 2):		$10,703.83	
7.0	Retainage Released Through This Period:			$0.00
8.0	Total Retainage Remaining:		$10,703.83	
9.0	Amounts Previously Paid:	$58,885.51		
10.0	Amount Due This Estimate:			$144,487.21

Note 1: At rate of 5%. Half of last month's retainage at 10% was released this payment.

Note 2: Maximum amount is 5% of current Contract Price ($279,049.00)

SUBMITTED BY:
Name: Jake Sikora Date: 10/29/2018
Title: Project Manager
Contractor: Peterson Companies, Inc.
Signature:

RECOMMENDED BY:
Name: Brad Lindaman Date: 10/30/2018
Title: District Engineer
Engineer: Barr Engineering Company
Signature:

APPROVED BY:
Name: Marj Ebensteiner Date:
Title: President
Owner: Ramsey-Washington Metro Watershed District

Signature:

CMAC FILTRATION BMP AT WILLOW POND
RAMSEY-WASHINGTON METRO WATERSHED DISTRICT
Summary of Work Completed Through October 23, 2018 for Progress Payment Number 2

						(1) Total Completed Through This Period		(2) Total Completed Previous Period		(3) Total Completed This Period	
Item	Description	Unit	Estimated Quantity	Unit Price	Extension	Quantity	Amount	Quantity	Amount	Quantity	Amount
A	Mobilization/Demobilization	L.S.	1	37,080.09	37,080.09	0.90	$33,492.08	0.3798952	$14,086.55	0.523341	$19,405.53
B	Erosion Control Construction Entrance	Each	1	2,500.00	2,500.00	1	$2,500.00	1	$2,500.00	0	$0.00
C	Erosion Control Silt Fence	L.F.	884	4.00	3,536.00	640	$2,560.00	640	$2,560.00	0	$0.00
D	Double Row Floatation Silt Curtain	L.F.	164	11.74	1,925.36	164	$1,925.36	0	$0.00	164	$1,925.36
E	Inlet Protection	Each	1	125.00	125.00	1	$125.00	0	$0.00	1	$125.00
F	Erosion Control Blanket	S.Y.	90	3.50	315.00	0	$0.00	0	$0.00	0	$0.00
G	Traffic Control	L.S.	1	2,000.00	2,000.00	1	$2,000.00	1	$2,000.00	0	$0.00
H	Control of Water	L.S.	1	23,666.12	23,666.12	1	$23,666.12	0	$0.00	1	$23,666.12
I	Tree Removal (8" diameter or greater)	Each	6	375.81	2,254.86	21	$7,892.01	21	$7,892.01	0	$0.00
J	Clear and Grub	S.Y.	1,003	6.17	6,188.51	1,003	$6,188.51	1003	$6,188.51	0	$0.00
K	Remove & Salvage Topsoil (P)	S.Y.	673	4.14	2,786.22	673	$2,786.22	673	$2,786.22	0	$0.00
L	Remove and Dispose of 12" RCP	L.F.	9	48.67	438.03	9	$438.03	0	$0.00	9	$438.03
M	Sawcut, Remove and Dispose of Asphalt Trail	S.Y.	40	8.65	346.00	40	$346.00	0	$0.00	40	$346.00
N	60 inch Precast Manhole with Access Door	Each	1	10,041.00	10,041.00	1	$10,041.00	0	$0.00	1	$10,041.00
O	Precast Concrete Weir and FRP Stop Log	L.S.	1	8,291.00	8,291.00	0	$0.00	0	$0.00	0	$0.00
P	48 inch Precast Manholes with Casting and Frame (Neenah R-1537)	Each	2	4,570.50	9,141.00	2	$9,141.00	0	$0.00	2	$9,141.00
Q	48-inch Precast Manhole with Access Door	Each	1	6,386.00	6,386.00	1	$6,386.00	0	$0.00	1	$6,386.00
R	12 inch Corrugated Polyethylene Pipe (CPEP) Dual-Wall (Smooth Interior)	L.F.	176	32.74	5,762.24	179	$5,860.46	0	$0.00	179	$5,860.46
S	12" CMP FES	Each	1	760.00	760.00	2	$1,520.00	0	$0.00	2	$1,520.00
T	Trash Guard for 12" CMP FES	Each	1	66.00	66.00	1	$66.00	0	$0.00	1	$66.00
U	12 inch Ductile Iron Pipe (DIP)	L.F.	71	73.03	5,185.13	75	$5,477.25	0	$0.00	75	$5,477.25
V	12 inch Cast Iron Plug Valve with Epoxy Lining & Coating w/Box ASM	Each	1	4,896.00	4,896.00	0	$0.00	0	$0.00	0	$0.00
W	Install 12 inch Butterfly Valve and Electrical Actuator (provided by others)	L.S.	1	1,576.00	1,576.00	0	$0.00	0	$0.00	0	$0.00
X	Existing Pipe Connection	Each	1	1,314.00	1,314.00	1	$1,314.00	0	$0.00	1	$1,314.00
Y	Stormwater Filter Piping and Fittings, All Complete	L.S.	1	11,011.00	11,011.00	1	$11,011.00	0	$0.00	1	$11,011.00
Z	Insulate Existing Sanitary Sewer	Each	1	599.00	599.00	1	$599.00	0	$0.00	1	$599.00
AA	Common Excavation for Filter (P)	C.Y.	376	64.72	24,334.72	376	$24,334.72	376	$24,334.72	0	$0.00
AB	Off-site Disposal of Excavated Material (P)	C.Y.	284	16.27	4,620.68	284	$4,620.68	142	$2,310.34	142	$2,310.34
AC	Geosynthetic Clay Liner (P)	S.Y.	662	43.12	28,545.44	662	$28,545.44	0	$0.00	662	$28,545.44
AD	Drain Filter	Ton	93	60.18	5,596.74	95	$5,717.10	0	$0.00	95	$5,717.10
AE	Plastic Netting	S.Y.	275	3.11	855.25	275	$855.25	0	$0.00	275	$855.25
AF	Spent Lime	L.S.	1	7,206.00	7,206.00	1	$7,206.00	0	$0.00	1	$7,206.00
AG	Class III Riprap	Ton	5	302.99	1,514.95	18.5	$5,605.32	0	$0.00	18.5	$5,605.32
AH	Asphalt Trail Paving	S.Y.	40	78.00	3,120.00	0	$0.00	0	$0.00	0	$0.00
AI	Electrical installation	L.S.	1	12,500.00	12,500.00	0	$0.00	0	$0.00	0	$0.00
AJ	Instrumentation Installation and Controls	L.S.	1	5,144.00	5,144.00	0	$0.00	0	$0.00	0	$0.00
AK	Helical Piles with Void Filling Material	L.S.	1	8,127.00	8,127.00	0	$0.00	0	$0.00	0	$0.00
AL	Import Common Topsoil Borrow	C.Y.	45	23.94	1,077.30	0	$0.00	0	$0.00	0	$0.00
AM	Shoreline Seed Mix (Furnish & Install)	S.Y.	41	19.00	779.00	0	$0.00	0	$0.00	0	$0.00
AN	Woodland Seed Mix (Furnish & Install)	S.Y.	1,355	3.00	4,065.00	0	$0.00	0	$0.00	0	$0.00
AO	Tree with Trunk Protection, #20 Container	Each	4	585.00	2,340.00	0	$0.00	0	$0.00	0	$0.00

CMAC FILTRATION BMP AT WILLOW POND
RAMSEY-WASHINGTON METRO WATERSHED DISTRICT
Summary of Work Completed Through October 23, 2018 for Progress Payment Number 2

						(1) Total Completed Through This Period		(2) Total Completed Previous Period		(3) Total Completed This Period	
Item	**Description**	**Unit**	**Estimated Quantity**	**Unit Price**	**Extension**	**Quantity**	**Amount**	**Quantity**	**Amount**	**Quantity**	**Amount**
AP	#2 Container Shrub	Each	30	65.00	1,950.00	0	$0.00	0	$0.00	0	$0.00
AQ	Shrub Protection Fencing	LF	320	5.40	1,728.00	0	$0.00	0	$0.00	0	$0.00
AR	12 inch Backflow Preventer	Each	1	2,138.00	2,138.00	0	$0.00	0	$0.00	0	$0.00
AS	Sedimentation Log	LF	60	5.00	300.00	154	$770.00	154	$770.00	0	$0.00
AT	Trail Protection	L.S.	1	13,830.36	13,830.36	0	$0.00	0	$0.00	0	$0.00
AU	15” CMP FES	Each	1	1,087.00	1,087.00	1	$1,087.00	0	$0.00	1	$1,087.00
			TOTAL BASE BID		**279,049.00**	**TOTAL EXT. =**	**$214,076.55**		**$65,428.35**		**$148,648.20**

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

October 24, 2018
File No: 9M

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

	Balance
General Account	$2,065.47
Grass Lake Emergency Project	$160.00
2018 CIP	$360.00
Willow Pond	$800.00
	$3,385.47

****

Permit Program

****

Permit Application Coversheet

Date November 07, 2018

Project Name McKnight Road Development **Project Number** 18-27

Applicant Name Lauren Grouws, M/I Homes of Minneapolis/St. Paul, LLC

Type of Development Residential

Property Description

This property is located at McKnight Road North and the Gateway Trail, south of Highway 36 in the City of North St. Paul. The applicant is proposing to construct a 100-unit townhome subdivision and 10 single family homes. The total site area is 10 acres. Volume reduction and rate control will be provided through construction of a filtration basin and infiltration basin. Filtration is being proposed on the west side of the site due to poor soils. Pretreatment will include hooded sump structures.

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 this 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**

#18-27 McKnight Road Development

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

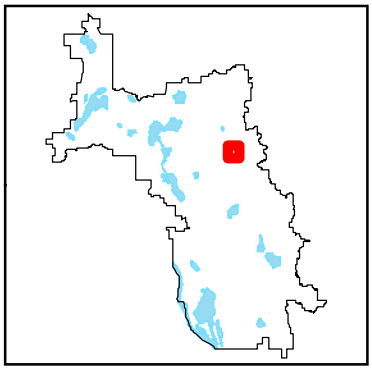
- RWMWD Boundary
- Watershed Org
- Flow Arrows
- Major Flow Arrows
- Subwatersheds
- Creeks
- Permits
- Ramsey Co Parcels
- City Boundaries

Highlighted Areas Represent Active Permit

0 250 500
Feet

0 0.05 0.1
Miles

N



18-27

Special Provisions

1. The applicant shall submit a revised model:
   A. Ensure all subwatersheds are included including impervious area southeast of watershed 300A.
   B. Provide calculations for the time of concentration values used.
   C. Provide a .dwg file to verify impervious area.

2. The applicant shall submit the escrow fee of $50,261.

3. The applicant shall submit an executed maintenance agreement for the proposed stormwater facilities that includes a statement that the owner must notify District staff if the infiltration basin's gate valve is opened.

4. The applicant shall provide contact information for the trained erosion control coordinator responsible for implementing the Stormwater Pollution Prevention Plan (SWPPP).

5. The applicant shall submit a copy of the approved Minnesota Pollution Control Agency's NPDES Construction Permit.

6. The applicant shall submit a final copy of the signed construction plans.

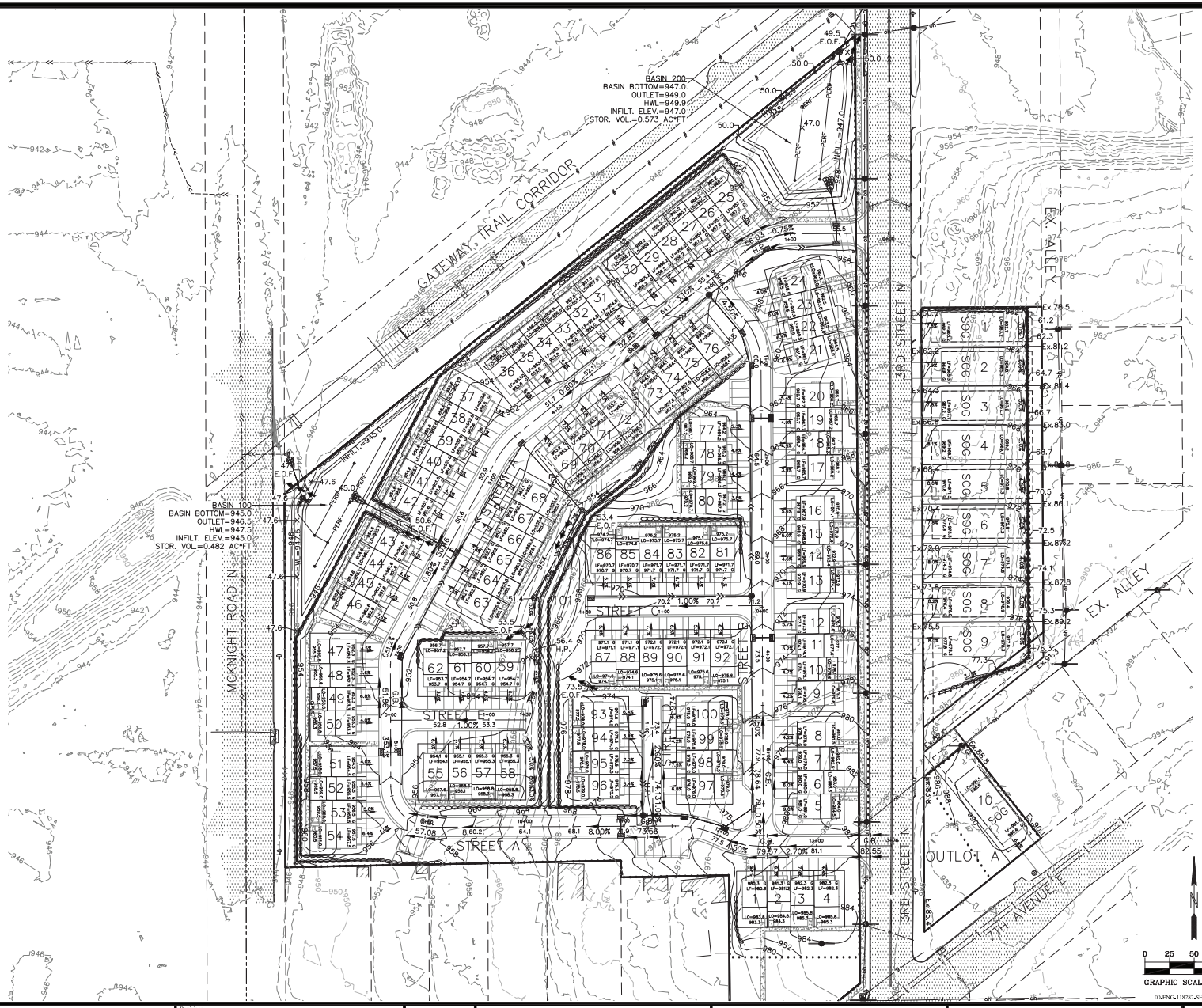
TOWN HOME SETBACKS

FRONT	23'
SIDE	15'
CORNER @ ROW	15'
REAR	15'
MCKNIGHT ROAD N	30'
3RD STREET N	20'
LOW OPENING	2' + HWL 1' + EOF
LOW FLOOR	2' + HWL 2' + EST. GROUND HWL

SINGLE FAMILY SETBACKS

FRONT	20'
SIDE	5'
REAR	30'
LOW OPENING	2' + HWL 1' + EOF
LOW FLOOR	2' + HWL 2' + EST. GROUND HWL

NOTES:
1. SEE SHEET 11 FOR RETAINING WALL PLAN
2. SEE SHEET 18 FOR BASIN DETAILS FOR BASIN 100
3. SEE SHEET 19 FOR BASIN DETAILS FOR BASIN 200
4. SEE SHEET 20 FOR OUTLET CONTROL STRUCTURE DETAILS



PIONEER engineering
CIVIL ENGINEERS LAND PLANNERS LAND SURVEYORS LANDSCAPE ARCHITECTS
2422 Enterprise Drive
Mendota Heights, MN 55120
(651) 681-1914
Fax: 681-9488
www.pioneereng.com

I hereby certify that this plan 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

Name: Brian N. Molinaro
Reg. No. _____ Date: 09-10-2018

Revisions
1. 10-9-2018 RWMWD Comments

Date 09-10-2018
Designed NAP
Drawn NCR

PRELIMINARY OVERALL GRADING PLAN

M/I HOMES
5354 PARKDALE DRIVE, SUITE 100
ST. LOUIS PARK, MINNESOTA 55416

McKNIGHT ROAD PROPERTY
NORTH SAINT PAUL, MN

10 OF 20

006-ENG-118282-SHEET-GRAD-OVR

RAMSEY-WASHINGTON
METRO WATERSHED DISTRICT

MEMORANDUM

Date: November 7, 2018

To: Board of Managers and Staff

From: Nicole Soderholm, Permit Coordinator

Subject: October Enforcement Action Report

During October 2018:

Number of Violations:	**28**
Install/Maintain Inlet Protection	5
Install/Maintain Perimeter Control	8
Install/Maintain Construction Entrance	4
Sweep Streets	1
Stabilize Exposed Soils	4
Contain Liquid/Solid Wastes	1
Remove Discharged Sediment	1
Protect/Maintain Permanent BMPs	4

Ongoing Activities:

Erosion/sediment control inspections and enforcement, permitting assistance to private developers and public entities, permit review with Barr Engineering, miscellaneous inquiries, WCA site visits and administration, collaboration with CRWD for proposed permit rule changes, permit close-outs, MN Water Resources conference

Project Updates:

Permit #17-31 Met Council Beltline Sanitary Sewer Rehab, St. Paul

Work began this fall on the Met Council's Beltline sanitary sewer project near Highway 61 and Warner Road in the City of St. Paul. District staff completed an inspection of the erosion and sediment control on October 24th. The site was compliant, but temporary soil stabilization and silt fence repair were requested. The applicant has submitted a dewatering permit to the DNR to allow for some pipe work. District staff provided comments to the application with concerns about movement or settling of the District's Betline storm interceptor due to the

proximity of the proposed dewatering. Barr staff are working with the applicant and DNR to collect additional information on the application to ensure there will be no adverse impacts to the District's Beltline during the project.

Permit #14-20 Roseville Garden Station

City staff were contacted anonymously to investigate an illicit discharge of sediment-laden water from the Roseville Garden Station site on October 16th. Staff confirmed the release of turbid water into the city's storm sewer and downstream wetland. The contractor was notified to discontinue pumping and was required to submit a plan to mitigate downstream impacts. City staff met with the contractor onsite on October 26th to go over the investigation completed by Braun Intertec. It was determined from shallow borings that there was no discernible sediment accumulation at the wetland outfall. City staff agreed that an attempt to remove sediment at the outfall would cause more disturbance than has already occurred. The contractor was issued a Notice of Violation for the incident, and District staff will continue to complete regular inspections of the site and monitor future dewatering activities.

Permit #17-21 Maplewood Retail Development

An inspection of the Maplewood retail site on White Bear Avenue was completed on October 30th. Violations were incurred for lack of inlet protection and perimeter control that was in disrepair. A follow-up inspection will be completed in early November to check on progress.

Permit #18-10 Maplewood 2018 SIP

The City of Maplewood's 2018 street reconstruction project near Minnehaha and Century Ave is still underway. Phase 2 of the project will be completed next year. The District was notified of sediment tracking from the site on October 11th. Staff visited the site and met with the contractor on October 12th. Erosion and sediment control practices on the site were in disrepair, and a list of corrective actions was discussed with the contractor and city staff. A follow-up inspection was completed on October 18th. The site was back in compliance, but soil stabilization remained an item of concern as the contractor was waiting on sod delivery. Areas that will not be permanently restored before the winter must be temporarily stabilized. Staff provided a full inspection report of the site and restoration punchlist on October 19th.

Permit #18-25 Windwood Passage Park improvements, Woodbury

The City of Woodbury's park project off Wellington Drive is underway. Staff completed an initial site inspection and met with the contractor on October 2nd. The site has been in compliance throughout the month of October, but regular sweeping has been needed in the parking lot due to equipment traffic.

Permits Closed in October 2018:

15-06 White Bear Lake High School Synthetic Turf Construction
17-16 Woodbury Middle School Improvements
17-17 Battle Creek Road Improvements, St. Paul
17-19 Midland Terrace Garages, Shoreview
17-27 JB Land Office and Warehouse, Vadnais Heights (Withdrawn)

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Stewardship Grant Program

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BMP Incentive Application Summary

Project Name: Kosobayashi **Application Number:** 18-26 CS

Board Meeting Date: 11/7/2018

Applicant Name: Helen & Kent Kosobayashi

Residential ☑ **Commercial/Government** ☐

Project Overview:

This project is located off County Rd C and Western Ave in Roseville. The property is on a hill that drains to an adjacent pond and is overgrown with buckthorn and other invasives causing soil erosion into the pond. The homeowner plans to remove the invasive species and plant native species to stabilize the hill. They are also interested in installing two rain gardens to capture roof and driveway runoff.
The native habitat restoration portion of this project is eligible for 50% funding and the rain gardens are eligible for 75% funding. Typically residential projects are capped at $15,000 with the option to apply for future phases of the work. The applicant is requesting full funding at this time so they can move forward with the entire project.

BMP type(s):

Native Habitat Restoration(1), Rain Garden(2)

Grant Request:

$19,200.00

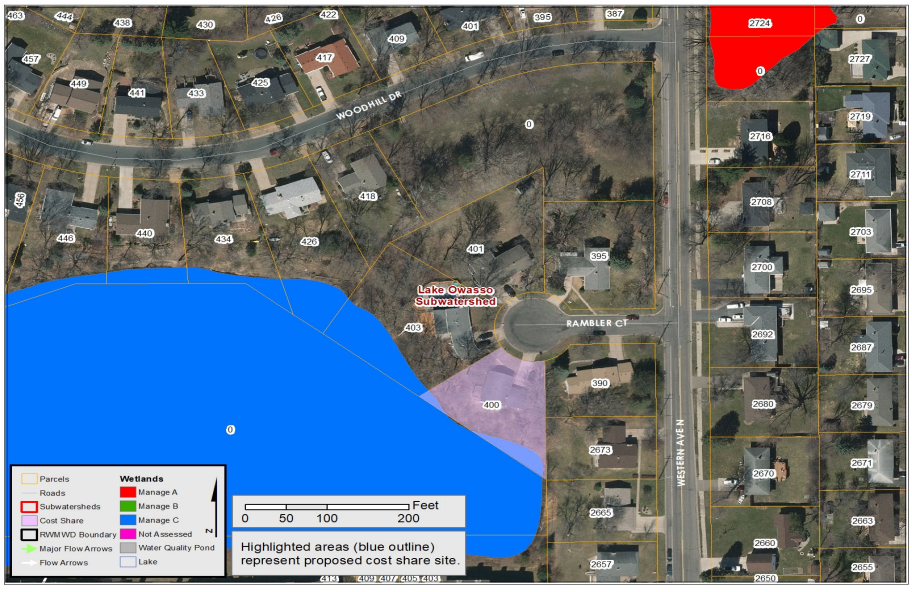
Recommendation:

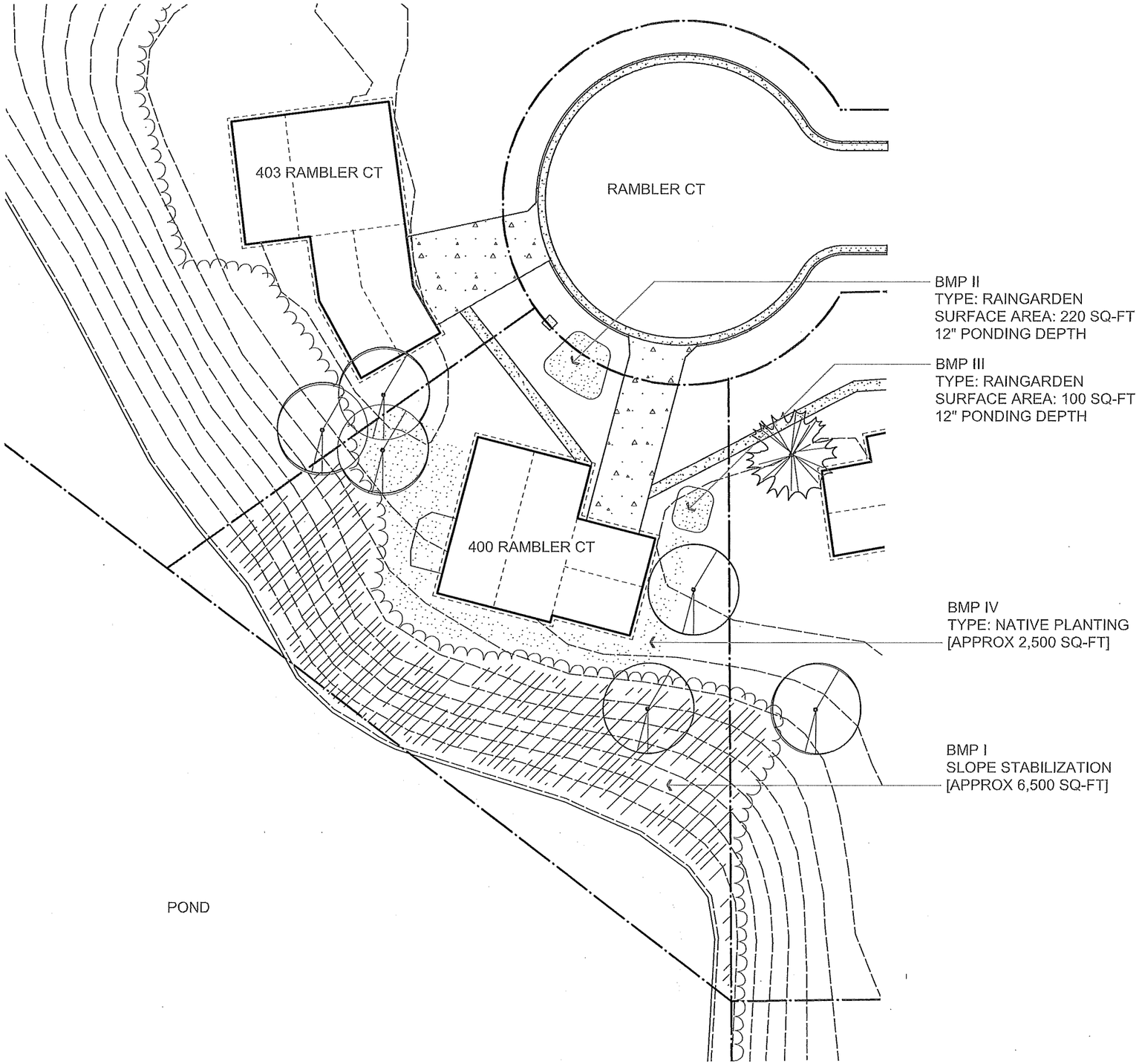
Staff recommends approval of this application.

Subwatershed:

Lake Owasso

Location Maps:





Ramsey Conservation District

RAMSEY CONSERVATION DISTRICT
1425 PAUL KIRKWOLD DR
ARDEN HILLS, MN 55112
651-266-7274
www.ramseyconservation.org

PROJECT: KOSOBAYASHI RESIDENCE
LOCATION:
400 RAMBLER CT
ROSEVILLE, MN 55113

WATERSHED DISTRICT:

RAMSEY-WASHINGTON METRO WATERSHED DISTRICT

DESIGNER: MPS
DATE: 07/17/2018
REVISION:
REVISION:
REVISION:
REVISION:
REVISION:
CHECKED BY:
TAA:

NOTES:
FOR REFERENCE USE ONLY. NOT FOR CONSTRUCTION

ORIGINAL SHEET SIZE: 11" x 17"

SCALE: 1"=30'0"

SITE PLAN

N

L1.1

RAMSEY-WASHINGTON
METRO WATERSHED DISTRICT

(651) 792-7950
rwmwd.org

2665 Noel Drive
Little Canada, MN 55117

November 7, 2018

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

Re: Budget Adjustment - Lionsgate Academy 18-05 CS

Sarah Hauer from Lionsgate Academy applied for the Best Management Practices Cost Share Program and was approved on 4/4/2018. The application funded the removal of asphalt, addition of a vegetated play area, and addition of a rain garden. Sarah Hauer is requesting a budget increase of $28,000 to the cost share application bringing the total grant request to $108,000. Increased funds were used for soil corrections, drain tile, and amended soil mix which were done at the request of RWMWD staff. This project will be funded through our school retrofit grant.

Stewardship Grant Program Budget Status Update

November 7, 2018

Homeowner	Coverage	Number of Projects	Funds Allocated
Habitat Restoration and rain garden w/o hard surface drainage	50% Cost Share $15,000 Max	4	$9,959.41
Rain garden w/hard surface drainage, pervious pavement, green roof	75% Cost Share $15,000 Max	5	$42,548
Shoreland Restoration (below 100-year flood elevation w/actively eroding banks)	100% Cost Share $15,000 Max	1	$14,000

Commercial, School, Government, Church, Associations, etc.	Coverage	Number of Projects	Funds Allocated
Habitat Restoration	50% Cost Share $15,000 Max	4	$19,240
Shoreland Restoration (below 100-year flood elevation w/actively eroding banks)	100% Cost Share $100,000 Max	0	$0
PRIORITY AREAS:	100% Cost Share $100,000 Max	7	$586,378.73
NON-PRIORITY AREAS:	75% Cost Share $50,000 Max	2	$64,830
Aquatic Veg Harvest	50% Cost Share $15,000 Max	1	$8,500
Maintenance	50% Cost Share $5,000 Max for 5 Years	9	$8,000
Consultant Fees			$85,892
Total Allocated			**$839,348.14**

2018 Stewardship Grant Program Budget	
Budget	$800,000.00
2017 Carryover	$200,000.00
Total Funds Allocated	$839,348.14
Total Available Funds	**$160,651.86**

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Action Items

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Request for Board Action

Board Meeting Date: November 7, 2018 **Agenda Item No.:** 8A

Preparer: Tina Carstens, Administrator

Item Description: 2019 CIP Maintenance and Repair Project Authorization to Finalize Design and Prepare the Bidding Documents and Advertise for Bids.

Background:
Annually, the District completes a project to maintain the existing infrastructure owned and operated by the District, and to assist and facilitate stormwater pond cleanouts to allow other public entities to meet their municipal separate storm sewer system (MS4) requirements.

As the 2018 project is being closed out, staff are wrapping up the 2019 CIP Maintenance/Repair project preliminary design and are seeking authorization from the board at the November 7 meeting to proceed with the bidding process. Electronic copies of the 95% design will be distributed separately prior to the meeting date. If the board deems it appropriate, they should consider a motion that "approves the preliminary design, estimate of probable costs, and expected schedule, and directs the staff to prepare the bidding documents and advertise the project for bid". Staff will present bids for the work at the December board meeting and a January 2 construction start is expected.

Applicable District Goal and Action Item:

Goal: Achieve quality surface water – The District will maintain or improve surface water quality to support healthy ecosystems and provide the public with a wide range of water-based benefits.

Action Items: Maintain District projects and consider opportunities to support the maintenance activities of others.

Staff Recommendation:
Staff recommends that the Board approve the preliminary design, estimated costs, and proposed project schedule, and direct staff to finalize the design and bidding documents and advertise the project for bid.

Financial Implications:
The CIP Maintenance and Repair project is included in the 2019 preliminary budget. Staff will present the engineer's cost estimate for this upcoming project at the meeting.

Board Action Requested:
Approve the preliminary design, estimated costs, and proposed project schedule, and direct staff to finalize the design and bidding documents and advertise the project for bid.

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Administrator's Report

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MEMO

TO: Board of Managers and Staff

FROM: Tina Carstens, Administrator

SUBJECT: November Administrator's Report

DATE: October 31, 2018

A. Meetings Attended

Monday, October 1	ALL DAY	WEFTEC Conference
Tuesday, October 2	ALL DAY	WEFTEC Conference
Wednesday, October 3	ALL DAY	WEFTEC Conference
Friday, October 5	10:00 AM	Markham Pond Grant Close-Out
Wednesday, October 10	2:00 PM	Met Council Grass Lake Area Sewer Project
	6:30 PM	Board Meeting
Monday, October 15	2:00 PM	Benefits Renewal Meeting
Tuesday, October 16	ALL DAY	Water Resources Conference
Wednesday, October 17	ALL DAY	Water Resources Conference
Wednesday, October 24	8:30 AM	Rush Line BRT Meeting
Thursday, October 25	2:00 PM	Ramsey SWCD Advisory Group
Friday, October 26	9:00 AM	North & East Metro Groundwater Meeting
Monday, October 29	9:00 AM	O&M Conference Planning
	2:30 PM	Willow Pond CMAC Meeting
Tuesday, October 30	10:30 AM	Metro Wastewater Treatment Project
	1:00 PM	MN Stormwater Manual Meeting
Wednesday, October 31	9:30 AM	Barr Project Check in Meeting

B. Upcoming Meetings and Dates

Watershed Excellence Awards	Wednesday, November 14, 2018
MAWD Annual Meeting	November 29 – December 1, 2018
December Board Meeting	Wednesday, December 5, 2018

C. 2019 Board Meeting Dates

Just wanted to touch base regarding a couple of the 2019 meeting dates that fall close to holidays.

The normal date for the January meeting would be January 2nd. Last month, Manager Skinner, indicated that she would be out of town that week. Will the rest of the managers be available for that meeting or is there a desire to move that meeting to January 9th?

The July board meeting date is also close to the 4th of July holiday. The meeting is scheduled for July 3, 2019. That date works for me but if a number of board members plan to be out of town that week, we should discuss moving it.

D. MAWD Annual Meeting

Attached is the conference book and registration form for your information. There are a number of pre-conference workshops during the day on Thursday and then the regular conference kicks off on Thursday night and lasts until Saturday morning. After last month, I am aware that many of you are not able to attend this year. If you are planning to attend, please let me know as soon as possible so we can get you registered for the event. I will need to know what days you plan to attend for hotel reservations and whether or not you would like to attend the pre-conference workshops.

2018 Annual Meeting and Trade Show

MINNESOTA ASSOCIATION OF WATERSHED DISTRICTS, INC

Land and Water Shall be Preserved

November 29 - December 1

Arrowwood Conference Center

Alexandria, MN

You are invited to join us for the Minnesota Association of Watershed Districts (MAWD) for the 2018 Annual Meeting and Trade Show. The MAWD Annual Meeting provides an opportunity for watershed district managers, staff, and key partners to join each other in professional development and training seminars. The Annual Meeting will also provide opportunities for watershed officials and staff to meet vendors and key partners from across the country at the Trade Show.

We would like to thank our Events Committee for their work and dedication in assisting with the development of our program this year, as well as to those who submitted an abstract and agreed to present at our workshops on Friday, November 30th. Finally we want to thank our exhibitors and annual sponsors for their financial contributions and the excitement they bring to our Annual Trade Show.

In this packet you will find more details about the programming and events included in the Annual Meeting agenda. We look forward to you joining us for another successful MAWD Annual Meeting and Trade Show.

New activities and programs for this year include:

Night at the Movies

Each Watershed District has been invited to submit their best video highlighting their district to be played Thursday night. The "Best Picture" award will be presented at the Friday night banquet.

Annual Sponsorship Levels

We have created four sponsorship levels for our exhibitors to select from which will grant them registration to our Annual Conference Trade Show and ongoing promotions throughout the year.

Watershed District Outreach and Education Award

All attendees will have access to vote for the WD with the best Outreach and Education Program on the Trade Show floor. There will be a row of Watershed District booths set up to showcase their work and attendees will have a ballot to vote. A winner will be announced and awarded a traveling trophy during Friday's banquet.

Registration Information:

Visit **www.mnwatershed.org** to get registered today or fill out the registration form in this packet.

$200 - includes all conference access and meals for each registrant.

Guest package is $85 which includes meals only.

The registration fee will increase to $250 after November 16.

There is a $25 processing fee on all refunds and no refunds will be given after November 23. The registration deadline is November 21.

Pre-Conference

$85 - includes access to all three workshops and meals on Thursday, November 29.

Lodging

Arrowwood Conference Center, call 866-386-5263 to make a reservation or send in the form in this packet.

Program Schedule Overview

WEDNESDAY, NOVEMBER 28

9 A.M.-2 P.M.	MN Association of Watershed Administrators (MAWA) Meeting
5 P.M.-7 P.M.	MAWA Social Hour and Reception

THURSDAY, NOVEMBER 29

PRE-CONFERENCE SESSIONS

8 A.M.-9 A.M.	Registration
9 A.M.-4 P.M.	Basic Watershed Management Workshop
9 A.M.-4 P.M.	Minnesota Drainage Seminar
9 A.M.-4 P.M.	Human Resources and Personnel Management Workshop
12 P.M.	Lunch

ANNUAL MEETING

4 P.M.-6 P.M.	MAWD Board of Directors Meeting
6 P.M.-9 P.M.	Registration, Trade Show Opening and Welcome Reception
7 P.M.-8:30 P.M.	Night at the Movies

FRIDAY, NOVEMBER 30

7 A.M.-9 A.M.	Breakfast - Trade Show Floor
8 A.M.– 10:45 A.M.	MAWD Business Meeting and Resolutions Hearing
8 A.M.-8:40 A.M.	Concurrent General Sessions I
9 A.M.-9:40 A.M.	Concurrent General Sessions II
10 A.M. -10:40 A.M.	Concurrent General Sessions III
11 A.M. -11:40 A.M.	Concurrent General Sessions IV
11:15 AM. -12 P.M.	Regional Caucuses
12 P.M.-2 P.M.	Luncheon

Keynote Speaker: Jeff Strock, Professor and Soil Scientist in the Dept. of Soil, Water and Climate
DNR Watershed District of the Year
BWSR Watershed District Employee of the Year Awards

2 P.M.-2:45 P.M.	Concurrent General Sessions V
2:45 P.M.-3:30 P.M.	Concurrent General Sessions VI
3:30 P.M.-4:15 P.M.	Concurrent General Sessions VII
5 P.M.-6:30 P.M.	Social Hour and Live Music
6:30 P.M.-8 P.M.	Dinner and Awards

Watershed District Program of the Year Award
Watershed District Project of the Year Award
MAWD Convention Award - Night at the Movies “Best Picture”
MAWD Convention Award - Best Education and Outreach Program Booth

SATURDAY, DECEMBER 1

7 A.M.-9 A.M.	Last Chance Networking Breakfast
9 A.M.-11 A.M.	MAWD Board of Directors Meeting

Basic Watershed Management Workshop

Pre-Conference Workshop | Thursday, November 29, 2018 | 9 A.M.-4 P.M.

9:00 – 9:15 WELCOME AND INTRODUCTIONS

9:15 – 10:30 YOUR ROLE as a WATERSHED DISTRICT

Understanding Watershed District Legal Powers and Purposes – Watershed districts have their own compact chapter of law – MN Chapter 103D and metro watershed districts also have 103B. This legal overview will provide insight into why watershed districts were created, and the legal authorities given to districts to pursue their missions.

Watershed Districts, BWSR, and the World – Your watershed district is just one organization in a world full of state, federal, non-profit, citizen, and municipal interests with their own mandates to do work for the public good. Sort out who's who and consider how partnerships could maximize your impact.

15-minute COFFEE and SNACK BREAK

10:45 – 12:15 YOUR ROLE as a WATERSHED "MOVER and SHAKER"

Every organization on the planet from the Girl Scouts to the US Army has some sort of strategic plan to guide them. Watershed district plans set priorities, outline strategies, and identify targeted and measurable goals. Learn the process for how to develop or update your plan and discover tips for getting those plans implemented.

60-minute LUNCH BREAK (Provided)

1:15 – 2:45 YOUR ROLE as a GOVERNMENT OFFICIAL

Has this happened to you?

1. Prior to the board meeting, another manager calls to encourage you to vote for an issue on the agenda. How should you respond?
2. The board treasurer is giving a report to the board. You spot a check to a vendor for a larger amount than what the board had previously authorized. What's the appropriate response?
3. A junior staff person tells you there have been inappropriate jokes in the workplace. Now what?
4. A county commissioner has let you know how she expects you to vote on an issue. Now what?
5. A citizen lets you know that the board did a terrible job approving a "stupid project." You happen to agree it wasn't a great project, but yours was one of only two dissenting votes. How do you respond?

This session will discuss how to respond to these and other scenarios that will help you do your job well and stay away from legal trouble and will provide an understanding of the Open Meeting Law, Data Practices Act, Freedom of Information Act, and other relevant rules and regulations.

15-minute COFFEE and SNACK BREAK

3:00 – 4:00 YOUR ROLE as a WATERSHED LEADER

Your county appointed you to the Board and they probably expect you to make sure the organization does more than just exist. Learn some techniques that contribute to the art of "boardsmanship" that will help your district excel.

Instructors: Steve Woods, Executive Director, Freshwater Society
Louis Smith, Water Law and Policy Attorney, Smith Partners
Kevin Bigalke, Central Region Manager, MN Board of Water and Soil Resources (BWSR)
Tera Guetter, Administrator, Pelican River Watershed District
Michelle Overholser, Yellow Medicine River Watershed District

#mawd18

Minnesota Drainage Seminar

Pre-Conference Workshop | Thursday, November 29, 2018 | 9 A.M.-4 P.M.

9:00 – 10:30 CLEAN WATER FUND RESEARCH and ALTERED HYDROLOGY

Overview of Clean Water Fund Research Projects Involving Drainage (Jeppe Kjaersgaard, MDA) – Clean Water Funds are used for several research projects each year, some of which involve drainage. This is an overview of pertinent Clean Water Fund research projects since the beginning of MN Department of Agriculture (MDA) Clean Water Fund Research Grants.

Altered Hydrology and Comprehensive Local Water Planning (Henry Van Offelen, BWSR) – This is an emerging issue associated with impaired waters stressor identification and comprehensive local water planning, including One Watershed, One Plan. There is a need to better understand what altered hydrology means and how to apply this topic to multipurpose watershed planning and implementation.

15-minute COFFEE and SNACK BREAK

10:45 – 12:15 PUBLIC WATERS AND PUBLIC DRAINAGE SYSTEMS

DNR Public Waters Authority over Work Done in Public Drainage Systems guidance document, Feb. 28, 2018. (Jim Sehl, DNR) – This guidance updates a DNR document from 1980 to clarify DNR's roles and responsibilities under M.S. Chapter 103G Waters of the State, M.R. Parts 6115.0150 - 6115.0270, and M.S. Chapter 103E Drainage that may involve DNR permitting or permission of drainage work. This presentation will walk through case studies to illustrate implementation of DNR's guidance.

Public Waters and Drainage Panel Discussion – Dialogue about experience to date using this DNR guidance. Panelists to include representatives of DNR, Drainage Authorities, and legal and engineering advisors.

60-minute LUNCH BREAK (Provided)

1:15 – 2:45 DRAINAGE LAW CURRENT TOPIC – REESTABLISHMENT OF RECORDS

There have been a number of drainage system records reestablishment proceedings since Section 103E.101, Subd. 4a. **Reestablishing records** was recommended by the DWG and adopted into drainage law in 2013. Some of these proceedings have involved public waters and some controversy. One was appealed by DNR to the MN Supreme Court. This is a current Drainage Work Group topic of discussion.

Drainage Engineer Information and Perspective (Chris Otterness, Houston Engineering)

DNR Perspective (Jim Sehl, MN Department of Natural Resources)

Drainage Authority Legal Counsel Perspective (Kurt Deter / John Kolb, Rinke Noonan)

These presentations and associated dialogue will help clarify the issues and the current status.

15-minute COFFEE and SNACK BREAK

3:00 – 4:00 DRAINAGE WORK GROUP COMMUNICATIONS and STAKEHOLDER INPUT

By mid-November, the Drainage Work Group plans to have summary information ready for stakeholders about topics that may see legislative action in 2019 or 2020. This will be an information and feedback opportunity for drainage stakeholders.

HR & Personnel Management Workshop

Pre-Conference Workshop | Thursday, November 29, 2018 | 9 A.M.-4 P.M.

9:00 – 10:30 AVOID LEGAL PITFALLS WHEN HIRING | MANAGING SOCIAL MEDIA RISK

Avoid Legal Pitfalls When Hiring

Hiring a new employee can be a time-consuming and demanding process. Public employers are required to navigate a series of laws, including federal and state nondiscrimination laws. This presentation points out some of the legal pitfalls that may be encountered by public employers during the hiring process. It also provides practical tips for making legally defensible hiring decisions.

Social Media Employment Risks and How Supervisors Can Manage Them

Social media has changed the way people share information. Employers have become aware of the impact that this form of communication has on the workplace. This session examines three areas of social media use in the public employment context that may expose government entities to risk: employee personal use of social media, the use of social media and Internet searches when making hiring decisions, and social media employment references. The session provides suggestions for managing that risk.

15-minute COFFEE and SNACK BREAK

10:45 – 12:15 BEST PRACTICES FOR HIRING OUTSIDE OF THE ORGANIZATION

Keeping Independent Contractors Independent

Budget constraints and hiring freezes have public entities looking for alternative ways to provide services. Subsequently, more members are looking to outsource instead of hire. This session examines the differences between an employee and an independent contractor and how coverage applies to each. Participants learn techniques to ensure that independent contractors remain independent.

Your Employee or Mine? Avoiding Unintended Consequences of Joint Employment Ventures

For years, watershed districts have collaborated to share resources, including employees. In this session, attendees learn the questions to answer to minimize exposures to potential liability when sharing personnel with other entities.

60-minute LUNCH BREAK (Provided)

1:15 – 2:45 WHAT TO DO (AND NOT DO) TO ATTRACT AND KEEP GREAT EMPLOYEES

Getting the right people on your team and managing their performance is one of the key building blocks for excellence in city performance. Through an interactive question and answer format, you will explore best practices in hiring and performance management processes in your organization.

15-minute COFFEE and SNACK BREAK

3:00 – 4:00 THE ROLE OF THE PERSONNEL COMMITTEE

Many watershed districts use Personnel Committees to vet board decisions about employee compensation, performance evaluations and disciplinary action. This session will be a quick dive into the topic, exploring best practices and includes audience discussion.

Instructors for this workshop are from the League of Minnesota Cities and MN Counties Intergovernmental Trust.

Meet our Keynote Speaker

Jeff Strock

Dr. Strock is a Professor and Soil Scientist in the Department of Soil, Water and Climate. He has been a member of the Faculty at the University of Minnesota since 1999 and is located at the Southwest Research and Outreach Center, near Lamberton, MN. Dr. Strock's research and outreach/education program focuses on agricultural drainage and water and nutrient management in agricultural systems, addressing production needs, and quantifying/mitigating negative off-site environmental impacts. Research includes testing and improving drainage water management practices (e.g. controlled drainage; bioreactors; vegetated, managed ditches; constructed wetlands; cover crops) to reduce nitrogen and phosphorus mobility; improving nitrogen management and understanding its storage, transformation and losses; and developing new, innovative agronomic management practices to improve crop yield and water and nutrient use efficiency (e.g. nitrogen mineralization, supplemental irrigation). Dr. Strock's experience in these areas spans a number of states and other countries. He has a successful history of collaborating with agencies, non-profits and the broad agriculture community and he has demonstrated a strong ability to work among groups with diverse perspectives.

Friday ◦ 12 p.m. ◦ Lake Darling Ballroom

Integrated Landscape Management for Agricultural Production and Water Quality

The Minnesota Department of Agriculture (MDA) selected two projects to receive Clean Water Fund research contracts in 2017. One project, titled "Integrated Landscape Management for Agricultural Production and Water Quality" was awarded to Dr. Jeffrey Strock and colleagues at the University of Minnesota Southwest Research and Outreach Center, Lamberton. This project established a small watershed scale site where the water quantity and water quality impact of multiple, best management practices (BMPs) were measured. Research will be used to identify in-field, edge-of-field and in-stream BMP strategies for achieving improved water quality in the Cottonwood River Watershed. The project aims to demonstrate the ability to meet the dual goals of maintaining farm productivity while improving watershed conditions and water quality. Information from this project will inform farmers and state agencies on the cumulative impacts of multiple, integrated BMPs in order to meet nutrient load reduction goals.

Conference Workshops

Concurrent General Session I ◦ Friday, November 30 ◦ 8 A.M.-8:40 A.M.

Research, Analysis, and Planning	WD Programs: Permitting and Education	Data Management
Harmful Algal Bloom Management in Minnesota Watersheds: Risks, Monitoring, and Controls. Watershed Districts spend countless hours and millions of dollars every year reducing phosphorus loading to combat eutrophication and nuisance algae blooms in their lakes. Yet little attention is paid to the risks and monitoring of these potentially toxic Harmful Algal Blooms (HABs). This presentation will provide guidance to watershed managers for risk assessment, sampling plan development and cost-effective control strategies. We will discuss potential risks faced by Minnesota Watershed Districts, selection and optimization of HAB monitoring programs throughout the watershed and alternatives for control strategies for the diverse waterbodies. HABs are a timely water quality issue that must be addressed on a watershed scale. It is critical for watershed managers to understand risk factors, sampling protocols and effective control strategies before a HAB occurs to minimize ecologic and public risk. **Anne Wilkinson-Wenck, Joe Bischoff-Wenck, Claire Bleser-Riley Purgatory Bluff Creek WD**	When Solar Comes to Town: The community solar garden industry is booming in Minnesota and projections indicate this trend will continue. Solar gardens are typically sited on rural parcels used for crop production or otherwise undeveloped land. Land for solar gardens is leased for 25+ years, after which the site may be decommissioned and returned to its former use. Installation of a solar garden is a change of land use that requires a host of regulatory approvals. The roads, equipment and solar panels are considered impervious and therefore require stormwater management. MPCA provides guidance to meet state standards but this guidance does not necessarily translate to watershed district standards. This talk provides valuable insights into stormwater management and will discuss potential benefits and issues related to vegetation, wildlife, soils, and water quality for an industry that may soon be (if not already) in your watershed. **Jim Shaver-Carnelian Marine St. Croix WD, Kristine Maurer-EOR**	The Metro Stormwater Geodata Project: At present, no data standard has been developed or adopted for the efficient translation and aggregation of geospatial data representing stormwater assets in Minnesota. In spring 2018, the MetroGIS collaborative, in partnership with private interests and public-sector agencies in the metro region have begun to document the specific business needs for, uses of, and needed contents and details for developing a data standard to help bridge this gap. This presentation will outline the benefits of developing this resource, its progress to date, and the anticipated steps toward its completion and implementation as a resource for the mapping, flow modeling and engineering interests that would make use of it in bringing data together. **Geoffrey Maas, GISP-MetroGIS/Metropolitan Council**

Conference Workshops

Concurrent General Session II ◦ Friday, November 30 ◦ 9 A.M.-9:40 A.M.

Research, Analysis, and Planning	WD Programs: Permitting and Education	Data Management
Does year-round aeration improve lake water quality? 3D modeling results are convincing Lake aeration is largely a misunderstood process. For 40 years Sweeney Lake homeowners have operated an aeration system year-round—intending to oxygenate the water, improve conditions for native fish and reduce the buildup of phosphorus and harmful algal growth in the impaired deep lake. While the TMDL study established a path toward better water quality, there was still a question about whether the lake's aeration system is part of the problem or the solution. As a result, the Bassett Creek Watershed Management Commission (BCWMC) initiated a study that employs three-dimensional water quality modeling to simulate sediment phosphorus release and phytoplankton/ zooplankton dynamics, with and without aeration, under different management efforts and climatic conditions. Temperature and dissolved oxygen outputs identified the best habitat for desired biota. This presentation will illustrate how animated modeling results improve our understanding of the problem and convince lake users that recommended management actions will meet the goals. **Greg Wilson-Barr Engineering Company**	Army Corps Regulatory Program Hot Topics: Permits, Jurisdiction and Policy Changes. In the past two years, the Army Corps St. Paul District's Regulatory program has streamlined the suite of general permits available to authorize projects with no more than minimal adverse effects, has been subject to various national legal decisions on jurisdiction, and has worked on numerous internal and external aquatic resource mitigation policy updates. This talk will cover the District's goals for these efforts and provide an overview of new permits, policies, and jurisdiction-related topics. **Jill Bathke-St. Paul District Army Corps of Engineers**	Development of a GIS-Based Water Quality Model for the City of Minneapolis: The City of Minneapolis needed a decision-making tool developed to identify, analyze, and prioritize water quality areas of concern to inform a variety of City initiatives. A key initiative is to incorporate water quality BMPs into planned City capital projects to best maximize City resources. To meet the City's goals, Barr Engineering Co. developed a citywide geographic-information-system-based (GIS-based) water quality (WQ) model to (1) quantify runoff and associated pollutant loading (i.e., total phosphorus (TP) and total suspended solids (TSS)) generated from various land uses (roadways, housing areas, industrial areas) and (2) estimate the runoff and pollutant removal that occurs at stormwater best management practices (BMPs) such as ponds, swales, and rain gardens. As a planning-level tool, the model will be used by City staff for big picture analysis of opportunities to improve the quality of stormwater being discharged through the municipal system into the lakes, creeks and the Mississippi River. **Michael Brice McKinney - Barr Engineering Co., Nicolas Cantarero-City of Minneapolis**

Conference Workshops

Concurrent General Session III ∘ Friday, November 30 ∘ 10 A.M.-10:40 A.M.

Research, Analysis, and Planning	WD Programs: Permitting and Education	Data Management
Watersheds Role in AIS: From Committee Concepts to Rapid Response. Like many watershed organizations, the Bassett Creek Watershed Management Commission (BCWMC) found it difficult to know their role in aquatic invasive species (AIS) management. The BCWMC convened an Aquatic Plant Management/Aquatic Invasive Species (APM/AIS) Committee that included BCWMC and city staff, lake groups, park districts, Hennepin County, Met Council, and the MnDNR. The committee identified activities needed to address AIS, identified the entities already filling all or parts of those roles, and determined how they could augment those activities. The committee recommendations included a new APM/AIS budget and development of an AIS rapid response plan for key AIS species in priority lakes. The plan was developed after discussions with various organizations and is the first of its kind to involve multiple partners. It outlines the actions required to address new AIS infestations and defines the roles of the BCWMC and partners so they can efficiently and effectively address new infestations. **Laura Jester- Bassett Creek Watershed Management Commission, Margaret Rattei-Barr Engineering Co., Karen Chandler-Barr Engineering Co.**	The Carrot and Hammer: Picking up where last year's permit-enforcement session left off, three experienced enforcers will describe and demonstrate legal tools available for ensuring compliance with watershed district permits, orders and rules. Enforcement efforts can be costly in terms of both staff resources and outside support, so the presenters will review ways to efficiently scale your efforts with real-world scenarios to illustrate best practices. The presenters encourage you to bring your own trials and tribulations with ne'er-do-wells for some collaborative problem-solving. **Maggie Karschnia-Prior Lake Spring Lake WD, Forrest Kelley-Capitol Region WD; Michael Welch-Smith Partners PLLP**	Monitoring Program Evolution: Capitol Region Watershed District (CRWD) established a monitoring program in 2004 to collect data on the water resources of the District. The goals of the program are to identify water quality problem areas, quantify runoff and pollutant loading, and promote understanding of District water resources. As the monitoring program expanded, the ability to effectively collect and use data was hampered by inefficient methods and limited staff time. CRWD has been able to optimize efficiency and accuracy by automating manual tasks, reducing time spent in the field by implementing telemetry, and developing a web data portal for user-generated reports. The monitoring program has been further optimized by tailoring monitoring site selection, equipment selection and sampling frequency to specific end goals. These increases in efficiency have allowed CRWD's monitoring program to continue to expand without increasing staffing or compromising data quality. CRWD hopes to share its solutions to some common inefficiencies. **Joe Sellner-Capitol Region WD, Britta Belden-Capitol Region WD**

Conference Workshops

Concurrent General Session IV ∘ Friday, November 30 ∘ 11 A.M.-11:40 P.M.

Research, Analysis, and Planning	WD Programs: Permitting and Education	Data Management
Grassy and Woody Riparian Shade Analysis and Implications for Restoring Biotic Health in an Urbanizing Coldwater Stream: Rising water temperatures in urban and farmed watersheds threaten the survival of coldwater biota. Managing baseflow, channel morphology, and riparian vegetation can lower temperatures, however there is limited research quantifying shade provided by grassy vegetation along narrow streams. Hemispherical photographs (HPs) were analyzed using WinSCANOPY to compare grassy and woody riparian shade along Brown's Creek, a small trout stream in Stillwater, Minnesota impaired by high temperatures and turbidity. The HP analysis results were extrapolated using LiDAR. Solitary trees were found to increase shade above 80% while grassy riparian shade ranged from 10% to 61% with an average of 34%. Implementation of a targeted shade restoration plan could reduce monthly mean stream temperatures in the summer by 0.16 to 0.52°C based on CE-QUAL-W2 model scenarios. Other strategies will be needed to address high temperatures in Brown's Creek. Targeting shade restoration will limit detrimental impacts of dense forest canopy on bank stability. **Karen Kill-Browns Creek WD, Olivia Sparrow -U of M, Camilla Correll- Emmons & Olivier Resources, Inc.**	River of Dreams Education Program: Most citizens are largely unaware of their local river's origins and where it travels downstream. The River of Dreams (ROD) program seeks to increase watershed understanding and sense of place among elementary students, making the next generation more aware of connections within their watershed to other rivers, lakes, oceans, and the people who utilize them. ROD is a fun and impactful education experience that gives participants a better understanding of their local rivers geography. Students are exposed to watershed concepts multiple times in ways that leave a lasting impression through writing activities, virtual tours, and a canoe launch event at a local river. **Andrew Ulven-International Water Institute, Asher Kingery-International Water Institute, Danielle Yaste-International Water Institute**	Minnesota's New & Improved Wetland Inventory: The Minnesota DNR is releasing the final phase of a statewide update of the National Wetland Inventory for Minnesota in the fall of 2018. The wetland inventory for Minnesota has been completely remapped using the latest GIS technology including lidar and high-resolution aerial imagery, making it the most comprehensive, current, and accurate inventory of wetlands in the country. More than just an improvement in the mapping accuracy, the new wetland inventory enhances the database to include additional wetland classification data to predict wetland functions. These data will improve our ability to support wetland management, land use planning, environmental impact assessment, and natural resource conservation and will benefit users spanning all levels of government, academia, private industry and non-profit organizations. This presentation provides an overview of the new wetland inventory along with information about how to access the data. Important features will be discussed and several example applications of the data will be highlighted. **Steve Kloiber-Minnesota DNR**

Conference Workshops

Concurrent General Session V ∘ Friday, November 30 ∘ 2 P.M.-2:45 P.M.

Planning and Adaptive Management	Bridging the Rural / Metro Divide: Flood Control	Bridging the Rural / Metro Divide: Models for a Successful Implementation	New Treatments and Technology
Moody Lake: Using Diagnostic Monitoring and the Pareto Principle to Rapidly and Economically Meet State Water Quality Goals. Moody Lake is currently on the impaired waters list for eutrophication due to excess phosphorus, but not for much longer. The CLFLWD is in the final stage of a multi-year, multi-phase, adaptive management approach to cost-effectively reduce phosphorus loads to Moody Lake. This project utilizes the Pareto Principle (a.k.a 80/20 rule) by identifying and addressing the highest phosphorus loads using the most effective BMPs. Project effectiveness monitoring shows progress made toward reducing watershed phosphorus loads to Moody Lake. This year we will complete the remaining watershed BMPs and begin the whole-lake alum treatment using a split treatment method this fall and next year. The combination of these projects are calculated to result in Moody Lake reaching a summer average phosphorus concentration of 40 ug/L, down from a previous summer average of more than 160 ug/L. Total estimated implementation cost is ~$1,000,000. Total lifetime phosphorus load reduction is 19,000 pounds ($53/lb). **Mike Kinney-Comfort Lake-Forest Lake WD, Meghan Funke-Emmons & Olivier Resources**	Buffalo Creek WD: Basic Water Management Projects: A Watershed-City Partnership. Flooding, drainage, and water quality issues often cross municipal boundaries, even within rural watershed districts. Further complications may be introduced when issues are located along private drainage systems with no managing authority which connect to downstream municipal storm sewer. Collaboration between cities and watershed districts is necessary to solve these water issues; however, without a clear and deliberate process, navigating this relationship has the potential to become adversarial. Through the petition process in MS 103D.605, the Buffalo Creek Watershed District (BCWD) and City of Glencoe embarked on two basic water management projects that forged a new relationship, gained the trust of adjacent landowners, and provided benefits to a wide range of stakeholders. These projects also bridge the city/county divide, solving an extensive range of water issues. This presentation will include a discussion on key steps in the process, facilitating discussions with project partners, and approaching the most contentious question: “Who pays?” **Corey Henke-Buffalo Creek WD, Chris Otterness-Houston Engineering, Inc.**	Red River Watershed Management Board: 40 Years of Flood Damage Reduction and Continued Water Management Efforts. The Red River Watershed Management Board (RRWMB) has been in existence since 1976. The RRWMB assists its member watershed districts in addressing flooding and water management issues. The RRWMB also works across state lines with its North Dakota counterpart, and both of these entities comprise the Red River Retention Authority (RRRA). The RRRA, recently secured a Partnership Agreement with NRCS through the Regional Conservation Partnership Program (RCPP) to provide funding for the development of watershed protection projects in the Basin. Currently, 20 individual sub-watershed plans are being developed throughout the basin to that will provide a wide range of benefits including Flood Prevention, Watershed Protection, Public Recreation, Public Fish and Wildlife Habit Improvement, and Agricultural Water Management. This presentation will give an overview of RRWMB governance and ongoing RCPP efforts in the Basin. **Robert Sip-Red River Watershed Management Board, Jerry Bents - Houston Engineering**	Improving Water Quality, Flood Storage and Habitat Diversity in New Brighton’s Hansen Park. Seeking to remedy declining water quality in downstream Pike and Long Lakes and reduce the risk of severe flood damage, the RCWD completed the Hansen Park Comprehensive Water Management Project, funded in part by a 2014 BWSR Targeted Watershed Demonstration Program grant. The project is expected to reduce the annual phosphorus load downstream by 150+ pounds per year, provide an additional 27.4 acre-feet of new flood storage within the park, and re-establish native habitats within the park. Learn about what made this project so ambitious, most notably a first-of-its-kind pump-controlled Iron-Enhanced Sand Filter system that uses multiple filter beds, automated valve controls, real-time water level monitoring, customizable user interface logic and remote real-time cellular control. The IESF system was designed to provide unrivaled operational and maintenance efficiency. This presentation will also touch on the site history, regulatory challenges, engineering solutions and construction procedures that contributed to the project’s success. **Kyle Axtell-Rice Creek WD, Dennis McAlpine, P.E. -Houston Engineering, Inc.**

Conference Workshops

Concurrent General Session VI ∘ Friday, November 30 ∘ 2:45 P.M.-3:30 P.M.

Planning and Adaptive Management	Bridging the Rural / Metro Divide: Flood Control	Bridging the Rural / Metro Divide: Models for Successful Implementation	NEW Treatments and Technology
Using GRAPS in Watershed Planning In this interactive 90 minute training session, you will learn how to integrate groundwater information presented in the Groundwater Restoration and Protection Strategy (GRAPS) report into the One Watershed, One Plan (1W1P) planning process. Using actual watershed examples, participants will work in small groups to: become familiar with the GRAPS report content, utilize GRAPS maps and groundwater condition summary to identify and target groundwater issues to be addressed in the 1W1P process, establish measurable goals, and identify appropriate actions to achieve restoration or protection goals. **Carrie Raber-Minnesota Department of Health, Annie Felix-Gerth-Board of Water and Soil Resources** **THIS IS A 90 MINUTE SESSION.**	Rice Creek WD: Using Technology and Partnerships to Manage Stormwater in the Ag/Urban landscape. As one of the most rapidly developing areas in the state, the Rice Creek Watershed District (RCWD) uniquely bridges the gap between agricultural land use and an established urban landscape. The evolving landscape requires a corresponding evolution in how runoff is managed, as increased volumes challenge the existing conveyance systems. This presentation will describe how the RCWD has utilized technology to provide a "crystal ball" into the future of stormwater management needs, and illustrate how collaborations with municipal partners address both short term and long term challenges. **Phil Belfiori - Rice Creek Watershed District, Chris Otterness - Houston Engineering, Inc.**	Minnehaha Creek WD: Model for Successful Implementation: Partnership, Focus, and Flexibility The Minnehaha Creek Watershed District (MCWD) is finding success in its innovative approach to water resource management by moving away from the traditional regulatory paradigm to partner with the land use community to align plans and investments to maximize economic, social, and environmental benefits for the communities it serves. The MCWD will share its approach which centers around three guiding principles: 1.Partnering with public and private entities to integrate goals, plans, and investments to maximize public benefit 2.Prioritizing and focusing in areas of highest need and opportunity to achieve significant, measurable results 3.Remaining flexible and responsive to opportunities created through coordination with land use planning. The presentation will include real world examples demonstrating the success of this approach and how it can be applied in other watersheds. **Becky Christopher-Minnehaha Creek WD**	Hydrologic Impacts of Corn Production Systems with and without Subsurface Drainage: Alterations of land use and management for agriculture have been implicated in surface and groundwater quality and quantity concerns. What remains poorly understood, however, is the influence of agricultural management practices on the landscape-scale water budget. In particular, conversion of perennial to annual vegetation, agricultural intensification, and installation of subsurface drainage systems have been implicated in changing water yield from farms in a manner that can result in increased incidence of flooding and more erosive rivers, potentially linking basin-scale water quality problems to farm-scale changes in the water budget. The goal of this project was to quantify all aspects of plot and field-scale water budgets for corn production systems (both with, and without subsurface drainage) and compare them against water budgets of sites with perennial vegetation. Results from this work will provide important information that will allow farmers to design water management infrastructure in a way that is both effective for production and environmentally responsible. **Jeff Strock-Professor and Soil Scientist - Department of Soil, Water and Climate**

Conference Workshops

Concurrent General Session VII ∘ Friday, November 30 ∘ 3:30 P.M.-4:15 P.M.

Planning and Adaptive Management	Bridging the Rural / Metro Divide: Flood Control	Bridging the Rural / Metro Divide: Models for Successful Implementation	New Treatments and Technology
THIS IS A 90 MINUTE SESSION, CONTINUED FROM THE 2 P.M. TRACK. Using GRAPS in Watershed Planning In this interactive 90 minute training session, you will learn how to integrate groundwater information presented in the Groundwater Restoration and Protection Strategy (GRAPS) report into the One Watershed, One Plan (1W1P) planning process. Using actual watershed examples, participants will work in small groups to: become familiar with the GRAPS report content, utilize GRAPS maps and groundwater condition summary to identify and target groundwater issues to be addressed in the 1W1P process, establish measurable goals, and identify appropriate actions to achieve restoration or protection goals. **Carrie Raber-Minnesota Department of Health, Annie Felix-Gerth-Board of Water and Soil Resources**	Using Technology and Partnerships to Formulate Flood Retention Strategies in Northwest Minnesota. As the second largest Watershed District in Minnesota, the Buffalo-Red River Watershed District (BRRWD) has formed a way to use technology and partnerships to develop comprehensive water resource management projects that not only benefit citizens of the District, but the Red River Basin of the North. This presentation will discuss why flood damage reduction (fdr) projects are needed, use of the Mediation Agreement, fdr types, project financing, and the use of new tools to develop fdr goals for a 1,785 square mile area. The BRRWD has successfully used these tools and strategies to develop projects such as the Wolverton Creek Restoration, Whisky Creek Tributaries, and the award winning Manston Slough Restoration. **Bruce Albright, Buffalo Red River WD, Erik S. Jones, P.E. - Houston Engineering, Inc.**	Various WDs: Setting Goals and Targeting Measurable Solutions for "Altered Hydrology" Across the State, “Altered Hydrology” is being cited as a stressor to biological impairments. However, measurable goals and targeted solutions for addressing this stressor are typically lacking. This presentation will cover approaches for setting measurable hydrology goals, targeting conservation to address “altered hydrology”, estimating progress towards goals, and developing rapid concept designs that position practitioners to implement solutions. Case studies will be presented for the Buffalo-Red River, Lac Qui Parle-Yellow Bank River, Middle Fork Crow River, and North Fork Crow River Watershed Districts. The results put local conservation practitioners in a position to begin implementing targeted conversation practices that will provide both water quantity and quality benefits. The presentation will show how the targeted solutions can be incorporated into local watershed plans, grant applications, and outreach information to landowners. **Drew Kessler-Houston Engineering, Inc., Mitch Enderson - Lac Qui Parle-Yellow Bank River WD, Margaret Johnson-Middle Fork Crow River WD, Cris Skonard -North Fork Crow River WD. Co-Author-Buffalo Red WD**	Chasing the Silver Bullet: Adventures in Alternative Stormwater Filtration Media (Iron Enhanced Sand and Spent Lime) Today’s stormwater practitioners are desperate for sustainable solutions that will filter stormwater to bind and remove pollutants in a cost-effective way. Where infiltration is impossible, we search for improved methods to remove particulate and dissolved phosphorus, metals and other pollutants from stormwater to meet permit requirements and improve the quality of downstream waterbodies. In addition, the stormwater community has great interest in putting byproducts, such as iron (as elemental iron) aggregate and spent lime, to good use in stormwater filters. There are some exciting recent advances in using these materials as stormwater filtration media. However, every success story has a cautionary backstory that has informed its success. This presentation will present these stories, including highlighting best practices in the design, implementation, monitoring and maintenance of Iron Enhanced Sand and Spent Lime Media filters. **Erin Anderson Wenz, PE, ENV SP-Barr Engineering Company, Keith Pilgrim, PhD-Barr Engineering Company, Paige Ahlborg -Ramsey-Washington Metro WD**

REGISTRATION FORM

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November 29, 2018 – December 1, 2018
Arrowwood Conference Center, 2100 Arrowwood Lane Northwest, Alexandria, MN, 56308

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This form does not register you for the MAWD Annual Conference, but only for a hotel room stay.

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We look forward to your participation!

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Project and Program Status Reports

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Technical Memorandum

To: Tina Carstens and Paige Ahlborg, RWMWD
From: Jen Koehler, Kevin Menken, Tyler Olsen and Erin Anderson Wenz, Barr
Subject: Wakefield Lake Sediment Management Analysis
Date: October 15, 2018
Project: 23/62-1006 180 007
c: Brad Lindaman, Barr

1.0 Introduction/Background

The Ramsey-Washington Metro Watershed District (RWMWD) has studied Wakefield Lake and its water quality over the past decade, including the completion of its Total Maximum Daily Load (TMDL) study and is in the process of implementing numerous water quality improvement projects in the Wakefield Lake subwatershed.

The Larpenteur Avenue storm sewer outfall into the southeast side of Wakefield Lake is directly across from and a short distance to the Wakefield Lake outlet on its southwest side. Past studies have determined that runoff from this storm sewer does not fully-mix with the complete lake volume, in essence "short-circuiting" to the outlet rather than mixing northward with the main body of the lake. As such, coarse sediment from Larpenteur Avenue (and its tributary areas) is deposited on the south end of the lake between the Larpenteur Avenue outfall and the Wakefield Lake outlet. Residents on Wakefield Lake have expressed concern about the accumulated sediment and trash in the lake at various public meetings.

The goal of this study is to estimate the volume of accumulated sediment on the south end of Wakefield Lake, to determining the sediment quality characteristics that may affect disposal requirements, to quantify the cost to manage accumulated sediments, and to evaluate the potential impact of this sediment removal on water quality in Wakefield Lake and in downstream Lake Phalen. Figure 1 shows Wakefield Lake and its major stormwater inflow and outlet locations, as well as the focus area for the evaluation of the accumulated sediment.

2.0 Bathymetric and Sediment Accumulation Analysis

Barr conducted a bathymetric survey on the south end of Wakefield Lake (~4 acres) on 6/21/2018 to determine the top of the accumulated sediment in this area. Following the bathymetric survey, sediment cores were collected at twelve locations on the south end of the lake on 7/19/2018 to determine the accumulated sediment depth. Figure 2 shows the sediment core locations and estimated accumulated sediment depth.

The sediment core profiles were reviewed and measured for transitions in sediment type and texture. Typically, accumulated sediment was assumed to be the layers of watery to more cohesive organic silts and, at times, firm/dense organic silts. These were overlying deeper peaty textured soil, which were assumed to be the native conditions. Vegetation was variable in the areas sediment cores were collected, with little or no vegetation in many areas, but some pockets of dense submerged aquatic vegetation in other areas.

Gridded bathymetric data (raster data) was created for Wakefield Lake for the following conditions based on the measured accumulated sediment depths from the collected cores:

- Existing conditions bathymetry was developed utilizing the existing bathymetric data (collected by the RWMWD in 2013) combined with the recent survey (2018) of the top of sediment on south end of Wakefield Lake
- Proposed (without accumulated sediment) bathymetry was developed using the existing bathymetric surface data and removal of the depth of accumulated sediment on the south end of Wakefield Lake

Figure 2 shows the existing contours and the proposed bathymetry. This gridded bathymetric data was used to estimate volume of accumulated material to be removed. The estimated volume of accumulated sediment to be removed from the south end of the lake is 3,700 cubic yards of sediment (6,660 tons).

Additionally, to better understand sediment disposal requirements, four of the cores were sampled and analyzed for polyaromatic hydrocarbons (PAHs) and metals in accordance with the Minnesota Pollution Control Agency (MPCA) guidelines for sediment testing and disposal in stormwater ponds in watersheds dominated by residential land use. Field screening for petroleum sheen, odor, or staining was done to determine if further testing for benzene and diesel range organics (DRO) was needed. No indication of these qualifiers was found, so these parameters were not analyzed. The results of the analytical testing were compared to the soil leaching values (SLV) to determine the disposal requirements. The laboratory analysis results for metals and PAHs are given in Table 1. The calculated BaP concentration, which is a representation of carcinogenic PAHs in the sediment, is above the 1400 µg/kg SLV in cores 2 and 4, indicating that dredged sediment is regulated fill and would need to be disposed of in a landfill.

Table 1. Laboratory analysis of sediment cores

Parameter (units)	MPCA Screening Value	Core 1	Core 2	Core 3	Core 4
Arsenic (mg/kg)	5.8	1.9	1.5	2.2	4.2
Barium (mg/kg)	1700	60.9	41.1	80.1	89.1
Cadmium (mg/kg)	8.8	0.39	0.18 j	0.33	0.83
Chromium (mg/kg)	36 CR6	21.8	22.1	25.1	34.3
Copper (mg/kg)	700	20.2	14.9	21.2	39.7
Lead (mg/kg)	2700	71.2	47.8	87.8	160
Mercury (mg/kg)	3.3 MC	0.044	0.012 j	0.038	0.079
Selenium (mg/kg)	2.6	< 0.47	< 0.44	< 0.52	< 0.68
Silver (mg/kg)	7.9	< 0.052	< 0.049	< 0.057	< 0.075
BaP Calculation: Kaplan-Meier (µg/kg)	1400 T	970	1800	860	1800

CR6: value represents the criteria for Chromium, hexavalent
MC: Mercury as Mercuric Chloride
T: Value represents a criteria for the total carcinogenic PAHs as BaP
j: Estimated detected value. The reported value is less than the stated laboratory quantification limit but greater than the laboratory method detection limit.

As part of the field work, Barr staff also inspected the slopes along the southeast side of the lake for signs of erosion that may be contributing to the sedimentation issue on the south end of Wakefield Lake. From the inspection, slope erosion was determined to be small or non-contributing to the accumulated sediment observed in the lake.

3.0 Pollutant Load Reduction Estimate

Utilizing the existing and proposed bathymetric data, Barr updated the P8 water quality model of the area to represent the existing conditions in Wakefield Lake as well as the proposed conditions (reflecting the removal of the accumulated sediment). The permanent pool volume for the lake was updated for existing and proposed conditions, and the models were run to quantify the impact of removing the accumulated sediment on the pollutant loads to Lake Phalen, downstream from Wakefield Lake.

Under existing conditions, the total permanent pool volume of Wakefield Lake was determined to be 89.3 acre-feet at the normal water level of 884.8 feet (MSL), and the flood pool volume was 127.4 acre-feet at a water level of 891 feet (MSL). Under proposed conditions, the permanent pool volume was increased to 91.6 acre-feet, and the flood pool volume remained at 127.4 acre-ft.

The P8 model was used to evaluate the following two mixing scenarios in Wakefield Lake:

1. A fully mixed scenario
2. A "short-circuiting" scenario

For the fully-mixed scenario, which assumes all storm sewer inflows fully- mix within the main basin of Wakefield Lake, the lake is modeled as a single basin.

However, because past studies have determined that flows from the Larpenteur Avenue storm sewer do not fully-mix within the main body of Wakefield Lake and largely "short-circuit" directly to the lake outlet, Wakefield Lake was modeled as two separate basins the second scenario, connected by a very large (non-restrictive) weir. The northern (main) part of the lake being modeled is one basin with inflows from the storm sewer and watersheds draining to the north end of the lake. This northern basin of the lake flows into the second basin, which reflects the storage on the south end of the lake and the inflows from Larpentuer Avenue and the outlet of Wakefield Lake.

Table 2 summarizes the results P8 model runs for the two mixing scenarios for the existing and proposed bathymetry of Wakefield Lake.

Table 2. P8 results for the proposed dredging of Wakefield Lake

Model Condition	Annual TSS Removal (lbs/yr, %)		Annual TP Removal (lbs/yr, %)	
Scenario 1: Fully-Mixed Scenario				
Existing Bathymetry	389,927	83.1%	810.0	74.7%
Proposed Bathymetry	390,344	83.2%	811.4	74.8%
Increased Pollutant Removal from outflow to Lake Phalen due to Dredging of Accumulated Sediment	416.8	0.1%	1.4	0.1%
Scenario 2: Short-Circuiting Scenario				
Existing Bathymetry	309,513	66.0%	576.4	47.7%
Proposed Bathymetry	313,438	66.8%	590.1	48.8%
Increased Pollutant Removal from outflow to Lake Phalen due to Dredging of Accumulated Sediment	3,925	0.8%	13.8	1.1%

The dredging of the accumulated sediment on the south end of Wakefield Lake has a more significant impact on the estimated pollutant removals in the "short-circuiting" scenario (which is how flows currently pass through the lake). The removal of the accumulated sediment from the south end of Wakefield Lake results in an increase in the overall pollutant removal occurring in Wakefield Lake, reducing the pollutant load to Lake Phalen by 13.8 pounds per year for total phosphorus (TP) and 3,925 pounds per year for total suspended solids (TSS).

Increased internal loading due to accumulated sediment in the south end of Wakefield Lake was also a concern. However, in a 2006 study of mobile phosphorus in the Wakefield Lake sediments, the highest concentrations of mobile phosphorus (phosphorus that can be released from the sediments into the water column) were in the deep hole in the north portion of the lake. The estimated mobile phosphorus concentrations in the south end of the lake and the area proposed dredging were already low. Additionally, the south end of the lake is shallower than the main basin and experiences significant flows through this area and likely does not thermally-stratify or experience anoxic conditions along the sediment interface. As a result, we do not anticipate that removing sediment from the south end of the Lake will significantly reduce the internal loading to Wakefield Lake.

4.0 Management of Sediments

As indicated in Section 2, dredged sediment from Wakefield Lake would need to be disposed of in a landfill, as the SLVs from two of the four cores were above the threshold for regulated disposal. An MPCA permit for management of dredged material would not be needed for sediment from Wakefield Lake because the measured pollutants are below the SRV values. However, other permits are still required to dredge and potentially reuse dredged sediment for use outside of landfilling:

- **MnDNR Public Waters Work Permit:** For any work or development activities conducted below the ordinary high water level of public waters or public waters wetlands, a work permit is needed from the MnDNR. Examples of development activities include filling, excavation, shore protection, structures, water level controls, dredging, and dams.
- **MPCA Brownfields Program:** If the intended use of the dredged material is for reuse on a non-landfill site, the user must apply to the MPCA's Brownfields Program. The brownfield program application must prove that reused material will not contaminate groundwater in order to obtain approval. *This program application is only required if the dredged material is intended for reuse on a residential or commercial site*.
- **MPCA Notification to Manage Dredged Materials without a Permit:** For projects not requiring a permit for management of dredged materials, it is still a best practice to submit a notification to the MPCA about the planned activity. This notice should be submitted at least 30 days prior to initiation of dredge activities.
- **Excavating and Grading Permit (City of Maplewood):** An excavating and grading permit application, along with an erosion control plan, must be submitted with the final grading plans to the City of Maplewood any time a significant amount of soil is being displaced or a drainage pattern is being altered. If disturbed area is greater than one acre, watershed and NPDES permits will be required.

Using the calculated volume of dredged sediment and assumed disposal in a landfill, Barr estimated planning level costs for the engineering, design, permitting, and removal/disposal of the accumulated sediment on the south end of Wakefield Lake. These costs are given in Table 3.

Table 3. Planning Level Opinions of Probable Costs for Wakefield Lake Dredging of Accumulated Sediment

Construction Activity	Planning Level Opinion of Cost[1]	Estimated Engineering Cost[2]	Total Project Cost[1,2]
Wakefield Lake Dredging of Accumulated Sediment	$1,002,000	$301,000	$1,303,000 ($1,043,000-$1,694,000)

[1] Costs include 30% construction contingency. These do not include costs related to education and outreach, legal, long-term maintenance, or monitoring. Costs are represented as a feasibility level Class 5 cost estimate as defined by AACE with a +50%/-30% uncertainty.

[2] Engineering Cost is estimated to be 30% of the construction cost. This cost includes engineering and design, permitting, and construction observation and administration.

For the "short-circuiting" scenario, given the total estimated project cost, the annualized cost range per pound of total phosphorus removed by the lake is $5,100 to $7,000 over a 35-year and 20-year period, respectively, with an assumed interest of 4%.

5.0 Discussion

Although the water quality in Wakefield Lake does not meet the MPCA's shallow lake water quality standards and the lake is listed as impaired for excess nutrients, the water quality in Wakefield Lake does show an improving water quality trend and upcoming projects in the subwatershed should help to continue that trend. Additionally, 2-D modeling of Wakefield Lake estimated that only 30% of the soluble and fine particulate phosphorus in the runoff from the Larpenteur Avenue tributary area contributes to the water quality observed at the historic monitoring location over the deep hole on the north end of the lake (representing the main body of the lake) while the remainder short-circuits through the south end of the lake. Because dredging the sediments accumulated at the south end of Wakefield Lake does not eliminate pollutant loads to Wakefield Lake and will likely not reduce internal loading in Wakefield Lake, the anticipated impact of dredging sediments on the south end on the observed water quality in Wakefield Lake is expected to be minimal.

Some have wondered if forcing all stormwater runoff to fully-mix within the lake will have an impact on Wakefield Lake water quality. Because much of the pollutant load from the Larpentuer Avenue storm sewer does not mix in the main basin of Wakefield Lake, which includes the historic monitoring station, and much of the load bypasses the lake. Forcing mixing of all watershed runoff into the lake basin will increase the total pollutant load to Wakefield Lake and will likely result in the degradation of water quality. Although forcing complete mixing of the Larpenteur Avenue runoff will likely degrade the water quality of Wakefield Lake, it will result in significant reductions in the pollutant loads to downstream Lake Phalen, by as much as 235 lbs/year.

Lake Phalen, which is located immediately downstream of Wakefield Lake, is a regional recreational resource with stable water quality that currently meets the MPCA's water quality standards for deep lakes.

Past water quality studies by the RWMWD indicated that approximately 19% of the phosphorus loading to Lake Phalen comes from the watershed along Larpenteur Avenue, including the Wakefield Lake subwatershed. The Strategic Lake Management Plan (SLMP) completed for the Phalen Chain of Lakes estimated that the annual total phosphorus load to Lake Phalen to be ~2,500 pounds of phosphorus per year.

The estimated reduction in loading to Lake Phalen by the dredging of accumulated sediment on the south end of Wakefield Lake (13.8 lbs of phosphorus per year) reflects a reduction in loading to the lake by ~ 0.5% and the expected impact on the stable water quality in Lake Phalen is likely negligible.

6.0 Recommendations

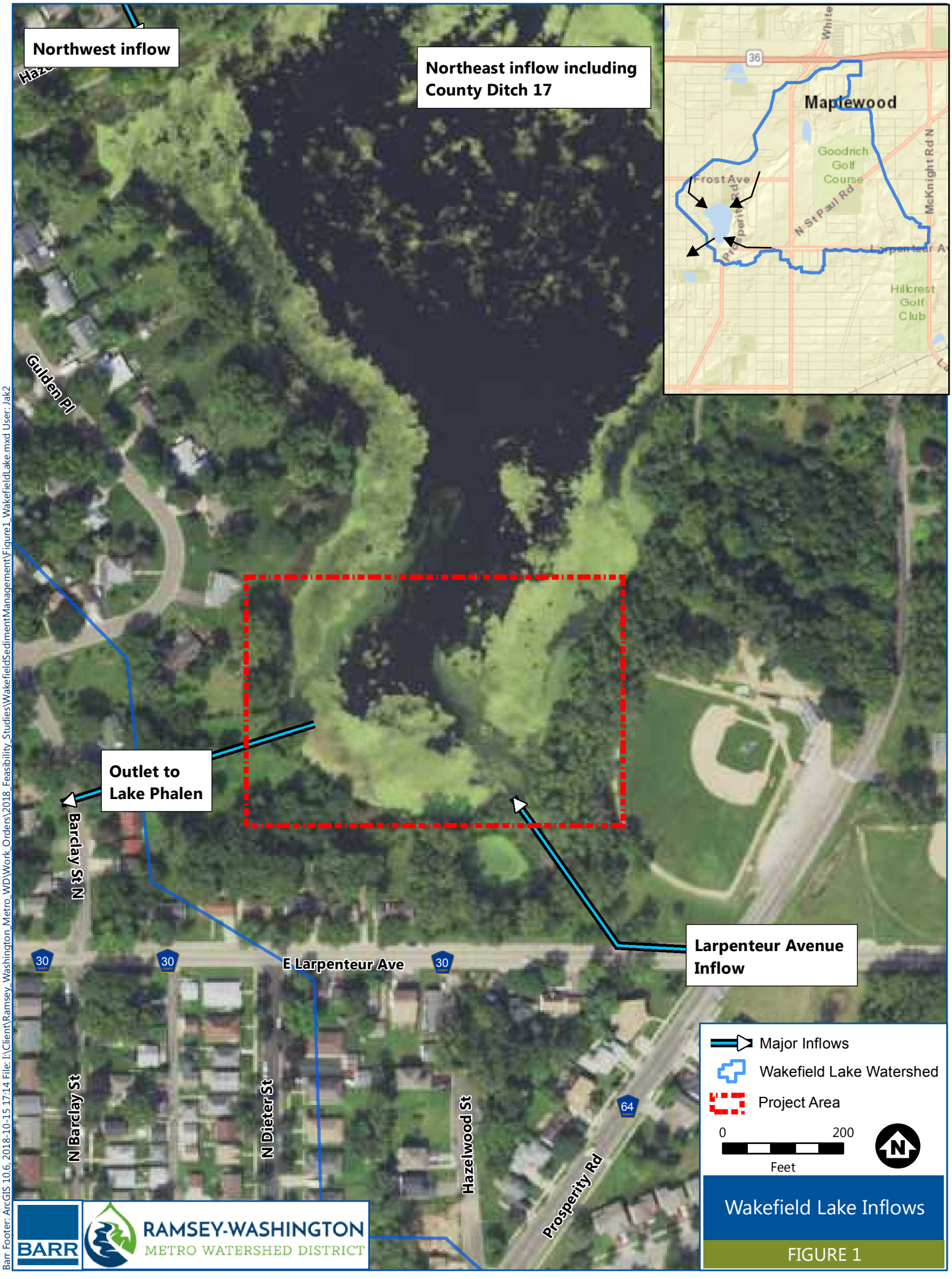
Based on the water quality modeling results and our estimated impact on the water quality of Wakefield Lake and Lake Phalen, complete dredging of accumulated sediment from the south end of Wakefield Lake is not recommended. However, a few alternative courses of action can be taken to help minimize future accumulation of sediment in Wakefield Lake and offer smaller-scale improvements.

One of the primary impacts on sediment accumulation in the lake is heavy pollutant loading from Larpenteur Avenue through an outfall on the south end of the lake. Most of the areas tributary to Larpenteur Avenue do not receive water quality treatment before discharging to Wakefield Lake. BMPs implemented through the permitting program, BMP retrofits, and infrastructure improvements should be targeted in this portion of the watershed to reduce the sediment loads to the lake to prevent further sedimentation on the south end of the lake. The RWMWD has already implemented several retrofit projects in this area, including those at Presentation Catholic Church and Woodland Hills Church. The RWMWD is also evaluating modifications to the small sedimentation pond on the south end of Wakefield Lake to improve water quality treatment.

In addition to looking for opportunities to reduce sediment loading from the Larpenteur Avenue watershed, the RWMWD could conduct targeted dredging of the inlet channel from the Larpenteur Avenue outfall and the accumulated sediment delta extending into the lake from the channel. This would increase future settling capacity of influent sediment and minimize accumulation in the main body of the lake. After the sediments are managed, the RWMWD could consider inspecting and maintaining this channel on a more regular basis. In addition, RWMWD could consider taking some measures to decrease the amount of trash that enters the lake from the Larpenteur storm sewer, a concern of residents,, through the installation of trash netting or other feature at the outfall.

Additionally, the District could monitor erosive conditions of the direct drainage area to the lake, especially along the recreational trails and baseball field on the southeast corner of the lake and take action if the areas show signs of more active erosion including install erosion control or improve vegetation cover. Currently there are some areas of minor erosion on the hillside next to the baseball

field, including some larger areas of bare soil although actual erosion from the bare surfaces seemed limited. However, it is possible that any eroded soil may collect on the flatter bench area at base of the slope and may not enter Wakefield Lake.



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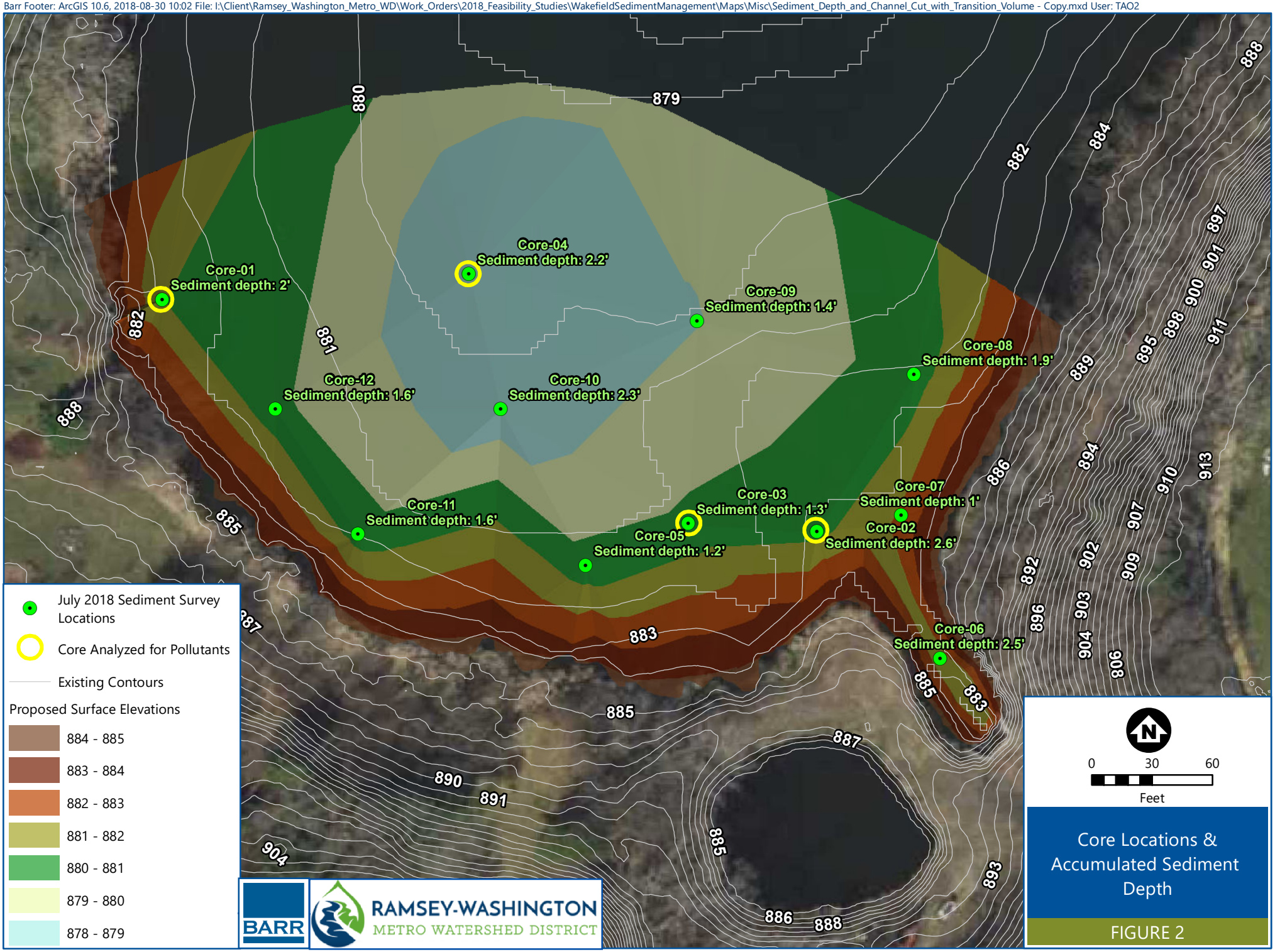
Core-01
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Core-08
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Core-03
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Core-07
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Core-06
Sediment depth: 2.5'
July 2018 Sediment Survey Locations
Core Analyzed for Pollutants
Existing Contours
Proposed Surface Elevations
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RAMSEY-WASHINGTON
METRO WATERSHED DISTRICT
Core Locations & Accumulated Sediment Depth
FIGURE 2

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 – November 2018
Date:	October 31, 2018

Project feasibility studies

Owasso County Park stormwater master plan and detailed design: phases I and II (Barr project manager: Matt Metzger; RWMWD project manager: Paige Ahlborg)

The purpose of this study is to assist the City of Shoreview Public Works and Ramsey County Parks with creating a holistic "living streets" retrofit design for North Owasso Road and best management practice (BMP) design for new parking lots in Owasso County Park.

The second phase of this collaborative effort began in July with meetings among the RWMWD, Barr, the county, the city, and the city's engineering consultant for reconstruction of Owasso Boulevard from Soo Street to Victoria Avenue. Recently, Barr further developed the conceptual design, which includes approximately 800 linear feet of permeable pavers at the park, a district-scale rain garden to manage stormwater from the park and roadway, and a network of pipes and pretreatment features to convey stormwater to the management features and large-event overflows to the lakes. The 60-percent design phase is ongoing and will transition into the final stages of design in November. A public meeting is scheduled for November 14. The team is developing accounting of the estimated project costs, runoff generation, and stormwater management by jurisdiction (city versus county). This accounting will inform development of a memorandum of understanding between the RWMWD, city, and county documenting the collaborative approach to stormwater management on the site, cost sharing, and identifying operation and maintenance responsibilities going forward.

Updates will continue through the duration of second-phase design as well as through the implementation phase in 2019. Barr staff and RWMWD staff will be engaged in the construction portion of the project to verify that the design implementation meets RWMMD standards and expectations.

System-wide evaluation of flood control options/Beltline resiliency study (Barr project manager: Erin Anderson Wenz; RWMWD project manager: Tina Carstens)

The purpose of this study is to evaluate system-level flood-damage-reduction options, including real-time mechanical alteration of Lake Phalen and Keller Lake channel outlet structures, as well as other critical system infrastructure, to actively manage stormwater runoff from flood-prone areas tributary to the Beltline storm sewer in an effort to reduce flood levels that would otherwise impact homes. The evaluation will use the RWMWD stormwater model to simulate system-level modifications to evaluate

how adjustments to outlet structures during a flood event may be able to optimize the existing system performance to reduce flooding impacts to homes adjacent to RWMWD-managed water bodies.

This period, Barr continued evaluating modifications to the outlet control structures on Keller Creek and Lake Phalen to identify a feasible operational plan to reduce upstream flood risk without adversely impacting downstream structures. There are several structures upstream and downstream of the outlet control structures that may be prone to flooding, so identifying a feasible operation plan is an iterative process. In the next few months, Barr will continue evaluating operational plans for the outlet structures on the Phalen Chain of Lakes to identify whether operation of those structures could further mitigate flood risk. The study is phased so that flood-prone areas in the upstream portion of the watershed are addressed first, working downstream.

If the study proves successful, recommendations for actual field modifications will be offered for future capital improvement programming.

Beaver Lake, Battle Creek Lake, and Lake Owasso subwatershed feasibility studies (Barr project manager: Josh Phillips; RWMWD project manager: Paige Ahlborg)

The purpose of this project is to evaluate BMP opportunities throughout the Beaver Lake, Battle Creek Lake, and Lake Owasso subwatersheds. These lakes are all considered to be "at risk" for nutrient impairment.

The reports for the Beaver Lake, Battle Creek Lake, and Lake Owasso subwatersheds are nearly complete. For the Beaver Lake study and Lake Owasso study, Barr is finalizing the report and preparing to present these studies to the RWMWD in the coming weeks. For the Battle Creek Lake study, Barr is assessing the water-quality benefit and public education opportunity associated with a potential BMP project in the Interstate 94/494/694 interchange. A presentation of this study is expected at the December board meeting.

District office permeable asphalt parking lot retrofit (Barr project manager: Matt Kumka; RWMWD project managers: Tina Carstens and Paige Ahlborg)

The purpose of this project is to assess the performance of the permeable asphalt parking lot at the watershed district office and create a range of retrofit options for the board and staff to consider.

Barr is discussing with paving contractors the feasibility of lightly milling the top layers of pavement away to expose more free draining materials. We are still awaiting some cost information from those contractors and potential timing for a test mill spot this fall.

Emergency response plan for Twin Lake, Grass Lake, and Snail Lake (Barr project manager: Erin Anderson Wenz; RWMWD project manager: Tina Carstens)

The purpose of this project is to evaluate the level of flood risk that Twin Lake's elevated water elevation poses to habitable structures and to verify the RWMWD's assumptions about the way that stormwater reaches the lake to better communicate risk (or non-risk) to area residents.

Barr and the RWMWD attended a public open house facilitated by the City of Little Canada on October 8. During the meeting, Barr and RWMWD staff explained drainage patterns in the Twin Lake watershed and presented historical water-quality information to address questions from residents. Information presented included the recent survey of critical outlet structures within the subwatershed, recent lake-level information, past water-quality data, historic precipitation data, and general groundwater patterns within the region. Residents asked questions related to how the Minnesota Department of Transportation unweave-the-weave project and East Vadnais Lake affects Twin Lake water surface elevations. Residents also volunteered to provide anecdotal information on lake levels for further validation of the RWMWD's stormwater model. The City of Little Canada offered to host another public meeting later this winter and requested that the RWMD attend to present responses to additional information provided by residents. At this point, we believe that an emergency response plan for this lake is unnecessary, as habitable structures do not appear to be at risk, even if the 100-year event were to happen while the lake is still elevated.

Emergency response plans for Snail Lake (involving protecting its lowest home and rerouting the emergency overflow when Snail Lake reaches 886.0) and Grass Lake (involving blocking any Grass Lake overflows from entering the pedestrian tunnel and instead routing them to wetland A) are underway and are expected to be completed in the next few weeks. The plans will be sent to the City of Shoreview for review and will be presented to the board at the December meeting.

Snail, Grass, and West Vadnais lakes outlet permitting with the DNR (Barr project manager: Erin Anderson Wenz; RWMWD project manager: Tina Carstens)

The purpose of this project is to coordinate permitting efforts for the proposed Snail, Grass, and West Vadnais lakes outlets with the DNR.

Barr will update the board at the November meeting about possible next steps (and their associated costs) in obtaining a permit for lowering West Vadnais Lake. At this point, based on discussions with the DNR and other Barr staff experienced in permitting work in public waters, it is likely that an environmental assessment worksheet (EAW) will be needed for West Vadnais Lake, but perhaps not for Grass Lake. We will orally share the expected cost of this effort at the board meeting, and will discuss how the results from the West Vadnais Lake to East Vadnais Lake gravity flow study may direct future efforts in lowering the level of West Vadnais Lake.

West Vadnais Lake to East Vadnais Lake gravity flow feasibility evaluation (Barr project manager: Erin Anderson Wenz; RWMWD project manager: Tina Carstens)

The purpose of this study is to understand the feasibility of lowering East Vadnais Lake levels and encouraging subsurface flow by gravity from West Vadnais Lake to East Vadnais Lake to reduce flooding in the Grass Lake area of the RWMWD. The scope of the study will give a better understanding of hydrologic dynamics between the connected water bodies and whether lowering East Vadnais Lake is a sufficient measure to reduce flooding while meeting the requirements of all involved stakeholders.

Geotechnical field work (soil boring and piezometer installations) occurred during the week of October 8. Additionally, RWMWD staff completed water-quality sampling of West Vadnais Lake, and the samples were shipped to Eurofins Laboratory and SePro Laboratory for analysis. Barr met internally to discuss groundwater and surface-water modeling to determine how the two lakes are hydraulically connected, and how lake mixing will affect water quality in East Vadnais Lake. The geotechnical investigations will provide information on the quantity and rate at which water could flow through the berm based on lake levels. The water-quality analysis will determine if there are any additional pollutants in West Vadnais Lake that East Vadnais Lake does not have, or if West Vadnais Lake has higher concentrations of certain pollutants. Modeling results will be communicated with all stakeholders (RWMWD board members and staff, Vadnais Lake Area Water Management Organization, and St. Paul Regional Water Service) to determine the next steps of the study. This meeting will be organized once modeling results are final.

Water-quality/project monitoring

Auto Lake monitoring systems (Barr project manager: Chris Bonick; RWMWD project manager: Eric Korte)

The purpose of this project is to install an automated system to monitor lake levels throughout the RWMWD and allow real-time transfer of data to the RWMWD's website for public consumption.

The RWMWD has recently called and/or emailed all owners of property where permanent monitoring stations are planned to inquire about approval. Many property owners are now asking for a specific site plan showing the location and footprint of the stations. We believe that all owners will ultimately approve having monitoring stations on their properties. However, the internal approval process is taking much longer than expected. With that said, we are making progress, and, once approved, we will order the equipment. We are optimistic that most of the equipment can be ordered before the end of 2018.

Maplewood Mall monitoring (Barr project manager: Matt Kumka; RWMWD project manager: Paige Ahlborg)

The purpose of this project is to assess the functionality of the Maplewood Mall stormwater retrofit project as it enters its fifth year of total completion. Features that will be inspected include all stormwater infrastructure, plantings, and tree growth. The findings, including site improvement and maintenance recommendations, will be summarized and presented to the board.

Inspections are now substantially complete, and Barr is reviewing the findings internally and processing them for usefulness. We are creating geographic information system (GIS) map figures to visualize the

data and inform the findings and recommendations memorandum. A draft memorandum is being prepared that describes current conditions and outlines recommendations for site improvements including structure repairs and tree replacements. Barr is also coordinating a scoping of the underdrains within several tree trenches to look for root penetration and sediment deposition.

Capital improvements

Wakefield Park/Frost Avenue stormwater project (Barr project managers: Erin Anderson Wenz and Fred Rozumalski; RWMWD project manager: Paige Ahlborg)

The purpose of this project is to work with the City of Maplewood and its consultants to develop a site plan that involves stormwater management features with associated educational elements for the northern portion of Wakefield Park.

The conceptual design phase of the project is complete. The proposed basins design has been presented to the City of Maplewood Parks Commission, which voted to move to the next phase of design. The project has yet to be approved by the city council. This past month, Barr refined the conceptual plan and ran final stormwater improvement models. The water-quality model shows a 41.5-pound reduction in total phosphorus from the new treatment facilities at Wakefield Park (including the Frost-Kennard spent lime filter). The TMDL-desired treatment reduction has been set at 51.8 pounds of total phosphorus. We anticipate that the project will go out for bid in early 2019.

School, commercial, and faith-based sites BMP retrofit projects (Barr project manager: Matt Kumka; 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 RWMWD.

Rain garden construction at the New Horizon Day Care in Woodbury and House of Prayer Lutheran Church in Oakdale is underway. Grading is complete at the House of Prayer rain garden, and Minnesota Native Landscape will move to New Horizon Day Care next. Grading will be completed this fall, and plantings are to occur in spring 2019.

Rough grading completed at the House of Prayer rain garden in Oakdale

Construction of the rain garden at the New Horizon day care in Woodbury

Roseville High School campus stormwater retrofit feasibility study (Barr project manager: Leslie DellAngelo; RWMWD project manager: Paige Ahlborg)

The purpose of this project is to evaluate the feasibility of a regional stormwater infiltration or filtration project and other local stormwater infiltration projects at Roseville High School. The school is designing an addition to the southeast end of the building, so the project will also include coordination with Roseville High School and its design engineers to place stormwater BMP retrofits.

Barr has evaluated a regional underground filtration BMP and developed draft concept-level design options, cost estimates, and estimated water-quality benefits. The results have been presented to the RWMWD in a draft memo. Barr continues to evaluate local BMP design options on the west side of the campus.

BMP incentive fund: general BMP design assistance and review (Barr project manager: Matt Kumka; RWMWD project manager: Paige Ahlborg)

The purpose of this project is to respond to requests for assistance to find cost-share opportunities from RWMWD partners and to seek opportunities for cost-share projects throughout the RWMWD.

Barr attended a kickoff meeting for the Aldrich Arena parking-lot reconstruction in Maplewood. Ramsey County is currently working on a design master plan for upgrades to the ice arena. The county is interested in a full parking-lot reconstruction that incorporates stormwater management features. Barr and the RWMWD will work with the county on a project scope in the coming weeks.

Construction at Maplewood City Hall has begun. Barr is observing construction of two rain gardens and helping coordinate installation of a custom sculpture near the entrance of the building.

Willow Pond CMAC Project (Barr project manager: Erin Anderson Wenz; RWMWD project manager: Tina Carstens)

The purpose of this study is to evaluate the feasibility of using CMAC technology in a project that involves diverting flows from Willow Pond to a filter that will remove dissolved and particulate phosphorus to benefit Bennett Lake.

Construction is nearly complete, and the site is mostly stabilized. Peterson Companies needs to complete plantings, instrumentation installation, and installation of the stop logs, check valve, and final restoration and stabilization.

Frost/Kennard enhanced water-quality treatment BMP (Barr project manager: Erin Anderson Wenz; RWMWD project managers: Tina Carstens and Paige Ahlborg)

The purpose of this project is to prepare plans and specifications, conduct project bidding, and observe construction for the water-quality BMP enhancement retrofit of the existing infiltration basin located on the parcel owned by the City of Maplewood. The parcel is located in the southwest quadrant of the intersection of Frost Avenue and Kennard Street.

Construction is complete. The filter is online, and the monitoring equipment is installed.

Completed Frost/Kennard enhanced water-quality treatment BMP (BMP is underground) in Maplewood

CIP project repair and maintenance

Beltline and Battle Creek tunnel repair construction services (Barr project manager: Nathan Campeau; RWMWD project manager: Dave Vlasin)

The purpose of this project is to perform ongoing maintenance and repairs of the Beltline tunnel system to significantly increase the service life of the tunnel.

The managers approved the final pay application and change order for the contractor. Barr completed the draft construction report and record drawings for RWMWD review. We anticipate issuing the final construction report in the next period.

CIP maintenance/repairs 2018 project (Barr project manager: Greg Nelson; RWMWD project manager: Dave Vlasin)

The purpose of this project is to maintain the existing systems and infrastructure owned and operated by the RWMWD and to assist and facilitate stormwater pond cleanouts to allow other public entities to meet their MS4 requirements.

One item remains and is expected to be completed by November 2. The contractor has orally committed to completing the cattail cleanout at site 12C this week to fulfill all requirements of the contract. Barr will prepare final submittals for payment and project closeout in November, assuming that the project is complete as promised. If continued delays are encountered, we will update the board at the November 7 meeting.

New-technology mini case studies: ProCom NEPTUN system (Barr project manager: Matt Kumka; RWMWD project manager: Tina Carstens)

Innovative technology	The NEPTUN system is a fish deterrence and guidance system that produces a non-linear electric field in an aqueous environment using a set of positive and negative electrodes. The electric field developed between the electrodes deters fish passage down a main channel and can also guide fish species to either a fish trap (invasive species removal) or a fish passage (guidance around dams).
Use	The NEPTUN system can be used for fish protection at surface-water intakes, fish protection during the operation of hydroelectric power plants, fish guidance through fish passes, and protection against invasive species migration.
Benefits of technology	▪ Fish protection and fish migration support ▪ Water-quality improvements of lakes and streams through the disruption of invasive species migration ▪ Water-quality improvements of lakes and streams through invasive species trapping and removals ▪ The electric field reduces paralysis of fish, fry, or other aquatic organisms and does not negatively impact reproduction. ▪ The electric fields do not cause negative impacts to humans ▪ Portable and fast installation without major channel modification
Drawbacks	▪ May be more susceptible to floating debris compared to horizontal electric barriers and require more maintenance ▪ Research is needed to verify that the barriers do not negatively impact migration of other aquatic organisms when used as a barrier to invasive species migration
Case studies/applications	▪ Rice Creek to prevent carp migration and promote trapping (Minnesota) ▪ Chocolay River (Michigan) and Bridgeland Creek (Ontario) to capture sea lamprey ▪ Laboratory tests on carp behavior and passage (Ontario)
Suppliers/contacts	**PROCOM SYSTEMS S.A. (supplier)** Ul. Pólnocna 15-19 bud. 2.2. 54-105 Wroclaw, Poland +48 71 77 66 700 info@fishprotection.eu **Przemyslaw Bajer, University of Minnesota (local contact)** +1 612 625 6722 Bajer003@umn.edu
Conclusion	The ProCom NEPTUN system offers a new and innovative electrical fish barrier alternative that has been shown to significantly reduce the passage of fish species through the barrier and assist in guiding invasive species to traps for removal.

Technology description

The NEPTUN system is a new approach to electric field generation to deter fish passage. The system produces a non-linear electric field that extends from an array of positive and negative electrodes (50 to 80 volts). An electric field is generated between the positive and negative electrodes where the intensity increases as the fish approaches the negative electrode. The variation in electric field intensity assists in deterring both small and large fish at different distances from the negative electrode. Large fish will generally be deterred farther away from the negative electrode, while small fish will be hindered as they approach closer to the negative electrode (figure 1). The goal of the electric field is not to stun fish, but to stimulate their neuromuscular system, allowing them to escape the field.

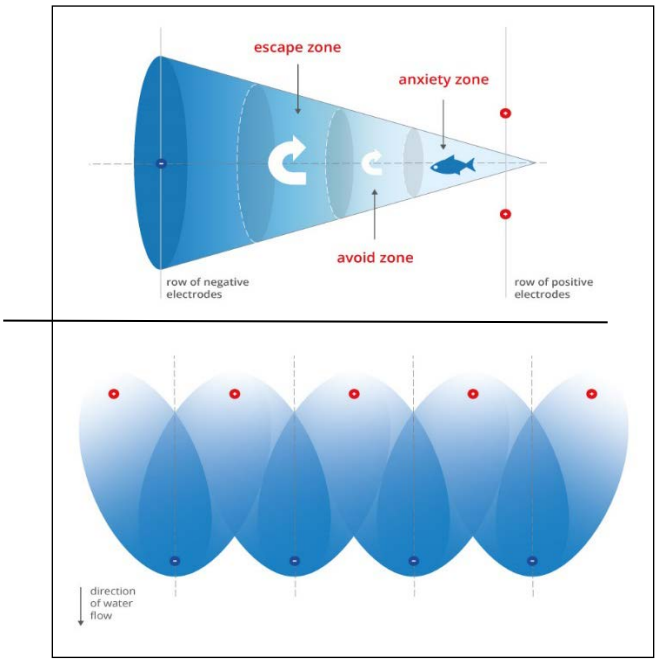


Figure 1: Electric field generation of the NEPTUN system (http://fishprotection.eu/)

Where the NEPTUN system differs from traditional fish electric field systems is this production of a non-homogeneous electric field. In traditional systems, the electric field generated between electrodes is homogeneous, and the amount of electric energy absorbed by a fish species depends on the size of the fish, the amount of time spent in the electric field, and the intensity of the electric field (which can be adjusted by a transformer). Thus, if the electric field in traditional systems is set to a voltage that deters larger fish, the field strength may not affect the passage of smaller fish. If the voltage is increased to also deter smaller fish from migrating through the electric field, larger fish may be paralyzed or killed by the electric field.

The positioning of the electrodes to produce this non-linear electric field results in high efficiency of fish deterrence, reaching up to 100-percent efficiency on past projects (examples discussed below). However, even though the electric field has a high efficiency in deterring fish species, the goal of the electric field is not to paralyze fish or harm other aquatic organisms. Additionally, the electric field is safe for humans. No negative impacts will result if a human were to fall or swim into the electric field.

Main applications

There are three main applications for the NEPTUN system which include: 1) fish protection at surface-water intakes, 2) fish protection during the operation of hydroelectric power plants and the direction of fish to fish passages, and 3) the prevention of invasive species migration (figure 2).

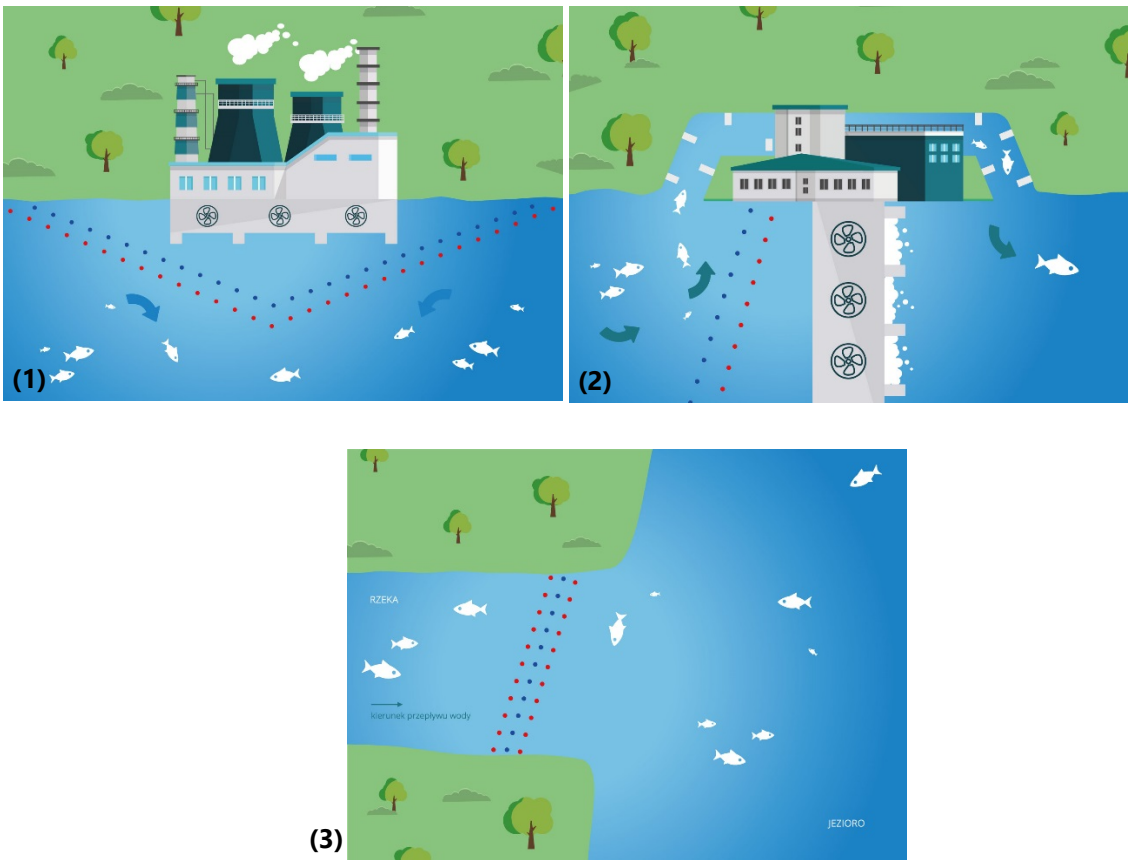


Figure 2: NEPTUN system applications (http://fishprotection.eu/)

Fish protection at surface intakes

Juvenile fish or individuals with poor swimming capacity can be negatively impacted from water intake systems. The current technology involves constructing heavily gridded covers and grills on the intake inlets to provide protection. However, this can result in the accumulation of debris and trash, which can reduce the efficiency and amount of water entering the intake and requires more frequent maintenance, which increases operating costs. By using the NEPTUN system, water intake efficiency can increase through the less frequent use of heavily gridded intake covers. Fish can also be protected by deterring them from entering the intake area or through directing them around the intake inlet to fish passages.

Fish protection at hydroelectric dams and direction to a fish passage

Even if sufficient fish passages are provided, fish migrating downstream can be injured or killed in hydroelectric dam turbine chambers, through sudden changes in water pressure or velocities, and through cavitation (mechanical development of air pockets). The current approach is to use heavily gridded covers and grills on turbine inlets. This can effectively limit fish access to the turbines, but still results in fish death due to high water velocities at the intakes that can pull fish onto the covers. By employing the use of a NEPTUN system upstream of the hydroelectric dam and just downstream of the fish passage, fish can be directed away from the turbines and safely to the fish passage.

Fish protection against invasive species

The emergence of invasive fish species in aquatic ecosystems can create a fishery imbalance as well as create water-quality concerns (e.g., common carp). Current management efforts to reduce invasive fish species impacts on aquatic ecosystems include chemical treatments, winter seining, commercial fishing, aeration of spawning grounds to prevent recruitment, and the use of predatory fish to prevent recruitment (e.g., bluegill predation of carp eggs). By installing the NEPTUN system across a river channel, the system can effectively prevent the movement of fish to and from spawning sites. Furthermore, a fish trap can be placed at one end of the system so that invasive fish species are guided to the trap and can be removed from the aquatic ecosystem.

Case studies

*NEPTUN **s**ystem installed at two location on Rice Creek to prevent carp migration and promote carp capture (Minnesota)*

In 2017, two NEPTUN systems were installed on Rice Creek to prevent the migration of carp. One system is positioned near Long Lake to prevent the migration of adult carp from Long Lake to their upstream, shallow spawning grounds in the Lino Chain of Lakes. The second system is placed near the Lino Chain of Lakes system to prevent the migration of juvenile carp to Long Lake. The electrodes are angled across the creek in such a way that the electric field guides the carp to a gate, which leads them to a ladder system directing them to a metal chute. This chute contains a Whooshh System that pneumatically propels carp through a plastic tube into a holding bin on shore. Initial testing of this system found that the carp aggressively tried to cross the electric barrier, but were not successful. A presentation by Matt Kocian from the Rice Creek Watershed District at the October 2018 Minnesota Water Resources Conference indicated that researchers are seeing 90- to 100-percent efficiency of carp deterrence by the NEPTUN system and 74-percent removal efficiency. The Rice Creek Watershed District is leasing and testing the ProCom NEPTUN system for two years for $120,000. If the district decide to purchase the system, it will cost an additional $30,000.

Figure 3: ProCom NEPTUN system on Rice Creek (http://fishprotection.eu/)

Figure 4: Carp removal system on Rice Creek (fish ladder, Whooshh System) (https://medium.com/@MnBWSR/the-potential-application-is-huge-3789a37fa190)

Additional information provided in the following publication:

Bajer, P.G., Claus, A.C., Wein, J., & Kukulski, E. (2018). Field test of a low-voltage, portable electric barrier to guide invasive common carp into a mock trap during seasonal migrations. Management of Biological Invasions. Vol 9, Issue 3, Pp. 291 – 297.

NEPTUN system installed on the Chocolay River (Michigan) and Bridgeland Creek (Ontario) to capture sea lamprey

A NEPTUN system was used on the Chocolay River to direct sea lamprey, an invasive species, to a portable trap. The system was operated every other night to compare how many sea lamprey could be captured in the trap with the electric field in use and not in use. Results showed that during nights when the electrodes were in use, approximately 33 percent of the tagged sea lamprey moving upstream were captured in the trap, while only 2 percent were captured when the electric field was off. Additionally, when the electric field was off, 96 percent of the tagged lamprey were able to swim upstream. When the electrodes were on, only 22 percent of the lamprey were able to swim upstream to spawning grounds.

A NEPTUN system was also installed on Bridgeland Creek in Ontario, Canada, and was used every night during two migratory seasons. During the first season, 2,440 sea lamprey were captured. Of the 422 tagged sea lamprey that approached the trap, 58 percent were captured. During the second season, 1,213 sea lamprey were captured. Of the 565 tagged sea lamprey that approached the trap system, 75 percent were captured. Although the voltage was set to a level less than the threshold expected to cause injury, the NEPTUN system and downstream areas were surveyed daily to assess impacts on fish species. During both seasons, 37 dead fish were observed in or near the electric lead (25 sea lamprey and 12 other fish species). The cost of the trapping device with the NEPTUN system was approximately $45,000.

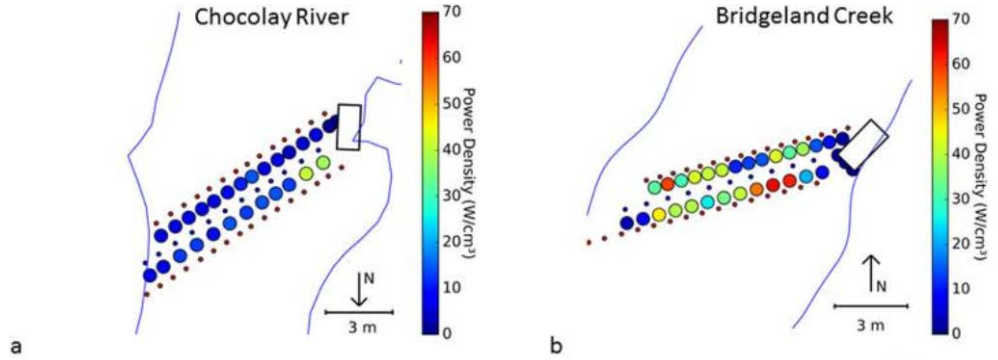


Figure 5: NEPTUN system installation set-up (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4920034/)

Additional information provided in the following publication:

Johnson, N.S., Miehls, S., O'Connor, L.M., Bravener, G., Barber, J., Thompson, H., Tix, J.A., & Bruning, T. (2016). A portable trap with electric lead catches up to 75% of an invasive fish species. Scientific Reports. Vol. 6. (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4920034/)

Lab tests of the NEPTUN System on deterring carp migration (Ontario)

Laboratory tests were conducted in Ontario, Canada, to determine the effect of the NEPTUN system on the crossing rates and behaviors of common carp. Wild common carp were captured and placed into a rectangular tank that contained a NEPTUN system consisting of four electrodes (figure 6). The behavior of 45 different common carp were assessed (three per 30-minute trial). During the period when the electrodes were turned on, the researchers observed the following behaviors most frequently: stunned and stays on same side of barrier, slow approach and slow retreat, and quick approach and strong turn away from the barrier (figure 7). There was one occurrence where the fish was considered over-paralyzed and dead and five instances where the fish were paralyzed. When the electrodes were on, the carp were also noted to spend significantly more time in sections 3 and -3, as shown in figure 6. For crossing rates, a mean crossing rate of one fish per trial was observed when the electrodes were on, which is significantly less than when the electrodes were turned off (15 crossings). The researchers realize that there are limitations to lab studies and that the behaviors of carp may be different in a field setting. However, the study did find that the NEPTUN system was effective in preventing the movement of common carp and provided valuable insights on how common carp respond behaviorally to this type of an electric barrier.

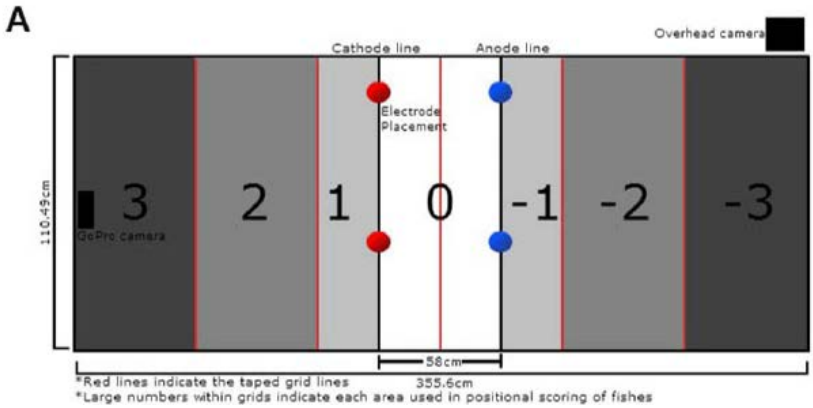


Figure 6: Experimental set-up of the laboratory tests with common carp and the NEPTUN system (http://reabic.net/journals/mbi/2017/Accepted/MBI_2017_Kim_Mandrak_correctedproof.pdf)

Figure 7: Common carp turning away from the NEPTUN system (http://fishprotection.eu/)

Additional information provided in the following publication:

Jaewoo, K. & Mandrak, N.E. (2017). Effects of vertical electric barrier on the behavior of common carp. Management of Biological Invasions. Volume 8. (http://reabic.net/journals/mbi/2017/Accepted/MBI_2017_Kim_Mandrak_correctedproof.pdf)

NEPTUN system installed on the Odra River near the Wroclaw Water Power Plant (Wroclaw, Poland)

A NEPTUN electric barrier was placed near the Wroclaw Water Power Plant in October 2015 to test the effectiveness of preventing fish entry. Results of the project indicate that the barrier was 96.8-percent effective at deterring fish entry (figure 8).

Figure 8: NEPTUN system installed at the Water Power Plant on the Odra River in Poland (http://fishprotection.eu/)

Other applications

The NEPTUN system has also been installed in locations such as the Witka River (Poland), the Nysa Klodzka River (Poland), Lake Geneva (Switzerland), and the Madeira River (Brazil).

Cost

NEPTUN cost varies depending on the application, location of the installation, and aquatic ecosystem characteristics (cross-section length of the channel, depth of the channel, etc.).

Maintenance

The frequency of cleanings will vary depending on site conditions, including local climate, surrounding environment, and amount and frequency of debris/trash accumulation on the electrodes. Due to the vertical orientation of the electrodes, perpendicular to the flow, the system may be more susceptible to floating debris compared to horizontal electric barriers and require more maintenance.

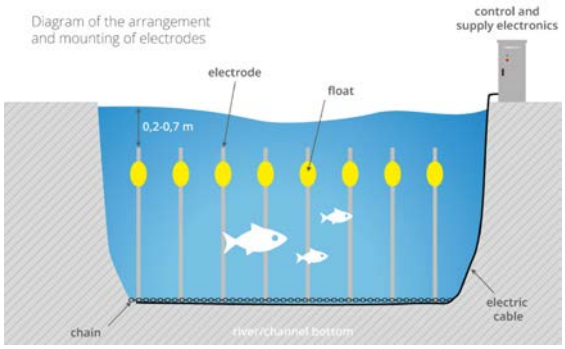


Figure 9: Orientation of the NEPTUN electrodes

Conclusion

The ProCom NEPTUN system offers a new and innovative electrical fish barrier alternative that has been shown to significantly reduce the passage of fish species through the barrier and assist in guiding invasive species to traps for removal. The system is portable and has ease of installation. Because of the non-homogeneous electrical field, the system has a higher efficiency for deterring fish of various sizes and provides more time for fish to react to the field, reducing the number of fatalities. The primary drawback of the system is that the vertical arrangement of the electrodes may require more maintenance than the traditional horizontal systems, depending on specific site characteristics.

Natural Resources Update – Bill Bartodziej and Simba Blood

Grass Lake Berm Repair (after the big rains)

Soon after the contractor had completed the final grading and the path installation, the NR team installed a native seed mix with a prairie seed drill (Sept. 11th). This approach will maximize the effectiveness of the native seeding. With a fall installation, the native seed will typically lay dormant until the following spring. In order to achieve a quick cover of vegetation, we also seeded a high rate of annual oats and winter wheat (cover crops).

A dew drop seeder was used to install seed on the berm.

Once we completed the seeding, the contractor came in (September 12) and covered all of the seeded areas with hydro-mulch for erosion control. Unfortunately, between September 17 and 20, we had over five inches of rain, including some periods of severe and prolonged downpours. Being such a short period between the seeding and the substantial rain events, the oats and wheat did not have a chance to establish, and several areas along the slopes failed and experienced gully erosion.

The severe rain events caused 1-2' gullies on the slopes.

After these major rain events, the berm and the slopes were again surveyed and deemed structurally sound. The bulk of the repair had to do with bringing soil from the base of the slopes up to fill the gullies. In addition, the damaged slope areas were re-seeded with native seed and a cover crop. Being so late in the growing season, it was decided to cover the repaired slope areas with a straw-coconut fiber erosion control blanket. This material will last for about one year, giving this area maximum protection throughout the winter and into the next growing season. We employed Ramsey County Corrections Greenhouse staff to assist with the re-grading and NR staff installed the erosion control blanket. Although this area had a pretty tough go of it this fall, in terms of vegetation establishment, it is now well fortified and the native seed will get off to a superb start next spring.

Sean from RCC re-grading the site with a skid-steer.

A heavy duty straw-coconut fiber blanket will protect the slope over the winter.

Gullies and soil deposition before repair

After re-grading, re-seeding and blanket installation

Public Involvement and Education Program – Sage Passi

New Master Water Stewards Recruited in Our Watershed

Our new team of Master Water Stewards toured our Watershed District on October 13. Their first stop was at Michelle Natarajan's newly established bee lawn on the east side of St. Paul. They visited this 2018 demonstration capstone project installed in late summer that converted Natarajan's traditional turf grass lawn to a more resilient blend of fine fescues and clover with native plantings on her boulevard. These six new Master Water Stewards include Stuart Knappmiller, Bobbie Scott, Bette Danielson and Logan Stapleton who reside on the east side of St. Paul, Ann Hagerman who lives in Little Canada next to Lake Gervais and Vince Tilley who resides in Vadnais Heights. Classes for the East Metro cohort from RWMWD, Capitol Region Watershed District, VLAWMO and Washington Conservation District teams will be held for the next six months.

Bobbie Scott (left) and Bette Danielson (right) explore Kristy Odland's LEAP award-winning yard in East St. Paul on the fall watershed tour. Kristy (center) incorporated many native plants and multiple rain gardens in her yard across from Beaver Lake.

A graduation celebration for the 2017-2018 Master Water Stewards was hosted by Freshwater Society at the Loppet Center at Theodore Wirth Park on October 16. It was fun to see alternative turf growing in gardens in front! Congratulations to our graduating stewards, Michelle, Melissa, Phil and Chris!

Smart Salting Level 1 Class Hosted by RWMWD in Woodbury

RWMWD partnered with the City of Woodbury, Washington Conservation District and Fortin Consulting on October 11 to offer a Smart Salting Level 1 workshop for city, county and private contractors who provide winter services for parking lots and sidewalks. Twenty-one people attended the training with presentations by Josh Dix (City of Roseville) and Lauren Schulzetenberg (Fortin Consulting).

During the workshop, Josh Dix, Working Foreman for the City of Roseville offered a strong knowledge of salt's environmental impacts and incorporated his own practical experience in salt reduction. In 2017 Josh Dix led Roseville's efforts to become one of the first Level 2 certified cities in the Minnesota Pollution Control Agency Smart Salt Training program. He built a brine sprayer from scratch to reduce the amount of salt being used during snowstorms. For this work, he received an Environmental Leadership Award from the Freshwater Society for reducing the amount of chlorides applied to city streets.

Schools Explore Water Issues through October Pre-Lessons and Field Trips

L'Etoile du Nord 4th graders check out an inlet into Beaver Lake (left). Central Park fifth graders explore life in the wetland at Harriet Alexander Nature Preserve adjacent to their school (right).

October was a packed month with pre-lessons, field trips and service projects arranged by our watershed for twenty classes from L'Etoile du Nord, St. John's School, Weaver Elementary, Battle Creek Elementary, Battle Creek Middle School and Central Park Elementary. L'Etoile du Nord 4th graders walked to the Beaver Lake neighborhood to learn about a rain garden and trench drain installed at a Master Water Steward demo residential demo site. They also visited Ann Hutchinson's yard and did a leaf pick-up at storm drains near her house, then explored an inlet and outlet at nearby Beaver Lake. St. John's School seventh graders visited the District's office site features and tested water in Gervais Creek.

Weaver fifth graders walked to Wakefield Lake and explored one of the original rain gardens in the park, then traveled around the lake to the boardwalk to collect samples and measure the dissolved oxygen and transparency in the lake. Central Park fifth grade classes did a scavenger hunt in the woods and wetland boardwalk area in Harriet Alexander Nature Center and cleaned up storm drains in the parking lot next to the Wildlife Rehabilitation Center. L'Etoile du Nord fifth graders stenciled storm drains in their neighborhood. Battle Creek Middle School students did water quality monitoring on Battle Creek and Battle Creek Elementary fifth graders took a watershed walk in their neighborhood.

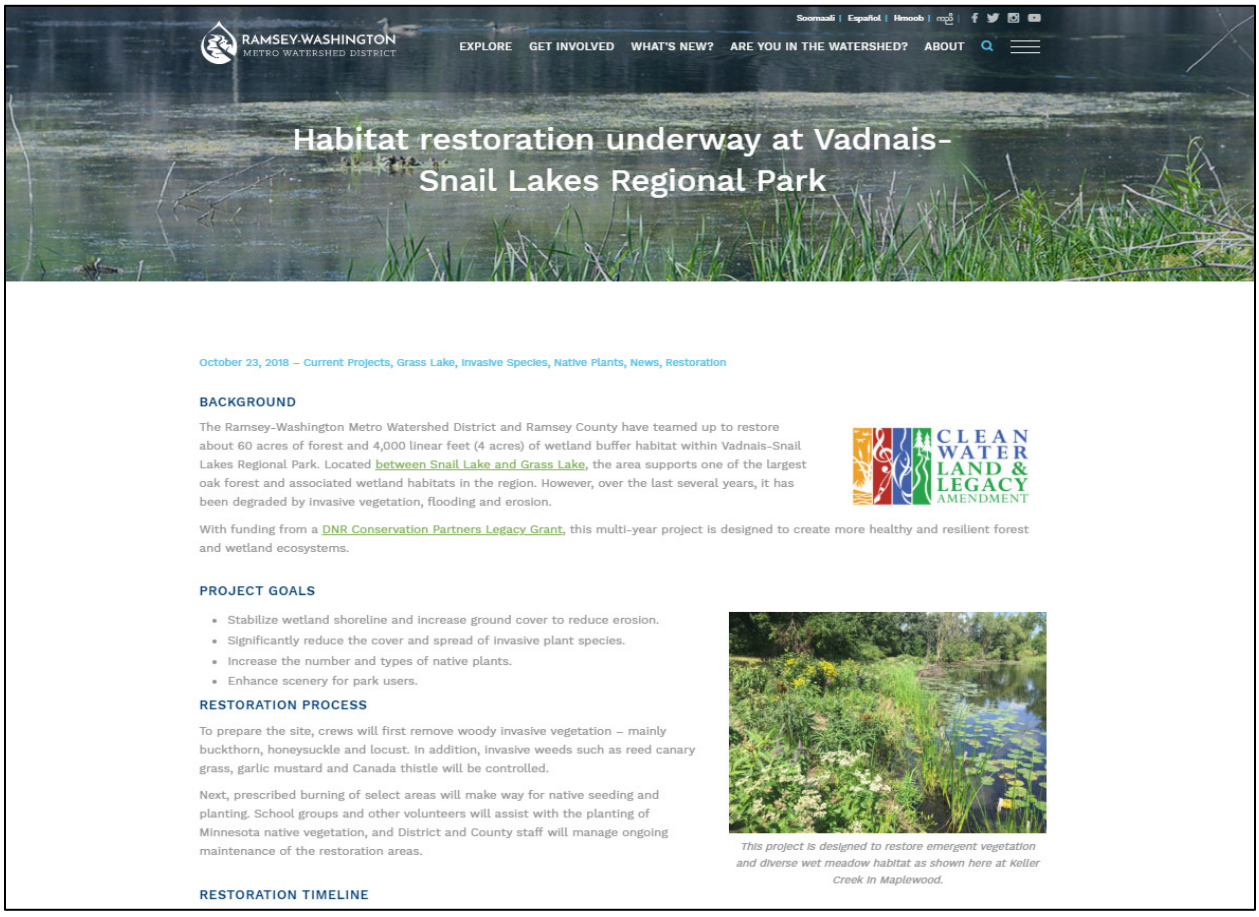
Neighborhood clean-ups. Below left: Central Park fifth graders. Below right: L'Etoile du Nord 4th graders

Communications Update – Chris O'Brien

Website updates

Vadnais-Snail Lakes Restoration

As work begins on the three-year restoration project in Vadnais-Snail Lakes Regional Park, we launched a project page with information and a map of the work planned for this area. The URL appears on four "Restoration in Progress" signs, which are being installed onsite so that interested park visitors can learn more about the project. As work progresses, we plan to add photos and updates to this page.

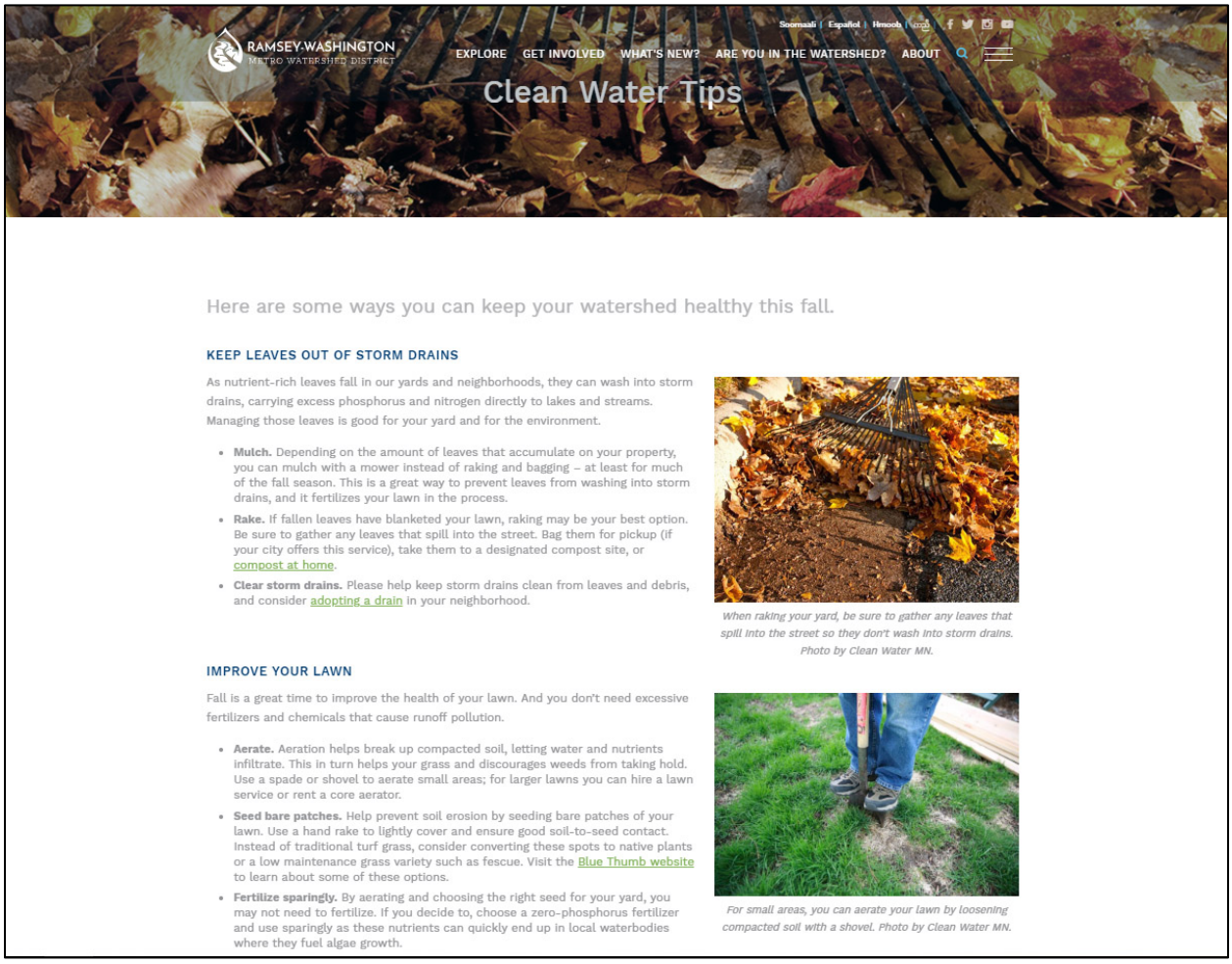


Shallow lakes video

In order to make our "Getting to Know Shallow Lakes" video easily searchable on the site, we added a blog post about the video that includes a link to view it on YouTube. The video is also linked on our homepage and on the pages for shallow lakes including Battle Creek, Beaver, Bennett, Eagle, Emily, Keller, Kohlman, Round, Shoreview, Wakefield and Willow lakes.

Seasonal tips

We updated our Clean Water Tips page (formerly Homeowner Tips) for fall with leaf/storm drain maintenance, lawn improvement tips and aquatic invasive species prevention.



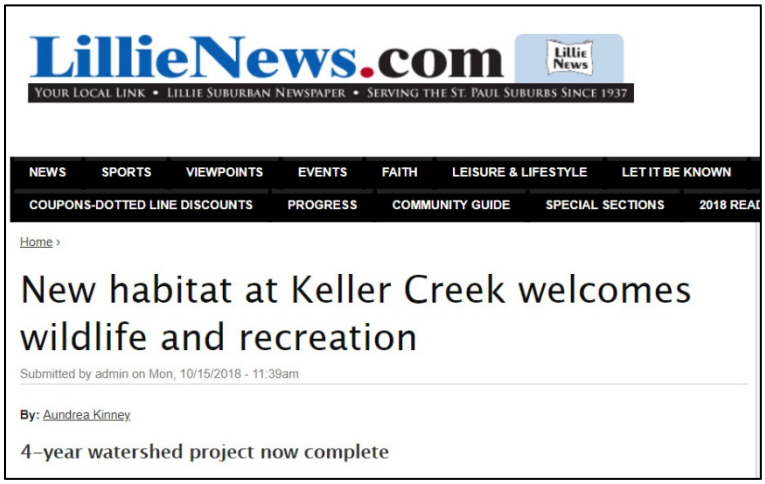
User testing results

Over the summer, Windmill Design conducted user testing on the new site with three audiences: engineers, educators and residents. The results were very positive overall with comments that users appreciated the clean design, concise language, photos, map functionality and ease of access to information.

Based on feedback from the user testing, we added a link on the homepage features to our Watershed Map page as a way to better promote this feature. Comments also suggested that Stewardship Grants could be more prominent, and we will add this to the homepage features when we start accepting applications again for next year.

Keller Creek article in Lillie News

The Ramsey County Maplewood Review published an article on our four-year Keller Creek restoration project. The article talks about the history of the creek. The reporter walked the site with Bill and Chris, RWMWD, to ask questions, and she is interested in covering future projects as well.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Home ›

New habitat at Keller Creek welcomes wildlife and recreation

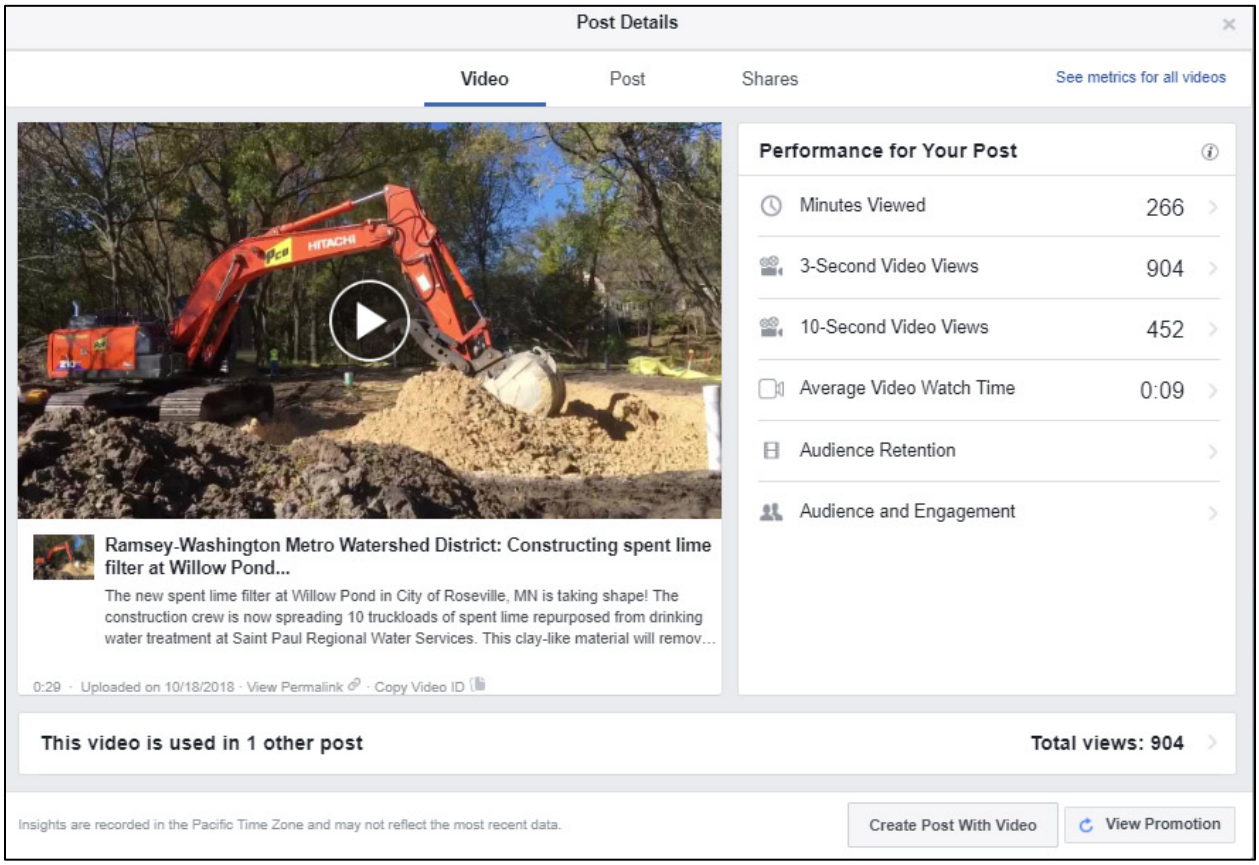
Submitted by admin on Mon, 10/15/2018 - 11:39am

By: Aundrea Kinney

4-year watershed project now complete

Social media

Our top post this past month was a short video of construction at the new Willow Pond Spent lime filter as the crew used an excavator to spread spent lime material in the treatment basin. The video was viewed more than 900 times on Facebook.



Office signage

We have begun pulling together ideas and quotes for updating the monument sign in front of the District office with our new logo. Below is photo of the current sign (left) and the new aluminum signage option we are considering (right):

With temperatures dropping this fall, we will likely need to wait until spring to install the new sign, which will include removing the old signage and patching/painting the monument. The Citizen Advisory Committee would also like to weigh in on design options before we make a final decision.

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Informational Items

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DNR Analysis: Current Groundwater Use Is Sustainable But Does Affect White Bear Lake

WHY WE'RE PUBLISHING THIS

Water levels in White Bear Lake have been the subject of public debate for over a century, with people thinking they are sometimes too high and sometimes too low. Most recently, a 2012 lawsuit by the White Bear Lake Restoration Association and White Bear Lake Homeowners Association charged that the Minnesota Department of Natural Resources (DNR) was allowing communities and businesses in the area to use too much groundwater, leading to unacceptably low lake levels that harmed White Bear Lake and violated Minnesota's water sustainability standard. In August 2017, the Ramsey County District Court ruled in favor of the associations and ordered DNR to make several modifications to existing permits and conduct additional analysis to determine whether further changes are needed. This publication presents the results of that analysis in a public newspaper, as required by the court.

Figure 1 shows the long-term water level record for White Bear Lake. The fact that water levels on White Bear have fluctuated considerably over time is well-established, as is the fact that the lake is connected to its underlying aquifers. What has been less clear is the relative impact of groundwater use on lake levels, compared with precipitation and evaporation. Building on previous work by the US Geological Survey and a nationally recognized groundwater modeling firm, DNR has developed a new groundwater flow model, completed in August 2018, that allows us to distinguish weather effects from groundwater use and helps us understand the impact of individual permits. To develop the model, DNR consulted other agencies and experts, and used the best available data on water use, precipitation, and evaporation.

KEY FINDINGS

Using a state-of-the-science groundwater flow model and the best available data, DNR's major findings from its analysis of permits that include wells within 5-miles of White Bear Lake (Figure 2) are:

1. Groundwater use has been declining (Figure 3)
2. Current groundwater use complies with Minnesota's sustainability standard (see inset at top of next page)
3. Current groundwater use has contributed to water levels falling below the recently established protective elevation for White Bear Lake (established in 2016 to protect recreational uses)
4. Temporary irrigation bans within nearby cities would not have a significant effect on water levels in White Bear Lake

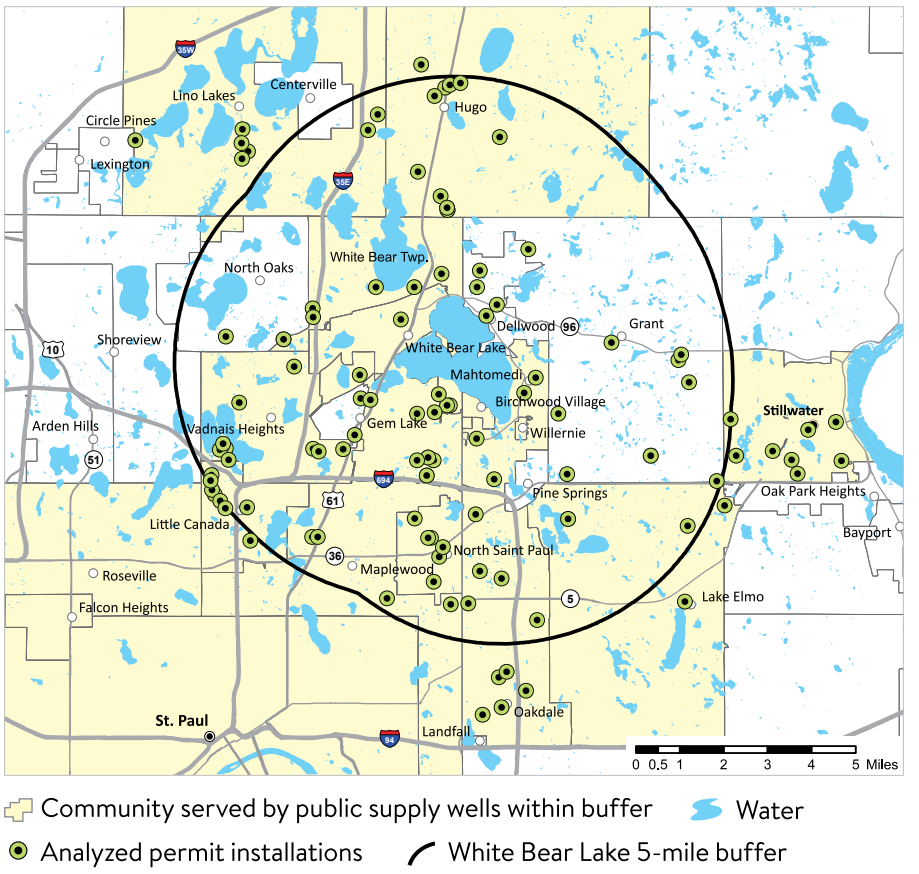

Figure 2. This map shows the approximate location of the permits that were included for this analysis, along with the 5-mile radius around White Bear Lake. The yellow areas indicate the communities that are served by water supplies with at least one well within the five-mile radius and that are thus subject to the court's order. Unshaded areas either do not have public water supply wells or the wells are located entirely outside of the 5-mile radius.

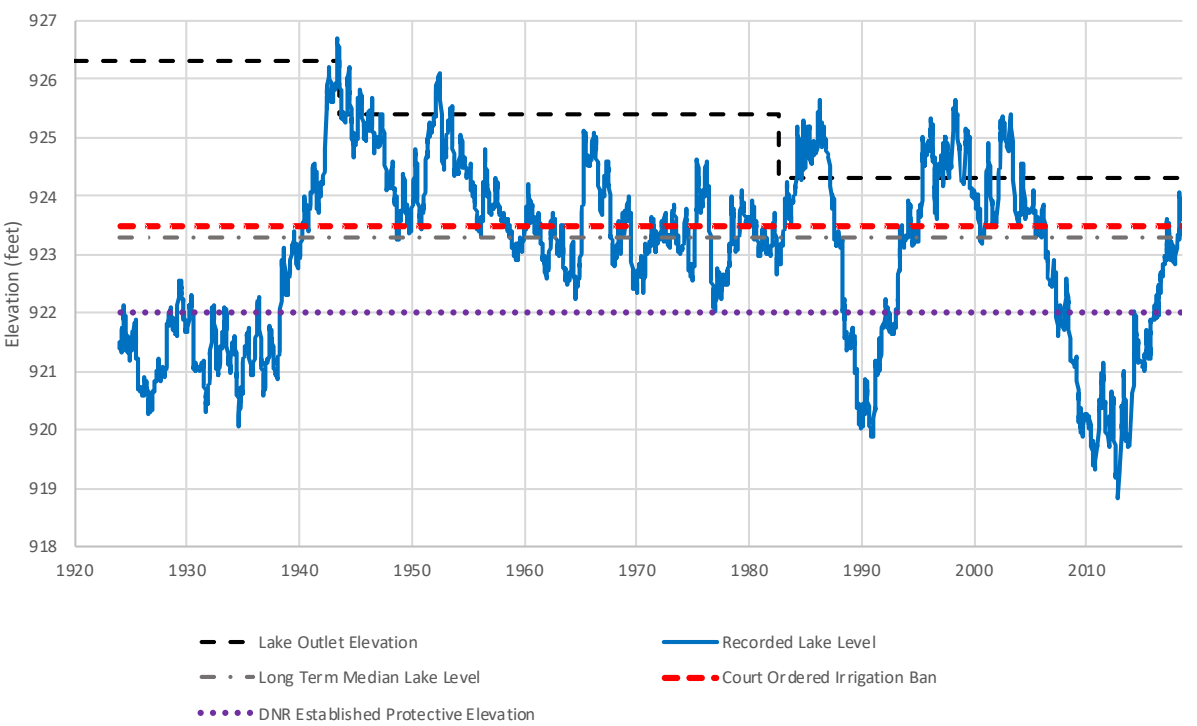

Figure 1. This graph illustrates that water levels have fluctuated widely in White Bear Lake over the last ninety years. The graph also shows historic lake levels relative to several key elevations, including the lake's outlet, which has varied over time and is currently 924.3 feet; the long-term median lake level of 923.3 feet; the court's residential irrigation ban trigger of 923.5 feet; and the protective elevation of 922.0 feet that DNR established in 2016.

What we analyzed

The Ramsey County District Court ordered DNR to review all existing groundwater appropriation permits within five miles of White Bear Lake, both individually and cumulatively, to ensure they meet the state sustainability standard (see inset at top of next page). The court also ordered DNR to assess the sustainability of an unprecedented scenario in which all of the permitees within 5-miles of White Bear Lake pump at their maximum permitted rates. Groundwater is used to supply drinking water—as well as water for businesses, irrigation, and other uses—in the five-mile area.

To conduct this analysis, DNR established a 5-mile radius around White Bear Lake and identified 44 groundwater permits within that area (Figure 2). It is important to note that communities often have multiple wells under a single groundwater appropriation permit. For purposes of this analysis, if a community had wells both within and outside the 5-mile radius, DNR considered all of their wells and their total water use in this analysis. Approximately 500,000 people are served by community water supplies subject to the court's order. See Figure 2 for a depiction of the communities affected and approximate location of all permits that were analyzed. Further details regarding how we conducted our analysis are provided in the Analysis section.

Where to go for more information

This publication summarizes DNR's analysis and findings at a high level. Additional information on our groundwater flow model and our full technical analysis are available at:

www.mndnr.gov/gwmp/wbl/index.html

Minnesota Statute 103G.287, Subd. 5. Sustainability standard.
The commissioner [of the DNR] may issue water-use permits for appropriation from groundwater only if the commissioner determines that the groundwater use is sustainable to supply the needs of future generations and the proposed use will not harm ecosystems, degrade water, or reduce water levels beyond the reach of public water supply and private domestic wells constructed according to Minnesota Rules, chapter 4725.

ANALYSIS SUPPORTING OUR FINDINGS

To comply with the court order, DNR analyzed three groundwater use scenarios, using the groundwater flow model to predict aquifer and lake levels resulting from changes in groundwater use when other factors (precipitation and evaporation) are held constant. To make our modeling as real world as possible, we applied each scenario to actual conditions beginning in 1988, allowing us to capture both wet and dry periods and compare model results with actual observed lake levels over the same period. However, because of lag times between changes in groundwater use and impacts to White Bear Lake, the model requires a "warm-up" period. For the timeframe we modeled, the long-term impacts of the three scenarios we modeled are most clearly evident from 2002 forward.

The three scenarios modeled are:

- **No Groundwater Use** - no permitted groundwater use in the area starting in 1988. This scenario provides a reference for comparison.
- **Existing Groundwater Use** - all reported use within five miles of White Bear Lake during the last ten years, projected back to 1988. The total amount of groundwater used over the past ten years is less than the amount used in the 1980s and 1990s. This decrease is reflected in the projected water levels (Figure 4 next page), and better allows us to assess the sustainability of current use.
- **Maximum Groundwater Use** - this scenario considered all permits as using the absolute maximum allowable groundwater from 1988 forward. This has never actually happened and is not expected to occur, but is something the court directed DNR to evaluate.

The analysis evaluated all of the permits both individually and collectively under these three scenarios. Figure 4 illustrates the results of lake level modeling under these scenarios.

Sustainability Criteria

DNR's analysis indicates that groundwater use in the area meets the state sustainability standard (see inset at the top of this page). Specifically this means:

- Groundwater use does not harm the White Bear Lake ecosystem
- Groundwater use does not jeopardize groundwater supplies for future generations or adversely impact private domestic wells
- Groundwater use does not degrade water quality in White Bear Lake

Note that Minnesota's sustainability standard does not address recreational use. However, DNR has established a protective elevation based on recreational use considerations, which is discussed separately in this publication.

Groundwater Use does not Harm the White Bear Lake Ecosystem

Under all of the scenarios considered, the groundwater use does not harm the White Bear Lake ecosystem. Each scenario results in different water levels that fluctuate to varying degrees, which creates changes in the types and abundance of aquatic vegetation, a key measure of ecosystem health. However, those changes do not cross thresholds that would result in a degraded biological community.

According to the model, in the "No Groundwater Use" scenario, water levels in the lake would have been higher than the observed water levels over the past 15 years (Figure 4). Sustained high water levels in the lake would have reduced the overall amount of near shore area that supports emergent plants (e.g. bulrush) compared to other scenarios, with minimal change in the amount of submerged vegetation.

In the "Existing Groundwater Use" scenario, water levels would have been up to about one foot or more higher on average than observed water levels (Figure 4). Water levels would still have declined during periods of less than normal rainfall. Periodic lower water levels do, however, benefit the lake ecosystem because of increased emergent plant growth near the shoreline. Periodic exposure during low water is needed to germinate some types of plant seeds. These plants help reduce shoreline erosion and provide important fish and wildlife habitat, especially when water levels rise, as they have in recent years.

In the "Maximum Groundwater Use" scenario, water levels in the lake would have been lower than the observed water levels (Figure 4). Lower water levels would increase emergent vegetation in the near shore area, while decreasing the aerial extent of submerged aquatic vegetation. However, the decrease in submerged vegetation would be less than the amount allowed under Minnesota law.

Groundwater use does not jeopardize groundwater supplies or impact private domestic wells

According to the model, water levels in each of the groundwater use scenarios would be more than adequate to reliably pump groundwater over many years, known as safe yield. This means that groundwater supplies for future generations would not be jeopardized. Given these modeled aquifer levels and past experience, we also don't anticipate problems with domestic wells under any of the scenarios.

Groundwater use does not degrade water quality

Based on past water levels and measurements of water clarity and phosphorous, there are no discernable impacts on water quality from the groundwater use simulated in these scenarios.

Individual Permits

Because the existing groundwater use permits do not cumulatively violate the state's sustainability standard, it follows that none of them individually violate the standard. However, groundwater use does demonstrably affect lake levels, and DNR's groundwater flow model allows us to better understand the relative impact of individual permits on lake levels. Key factors determining an individual permit's impact on White Bear Lake include distance of the well(s) from the lake and the volume of water used. Of the 44 permits analyzed, permits held by these ten entities contribute most substantially to the water level impacts.

- White Bear Lake
- White Bear Township
- Mahtomedi
- Vadnais Heights
- Oakdale
- North St. Paul
- Saputo Dairy Foods
- Hugo
- Stillwater
- Lino Lakes

Again, it is important to underscore that none of these permits is violating the state's sustainability standard. However, to the extent that adjustments may be warranted to support recreational uses (see Protective Elevation discussion), these permits would have the greatest impact.

DNR Analysis continued on next page

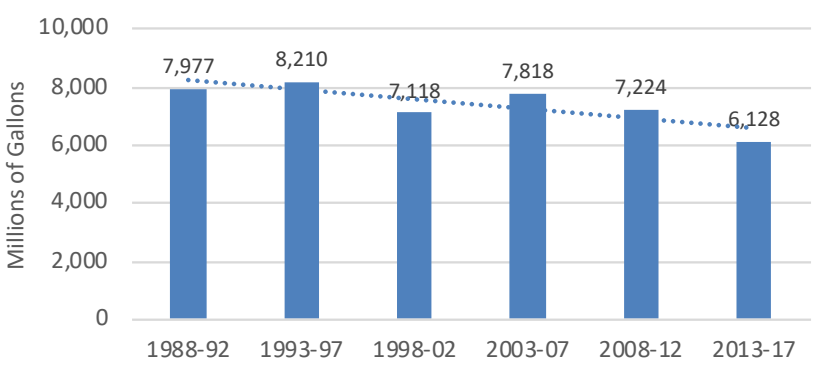

Figure 3. This graph illustrates that groundwater use has been declining over the last ten years. Annual average use was calculated in 5-year increments, beginning in 1988, which marks the start of consistent use reporting. The volume of water includes wells that are outside of the 5 mile radius when a community has wells both inside and outside of the radius.

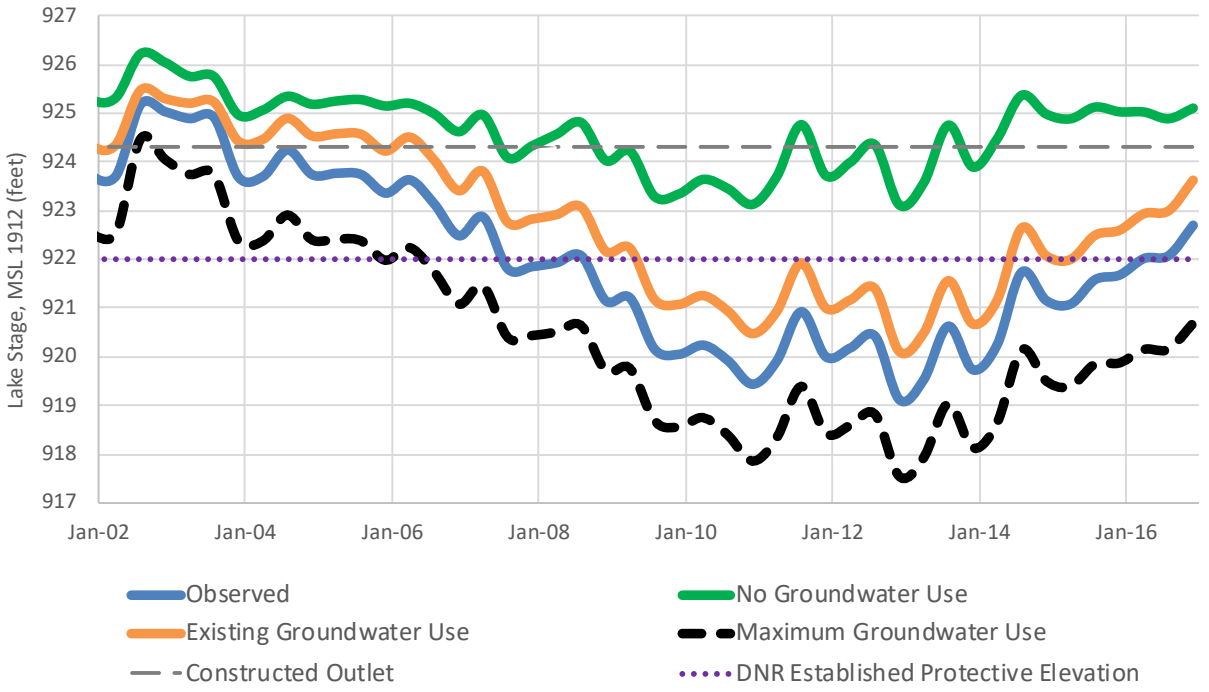

Figure 4. This graph is one of the key outputs from the groundwater flow model and illustrates the predicted water levels for White Bear Lake under different groundwater use scenarios within the 5-mile radius of the lake. The lines have the same general shape, because water level fluctuations are driven primarily by rainfall and evaporation. However the differences among the lines reflect the relative impact of different levels of groundwater use on lake levels.

GROUNDWATER USE AND THE WHITE BEAR LAKE PROTECTIVE ELEVATION

In 2016, DNR established a protective elevation of 922.0 feet for White Bear Lake. State law provides for setting protective elevations for lakes that are subject to direct surface water appropriations, with the goal of limiting (not eliminating) adverse impacts to the lake from the appropriation. The protective elevation established for White Bear Lake was the first time DNR developed a protective elevation to help manage groundwater, rather than surface water, appropriations.

In setting the protective elevation for White Bear Lake, DNR considered multiple factors, including the lake's historic range, aquatic vegetation, fisheries, water quality, recreational uses, and the area and slope of the lakebed.

We determined that there were no permanent adverse impacts to the lake ecosystem or water quality associated with temporary declines to the lower end of White Bear Lake's historic range. Indeed, there are demonstrable ecosystem benefits to variable lake levels, and declines to the lower end of the range provide an important ecological reset for aquatic vegetation, which in turn supports fish and other organisms.

However, our review of all available information also demonstrated that there were adverse impacts to recreational uses associated with lower lake levels. These adverse impacts included things like dock extensions, the closure of Ramsey County Beach, increased requests to control eurasian milfoil, reduced access at public ramps and private marinas, and limitations on shore fishing.

In seeking to balance the ecosystem benefits and negative recreational impacts of lake levels at the lower end of White Bear Lake's historic range, DNR established the 922.0 feet protective elevation. The protective elevation is not a fixed level that is maintained, or a minimum level that is guaranteed. Rather, it is a level at or before which DNR will work with permit holders to modify their water use in order to reduce the likelihood that the lake will fall below the protective elevation for an extended period of time. This does not mean that DNR will shut-off drinking water in order to protect recreational uses of the lake. But it does mean that we will implement reasonable, science-based permit adjustments to support the protective elevation.

Our analysis indicates that water levels under the "Existing Groundwater Use" scenario would have fallen below the lake's protective elevation in 6 of the last 15 years (Figure 4). Observed lake levels fell below the protective elevation in 10 of the last 15 years. The difference between the two scenarios, relative to the protective elevation, is because current groundwater use is lower than historic use and the model applies that change starting in 1988.

The "Maximum Groundwater Use" scenario would result in falling below the protective elevation both more frequently and by a wider margin than the observed lake levels over this same time period. However, as stated previously, pumping at the maximum rate by all permitted users is an unprecedented and unrealistic scenario. The insights gained from this scenario are not particularly useful in managing groundwater appropriation permits.

Importantly, the groundwater flow model provides a new tool in applying the protective elevation. It allows us to calculate the amount of water that can be pumped without causing lake levels to fall below the protective elevation under normal weather conditions. (The protective elevation is not intended to ensure that the lake will not fall below 922.0 under prolonged drought.) It also allows us to identify which permits are having the greatest impacts on lake levels and focus our efforts to implement the protective elevation on those permits.

TEMPORARY IRRIGATION BAN WOULD RESULT IN LITTLE CHANGE TO WATER LEVELS

DNR also simulated how a temporary irrigation ban would affect lake levels. Specifically, we attempted to model the Ramsey County District Court's ban on residential irrigation when water levels drop below 923.5 feet. To do this we used the "Existing Groundwater Use" scenario and subtracted the estimated volume of water attributable to residential irrigation when the ban would have been in effect between 2002 and 2016. Under this approach, the residential irrigation ban was modeled beginning in 2007, when the existing groundwater use scenario dropped below 923.5 feet, and continued through 2016 as lake levels had not yet reached the court's established level of 924.0 feet for lifting the ban. The model indicates that the irrigation ban would have increased lake levels by about 4.5 inches after ten years. A ban of shorter duration would have less of an impact on lake levels.

The two main reasons for this modest change in lake level have to do with the amount of water pumped and the distance of that pumping from the lake. The communities with wells closest to White Bear Lake use a relatively small amount of water for irrigation, and the communities with higher summer water use are located many miles away from the lake. The model clearly shows it takes many years for pumping effects to fully reach the lake.

The model does demonstrate that permanent and long-term water conservation does benefit lake levels. Temporary restrictions can be extremely important for suppliers to manage peak demand and community water supplies. However, the court's temporary residential irrigation bans would not result in substantial changes to water levels on White Bear Lake.

WHAT'S NEXT

DNR is appealing the Ramsey County District Court's ruling, based on the court's assessment of the science, interpretation of state law, and application of that law to the specific facts of the White Bear Lake case. That matter is pending before the Minnesota Court of Appeals. A ruling in our appeal is not expected until the first half of 2019.

Despite the pending appeal, DNR has continued to work hard to improve our collective understanding of the very complex relationship between groundwater use and water levels on White Bear Lake. Our new groundwater flow model represents a significant advancement of the science and is one of the most sophisticated models available anywhere in the United States for conducting this kind of analysis. Using this new tool, we are committed to working with local communities, businesses and residents to make carefully targeted, well-informed modifications to water use in the area.

DNR's work has been, and must continue to be, informed by the best available science. That science does change and evolve. Based on our analysis, DNR has concluded that existing groundwater use meets Minnesota's sustainability standards, but also contributes to the frequency and degree to which White Bear Lake may fall below the protective elevation that supports recreational uses of the lake. We have initiated discussions with the affected community water suppliers regarding these findings and will be working with them to explore conservation options and alternative water sources that can help ensure White Bear Lake remains a prized recreational asset for area residents and all Minnesotans.