March 26, 2019

Commissioners
Shingle Creek and West Mississippi Watershed Management Commissions
Hennepin County, Minnesota

The agenda and meeting packet are available to all interested parties on the Commission’s website at
http://www.shinglecreek.org/minutes--meeting-packets.html

Dear Commissioners:

Regular meetings of the Shingle Creek and West Mississippi Watershed Management Commissions will be held **Thursday, April 11, 2019**, at Edinburgh USA, 8700 Edinbrook Crossing, Brooklyn Park, MN. Lunch will be served at 12:00 noon and the meetings will convene concurrently at 12:45.

Please email me at judie@jass.biz to confirm whether you or your Alternate will be attending the meeting.

Your meal choices are:

- ______ Grilled Chicken Caesar Salad, Garlic Croutons, Shaved Parmesan
  - ______ Dressing on the side
- ______ BLT Chicken Sandwich, Bacon, Lettuce, Tomato, Aioli, Onion Roll, Kettle Chips
- ______ Mushroom Lasagna, Swiss Chard, Parmesan, Boursin, Herbs, Balsamic Mushroom Glaze
- ______ I will be attending but DO NOT want a meal.
- ______ I will not be attending the meeting.

We must make final reservations by **noon, Wednesday, April 3, 2019**. Please make a reservation, even if you are not requesting a meal, so we can arrange for sufficient seating and meeting materials. Thank you.

Regards,

Judie A. Anderson
Administrator

cc: Alternate Commissioners Member Cites Troy Gilchrist TAC Members
    Metropolitan Council MPCA DNR Wenck Associates
A combined regular meeting of the Shingle Creek and West Mississippi Watershed Management Commissions will be convened on Thursday, April 11, 2019, at 12:45 p.m. at Edinburgh USA, 8700 Edinbrook Crossing, Brooklyn Park, MN. Agenda items are available at http://www.shinglecreek.org/minutes–meeting-packets.html.

1. Call to Order.
   SCWM  a. Roll Call.
   √ SCWM  b. Approve Agenda.*
   √ SCWM  c. Approve Minutes of Last Meeting.*
2. Reports.
   √ SC  a. Treasurer’s Report.*
   √ SC  b. Approve Claims* - voice vote.
   √ WM  c. Treasurer’s Report.*
   √ WM  d. Approve Claims* - voice vote.
3. Open forum.
4. Project Reviews.
   √ SC  a. SC2019-005 Park Center High School, Brooklyn Park.*
   a. Cost Share Applications.
      SCWM  1) Use of levy funds for equipment – discussion.
   √ SC  2) Authorize Autumn Ridge Reimbursement.**
   √ SCWM  a. 2018 Annual Water Quality Report.*
   √ SCWM  b. 2019 River Watch and WHEP Agreements.*
   SCWM  c. Next TAC meeting – tentatively 8:30 a.m., Thursday, April 25, 2019, Crystal City Hall.
      1) March 14, 2019 TAC Meeting Minutes* - information only.
7. Education and Public Outreach.
   √ SCWM  a. Education and Outreach – update.**
   SCWM  b. Next WMWA meeting – 8:30 a.m., Tuesday, May 14, 2019, Plymouth City Hall.
8. Grant Opportunities and Updates.
   SC  d. SRP Reduction Project – verbal update.
   SC  e. Biochar Award – Press Release.*
   SCWM  a. Communications Log.*
   SCWM  b. Limited Liability Legislation Update.*
10. Other Business.
   SCWM  11. Adjournment.
MINUTES
Regular Meeting
March 14, 2019

(Action by the SCWMC appears in blue, by the WMWMC in green and shared information in black.
*indicates items included in the meeting packet.)

I. A joint meeting of the Shingle Creek Watershed Management Commission and the West Mississippi Watershed Management Commission was called to order by Shingle Creek Chairman Andy Polzin at 12:52 p.m. on Thursday, March 14, 2019, at the Clubhouse at Edinburgh, USA, 8700 Edinbrook Crossing, Brooklyn Park, MN.

Present for Shingle Creek: David Vlasin, Brooklyn Center; John Roach, Brooklyn Park; Burton Orred, Jr., Crystal; Gary Anderson, Minneapolis; Bill Wills, New Hope; Andy Polzin, Plymouth; Ed Matthiesen, Wenck Associates, Inc.; Troy Gilchrist, Kennedy & Graven; and Judie Anderson, JASS.

Not represented: Maple Grove, Osseo and Robbinsdale.

Present for West Mississippi: David Vlasin, Brooklyn Center; Steve Chesney, Brooklyn Park; Gerry Butcher, Champlin; Ed Matthiesen, Wenck Associates, Inc.; Troy Gilchrist, Kennedy & Graven; and Judie Anderson, JASS.

Not represented: Maple Grove and Osseo.

Also present: Andrew Hogg, Brooklyn Center; Mitchell Robinson, Brooklyn Park; Todd Tuominen, Champlin; Mark Ray, Crystal; Derek Asche, Maple Grove; Liz Stout, Minneapolis; Bob Grant and Megan Hedstrom, New Hope; Leah Gifford, Plymouth; Marta Roser, Robbinsdale; Drew McGovern, Hennepin County, for Project Review SC2019-004; and Rich Harrison and Laura Scholl, Metro Blooms, for item VI.A.1.

II. Agendas and Minutes.

Motion by G. Anderson, second by Wills to approve the Shingle Creek agenda.* Motion carried unanimously.

Motion by Butcher, second by Chesney to approve the West Mississippi agenda.* Motion carried unanimously.

Motion by Wills, second by G. Anderson to approve the minutes of the February meeting.* Motion carried unanimously.

Motion by Butcher, second by Chesney to approve the minutes of the February meeting. * Motion carried unanimously.

III. Finances and Reports.

A. Motion by Orred, second by Wills to approve the Shingle Creek March Treasurer’s Report.* Motion carried unanimously.

Motion by Orred, second by Wills to approve the Shingle Creek March claims.* Claims totaling $56,910.68 were approved by roll call vote: ayes – Vlasin, Roach, Orred, G. Anderson, Wills, and Polzin; nays – none; absent – Maple Grove, Osseo and Robbinsdale.
B. Motion by Chesney, second by Butcher to approve the West Mississippi March Treasurer’s Report.* Motion carried unanimously.

Motion by Butcher, second by Chesney to approve the West Mississippi March claims.* Claims totaling $12,092.30 were approved by roll call vote: ayes – Vlasin, Chesney, and Butcher; nays – none; absent – Maple Grove and Osseo.

IV. Open Forum.

V. Project Reviews.

A. SC2019-003 Windsor Ridge, New Hope.* Construction of 32 single-family residential homes on 8.7 acres located at 51st and Pennsylvania Avenues North. Following development, the site will be 36.6 percent impervious with 3.2 acres of impervious surface, an increase of 3.2 acres. A complete project review application was received February 14, 2019.

To comply with the Commission’s water quality treatment requirement, the site must provide ponding designed to NURP standards with dead storage volume equal to or greater than the volume of runoff from a 2.5” storm event, or BMPs providing a similar level of treatment - 85% TSS removal and 60% TP removal. Infiltrating 1.3-inches of runoff, for example, is considered sufficient to provide a similar level of treatment. If a sump is used the MnDOT Road Sand particle size distribution is acceptable for 80% capture.

Runoff from the majority of the site is proposed to be routed to a NURP pond connected to an infiltration basin. According to the MIDS calculator, this treatment pond removes 91% TSS and 87% TP. Stormwater entering this pond is pretreated with a 6-ft. diameter/6-ft. depth sump, which removes 85% TSS according to SHSAM. The applicant meets Commission water quality treatment requirements.

Commission rules require that site runoff is limited to predevelopment rates for the 2-, 10-, and 100-year storm events. Runoff from the majority of the site is proposed to be routed to a NURP pond connected to an infiltration basin. The applicant meets Commission rate control requirements.

Commission rules require the site to infiltrate 1.0 inch of runoff from new impervious area within 48 hours. The new impervious area on this site is 3.2 acres, requiring infiltration of 11,580 CF within 48 hours. Runoff from the majority of the site will be routed to a NURP pond connected to an infiltration basin. In addition, a small portion of the site will be routed to a second infiltration basin. Together these infiltration basins have the capacity to infiltrate the required volume within 48 hours. In fact, soils have measured infiltration rates of 31 inches/hour, which is higher than 8.3 inches/hour, the highest infiltration rate the Minnesota Stormwater Manual allows for water quality purposes. The applicant proposes to amend in-place sandy soils with 1 ft. of topsoil to slow infiltration rates to 8.3 inches/hour. The applicant will test infiltration post-construction to confirm desired infiltration rates. The applicant meets Commission volume control requirements.

The National Wetlands Inventory does not identify any wetlands on site. The applicant meets Commission wetland requirements. There are no Public Waters on this site. The applicant meets Commission Public Waters requirements. There is no FEMA-regulated floodplain on this site. The lowest opening elevations of houses are at least two feet higher than the high-water elevation of the ponds according to Atlas 14 precipitation. The applicant meets Commission floodplain requirements.

An erosion control plan was submitted with the project review and includes rock construction entrances, perimeter silt fence, silt fence surrounding basins, inlet protection, rip rap at inlets, and native seed specified on the pond slopes. The erosion control plan meets Commission requirements.

A public hearing on the project was conducted on March 5, 2019 as part of Planning Commission and City Council review of this project, meeting Commission public notice requirements.

The City plans to own Outlot A and maintain the pond within it; therefore, an O&M agreement is not necessary.
Motion by Wills, second by G. Anderson to advise the City of New Hope that approval of project SC2019-003 is granted, subject to the following conditions:

1. Demonstrate by double-ring infiltrometer or witness test that the site meets the design infiltration rate of 8.3 inches/hour.

2. Provide evidence that work within the railroad right of way is allowed.

Motion carried unanimously.

B. SC2019-004: CSAH-81 (Bottineau Boulevard), Crystal and Brooklyn Park.* Reconstruction and expansion of CSAH 81 on 50.2 acres (1.6 miles) to provide a consistent six-lane roadway, stormwater structures, and a multi-use trail that is part of the future Crystal Lake Regional Trail. The site location is 200 feet north of CSAH 8 (West Broadway Ave) in Crystal to 200 feet south of 83rd in Brooklyn Park. Following development, the site will be 65 percent impervious with 32.7 acres of impervious surface, an increase of 5.7 acres. A complete project review application was received on February 18, 2019.

To comply with the Commission’s water quality treatment requirement, the site must provide ponding designed to NURP standards with dead storage volume equal to or greater than the volume of runoff from a 2.5” storm event, or BMPs providing a similar level of treatment - 85% TSS removal and 60% TP removal. Infiltrating 1.3-inches of runoff, for example, is considered sufficient to provide a similar level of treatment. If a sump is used the MnDOT Road Sand particle size distribution is acceptable for 80% capture.

Runoff from the site is proposed to ultimately be routed offsite at seven different discharge points. All inlets to filtration basins will receive pretreatment via a 4-foot-deep sump structure in the manhole/catch basin immediately upstream. The applicant submitted SHASAM model results demonstrating that the water quality requirements will be met by the SAFL baffle/Preserver structures. The applicant meets Commission water quality requirements.

Commission rules require that site runoff is limited to predevelopment rates for the 2-, 10-, and 100-year storm events. Runoff from the site ultimately flows into Shingle Creek. Runoff leaves the site via various adjacent ditches. Overall, the project results in a decreased discharge rate offsite. However, due to limited right-of-way space, rate control is not met at every individual discharge location. For the drainage areas that did not meet rate control, slight increases in overall discharge volume are anticipated.

Rena Weis from Wenck called Brooklyn Park City Engineer Jesse Struve on March 6, 2019. Struve did not see an issue with the slight increase in rate and volume within the right-of-way during the 100-year event from Drainage Area 6 since the water will flow south along Highway 81 to Shingle Creek. The applicant meets Commission rate control requirements.

Commission rules require the site to infiltrate 1.0 inch of runoff from new impervious area within 48 hours. The project site is located within a Drinking Water Supply Management Area and, therefore, proposes filtration instead of infiltration. The new impervious area is 5.7 acres, requiring filtration of 0.48 acre-feet (20,691 CF) within 48 hours. The applicant proposes to construct five filtration basins that have the capacity to filtrate the required volume within 48 hours. The applicant meets Commission volume control requirements.

A wetland assessment was completed in February 2018 by Hennepin County, which identified ten wetlands within the project boundary. The Shingle Creek WMC is LGU for WCA administration in Brooklyn Park. The applicant proposes to encroach on 0.4 acres of wetland and provide compensation through wetland bank credits. The applicant meets Commission wetland requirements, contingent on wetland credits being purchased.

Shingle Creek is a DNR Public Water that crosses CSAH-81. It is impaired for aquatic life and aquatic recreation due to chloride, dissolved oxygen, and E. coli concentrations and poor aquatic macroinvertebrate bioassessment scores. The proposed project is anticipated to improve the water quality of the creek by bringing the
site up to current standards and installing Best Management Practices where they didn’t previously exist. The applicant meets Commission Public Waters requirements.

There is FEMA 100-year floodplain where CSAH-81 crosses Shingle Creek. There are no proposed buildings as part of this project. This project proposes to replace the Shingle Creek culvert beneath CSAH-81, which involves 81 feet of transverse encroachment of the floodplain. Approximately 5.8 CY of fill will be placed within the floodplain. The project proposes the creation of approximately 10.2 CY of compensatory storage, which will be in the CSAH-81 project area and hydraulically connected to the Shingle Creek floodplain, resulting in a net increase of approximately 4.4 cubic yards of storage. The applicant meets Commission floodplain requirements.

The project proposes replacement of the Shingle Creek culvert underneath CSAH-81. The new culvert will have the same cross section as the existing culvert and will be 5 feet longer than the existing culvert. HEC-RAS modeling was submitted to show that the water surface elevation will not be changed.

An erosion control plan was submitted with the project review, and includes erosion control blanket, perimeter silt fence/biolog, biologs surrounding detention ponds/infiltration basins, inlet protection, rip rap at inlets, and native seed specified on the filtration basin slopes. The erosion control plan meets Commission requirements.

Hennepin County mailed letters to residents and business owners along the project corridor to update them on the reconstruction timeline and stages in January 2019. The City of Brooklyn Park held an Open House for this phase of the CSAH-81 redevelopment on Tuesday, October 3, 2017. These activities meet the Commission public notice requirements.

Operations & Maintenance (O&M) for this site is covered under Hennepin County’s MS4 permit.

Motion by Roach, second by Wills to advise the cities of Brooklyn Park and Crystal that approval of project SC2019-004 is granted, subject to the following conditions:

1. Purchase of wetland bank credits.
2. Revision of plans to show all erosion and sediment control practices that were indicated on hand-annotated plan submittal.

Motion carried unanimously.

VI. Watershed Management Plan

A. Cost Share Applications. The Commissions have on hand approximately $100,057 (2018 audit hasn’t been completed) in the Partnership Cost Share account, with another approximately $50,500 levied to be received in 2019. Prior to this meeting the Technical Advisory Committee (TAC) met to discuss the following projects.

1. Autumn Ridge Apartments.* The City of Brooklyn Park has submitted a Partnership Cost Share application on behalf of Sherman Associates and Metro Blooms for Phase II of improvements on the Autumn Ridge multi-family housing site at 63rd and Boone Avenues North. The amount requested is $50,000. The proposed project is additional on-site water quality treatment, including 7-8 new rain gardens, additional pollinator habitat, and educational signage. The project also includes extensive resident education and participation, both in the design process and in installation and planting. In addition, the project includes Smart Salting education and training for the on-site property managers. The TAC recommended approval of this application.

Motion by Willis, second by G. Anderson to approve this application at the requested amount. Motion carried unanimously.

2. Speed Thru Car Wash.* The City of New Hope has submitted a Partnership Cost Share application on behalf of LAMA Holdings LLC, Chris Robbins, for a capture and reuse project at the Speed Thru Car Wash at 7201 Bass Lake Road. The amount requested is $50,000. The proposed project is the installation of five 20,000-gallon storage tanks and a filtration system to capture runoff from the site for reuse as car wash water. The site drains to the Bass Lake Road trunk storm sewer and then to Upper Twin Lake. Runoff
from nearly all impervious surface on site will be collected and routed to the storage tanks which will be treated by aerobic bacteria. All petroleum-based products will be consumed, and the only byproducts are CO₂ and water. After bacteria treatment the water will be further purified using a reverse osmosis system before being dispensed in the car wash tunnel. The TAC recommended denial of this application pending receipt of additional information from the applicant.

Motion by Wills, second by Roach to table action on this application. Motion carried unanimously.

3. Enhanced Street Sweeper.* The TAC has previously debated the use of capital or cost share funds for high performance street sweeping equipment. While the TAC and Commissions are favorable of this idea, it is ultimately the decision of Hennepin County as to whether this meets the state statutes regulating their capital bonding. Staff have been in contact with Karen Galles at Hennepin County Energy and Environment, who is supportive of the idea. She has been discussing this idea with various upper level managers and county attorneys.

The City of Plymouth is requesting the Commission to add a regenerative air sweeper to its 2020 CIP. This item is on the City’s CIP. According to their application, the City is bringing its street sweeping program inside in 2019 and is committed to expanding the program to address water quality concerns going forward. All water resources within and downstream of the City of Plymouth could be affected by the enhanced street sweeping effort. Enhanced street sweeping was identified in the Bass, Schmidt & Pomerleau TMDL, the Cedar Island, Pike and Eagle Lake TMDL, and the Pike Lake Subwatershed Assessment as a cost-effective BMP for nutrient reductions. The TAC recommended to the Commission approval of this application conditioned that before-and-after performance reporting parameters be developed.

Motion by Orred, second by Roach to approve the TAC’s recommendation. Motion carried unanimously.

B. Minor Plan Amendment.* The Commissions have previously discussed revising some of the provisions of the CIP program, namely increasing the voluntary $500,000 annual levy limit and lifting the $250,000 per project maximum. On February 21, 2019 BWSR Board Conservationist Steve Christopher concurred this could be completed by Minor Plan Amendment. Since this is an issue that cities may wish to take some time to discuss, Staff recommend that the Commissions provide 60 days for local review rather than the standard 30 days.

CIP revisions may also be completed by Minor Plan Amendment. At this time the only CIP action proposed by a member city that requires a Minor Plan Amendment (MPA) is rescheduling the generic “Lake Internal Load“ project in 2020 to 2019, revising its cost to $370,500, and specifying that the project is the Crystal Lake Management Project. The Commission approved for a Section 319 grant for that project. The $370,500 shown in the CIP is the full cost of the project; should the Commission be awarded a grant, the actual amount levied would be less than that.

If the Commissions choose to go forward with the MPA, Staff recommend setting May 9, 2019 as the public meeting at which it would be discussed. At that May 9 meeting, the Commissions would discuss any other 2019 CIP projects proposed and establish a maximum levy for 2019. The Minor Plan Amendment and maximum levy would then be forwarded to Hennepin County for consideration by the Hennepin County Board. A copy of the notice, noticing requirements, proposed revisions to the CIP policy, and the CIP program itself, are included in Staff’s March 8, 2019 memo.

Motion by G. Anderson, second by Vlasin to proceed with the public meeting as described above. Motion carried unanimously.

Motion by Chesney, second by Butcher to proceed with the public meeting as described above. Motion carried unanimously.
VII. **Water Quality.**

A. The January 24, 2019 Technical Advisory Committee (TAC) minutes* are included in the meeting packet.

B. The next TAC meeting is scheduled for 8:30 a.m., Thursday, April 25, 2019, at Crystal City Hall.

VIII. **Education and Public Outreach.**

A. **2018 NPDES Report.*** A copy of the draft 2018 NPDES Phase II Education and Public Outreach Program Annual Report is included in the meeting packet. It serves both as a report to the Commissions and a report to the member cities that they can use in the preparation of their annual NPDES reports. The report formats information about 2018 activities in a way that will help the MS4s meet the reporting requirements under the State of Minnesota General Permit for Municipal Stormwater.

   Motion by G. Anderson, second by Roach to accept the 2018 NPDES report and directing Staff to forward it to the member cities. **Motion carried unanimously.**

   Motion by Butcher, second by Chesney to accept the 2018 NPDES report and directing Staff to forward it to the member cities. **Motion carried unanimously.**

B. **Environmental Initiative Nomination.*** As directed at the February meeting, Staff prepared a nomination to the Environmental Initiative Awards for the Shingle Creek Biochar- and Iron-Enhanced Sand Filters Project. Several Commissioners were able to review and provide helpful feedback prior to its submittal. The final version of the nomination is included in the meeting packet. Award recipients will be announced in March.

   Environmental Initiative (environmental-initiative.org/) is a nonprofit organization comprised of leading Minnesota businesses, environmental advocacy nonprofits, and state agencies with a goal of developing collaborative solutions to Minnesota’s environmental problems.

C. The West Metro Water Alliance (WMWA) met on March 12, 2019.

1. **Watershed PREP and Education and Outreach Events.** Educators are currently scheduling spring classroom visits and are also available to table at city and school events. Contact Amy Juntunen at amy@jass.biz to schedule these events. In 2019 the educators will also be putting together some potential presentations for lake associations.

2. **Ten Things You Can Do Brochure.** The brochure is in final edits and the group is working with Hennepin County to update the design and layout. It is expected the County will print the brochure at no cost to the watershed organizations.

3. **Special Projects.** Each year the four watersheds budget $8,000 to undertake a larger project. The group discussed whether the watersheds should update the public opinion survey conducted in 2008. That was a professional, scientific phone survey that contacted 400 households in the four watersheds to obtain baseline information about the level of water and natural resources knowledge in the area and what barriers to implementing household practices might be. That survey was $10,000 ten years ago, and would likely cost more today. It was the consensus of the group that while this information is helpful, updating the survey would not likely change the education and outreach being currently provided, and that the money would better be used to fund implementation practices. It was also the consensus that it would be useful to have a scientific survey done to see if awareness has been raised in the ensuing ten years. It was agreed that this should be done on a Metro scale, and that WMWA should request that Watershed Partners, a consortium of agencies, cities, and watersheds across the Metro, consider this.

4. The group also discussed **purchasing educational displays** and noted that the native plant root puller display is extremely popular among both adults and youth. The nonprofit Blue Thumb has these custom displays made for about $3,500. The displays educate users about one of the many features of native plants, their root...
lengths compared to turf grass. This makes them ideal for stabilizing streambanks and lakeshores and for promoting infiltration by creating deep root channels. The display allows the user to pull out a string that is as long as the roots are deep. The strings are spring-wound, which then automatically retracts the strings back into the display. It was the consensus to get more information and a quote to be considered at the next WMWA meeting. The display can be used at booths and city events, and it was suggested that it could also be a movable display, set up at city halls or community centers on a rotating basis. It would help support the Pledge to Plant campaign as well. It was also noted that Blue Thumb is a valuable source of information, including educational materials, how-to guides, a plant finder tool, and more. http://www.blue-thumb.org/public-resources/

5. Website/Social Media. The website Google Analytics for February 2019, along with the Facebook insights for the last 28 days for both the Shingle Creek Commission and WMWA, are included in Staff’s March 13, 2019 memo.*

F. Motion by Roach, second by Orred to fund sponsorship of the Freshwater 2019 Water Summit for $500, to be taken from the Education budget. Motion carried unanimously.

Motion by Chesney, second by Vlasin to match this contribution. Motion carried unanimously.

G. The next WMWA meeting is scheduled for 8:30 a.m., Tuesday, April 9, 2019, at Plymouth City Hall.

IX. Grant Opportunities and Updates.

A. The final application for the Crystal Lake Management Plan Section 319 Grant* was included in the meeting packet. The total project cost is $370,506; grant funds requested total $216,066.

B. Matthiesen provided verbal updates of the following:
1. Bass and Pomerleau Lakes Alum application.
2. Twin Lake Carp removal.
3. SRP Reduction project.

X. Communications.

A. February Communications Log.* No items required action.

XI. Other Business.

A. The terms of representatives from Champlin, Maple Grove, and Minneapolis expired January 31, 2019.

B. Hogg reported that the Commission engineering staff and Brooklyn Center city staff met with a representative from the Board of the Mallard Creek Townhomes at Unity Avenue. The townhouse association was looking for information on water quality issues for stormwater facilities that outlet to Shingle Creek. Staff provided grant information along with engineering contacts for the board to begin forming a plan for improvements.

XII. Adjournment. There being no further business before the Commissions, the meetings were adjourned at 1:47 p.m.

Respectfully submitted,

Judie A. Anderson
Recording Secretary
JAA:tim
SHINGLE CREEK WATERSHED MANAGEMENT COMMISSION

PROJECT REVIEW SC2019-005: Park Center High School

Owner: Dale Carlstrom
Osseo Area Schools
11200 93rd Avenue North
Maple Grove, MN 55369

Engineer: Eric Meyer
Company: Larson Engineering
Address: 3524 Labore Road
White Bear Lake, MN 55110
Phone: 651-481-9120
Fax: 651-481-9201
Email: emeyer@larsonengr.com

Purpose: Reconfiguration of parking lots, construction of new bituminous drives, new and reconstructed sidewalk, installation of artificial turf, and addition of infiltration basins and related utilities on 53.9 acres.

Location: 7300 Brooklyn Blvd, Brooklyn Park, 55443 (Figure 1).

Exhibits:
1. Project review application and project review fee of $2,200, dated February 28, 2019, received February 28, 2019.
2. Site plan, preliminary plat, grading, utility, erosion control, and landscaping plans dated March 7, 2019, received March 22, 2019. Hydrologic calculations by Larson Engineering, dated March 21, 2019, received March 22, 2019. Hydrologic calculations were revised and received on April 2, 2019.

Findings:
1. The proposed project is the reconstruction and improvement of parking facilities and artificial turf at Park Center High School. The site is 53.9 acres. Following development, the site will be 48.3 percent impervious with 26.0 acres of impervious surface, an increase of 0.9 acres.

2. The complete project application was received on February 28, 2019. The application did not meet the Commission's requirements at that time, and additional design changes were requested by the Owner, unrelated to Commission requirements. An updated complete submittal was received on March 22, 2019. To comply with the 60-day review requirement, the Commission must approve or deny this project no later than the May 9, 2019 meeting. Sixty calendar-days expires on May 21, 2019.

2. To comply with the Commission's water quality treatment requirement, the site must provide ponding designed to NURP standards with dead storage volume equal to or greater than the volume of runoff from a 2.5” storm event, or BMPs providing a similar level of treatment - 85% TSS removal and 60% TP removal. Infiltrating 1.3-inches of runoff, for example, is considered sufficient to provide a similar level of treatment. If a sump is used the MnDOT Road Sand particle size distribution is acceptable for 80% capture.

Three infiltration basins are proposed at the site to capture runoff. Two of the proposed infiltration systems are surface basins and one is an
underground basin. The proposed infiltration basins are designed to infiltrate 1.0” of runoff from the new/reconstructed impervious surface. The project proposes 161,306 square feet [3.7 acres] of new/reconstructed impervious surface. Reconstructed surface is defined as that which disturbs the existing aggregate base. The applicant provided MIDS model output demonstrating that the design will remove 92% of TP and 92% of TSS. Rain Guardian pretreatment devices are specified at the inlets of the surface infiltration basins and an isolator row with a 5.6 ft deep sump at the inlet of the underground infiltration basin. The applicant meets Commission water quality treatment requirements.

3. Commission rules require that site runoff is limited to predevelopment rates for the 2-, 10-, and 100-year storm events. Runoff from the site is directed to Regent Avenue, to Brooklyn Boulevard, and to Shingle Creek, or to one of three proposed infiltration basins with overflow to Shingle Creek. The applicant meets Commission rate control requirements at all discharge points (Table 1).

Table 1. Runoff from site (cfs).

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4. Commission rules require the site to infiltrate 1.0 inch of runoff from new impervious area within 48 hours. The new/reconstructed impervious area on this site is 3.7 acres, requiring infiltration of 0.31 acre-feet (13,442 cubic feet) within 48 hours. The applicant proposes to construct three infiltration basins to receive runoff from new and reconstructed impervious surface. An infiltration rate of 0.45 in/hr was assumed, which is representative of the B soils on site. These proposed infiltration basins have the capacity to infiltrate the required volume within 48 hours. The applicant meets Commission volume control requirements.

5. The National Wetlands Inventory identifies one probable wetland and one potential wetland in the southeast portion of the site. Shingle Creek WMC is LGU for WCA administration. No work is proposed in the wetland area. The applicant meets Commission wetland requirements.

6. Shingle Creek is a DNR Public Water on the south side of the site. It is impaired for aquatic life and aquatic recreation due to chloride, dissolved oxygen, and E. coli concentrations and poor aquatic macroinvertebrate bioassessment scores. The proposed project is not anticipated to negatively impact Shingle Creek or its Aquatic Consumption/Aquatic Recreation status. The applicant meets Commission Public Waters requirements.

7. There is FEMA 100-year floodplain on the southeastern portion of this site. The project does not propose any changes to the floodplain. The applicant meets Commission floodplain requirements.
8. An erosion control plan was submitted with the project review, and includes a rock construction entrance, perimeter silt fence, silt fence surrounding infiltration basins, inlet protection, rip rap at inlets, and native seed specified on the pond slopes. The erosion control plan meets Commission requirements.

9. A neighborhood open house will be conducted on Thursday, April 4, meeting Commission public notice requirements.

10. A draft Operations & Maintenance (O&M) plan, which will be the responsibility of the Owner, was provided.

11. A Project Review Fee of $2,200 has been received.

**Recommendation:** Recommend approval with no conditions.

Wenck Associates, Inc.
Engineers for the Commission

________________________________________________________________________________________

Ed Matthiesen, P.E.                               Date
Figure 1. Site location.
Figure 2. Existing and Proposed Drainage Areas.
Figure 3. New/Reconstructed Impervious.
WEST MISSISSIPPI WATERSHED MANAGEMENT COMMISSION

PROJECT REVIEW WM2019-002: Emery Village Reserve 3rd Addition

Owner: Thompson Townhomes, LLC  
Dan Thompson  
2605 Campus Drive  
Plymouth, MN 55441

Engineer: Daniel L. Schmidt

Company: Sathre-Bergquist, Inc.

Address: 150 South Broadway  
Wayzata, MN

Phone: 952-476-6000
Fax: 
Email: Schmidt@sathre.com

Purpose: Construction of 52 multi-family units on 4.4 acres.

Location: Corner of Emery Village Drive and Business Park Blvd in Champlin (Figure 1).

Exhibits:
1. Project review application and project review fee of $1,700, dated March 1, 2019, received March 4, 2019.


Findings:
1. The proposed project is the construction of a 52 multi-family unit addition to the Emery Village Reserve Development. The site is 4.04 acres. Following development, the site will be 62.6 percent impervious with 2.53 acres of impervious surface, an increase of 2.53 acres.

2. The complete project application was received on February 28, 2019. A revised complete application was received on March 28, 2018. Further revisions were received up to April 4, 2019. To comply with the 60-day review requirement, the Commission must approve or deny this project no later than the May 9, 2019 meeting. Sixty calendar-days expires on May 27, 2019.

2. To comply with the Commission’s water quality treatment requirement, the site must provide ponding designed to NURP standards with dead storage volume equal to or greater than the volume of runoff from a 2.5” storm event, or BMPs providing a similar level of treatment - 85% TSS removal and 60% TP removal. Infiltrating 1.3-inches of runoff, for example, is considered sufficient to provide a similar level of treatment. If a sump is used the MnDOT Road Sand particle size distribution is acceptable for 80% capture.

The site is located within a Drinking Water Supply Management Area, and therefore, infiltration practices may not be used. Runoff from the site is proposed to be routed to three filtration basins, prior to discharge offsite to existing storm sewer. Outlet structures are designed for each of the three basins. The applicant used P8 to model TSS and TP load reduction from the site and demonstrated 94.9% removal of TSS and 66.1% removal of TP. The applicant meets Commission water quality treatment requirements.
3. Commission rules require that site runoff is limited to predevelopment rates for the 2-, 10-, and 100-year storm events. The 3rd Addition is part of a larger development plan that constructed regional ponds to provide rate control for future development. A storm sewer system was designed to convey future additions to the regional pond and therefore, this development must not exceed the capacity of the existing 24” storm sewer stub. The applicant provided calculations showing that the capacity of the existing stub is not exceeded. Furthermore, the City of Champlin developed a HydroCAD model that includes this proposed project that shows the high-water level of the regional basin will not impact neighboring properties. Runoff from the site is directed into one of three proposed filtration basins prior to discharging through existing storm sewer to the east. The applicant meets Commission rate control requirements (Table 1).

<table>
<thead>
<tr>
<th>Drainage Area</th>
<th>2-year event</th>
<th>10-year event</th>
<th>100-year event</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre-</td>
<td>Post-</td>
<td>Pre-</td>
</tr>
<tr>
<td>Total Site</td>
<td>0.8</td>
<td>1.6</td>
<td>3.7</td>
</tr>
</tbody>
</table>

Note: Post-development rates are higher but are within the approved rate for the Emery Village Reserve development

4. Commission rules require the site to filtrate 1.0 inch of runoff from new impervious area within 48 hours. The new impervious area on this site is 2.53 acres, requiring filtration of 0.21 acre-feet (9,184 cubic feet) within 48 hours. The applicant proposes to construct three filtration basins that have the capacity to filtrate the required volume within 48 hours. The regional pond can handle the additional volume associated with the Emery Village Reserve 3rd Addition development. The applicant meets Commission volume control requirements.

5. The National Wetlands Inventory does not identify any wetlands on site. The applicant meets Commission wetland requirements.

6. There are no Public Waters on this site. The applicant meets Commission Public Waters requirements.

7. There is no floodplain on this site. The City of Champlin requires a 3-foot freeboard between the 100-year high water level and the lowest opening unless it can be demonstrated that a 2-foot freeboard is sufficient. The low floor elevations of the buildings are at least two feet higher than the high-water elevation of the detention ponds/infiltration basins according to Atlas 14 precipitation, and the applicant demonstrated that this is sufficient. The applicant meets Commission floodplain requirements.

8. An erosion control plan was submitted with the project review, and includes rock construction entrances, perimeter silt fence, silt fence surrounding infiltration basins, inlet protection, rip rap at inlets, and native seed specified on the pond slopes. The erosion control plan meets Commission requirements.

9. A public hearing on the project was conducted on March 18, 2019 as part of Planning Commission and City Council review of this project, meeting Commission public notice requirements.
10. A draft Operations & Maintenance (O&M) agreement between the applicant and the City of Champlin was provided.

11. A Project Review Fee of $1,700 has been received.

**Recommendation:** Recommend approval subject to the following condition(s):

1. City review outlet control structure shop drawings to ensure conformance with intended design.

Wenck Associates, Inc.
Engineers for the Commission

_________________________________________   ______________________________
Ed Matthiesen, P.E.   Date
Figure 1. Site location.
Figure 2. Site grading plan.
Figure 2. Site drainage map.
To: Shingle Creek/West Mississippi WMO Commissioners

From: Ed Matthiesen, P.E.  Tom Langer
       Diane Spector  Sarah Nalven
       Jeff Strom  Anne Wilkinson

Date: April 5, 2019

Subject: Annual Water Quality Report

| Recommended Commission Action | Review and receive the report. |

Attached is the Annual Water Quality report. Sarah Nalven will attend the April 11, 2019 meeting to present the findings. The technical appendices can be found at shinglecreek.org/water-quality.html.

Trends in water quality are mostly stable, but there are encouraging signs. Three of the lakes—Lower Twin Lake, Ryan Lake, and Schmidt Lake—have been removed from the 303(d) list of Impaired Waters due to improvements to water quality. And water quality in Shingle Creek at the outlet monitoring site in Minneapolis shows an improvement—a decreasing trend in total phosphorus (TP) and total suspended solids (TSS). This improvement is likely the result of several factors, including improved erosion control and street sweeping in the watershed; the ban on phosphorus in fertilizer; retrofitting Best Management Practices in the watershed, both as part of redevelopment and as stand-alone projects; and stream stabilization projects reducing bank erosion.

2018 was above average in precipitation, mainly from a very wet September (>7 inches of rain v. an average of 4). Stream water quality was about average. Typically, total phosphorus (TP) and total suspended solids (TSS) values are below state standards except during storm events, when wash-off from the watershed increases those concentrations above the standards. Lake water quality was about average.

The water Quality Report provides summary information for each of the water resources within the three management units of Shingle Creek and for West Mississippi as a whole. More detailed information is presented in the appendices.
2018 Annual Water Quality Report

Prepared for:
Shingle Creek and West Mississippi Watershed Management Commissions

Prepared by:
WENCK Associates, Inc.
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APPENDICES

Appendix A: Precipitation Data
Appendix B: 2018 West Mississippi Outfall Monitoring Data
Appendix C: 2018 Shingle Creek Stream Monitoring Data
Appendix D: Wetland Monitoring
Appendix E: Lake Monitoring

(Appendices are available at http://www.shinglecreek.org/water-quality.html.)
Executive Summary

The Shingle Creek and West Mississippi Watershed Management Commissions annually monitor water quality in the lakes, streams and outfalls of the watersheds. The Commissions’ technical staff obtains the stream and some lake water quality, fisheries and vegetation data while volunteers also collect lake water quality and stream and wetland macroinvertebrate data.

Water quality in a given year is influenced by the amount of precipitation and the type of precipitation events. Overall, 2018 had more precipitation than the long-term average for this area (Appendix A), with September experiencing 4.55 inches more rain than average. This example of annual variability illustrates why long-term monitoring is necessary to determine potential trends in the data and what may be considered natural variability.

Water quality in Shingle Creek and Bass Creek and in the outfalls of the West Mississippi watershed is typical of urban streams in the Twin Cities metropolitan area. Water in these streams and outfalls is dominated by watershed runoff. Both Shingle Creek and Bass Creek are listed as Impaired Waters for chloride, bacteria, biota, and dissolved oxygen.

The lakes in Shingle Creek are typical of urban lakes. Thirteen of the 16 lakes were originally listed as Impaired Waters of the State due to excess nutrients. TMDLs and Implementation Plans have been approved for all the Impaired Waters, and the Commission and its member cities have been actively implementing improvements.

Trends in water quality are mostly stable, but water quality projects and best management practices continue to be implemented throughout the watershed. These include improved erosion control and street sweeping in the watershed; the ban on phosphorus in fertilizer; retrofits of best management practices in the watershed, both as part of redevelopment and as stand-alone projects; and stream stabilization projects reducing bank erosion. In part as a result of these measures, some water quality improvements have been observed. For example, the water quality in Shingle Creek at the outlet monitoring site in Minneapolis (SC-0) shows statistically significant decreasing trends in total phosphorus (TP) and total suspended solids (TSS) concentrations. There are also more lakes showing improving trends than deteriorating trends in TP, chlorophyll and/or Secchi depth.
1.0 Introduction

BACKGROUND

Minnesota Administrative Rule 8410.0100 Subp.5 requires watershed management organizations to conduct monitoring programs “capable of producing accurate data to the extent necessary to determine whether the water quality and quantity goals of the organization are being achieved.”

The Shingle Creek and West Mississippi Watershed Management Commissions (WMC) began monitoring water quality and streamflow in 1990. In Shingle Creek, 12 sites were monitored from 1990–1992, however monitoring was discontinued from 1992–1995. Shingle Creek monitoring has since resumed on an annual basis at two long-term monitoring sites (SC-0 and SC-3) (Figure 1-1). In 2013, a third routine stream monitoring site was added near the outlet of Bass Creek (BCP). The West Mississippi WMC monitored water quality and streamflow from 1990-1992 at two outfall sites in the Oxbow Creek and Mattson Brook watersheds (Figure 1-1). Results indicated very little flow in these tributaries and no water quality or quantity problems or concerns. Thus, the Commission chose to discontinue monitoring after the 1992 monitoring season. In 2010, the Commission elected to once again monitor water quality and flow at 2-3 outfall monitoring sites per year in the West Mississippi watershed.

Thirteen of the sixteen lakes in Shingle Creek are periodically monitored for water quality by volunteers through the Citizen Assisted Monitoring program (CAMP) (Figure 1-1). Additionally, Wenck staff conducts intensive monitoring on two lakes per year as part of the 5-year TMDL review for these lakes. High school volunteers coordinated by Hennepin County Environmental Services (HCES) perform macroinvertebrate monitoring at various locations in the watersheds (Figure 1-1). HCES also coordinates wetland monitoring by adult volunteers (Figure 1-1).

OBJECTIVES

The Shingle Creek and West Mississippi WMCs have established monitoring objectives to guide their monitoring programs. The following objectives have been established for stream, outfall and lake monitoring in both watersheds:

- To quantify the current status of streams/outfalls and lakes (Shingle Creek only) throughout the watershed in comparison to state water quality standards established for nutrients, turbidity, chloride, bacteria, and other parameters currently regulated by the State.
- To quantify changes over time, or trends, in stream and lake water quality in the Shingle Creek and West Mississippi watersheds.
- To quantify the effectiveness of implemented BMPs throughout the watershed for the protection of water quality.
Figure 1-1. Shingle Creek and West Mississippi management units, streams, lakes, and monitoring sites.
TMDLS AND IMPLEMENTATION PLANS

The majority of the lakes in the Shingle Creek watershed do not meet state standards for water quality and are included on the Minnesota Pollution Control Agency (MPCA) 303(d) List of Impaired Waters. The 303(d) list is named after the section of the federal Clean Water Act that requires states to set water quality standards and to assess conditions in lakes, rivers, and streams to determine if those standards are being met. If the standards are not met, a Total Maximum Daily Load (TMDL) study must be completed to identify the course of action needed to restore the resource to meet state standards. Table 1-1 below shows the Impaired Waters in the Shingle Creek watershed. Regional or statewide impairments that affect the watershed are also noted in Table 1-1 and are being sponsored by the MPCA. The Commission has completed TMDLs for the balance of the impairments.

Each TMDL establishes a water quality goal and a pollutant load reduction to achieve that goal. A separate TMDL Implementation Plan sets forth actions that will be undertaken by various stakeholders. Those actions include the continuation and expansion of lake and stream monitoring to assess progress toward the load reductions and water quality goals.

Schmidt, Lower Twin, and Ryan Lakes were delisted, or removed from the 303(d) list by the MPCA in 2014. Actions taken in the watershed and lakes have improved water quality to state standards. Those lakes are now considered to be “protection lakes,” and the focus has shifted to maintaining or continuing to improve water quality.

Table 1-1. Impaired Waters in the Shingle Creek watershed.

<table>
<thead>
<tr>
<th>Water Resource</th>
<th>Impairment</th>
<th>Date TMDL Approved</th>
<th>5-year Review</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bass Lake</td>
<td>Nutrients</td>
<td>9/25/09</td>
<td>Completed 2017</td>
</tr>
<tr>
<td>Cedar Island Lake</td>
<td>Nutrients</td>
<td>4/14/10</td>
<td>Completed 2018</td>
</tr>
<tr>
<td>Crystal Lake</td>
<td>Nutrients</td>
<td>3/25/09</td>
<td>Completed 2016</td>
</tr>
<tr>
<td>Eagle Lake</td>
<td>Nutrients</td>
<td>4/14/10</td>
<td>Completed 2018</td>
</tr>
<tr>
<td>Lake Magda</td>
<td>Nutrients</td>
<td>9/30/10</td>
<td>2019</td>
</tr>
<tr>
<td>Meadow Lake</td>
<td>Nutrients</td>
<td>3/23/10</td>
<td>2019</td>
</tr>
<tr>
<td>Pike Lake</td>
<td>Nutrients</td>
<td>4/14/10</td>
<td>Completed 2018</td>
</tr>
<tr>
<td>Pomerleau Lake</td>
<td>Nutrients</td>
<td>9/25/09</td>
<td>Completed 2017</td>
</tr>
<tr>
<td>Ryan Lake</td>
<td>Nutrients</td>
<td>11/9/07</td>
<td>Completed 2014</td>
</tr>
<tr>
<td>Schmidt Lake</td>
<td>Nutrients</td>
<td>9/25/09</td>
<td>Completed 2017</td>
</tr>
<tr>
<td>Upper, Middle, and Lower Twin Lake</td>
<td>Nutrients</td>
<td>11/9/07</td>
<td>Completed 2014</td>
</tr>
<tr>
<td></td>
<td>Mercury in fish</td>
<td>3/27/07 (MPCA)</td>
<td>Not yet begun (MPCA)</td>
</tr>
<tr>
<td>Shingle Creek</td>
<td>Chloride</td>
<td>2/14/07</td>
<td>Completed 2014</td>
</tr>
<tr>
<td>Shingle Creek</td>
<td>Dissolved oxygen</td>
<td>11/4/11</td>
<td>2019-20</td>
</tr>
<tr>
<td>Shingle Creek</td>
<td>Biota-macroinvertebrates</td>
<td>11/4/11</td>
<td>2019-20</td>
</tr>
<tr>
<td>Shingle Creek</td>
<td>E. coli</td>
<td>11/20/14 (MPCA)</td>
<td>2019-20</td>
</tr>
<tr>
<td>Bass Creek</td>
<td>Biota-fish</td>
<td>11/4/11</td>
<td>2019-20</td>
</tr>
<tr>
<td>Bass Creek</td>
<td>Chloride</td>
<td>Metro wide TMDL (MPCA)</td>
<td>2020</td>
</tr>
</tbody>
</table>
2.0 Overview of 2018 Monitoring Efforts

2018 monitoring activities in the Shingle Creek and West Mississippi watersheds included stream and outfall monitoring, lake monitoring, and volunteer wetland monitoring. Each of these efforts are described below in more detail.

STREAM AND OUTFALL MONITORING

Continuous flow measurements and water quality samples were collected by the Commission at six locations in the Shingle Creek and West Mississippi watersheds. Two of the stations, Oxbow Creek and Environmental Preserve (ENVP), are located in the West Mississippi Management Unit (Figure 1-1). The other stations include Bass Creek Park (BCP), SC-3, and SC-0 and are located in the Upper, Middle, and Lower Shingle Creek Management Units, respectively (Figure 1-1). Additionally, the USGS, in partnership with the Shingle Creek WMC, monitored continuous flow at station SC-1 in the Lower Shingle Creek Management near the outlet of Shingle Creek. Each monitoring station is described in more detail in Sections 3.0 through 6.0.

Stream stage height (water level) was continuously recorded from May through October at all monitoring stations in 2018. Stage height was used to calculate stream discharge using site-specific stage-discharge relationships (Appendix C). Routine water quality grab samples were collected once per month at the West Mississippi sites and two times per month at the Shingle Creek sites. In addition to water quality grab samples, at least two storm composite samples were collected at each Shingle Creek monitoring station and one storm composite sample was collected at each West Mississippi monitoring station using automated sampling equipment. Routine samples at each Shingle Creek site were analyzed for total phosphorus (TP), orthophosphorus (ortho-P), total dissolved phosphorus (TDP), total suspended solids (TSS), total Kjehldal nitrogen (TKN), nitrate/nitrite (NO2/NO3) and chloride. Routine samples at each West Mississippi site were analyzed for TP, ortho-P, TSS, and chloride. Storm samples were analyzed for the same parameters with the exception of chloride. Field parameters were also recorded during each routine site visit, including dissolved oxygen (DO), temperature, pH, and conductivity.

Overall, rainfall in the Shingle Creek and West Mississippi Watersheds was approximately 3.7 inches above normal (1992-2018) (Appendix A). During the first half of 2018 (January to June), precipitation was 1.1 inches below normal, while the second half of 2018 (July through December) was 4.9 inches above normal. This pattern resulted in normal low-flow conditions throughout the watersheds during spring and early summer with an increase in flow conditions during late summer into the fall. September’s precipitation was 4.6 inches above normal and drove the second half of the year statistics. In a normal year, we typically see higher flow conditions during spring and early summer followed by low-flow conditions in the late summer and early fall. However, 2016 experienced a similar precipitation pattern to that of 2018 where greater rainfall events are beginning to occur more frequently late in the year.

In 2018, stream pollutant concentrations were similar to prior years. More detailed results of the stream and outfall flow and water quality sampling are presented in the following sections and in Appendices A-C. Sections 4.0 through 7.0 of this report provide more in-depth analysis of the impairment status within each management unit.
LAKE MONITORING

There are 16 lakes in the Shingle Creek watershed, and none in the West Mississippi watershed. The Shingle Creek WMC has monitored 14 of the lakes routinely since 1996 through the Citizen Assisted Lake Monitoring Program (CAMP) and the Commission’s Intensive Lake Monitoring Program (Palmer and Curtis Lakes have not been monitored). The CAMP was initiated by the Met Council to supplement the water quality monitoring performed by Met Council staff and to increase knowledge of water quality of Metro area lakes. Volunteers in the program monitor their lake every other week from mid-April to mid-October. They measure surface water temperature, Secchi depth, and collect surface water samples that are analyzed by the Met Council for TP, TKN, and chlorophyll-a.

The Commission’s Intensive Lake Monitoring Program was established in 2012. Through this program, each lake in the watershed is monitored approximately every five years to evaluate protection efforts for lakes that are not impaired, and to assess progress toward achieving the TMDLs and state water quality standards for the impaired lakes. Monitoring activities include early and late season vegetation surveys, sediment core collection, fish community surveys and bi-weekly water quality sampling, including water column sampling. The methods and sampling techniques for biological communities and more thorough summaries are outlined in the Appendix E.

Six lakes were monitored in 2018. Crystal and Ryan Lakes were the two lakes selected for the Commission’s Intensive Lake Monitoring in 2018, while Upper, Middle and Lower Twin Lakes were sampled under the EPA Section 319 carp management grant project. Bass Lake was also assessed by Three Rivers Park District and CAMP with Wenck conducting SAV monitoring in 2018. A detailed review of the 2018 lake data is presented in Appendix E.

VOLUNTEER MONITORING

Both Commissions have sponsored volunteer opportunities for students and adults to undertake lake, stream and wetlands monitoring. The Citizen Assisted Monitoring Program (CAMP) is managed by the Metropolitan Council. The Shingle Creek Commission participates by recruiting and training volunteers and paying a modest fee each year for lab sample processing and consumables. In 2018, Bass Lake was monitored through CAMP and that data can be found in the Upper Shingle Creek Management Unit section below.

Both Commissions work with Hennepin County Energy and Environment to offer opportunities for high school students to monitor stream macroinvertebrates (RiverWatch) and for adult volunteers to monitor wetland health (Wetland Health Evaluation Program, WHEP). WHEP data is presented in Appendix D.
3.0 Figure Interpretation

The following sections contain dot charts that summarize the most recent (blue circle and year label) and historic (open black circle) water quality conditions and biota health indices (Figure 3.1). Each dot within the chart represents the percent difference from the respective impairment threshold/criteria for each parameter. Positive percent difference values (red shaded area) are exceedances of the standard while negative percent difference values (green shaded area) are conditions meeting standards. Values that deviate from the standard by more than double (> ±100%) are represented by a black open circle with a ‘x’ through it. These values are also reported as ± 110% (i.e. Fig 3.1 – Chloride). Parameters with no value assignment are current data gaps (i.e. Fig 3.1 – Escherichia coli). Stream and lake specific metrics, standards and data manipulations are reported in the following subsections.

Figure 3-1. Example of data summary reporting for a stream sample site.

3.1 Streams

Stream metrics and respective threshold criteria reported in the dot charts are:
- Dissolved Oxygen (DO) \(^1\) = 5 mg/L = MPCA standard
- Total Phosphorus (TP) \(^1\) = 100 mg/L = MPCA standard
- Total Suspended Solids (TSS) \(^1\) = 30 mg/L = MPCA standard
- Nitrate/ Nitrite (NO\(_3\)/NO\(_2\)) \(^1\) = 4.9 mg/L= MPCA draft aquatic toxicity chronic standard
- Chloride \(^2\) = 230 mg/L = MPCA standard
- *Escherichia coli* (E. coli) \(^3\) = 126 cfu/100mL = MPCA standard
Fish Indices of Biotic Integrity (Fish IBI) \(^4\) = 42 = MPCA standard
Invert Indices of Biotic Integrity (Invert IBI) \(^5\) = 43 = MPCA standard

1 Summer month average (6/1 - 9/30)
2 Winter month average (11/1 - 4/30)
3 Monthly geomean from previous 10 years
4 Low gradient IBI standard
5 Southern forest glide pool IBI standard

3.2 Deep Lakes

Deep lake metrics and respective threshold criteria reported in the dot charts are:
- Chlorophyll-\(a\) (Chl-\(a\)) \(^1\) = 14 \(\mu\)g/L = MPCA standard
- Total Phosphorus (TP) \(^1\) = 0.04 mg/L = MPCA standard
- Secchi Depth \(^1\) = 1.4 m = MPCA standard
- Floristic Quality Index (FQI) = 18.6 = MnDNR 2B standard
- Species Richness = 12 = MnDNR 2B standard
- Common Carp Density = 100 kg/ha = critical impairment threshold
- Fish IBI Tool #2 \(^2\) = 45 = MnDNR standard
- Fish IBI Tool #4 \(^2\) = 39 = MnDNR standard
- Fish IBI Tool #7 \(^2\) = 37 = MnDNR standard

1 Summer month average (6/1 - 9/30)
2 Fish IBI tool is determine by MnDNR lake class grouping

3.3 Shallow Lakes

Shallow lake metrics and respective threshold criteria reported in the dot charts are:
- Chlorophyll-\(a\) (Chl-\(a\)) \(^1\) = 20 \(\mu\)g/L = MPCA standard
- Total Phosphorus (TP) \(^1\) = 0.06 mg/L = MPCA standard
- Secchi Depth \(^1\) = 1.0 m = MPCA standard
- Floristic Quality Index (FQI) = 17.8 = MnDNR 2B standard
- Species Richness = 11 = MnDNR 2B standard
- Common Carp Density = 100 kg/ha = critical impairment threshold

1 Summer month average (6/1 - 9/30)
4.0 West Mississippi Management Unit

WEST MISSISSIPPI MANAGEMENT UNIT OVERVIEW

The West Mississippi Management Unit encompasses the entire West Mississippi Watershed Management Commission jurisdictional boundary. This management unit covers 16,000 acres across five municipalities in Hennepin County. Brooklyn Park (64%) covers a majority of the management unit, with Champlin (20%), Brooklyn Center (11%), Maple Grove (5%), and Osseo (1%) making up the rest (Figure 4-1 and Table 4-1).

The West Mississippi Management Unit is highly developed, however there is still approximately 1,000 acres (7% of management unit) of agricultural land still in production within the City of Brooklyn Park in the western portion of the watershed. Most of the developed land in the watershed is single family residential and therefore the most common land use classification is low-moderate impervious development (38%). Due to soil conditions within the watershed, there are no lakes and very few wetlands. Land use for the West Mississippi Management Unit is summarized in Table 4-1.

One of the defining characteristics of the West Mississippi Management Unit is its sandy, well-draining soils. Much of the watershed is located within the Anoka Sand Plain and therefore approximately 88% of the management unit contains type A, A/D, or B soils (Table 4-1). Soil type for the West Mississippi Management Unit is summarized in Table 4-1.

There are four major outfalls in West Mississippi: Oxbow, Environmental Preserve, Mattson Brook, and 65th Avenue outfalls. Located in Champlin, the Oxbow storm sewer outfall consists of a series of storm sewer pipes that drain approximately 1,167 acres of land in Champlin and Maple Grove. The Environmental Preserve is a small stream located in Brooklyn Park. This stream drains approximately 2,160 acres upstream of Brooklyn Park’s Environmental Preserve and outlets to a small wetland in the Coon Rapids Dam Regional Park. Mattson Brook is another small surface channel/stream that drains most of central Brooklyn Park (approximately 3,500 acres) and includes a tributary, Edinbrook/Century Channel. The 65th Avenue outfall is located in Brooklyn Center at the northeast corner of the Highway 252 and Interstate 694 interchange. This outfall drains approximately 590 acres of land in Brooklyn Center, which includes runoff from the commercial and industrial land west of Highway 252. The remainder of the West Mississippi Management Unit is made up of a series of small outfalls with relatively small drainage areas that discharge directly to the Mississippi River.
Figure 4-1. West Mississippi Management Unit Overview
Table 4-1. West Mississippi Management Unit water resources and land features.

<table>
<thead>
<tr>
<th>Streams/Outfalls</th>
<th>Type</th>
<th>Impairment Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>65th Ave Outfall</td>
<td>Storm sewer/Intermittent</td>
<td>Not Assessed</td>
</tr>
<tr>
<td>Mattson Brook</td>
<td>Storm sewer/Intermittent</td>
<td>Not Assessed</td>
</tr>
<tr>
<td>Environmental Preserve</td>
<td>Storm sewer/Intermittent</td>
<td>Not Assessed</td>
</tr>
<tr>
<td>Oxbow Creek</td>
<td>Storm sewer/Intermittent</td>
<td>Not Assessed</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lakes</th>
<th>Type</th>
<th>Impairment Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cities</th>
<th>Acres</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brooklyn Park</td>
<td>9,920</td>
<td>64%</td>
</tr>
<tr>
<td>Champlin</td>
<td>3,123</td>
<td>20%</td>
</tr>
<tr>
<td>Brooklyn Center</td>
<td>1,693</td>
<td>11%</td>
</tr>
<tr>
<td>Maple Grove</td>
<td>559</td>
<td>5%</td>
</tr>
<tr>
<td>Osseo</td>
<td>190</td>
<td>1%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Landuse</th>
<th>Acres</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-Moderate Impervious (5-50%)</td>
<td>6,062</td>
<td>38%</td>
</tr>
<tr>
<td>Highly Impervious (51-100%)</td>
<td>4,078</td>
<td>25%</td>
</tr>
<tr>
<td>Grassland/Shrubland</td>
<td>2,679</td>
<td>17%</td>
</tr>
<tr>
<td>Agriculture</td>
<td>1,105</td>
<td>7%</td>
</tr>
<tr>
<td>Wetland</td>
<td>850</td>
<td>5%</td>
</tr>
<tr>
<td>Forest</td>
<td>669</td>
<td>4%</td>
</tr>
<tr>
<td>Open Water</td>
<td>618</td>
<td>4%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Acres</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>7,910</td>
<td>51%</td>
</tr>
<tr>
<td>A/D</td>
<td>4,419</td>
<td>29%</td>
</tr>
<tr>
<td>B</td>
<td>1,221</td>
<td>8%</td>
</tr>
<tr>
<td>B/D</td>
<td>320</td>
<td>2%</td>
</tr>
<tr>
<td>C</td>
<td>30</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>C/D</td>
<td>58</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Not Assessed (Heavily Disturbed)</td>
<td>1,032</td>
<td>7%</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Untreated Area</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Yet Estimated</td>
<td></td>
</tr>
</tbody>
</table>

OUTFALL MONITORING CURRENT CONDITIONS AND TRENDS

The West Mississippi WMC monitored water quality and streamflow from 1990-1992 at two of the four major outfalls (Oxbow Creek and Mattson Brook). Results indicated very little flow in these tributaries and no water quality or quantity problems or concerns. Thus, the Commission chose to discontinue monitoring after the 1992 monitoring season. In 2010, the Commission elected to once again monitor water quality and flow at two outfall monitoring sites per year in the West Mississippi watershed.

Due to the extensive storm sewer infrastructure and other drainage alterations, the four major outfalls in West Mississippi are likely considered Class 7 waters. By definition, Class 7 waters are “limited resource value waters and are typically not protected for aquatic life and recreation due to lack of water, lack of habitat, or extensive physical alteration.” While these outfalls are not subject to water quality standards/assessments, they all discharge to the Mississippi River, which is a Class 2B water that is currently impaired for bacteria and
nutrients (TP). Thus, the Class 2B water quality standards developed by the State of Minnesota provide a good benchmark to evaluate water quality of the four major outfalls.

Below is a general summary and description of current water quality conditions of each outfall based on recent monitoring data (2010 through 2018). At this time, we were not able to calculate long-term data trends due to the limited amount of data for each site.

### 4.1 Oxbow Outfall

**Water Quality**

- TP concentrations currently exceed Class 2B standards.
- Ortho-phosphorus concentrations (not shown on figure) were relatively high, indicating that phosphorus loads are coming from both dissolved and particulate sources.
- TSS and chloride levels are below standards.

![Figure 4-2. Oxbow Outfall water quality summary (since 2010).](image)

**Recommendations**

- Water quality monitoring will occur in 2020.
- 2020 monitoring should include measurement of E. coli concentrations.
- Winter chloride sampling should be considered.
4.2 Environmental Preserve Outfall

Water Quality
- TP, TSS and DO concentrations exceed standards.
- 2018 TP and DO concentrations were the highest above the standard observed to date.
- This was the first recorded year in which the average TSS concentration exceeded standards. However, TSS concentrations measured during routine sampling events were, with one exception, always below the TSS standard. Conversely, samples taken during storms had very high TSS concentrations and are responsible for driving up the 2018 average TSS concentration.
- NO₃/NO₂ and chloride concentrations are well below standards, although these parameters have not been monitored since 2011.

![Figure 4-3. Environmental Preserve Outfall water quality summary (since 2010).](image)

Recommendations
- Water quality monitoring will occur in 2020, which will help provide context to the high TP and TSS concentrations observed in 2018.
- 2020 monitoring should include measurement of E. coli concentrations.
- Winter chloride sampling should be considered.
4.3 Mattson Brook Outfall

Water Quality
- This site was not monitored in 2018. It was most recently monitored in 2017.
- TSS and TP concentrations met standards in 2017 and were the lowest (best) since sampling began in 2010.
- Ortho-phosphorus concentrations (not shown on figure) were relatively high, indicating that phosphorus loads are coming from both dissolved and particulate sources.
- DO and chloride concentrations exceeded standards.
- NO₃/NO₂ concentrations are well below the standard, although this parameter has not been monitored since 2011.

Figure 4-4. Mattson Brook Outfall water quality summary (since 2010).

Recommendations
- Water quality monitoring will occur in 2019.
- 2019 monitoring will include measurement of E. coli concentrations.
- Winter chloride sampling should be considered.
4.4 65th Ave Outfall

Water Quality
- This site was not monitored in 2018. It was most recently monitored in 2017.
- TSS and TP met standards in 2017 and were the lowest (best) observed since sampling began in 2010.
- DO and chloride concentrations routinely exceed standards at this site.
- NO₃/NO₂ concentrations are well below the standard, although this parameter has not been monitored since 2011.

Figure 4-5. 65th Ave Outfall water quality summary (since 2010).

Recommendations
- Water quality monitoring will occur in 2019.
- 2019 monitoring will include measurement of E. coli concentrations.
- Winter chloride sampling should be considered.
5.0 Upper Shingle Creek Management Unit

UPPER SHINGLE CREEK MANAGEMENT UNIT OVERVIEW

The Upper Shingle Creek Management Unit is the headwaters of the Shingle Creek watershed and covers approximately 8,300 acres across four municipalities in Hennepin County. Plymouth (53%) and Maple Grove (30%) make up a majority of this management unit, with New Hope (12%) and Brooklyn Park (5%) also having small portions (Figure 5-1 and Table 5-1).

Lakes and wetlands are a common feature in the Upper Shingle Creek Management Unit. The Bass Chain of Lakes is located in the City of Plymouth and includes Bass, Schmidt and Pomerleau Lakes. Bass and Schmidt are shallow lakes, while Pomerleau Lake is a deep lake. The major inflow to Bass Lake and out of the lake is Bass Creek. Bass Creek starts as a series of wetlands west of Vicksburg Lane in Plymouth and flows east into New Hope and then north to where it meets Eagle Creek just south of Interstate 694 in Brooklyn Park.

The other major lake chain in the Upper Shingle Creek Management Unit is the Eagle Chain of Lakes. This chain includes Eagle, Cedar Island, and Pike Lakes. The Eagle Chain of Lakes is primarily in the City of Maple Grove, however portions of Pike Lake and the watershed draining to Pike Lake are located in Plymouth. Eagle Lake outlets to Eagle Creek which flows a short distance through a series of wetlands prior to its confluence with Bass Creek just south of Interstate 694 in Brooklyn Park.

Lake Magda and Meadow Lake are two shallow lakes in the Upper Shingle Creek Management Unit. Lake Magda is a small (10 acre) lake located Brooklyn Park. Meadow Lake is also a very small lake (12 acres) located in New Hope. Both lakes have relatively small contributing watersheds.

The Upper Shingle Creek Management Unit is almost fully developed, however it was one of the last areas in the Shingle Creek watershed to develop. Thus, much of this management unit was developed under stormwater management rules and therefore has some level of water quality treatment. Most of the water quality treatment throughout the watershed consists of stormwater ponds and wetlands. A recent desktop analysis determined that approximately 66 acres of the watershed flows directly to Bass Creek with no water quality treatment (see Table 4-1). By comparison, the Middle and Lower Shingle Creek Management Units have approximately 1,700 and 2,000 acres of untreated area, respectively, that discharge directly to Shingle Creek.

Land use within the Upper Shingle Creek Management Unit is predominantly high impervious urban development (28%) and low-moderate impervious urban development (26%). While this management unit is almost fully developed, it has significantly less impervious coverage (54%) compared to the Middle (73%) and Lower (84%) Shingle Creek Management Units. The Upper Shingle Creek Management Unit also has the highest percentage of wetlands and open water (lake) features compared to the other Shingle Creek management units.
Figure 5-1. Upper Shingle Creek Management Unit Overview.
Table 5-1. Upper Shingle Creek Management Unit water resources and land features.

<table>
<thead>
<tr>
<th>Streams</th>
<th>Type</th>
<th>Impairment Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bass Creek (07010206-784)</td>
<td>Class 2B</td>
<td>Impaired (Cl, Biota – Fish)</td>
</tr>
<tr>
<td>Eagle Creek (07010206-671)</td>
<td>Class 2B</td>
<td>Not Assessed</td>
</tr>
<tr>
<td>Pike Creek (07010206-667)</td>
<td>Class 2B</td>
<td>Not Assessed</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lakes</th>
<th>Type</th>
<th>Impairment Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pomerleau Deep Lake</td>
<td>Impaired (nutrients)</td>
<td></td>
</tr>
<tr>
<td>Curtis Shallow Lake</td>
<td>No Data</td>
<td></td>
</tr>
<tr>
<td>Schmidt Shallow Lake</td>
<td>Not Impaired (de-listed in 2016)</td>
<td></td>
</tr>
<tr>
<td>Bass Shallow Lake</td>
<td>Impaired (nutrients)</td>
<td></td>
</tr>
<tr>
<td>Meadow Shallow Lake</td>
<td>Impaired (nutrients)</td>
<td></td>
</tr>
<tr>
<td>Magda Shallow Lake</td>
<td>Impaired (nutrients)</td>
<td></td>
</tr>
<tr>
<td>Cedar Island Shallow Lake</td>
<td>Impaired (nutrients)</td>
<td></td>
</tr>
<tr>
<td>Pike Shallow Lake</td>
<td>Impaired (nutrients)</td>
<td></td>
</tr>
<tr>
<td>Eagle Deep Lake</td>
<td>Impaired (nutrients)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cities</th>
<th>Acres</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plymouth</td>
<td>4,417</td>
<td>53%</td>
</tr>
<tr>
<td>Maple Grove</td>
<td>2,477</td>
<td>30%</td>
</tr>
<tr>
<td>New Hope</td>
<td>965</td>
<td>12%</td>
</tr>
<tr>
<td>Brooklyn Park</td>
<td>463</td>
<td>6%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Landuse</th>
<th>Acres</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highly Impervious (51-100%)</td>
<td>2,367</td>
<td>28%</td>
</tr>
<tr>
<td>Low-Moderate Impervious (5-50%)</td>
<td>2,165</td>
<td>26%</td>
</tr>
<tr>
<td>Wetlands</td>
<td>1,250</td>
<td>15%</td>
</tr>
<tr>
<td>Grassland and Shrubland</td>
<td>1,104</td>
<td>13%</td>
</tr>
<tr>
<td>Open Water</td>
<td>665</td>
<td>8%</td>
</tr>
<tr>
<td>Forest</td>
<td>617</td>
<td>7%</td>
</tr>
<tr>
<td>Agriculture</td>
<td>154</td>
<td>2%</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Acres</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>2,346</td>
<td>28%</td>
</tr>
<tr>
<td>A/D</td>
<td>2</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>B</td>
<td>1,892</td>
<td>23%</td>
</tr>
<tr>
<td>B/D</td>
<td>1,006</td>
<td>12%</td>
</tr>
<tr>
<td>C</td>
<td>89</td>
<td>1%</td>
</tr>
<tr>
<td>C/D</td>
<td>1,003</td>
<td>12%</td>
</tr>
<tr>
<td>Water</td>
<td>736</td>
<td>9%</td>
</tr>
<tr>
<td>Not Assessed (Heavily Disturbed)</td>
<td>1,249</td>
<td>15%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Untreated Area (Creek Corridor)</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maple Grove</td>
<td>48</td>
</tr>
<tr>
<td>Plymouth</td>
<td>18</td>
</tr>
</tbody>
</table>
5.1 Monitoring History

STREAMS

Stream flow and water quality are monitored at one location, Bass Creek Park (BCP), in the Upper Shingle Creek Management Unit. BCP is in Brooklyn Park and drains approximately 65% of the Upper Shingle Creek Management Unit. This station was monitored briefly in 2000 by the MPCA as part of a water quality assessment project, which determined that Bass Creek was impaired for chloride and biotic integrity as measured by Fish IBI scores. TMDL studies were completed by the Commission and the MPCA in 2007 to address the chloride impairment and in 2011 to address the Fish IBI impairment. The Commission began monitoring the BCP site in 2013 to continually assess water quality conditions in Bass Creek and measure progress toward achieving the TMDLs. Bass Creek is considered a Class 2B water and is subject to the North Central Hardwood Forest Class 2B water quality standards.

LAKES

Lake water quality has been monitored for eight lakes in the Upper Shingle Creek Management Unit (excluding Curtis Lake) since at least the mid-1990s. All the monitored lakes in the Upper Management Unit were classified as impaired for nutrients (TP) in the early 2000s.

5.1.1 Bass Lake Chain

- The Bass Lake chain of lakes includes Bass, Schmidt and Pomerleau Lakes.
- Bass Lake’s water quality and submerged aquatic vegetation community was sampled in 2018 and observed concentrations or score that did not meet water quality standards or biological thresholds.
- Historically, Pomerleau and Bass Lake tend to exceed water quality standards while Schmidt Lake tends to flip between slightly exceeding and meeting standards.
- Schmidt Lake was listed as impaired in 2002 and this listing was based on limited data at that time from the 1990s. The lake was recently removed from the State’s 303(d) list of impaired waters in 2016. There does not appear to be any clear trend in the water quality data for Schmidt Lake over the past 10 years and the lake has consistently met water quality standards since the early 2000s.
- Bass and Pomerleau Lakes will be undergoing aluminum sulfate treatments in 2019.

5.1.2 Eagle Lake Chain

- The Eagle Lake chain of lakes includes Eagle, Pike and Cedar Island Lakes. Common Carp population assessments were the only monitoring activities within the chain in 2018.
- Common carp do not appear to be a concern for the chain of lakes. Additional fisheries information on the shallow lakes of this chain would be informative to assess impact on water quality.
- Cedar Island and Pike Lakes have consistently exceeded water quality standards over the past 10 years. Cedar Island has some of the highest TP and chlorophyll-a concentrations of any lake monitored in the Shingle Creek watershed.
- There is no trend in water quality for Cedar Island and Pike Lakes and they remain impaired.
- Eagle Lake has met standards in 2 of the past 4 years in which it has been monitored, however the 10-year average still exceeds State standards.
5.1.3 Lake Magda and Meadow Lake

- Meadow was last sampled in 2016, Magda was last sampled in 2017.
- Meadow Lake and Lake Magda have consistently exceeded water quality standards over the past 10 years. These systems have 5-year TMDL reviews occurring in 2019.
- Both lakes have fish communities that may be leading to water quality impairments, a turbid water state, and a poor vegetation community.
5.2 Bass Creek Park (BCP) Stream Reach

**Water Quality**
- TSS, NO₃/NO₂ and DO concentrations meet their respective standards, although DO concentrations are near the impairment threshold.
- TP and chloride concentrations exceed their respective standards.
- Orthophosphate (SRP) as a fraction of TP is higher at this site than at other sites on Shingle Creek.

**Biota**
- Fish and macroinvertebrate IBI scores did not meet biological impairment thresholds.
- 2010 biotic stressor ID highlighted DO, chloride, system flashiness, historic straightening and armoring as possible candidate stressors.
- The continued use of chlorides within the watershed and the increased size and intensity of storm events is a continued and growing concern for biota within the system.

![Figure 5-2. Bass Creek Park stream water quality and biota health summary since 2000.](image)

**Recommendations**
- Water quality monitoring will occur in 2019.
- 2019 monitoring will include measurement of E. coli concentrations.
- The EPA-funded SRP Reduction Project will begin in 2019 and one test location is on Bass Creek just upstream of BCP (Cherokee Wetland).
- Efforts to restore biological health should be considered. The Shingle Creek DO/Biotic TMDL review will occur in 2019 and 2020.
- Increased biotic assessments in conjunction with habitat assessments could begin to tease apart the impact of the numerous biotic stressors influence the stream.
5.3 Bass Lake

Water Quality
- TP, Chl-a, and Secchi depth within Bass Lake are relatively poor.
- Historic trend assessment: TP and Chl-a are increasing, Secchi depth is decreasing.

Fisheries
- Relatively healthy, diverse and balanced trophic structure resulting in a healthy community.
- Common carp are not a concern within the lake.

Vegetation
- Is near biological standards yet dominated by undesirable levels of coontail that impact recreation for select property owners.
- Curlyleaf pondweed is a concern on the lake and is treated annually by the lake association.
- Improved water quality conditions may improve vegetation community health.

Figure 5-3. Biota and water quality summary (since 2000) for Bass Lake.

Recommendations
- Bass Lake will be receiving an alum sulfate treatment in 2019 to reduce internal loads resulting from summer hypoxia within the lake. Treatment is expected to improve all three water quality parameters and possibly the vegetation community.
- Follow up water quality and biological monitoring will occur in 2019 post alum treatment.
- Assist the lake association with SAV management planning and treatment (occurring in 2019-2022).
5.4 Schmidt Lake

Water Quality
- TP, Chl-a, and Secchi have annual records of both meeting and exceeding standards. Based on the most recent monitoring data (2017), TP exceeded, while Chl-a and Secchi depth both meet water quality standards.
- Historic trend assessment: TP is decreasing, Secchi depth is increasing.

Fisheries
- The most recent fish community surveys were conducted in 2011 and can be found here: [http://www.plymouthmn.gov/home/showdocument?id=7422](http://www.plymouthmn.gov/home/showdocument?id=7422).
- The lake does not currently meet the size and/or lake class grouping to be evaluated with MnDNR IBI tools.

Vegetation
- The vegetation community was observed as biologically impaired. Vegetation impairments often result from poor water quality and/or poor fish community health. The lake association has managed aquatic vegetation in past years.

![Figure 5-4. Biota and water quality summary (since 2000) for Schmidt Lake.](image)

Recommendations
- The vegetation, fisheries and water quality will be sampled in 2019 as part of the routine lake monitoring program.
5.5 Pomerleau Lake

Water Quality
- TP, Chl-a, and Secchi all met water quality standards 2017 (most recent monitoring efforts). 2017 experienced the best water quality on record since 2000.
- Historic trend assessment: Chl-a is decreasing (improving), while other parameters showed no trend.

Fisheries
- 2017 surveys observed a relatively low amount of stress tolerant fish, suggesting fish community health has been improved from historic surveys efforts.
- It is possible that a change in the fish community was one factor in the improved water quality conditions seen in 2017 as omnivorous fish (i.e. black bullhead) can cause water quality impairments at high densities.
- The lake was not sampled using standard common carp survey techniques, however, no carp were observed during standard trap and gill net surveys.

Vegetation
- In 2017, the vegetation community was observed to decrease in both species richness and quality species between spring and summer surveys and did not meet biological health thresholds.
- Overall, a limited number of species were observed with select species dominating the community. Vegetation growth was relatively abundant with dense surface growth around most of the lake’s perimeter. CLP was present in spring assessments.

Figure 5-5. Biota and water quality summary (since 2000) for Pomerleau Lake.

Recommendations
- The lake is receiving an aluminum sulfate treatment in 2019.
- The impact of fisheries on the lake is unknown but suspected to have a significant impact.
- SAV management may be warranted from the Commission post 2019 alum treatment.
5.6 Cedar Island Lake

Water Quality
- All three water quality parameters are poor and exceed standards with Chl-a and TP more than double the impairment threshold (many annual occurrences).
- Historic trend assessment: Chl-a is increasing and Secchi depth is decreasing.

Fisheries
- A rotenone treatment was completed in the past to address rough fish, but no data is available regarding the outcomes.
- Cedar Island is a shallow lake with water quality that could be driven by the fish community.

Vegetation
- The vegetation community is biologically impaired and lacked both diversity of species and quality of species.
- An impaired vegetation community may be explained by reduced water quality conditions as high nutrients and limited light penetration can favor a few select species.

![Biota and water quality summary (since 2000) for Cedar Island Lake.](image)

Recommendations
- The influence of the fishery is unknown but suspected to be a driver of water quality within the lake.
- Fisheries survey information today suggests a large fish population and a history of unsuccessful management activities (rotenone, stocking, etc.).
5.7 Eagle Lake

**Water Quality**
- Water quality has historic variability with the most recent data suggesting impaired water quality. Secchi depth was the only 2017 parameter observed to be meeting standards.
- Historic trend assessment: TP is increasing and Secchi depth is decreasing.

**Fisheries**
- The MnDNR conducted an IBI assessment in 2011 and observed a fish community that was right at the biological impairment threshold.
- No common carp were observed during population assessment, therefore, common carp are not believed to impact water quality in Eagle Lake at this time.

**Vegetation**
- Spring and summer surveys in 2015 found a vegetation community that increased in species richness and vegetation quality and is meeting biological health conditions.
- Generally, high light penetration and bathymetric diversity provide ample growing conditions for various species within the lake.
- A large presence of curlyleaf pondweed exists in the lake and senesces by early summer.

![Biota and water quality summary (since 2000) for Eagle Lake.](image)

**Figure 5-7. Biota and water quality summary (since 2000) for Eagle Lake.**

**Recommendations**
- Continued efforts to improve water quality may ensure that vegetation quality within the lake continues to meet biological health standards.
- Implement recommendations from recently completed 5-year TMDL review for Eagle Lake.
5.8 Pike Lake

Water Quality
- Overall water quality is poor and not meeting water quality standards.
- Historic trend assessment: TP is increasing.

Fisheries
- Most recent fish surveys were conducted in Fall of 2015 and observed a large insectivore presence compared to other trophic guilds. 2015 netting surveys were outside the typical summer sampling period for fish and comparisons to other surveys is cautioned.
- With a large surface connection to Eagle, the exchange of individuals is likely high between the lakes.
- No common carp were observed during population assessment, therefore, common carp are not believed to impact water quality in Pike Lake at this time.

Vegetation
- The vegetation community is biologically impaired and lacked both diversity of species and quality of species.
- An impaired vegetation community may be explained by poor water quality conditions as high nutrients and limited light penetration can favor a degraded vegetation community.

![Figure 5-8. Biota and water quality summary (since 2000) for Pike Lake.](image)

Recommendations
- Continued efforts to reduce nutrient loading.
- Implement recommendations from recently completed 5-year TMDL review for Eagle Lake.
5.9 Magda Lake

Water Quality
- Water quality is degraded and does not meet water quality standards.
- Brown milky water conditions were observed in the lake after precipitation events which likely resulted from storm sewer inputs during summer street repairs within the watershed.
- Historic trend assessment: No trends observed.

Fisheries.
- Fisheries survey conducted in 2017 did not observe common carp, however, a large population of bullheads and an imbalanced fishery were observed.
- Water quality has the potential to be greatly influenced by the fish community in shallow lakes. It is likely that the current fish community is contributing to impairments within the lake.

Vegetation
- The vegetation community is biologically impaired and vegetation health decreased through the open water season.
- Poor water quality impedes the ability of native plants to grow as they quickly become light limited.

Figure 5-9. Biota and water quality summary (since 2000) for Magda Lake.

Recommendations
- Efforts to remove fish or maintain a healthy fishery should become a priority to increase water quality and biotic community health.
- Implement findings of 5-year TMDL review when study is completed in 2019.
5.10 Meadow Lake

Water Quality
- Water quality is degraded and does not meet water quality standards.
- Historic trend assessment: No trends observed.

Fisheries
- Fisheries survey conducted in 2017 did not observe common carp, however, a large population of fathead minnows was observed.
- Water quality has the potential to be greatly influenced by the fish community in shallow lakes. We believe that the current fish community is contributing to impairments within the lake.

Vegetation
- Vegetation quantity and quality are below impairments thresholds and are likely the result of poor water quality conditions.
- Vegetation health decreased across the open water season as water quality decreased.

Figure 5-10. Biota and water quality summary (since 2000) for Meadow Lake.

Recommendations
- A greater fisheries assessment and efforts to keep fish out of Meadow Lake will likely have a significant impact on the water quality and vegetation community health.
- Implement findings of 5-year TMDL review when study is completed in 2019.
6.0 Middle Shingle Creek Management Unit

MIDDLE SHINGLE CREEK MANAGEMENT UNIT OVERVIEW

The Middle Shingle Creek Management Unit covers Shingle Creek from the confluence of Eagle and Bass Creeks to Palmer Lake in Brooklyn Park. This management unit covers approximately 9,500 acres across four municipalities in Hennepin County. A majority of the management unit is located in Brooklyn Park (62%), with the rest covering portions of Maple Grove (27%), Brooklyn Center (8%), and Osseo (3%) (Figure 6-1 and Table 6-1).

The Middle Shingle Creek Management Unit is fully developed. Most of the eastern portion of the management unit (Brooklyn Park and Brooklyn Center) was developed in the 1960s and 1970s with minimal stormwater treatment. The western portion of the watershed, particularly Maple Grove, was developed more recently in the 1980s and 1990s and therefore much of this area has some level of stormwater quality treatment. A recent desktop analysis determined that there are approximately 1,700 acres of the watershed flowing directly to Shingle Creek with minimal water quality treatment, most of which is in the City of Brooklyn Park (see Table 6-1).

Land use within the Middle Shingle Creek Management Unit is predominantly high impervious urban development (45%) and low-moderate impervious urban development (28%). In general, development through the Shingle Creek watershed occurred from east to west and therefore the Middle Shingle Creek Management Unit has the second most impervious coverage of the three management units. Lakes are not a common feature in the Middle Shingle Creek Management Unit. Lake Success is the only lake in the watershed by DNR definition. Palmer Lake is another shallow water body located in this management unit, however it is classified as a wetland by DNR standards.

Similar to the West Mississippi Management Unit, the Middle Shingle Creek Management Unit is characterized by sandy, well-draining soils. Approximately 62% of the management unit contains type A, A/D, or B soils. Soil type for the Middle Shingle Creek Management Unit is summarized in Table 6-1.
Figure 6-1. Middle Shingle Creek Management Unit Overview.
Table 6-1. Middle Shingle Creek Management Unit water resources and land features.

<table>
<thead>
<tr>
<th>Streams</th>
<th>Type</th>
<th>Impairment Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shingle Creek (07010206-506)</td>
<td>Class 2B</td>
<td>Impaired (Cl, DO, <em>E. coli</em>, Biota – Invert.)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lakes</th>
<th>Type</th>
<th>Impairment Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Palmer</td>
<td>Shallow</td>
<td>Not Assessed</td>
</tr>
<tr>
<td>Success</td>
<td>Shallow</td>
<td>Not Impaired</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cities</th>
<th>Acres</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brooklyn Park</td>
<td>5,839</td>
<td>62%</td>
</tr>
<tr>
<td>Maple Grove</td>
<td>2,558</td>
<td>27%</td>
</tr>
<tr>
<td>Brooklyn Center</td>
<td>769</td>
<td>8%</td>
</tr>
<tr>
<td>Osseo</td>
<td>273</td>
<td>3%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Landuse</th>
<th>Acres</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highly Impervious (51-100%)</td>
<td>4,215</td>
<td>45%</td>
</tr>
<tr>
<td>Low-Moderate Impervious (5-50%)</td>
<td>2,645</td>
<td>28%</td>
</tr>
<tr>
<td>Grassland and Shrubland</td>
<td>1,422</td>
<td>15%</td>
</tr>
<tr>
<td>Wetlands</td>
<td>893</td>
<td>9%</td>
</tr>
<tr>
<td>Forest</td>
<td>236</td>
<td>3%</td>
</tr>
<tr>
<td>Agriculture</td>
<td>19</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Open Water</td>
<td>10</td>
<td>&lt;1%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Acres</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>2,943</td>
<td>31%</td>
</tr>
<tr>
<td>A/D</td>
<td>2,138</td>
<td>23%</td>
</tr>
<tr>
<td>B</td>
<td>772</td>
<td>8%</td>
</tr>
<tr>
<td>B/D</td>
<td>228</td>
<td>2%</td>
</tr>
<tr>
<td>C</td>
<td>36</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>C/D</td>
<td>39</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Water</td>
<td>86</td>
<td>1%</td>
</tr>
<tr>
<td>Not Assessed (Heavily Disturbed)</td>
<td>3,197</td>
<td>34%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Untreated Area (Direct)</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brooklyn Park</td>
<td>1,637</td>
</tr>
<tr>
<td>Brooklyn Center</td>
<td>95</td>
</tr>
</tbody>
</table>
6.1 Monitoring History

STREAMS

Stream flow and water quality have been monitored at one location, SC-3, in the Middle Shingle Creek Management Unit. This station is located at the intersection of Shingle Creek and Brooklyn Boulevard in Brooklyn Park. This monitoring location drains approximately 54% of the Middle Shingle Creek Management Unit. The Shingle Creek WMC began monitoring this station in the early 2000s. Shingle Creek was placed on the State’s 303(d) list of impaired waterbodies in 1998 for chloride, in 2004 for DO, and in 2006 for macroinvertebrate IBI scores. TMDL studies were completed by the Commission and the MPCA in 2007 to address the chloride impairment and in 2011 to address the DO and macroinvertebrate IBI impairments. The Commission has continued to monitor this station every year since the completion of the TMDLs to assess water quality conditions in the Middle Shingle Creek Management Unit and measure progress toward achieving the TMDLs. Shingle Creek is considered a Class 2B water and is therefore subject to the North Central Hardwood Forest Class 2B water quality standards for streams.

Four main water quality parameters of concern have been sampled at the SC-3 monitoring station since 2002: TSS, TP, dissolved oxygen (DO), and chloride. The dot charts depict the current condition and associated Class 2B water quality standard. Monitoring results for other water quality parameters not covered in this section (ortho-P, TKN and nitrate) are presented in Appendices C. Also included in dot charts is the fish/macroinvertebrate IBI monitoring. Fish and macroinvertebrate IBI assessments were performed at the sample locations to provide an update to dated (2000) assessments along Shingle Creek.

Below is a general summary of the current conditions of the four main water quality parameters of concern and IBI monitoring results in the Middle Shingle Creek Management Unit.

LAKES

Lake water quality has been monitored on the only lake in the Middle Shingle Creek Management Unit, Lake Success, since the 1990s (Palmer Lake is a considered wetland for monitoring purposes).

Historic water quality sampling on Lake Success has focused on three main parameters: TP, chlorophyll-a, and Secchi depth (transparency). Lake Success is not currently meeting state water quality standards for water quality parameters, however it is currently not listed on the 303(d) list of impaired waters. Lake Success was monitored by the Commission in 2016 through the Intensive Lake Monitoring program.

The fish community was assessed on Palmer Lake as it is a flow-through wetland habitat for Shingle Creek and suspected to serve as a carp nursery. Results of the 2018 survey are presented in Section 6.4.
6.2 SC-3 Stream Reach

Water Quality
- TP concentrations have not met standards in most years and did not meet standards in 2018. TSS, chloride and DO concentrations also frequently have not meet their respective standards, although in 2018, DO and TSS met standards.
- NO₃/NO₂ concentrations are consistently below the impairment threshold.
- Chloride was over double the standard concentration.

Biota
- 2018 fish and macroinvertebrate IBI scores did not meet standards.
- 2010 biotic stressor ID highlighted DO, chloride, system flashiness, historic straightening and armoring as possible candidate stressors. Areas of the site were extremely silty (a common habitat impairment).
- The continued use of chlorides within the watershed and the increased size and intensity of storm events is a continued and growing concern for biota within the system.

Figure 6-2. SC-3 stream water quality and biota health summary since 2000.

Recommendations
- Water quality monitoring will occur in 2019.
- 2019 monitoring will include measurement of E. coli concentrations.
- Review and investigate ways to reduce chloride impact on stream.
- Investigate and restore biotic health within the stream reach.
- Increased biotic assessments in conjunction with habitat assessments could begin to tease apart the impact of the numerous biotic stressors influence the stream.
- Implement findings of DO and biotic TMDL Review which will be completed in 2020
6.3 Lake Success

**Water Quality**
- Most recent monitoring efforts (2016) indicate TP and Secchi were not meeting standards, while Chl-a was slightly above impairment threshold. Overall water quality is poor.
- Historic trend assessment: Secchi depth is decreasing.

**Fisheries**
- No fisheries assessment has been conducted.

**Vegetation**
- No vegetation was observed in spring or summer surveys.

---

**Figure 6-3. Biota and water quality summary (since 2000) for Lake Success.**

**Recommendations**
- Conduct a fish community assessment.
- Investigate why there is no vegetation growth.
6.4 Palmer Lake

Fisheries
- Wenck conducted a shallow lake fish assessment on Palmer Lake in 2018 to determine if common carp utilized the lake/wetland.
- A very tolerant fish community was observed, and a large number of adult common carp were observed swimming within the lake.
- >80 young of year carp were captured suggesting that Palmer Lake is a nursery habitat for carp.

Table 6.1. Fish summary from shallow lake fish assessment.

<table>
<thead>
<tr>
<th>Fish Species</th>
<th>Count</th>
<th>Mass (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black Bullhead</td>
<td>4</td>
<td>102</td>
</tr>
<tr>
<td>Northern Pike</td>
<td>1</td>
<td>71</td>
</tr>
<tr>
<td>Common Carp</td>
<td>87</td>
<td>925</td>
</tr>
<tr>
<td>Largemouth Bass</td>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>Fathead Minnow</td>
<td>41</td>
<td>54</td>
</tr>
<tr>
<td>Central Mudminnow</td>
<td>4</td>
<td>27</td>
</tr>
<tr>
<td>Spotfin Shiner</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>Hybrid Sunfish</td>
<td>1</td>
<td>4</td>
</tr>
</tbody>
</table>

Vegetation
- Fortin consulting was observed out on the lake conducting a vegetative AIS assessment.
- Wenck observed very little vegetation overall but did notice small amounts of curlyleaf pondweed in the basin.

Recommendations
- The overall biotic health of Palmer Lake is significantly degraded. The in lake and wetland fringe habitat is filled with tolerant and/or invasive species.
- The wetland sediment is very fine particles that are easily moved and may be contributing to degraded and impaired conditions within the lake.
7.0 Lower Shingle Creek Management Unit

LOWER SHINGLE CREEK MANAGEMENT UNIT OVERVIEW

The Lower Shingle Creek Management Unit covers Shingle Creek from the outlet of Palmer Lake in Brooklyn Center to the creek’s confluence with Mississippi River in Minneapolis. This management unit covers approximately 11,000 acres across six municipalities in Hennepin County. This management unit is split fairly evenly between Brooklyn Center (27%), Crystal (23%), Minneapolis (19%), Robbinsdale (14%), New Hope (10%), and Brooklyn Park (7%) (Figure 7-1 and Table 7-1).

Lakes are a common feature in the Lower Shingle Creek Management Unit. The Twin Chain of Lakes is located in Crystal, Brooklyn Center, and Robbinsdale and includes Upper Twin, Middle Twin and Lower Twin Lakes. Upper (118 acres) and Lower Twin (30 acres) are shallow lakes, while Middle Twin Lake (54 acres) is a deep lake. Flow through the lake chain is from north to south or from Upper to Middle to Lower Twin. Lower Twin Lake outlets over a weir located at France Avenue to a small channel (Ryan Creek) that flows downstream to Ryan Lake. Ryan Lake is a small (15 acres) deep lake located in Robbinsdale, Brooklyn Center, and Minneapolis. Ryan Lake outlets to Ryan Creek which flows east to where it discharges to Shingle Creek near 49th Ave N in Minneapolis. Crystal Lake is the other lake in the Lower Shingle Creek Management Unit. Crystal Lake is a moderate sized (89 acres) deep lake located in the City of Robbinsdale.

The Lower Shingle Creek Management Unit is fully developed. Most of this management unit was developed in the 1950s and 1960s or earlier and therefore has minimal stormwater treatment. A recent desktop analysis determined that there are approximately 2,000 acres of the watershed flowing directly to Shingle Creek with no water quality treatment, most of which is in Minneapolis (see Table 7-1).

Land use within the Lower Shingle Creek Management Unit is predominantly high impervious urban development (71%). In general, development through the Shingle Creek watershed occurred from east to west and therefore the Lower Shingle Creek Management Unit has the highest impervious coverage of the three Shingle Creek Management Units. The remainder of land in the Lower Shingle Creek Management Unit is split between grassland and shrubland (13%), low-moderate impervious urban development (8%), open water (3%), wetlands (3%) and forest (2%) (see Table 7-1).
Figure 7-1. Lower Shingle Creek Management Unit Overview.
Table 7-1. Lower Shingle Creek Management Unit water resources and land features.

<table>
<thead>
<tr>
<th>Streams</th>
<th>Type</th>
<th>Impairment Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shingle Creek (07010206-506)</td>
<td>Class 2B</td>
<td>Impaired (Cl, DO, <em>E. coli</em>, Biota – Invert.)</td>
</tr>
<tr>
<td>Ryan Creek (07010206-536)</td>
<td>Class 2B</td>
<td>Not Assessed</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lakes</th>
<th>Type</th>
<th>Impairment Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crystal</td>
<td>Deep Lake</td>
<td>Impaired (nutrients)</td>
</tr>
<tr>
<td>Upper Twin</td>
<td>Shallow Lake</td>
<td>Impaired (nutrients)</td>
</tr>
<tr>
<td>Middle Twin</td>
<td>Deep Lake</td>
<td>Impaired (nutrients)</td>
</tr>
<tr>
<td>Lower Twin</td>
<td>Shallow Lake</td>
<td>Not Impaired (de-listed in 2016)</td>
</tr>
<tr>
<td>Ryan</td>
<td>Shallow Lake</td>
<td>Not Impaired (de-listed in 2016)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cities</th>
<th>Acres</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brooklyn Center</td>
<td>2,902</td>
<td>27%</td>
</tr>
<tr>
<td>Crystal</td>
<td>2,515</td>
<td>23%</td>
</tr>
<tr>
<td>Minneapolis</td>
<td>2,048</td>
<td>19%</td>
</tr>
<tr>
<td>Robbinsdale</td>
<td>1,485</td>
<td>14%</td>
</tr>
<tr>
<td>New Hope</td>
<td>1,092</td>
<td>10%</td>
</tr>
<tr>
<td>Brooklyn Park</td>
<td>810</td>
<td>7%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Landuse</th>
<th>Acres</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highly Impervious (51-100%)</td>
<td>7,700</td>
<td>71%</td>
</tr>
<tr>
<td>Grassland and Shrubland</td>
<td>1,425</td>
<td>13%</td>
</tr>
<tr>
<td>Low-Mod Impervious (5-50%)</td>
<td>835</td>
<td>8%</td>
</tr>
<tr>
<td>Open Water</td>
<td>370</td>
<td>3%</td>
</tr>
<tr>
<td>Wetlands</td>
<td>309</td>
<td>3%</td>
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<tr>
<td>Forest</td>
<td>196</td>
<td>2%</td>
</tr>
<tr>
<td>Agriculture</td>
<td>16</td>
<td>0%</td>
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<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Acres</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>2,346</td>
<td>28%</td>
</tr>
<tr>
<td>A/D</td>
<td>2</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>B</td>
<td>1,892</td>
<td>23%</td>
</tr>
<tr>
<td>B/D</td>
<td>1,006</td>
<td>12%</td>
</tr>
<tr>
<td>C</td>
<td>89</td>
<td>1%</td>
</tr>
<tr>
<td>C/D</td>
<td>1,003</td>
<td>12%</td>
</tr>
<tr>
<td>Water</td>
<td>736</td>
<td>9%</td>
</tr>
<tr>
<td>Not Assessed (heavily disturbed)</td>
<td>1,249</td>
<td>15%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Untreated Area (Direct to Creek)</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minneapolis</td>
<td>1,342</td>
</tr>
<tr>
<td>Brooklyn Center</td>
<td>301</td>
</tr>
<tr>
<td>Robbinsdale</td>
<td>295</td>
</tr>
<tr>
<td>Crystal</td>
<td>57</td>
</tr>
</tbody>
</table>
7.1  Monitoring History

STREAMS

Water quality has been monitored routinely at one location, SC-0, in the Lower Shingle Creek Management Unit. This station is located in Webber Park in Minneapolis just upstream of 45th Ave. The SC-0 monitoring station drains approximately 82% of the Lower Shingle Creek Management Unit, as well as the entire Middle and Upper Shingle Creek Management Units. The Shingle Creek WMC began monitoring this station routinely in 2002. Shingle Creek was placed on the State’s 303(d) list of impaired waterbodies in 1998 for chloride, in 2004 for DO, and in 2006 for macroinvertebrate IBI scores. TMDL studies were completed by the Commission and the MPCA in 2007 to address the chloride impairment and in 2011 to address the DO and macroinvertebrate IBI impairments. The Commission has continued to monitor this station every year since the completion of the TMDLs to assess water quality conditions in the Middle Shingle Creek Management Unit and measure progress toward achieving the TMDLs. Shingle Creek is considered a Class 2B water and is therefore subject to the North Central Hardwood Forest Class 2B water quality standards for streams.

Four main water quality parameters of concern have been sampled at the SC-0 monitoring station since 2002: TSS, TP, dissolved oxygen (DO), and chloride. The dot charts depict the current condition and associated Class 2B water quality standard. Monitoring results for other water quality parameters not covered in this section (ortho-P, TKN and nitrate) are presented in Appendix C. Also included in the dot charts is the fish/macroinvertebrate IBI monitoring. Fish and macroinvertebrate IBI assessments were performed at the sample locations to provide an update to previous assessments along Shingle Creek. Additional fish and macroinvertebrate IBI assessments were performed by the MPCA at the USGS site since the 1990s with those results previously summarized in the 2017 Annual Report.

Below is a general summary of the current conditions of the four main water quality parameters of concern and IBI monitoring results in the Lower Shingle Creek Management Unit.

LAKES

Lake water quality has been monitored for all five lakes in the Lower Shingle Creek Management Unit since at least the mid-1990s. All of the lakes in the Lower Management Unit were assessed as impaired for nutrients (TP) in the early 2000s. TMDL studies for each lake were completed by the Commission and the MPCA through two different TMDL studies: The Twin and Ryan Lakes Nutrient TMDL (2007) and The Crystal Lake Nutrient TMDL (2008).

Historic water quality sampling on each lake has focused on three main parameters: TP, chlorophyll-a, and Secchi depth (transparency). In more recent years, biotic sampling has become a priority of the Commission and updates to both fisheries and the submerged aquatic vegetation community have been occurring. The following is a general summary of water quality conditions for each lake in the Lower Shingle Creek Management Unit since 2000.
**Twin Lake Chain**

- Upper Twin and Middle Twin Lakes have consistently exceeded water quality standards over the past 10 years.
- There does not appear to be any positive or negative trend in water quality for Upper Twin and Middle Twin and both lakes are still considered impaired.
- Lower Twin has met state water quality standards over the past 10 years and was removed from the State’s 303(d) list of impaired waters in 2016.
- The biotic communities (fish and SAV) are severely degraded within the Twin Lakes.
- Common carp management is currently underway on the system as part of the Twin Lake Carp study.

**Ryan Lake**

- Similar to Lower Twin, Ryan Lake has met state water quality standards over the past 10 years and was recently removed from the State’s 303(d) list of impaired waters in 2016.
- Ryan Lake fishery appears to be a boom-bust fishery that is susceptible to periodic winterkills.

**Crystal Lake**

- Crystal Lake has not met State water quality standards over the past 10 years.
- Carp populations persist at levels that can be contributing to water quality and habitat degradation.
- SAV impairments are severe with little to no vegetation observed in the system.
7.2 SC-0 Stream Reach

**Water Quality**
- TP, chloride and DO concentrations did not meet standards in 2018 and also have not met standards in most years.
- TSS concentrations met standards in 2018, but frequently have not met standards.

**Biota**
- Fish and macroinvertebrate IBI scores have never met biological impairment thresholds.
- Rusty crayfish is an aquatic invasive species that was observed frequently at the site and is the first documented occurrence within Shingle Creek.
- 2010 biotic stressor ID highlighted DO, chloride, system flashiness, historic straightening and armoring as primary stressors.
- The continued use of chloride within the watershed and the increased size and intensity of storm events is a continued and growing concern for biota within the system.

![Figure 7-2. SC-0 stream water quality and biota health summary since 2000.](image)

**Recommendations**
- Water quality monitoring will occur in 2019.
- 2019 monitoring will include measurement of E. coli concentrations.
- Develop a management plan for AIS, namely the Rusty Crayfish, for Shingle Creek.
- Investigate stressors impairing biotic community health with efforts oriented to improving biotic health in the stream.
- Continue biotic assessments in conjunction with habitat assessments in to tease apart the impact of the numerous stressors influencing the stream.
- Implement findings of DO and biotic TMDL Review which will be completed in 2020.
7.3 Upper Twin Lake

Water Quality
- All three water quality parameters failed to meet state standards in 2018. Chl-a and TP were very poor and were more than double the impairment standard.
- Chl-a and TP are consistently above double the standards, suggesting severe impairment.

Fisheries
- Carp density exceeds the critical threshold by more than 100%.
- The IBI observed a relatively impaired fish community dominated by black bullheads.
- About 3,000 carp and 50,000 black bullhead were removed via winter seining in 2018.
- Removal targets for carp were not met for the Twin Lake system and continued removals are being pursued.

Vegetation
- Vegetation community is poor and lacked both species richness and quality of species. Community conditions degraded across the open water season.
- CLP treatment was conducted on 9.4 acres of the lake. CLP was notably down due to late winter snow cover on the lake.

![Graph showing difference in fish, vegetation, and water quality parameters from 2018 to 2019.]

Figure 7-3. Biota and water quality summary (since 2000) for Upper Twin Lake.

Recommendations
- Carp management efforts are on-going within the Twin Lake chain via Ryan Creek removals (spring 2019).
- Continue aquatic vegetation management plan and CLP treatments in 2019 and 2020.
- Monthly water quality sampling will be completed in 2019.
7.4 Middle Twin Lake

Water Quality
- TP just met WQ standards in 2018 while no other parameter did.
- In 2017, Chl-a was very poor at more than double impairment standard value, but it improved in 2018.
- Water quality has improved slightly since 2017 but it is too early to tell whether this was the result of the large carp and bullhead removal effort during winter 2018 or simply annual variability.

Fisheries
- Carp density exceeds the critical threshold by more than double critical threshold.
- The IBI observed a relatively impaired fish community dominated by black bullheads.
- About 3,000 carp and 50,000 black bullhead were removed via winter seining in 2018.
- Removal targets for carp were not met for the Twin Lake system through 2018 removal efforts. Continued removals are being pursued in 2019.

Vegetation
- Vegetation community is poor and lacked both species richness and quality of species.
- EWM and CLP were sparsely observed in various locations across the lake.

Figure 7-4. Biota and water quality summary (since 2000) for Middle Twin Lake.

Recommendations
- Common carp management efforts are on-going within the Twin Lake chain via Ryan Creek removals (spring 2019).
- Continued monitoring of the SAV will be important to restoring a healthy ecosystem.
- Monthly water quality sampling will be completed in 2019.
7.5 Lower Twin Lake

**Water Quality**
- 2018 monitoring indicate Chl-a and Secchi did not meet water quality standards while TP met the standard. Historic trend assessment: TP is decreasing and Secchi depth is increasing (both improving conditions).

**Fisheries**
- Carp density was less than threshold, however, the lake is well connected to the other Twin lakes and contributes to the overall carp density problem.
- The 2018 IBI score indicates an impaired fish community dominated by black bullheads.
- About 3,000 carp and 50,000 black bullhead were removed via winter seining in 2018.
- Removal targets for carp were not met for the Twin Lake system.
- A fish barrier was placed along Ryan Creek to prevent individuals from entering Lower Twin Lake from Ryan Lake.

**Vegetation**
- Vegetation community is poor and lacked both species richness and quality of species.
- CLP was sparsely observed within the basin.

Figure 7-5. Biota and water quality summary (since 2000) for Lower Twin Lake.

**Recommendations**
- Continued carp management efforts are on-going within the Twin Lake chain (2019).
- Continued monitoring of the SAV will be important to restoring a healthy ecosystem.
- Monthly water quality sampling will be completed in 2019.
7.6 Ryan Lake

**Water Quality**
- Secchi (transparency) was exceptional early in 2018 (>5m) but declined over the season. Average annual Secchi depth for 2018 was well below the standard.
- TP and Chl-a did not meet state standards and declined over the open water season.

**Fisheries**
- The MnDNR had informed the Commission that they would be conducting standard fish community assessments in 2018, therefore, the Commission did not plan to duplicate assessment. Due to partial winterkill, the DNR didn’t conduct the assessment so no standard netting occurred.
- Experienced a partial winter kill in 2018 (noted dead carp along shoreline).
- MnDNR did attempt to use as a walleye rearing pond in 2018, however, fry did not survive.

**Vegetation**
- Community had limited diversity and was dominated by an overabundance of coontail.

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**Figure 7-6. Biota and water quality summary (since 2000) for Ryan Lake.**

**Recommendations**
- The MnDNR did not sample the fish community in 2018 via standard sampling methods. Therefore, this should be considered in future monitoring years by the Commission.
- Internal loading feasibility assessment has demonstrated the potential for high internal loading, however, lake response modeling suggests the internal load is not a significant proportion of the nutrient budget. As upstream lake water quality improves, internal load could become more significant.
7.7 Crystal Lake

**Water Quality**
- Significant algal blooms were observed on the lake, especially late summer.
- Water quality did not meet TP, Chl-a or Secchi standards.

**Fisheries**
- Common carp population assessment revealed densities at 126 kg/ha, which are above the critical threshold.

**Vegetation**
- Extremely limited vegetation growth was observed. Habitat conditions are extremely degraded within the lake.

![Graph showing % difference from impairment for Fisheries, Vegetation, and Water Quality](image)

**Figure 7-7. Biota and water quality summary (since 2000) for Crystal Lake.**

**Recommendations**
- MnDNR is conducting a fisheries survey in 2019.
- Carp alone do not explain turbidity and lack of vegetation and greater research is needed to improve all aspects of Crystal Lake.
- Grant efforts are being pursued to further investigate internal loading and SAV concerns within the lake.
8.0 Recommendations

Results of the historic water quality monitoring for the four management units support the following conclusions and recommendations.

**West Mississippi Management Unit**

- Identify areas that currently have no water quality treatment and/or minimal treatment. Once these areas have been identified, they should be targeted for enhanced street sweeping and assessed for potential BMP retrofit opportunities.
- Identify bacteria sources and high potential loading areas.
- Salt management practices in the impervious areas upstream of the 65th Avenue outfall should be reviewed to determine potential sources of chloride at this location.

**Upper Shingle Creek Management Unit**

- TP concentrations currently exceed State standards near the outlet of Bass Creek, and monitoring indicates a high dissolved phosphorus component. The dissolved phosphorus is likely coming from the breakdown of organic matter and sediment release of phosphorus in the lakes, ponds and flow-through wetlands throughout the Upper Management Unit. Continue to identify ponds and wetlands in or near the main channel (such as the Cherokee wetland) that are currently releasing phosphorus and investigate strategies to decrease these loads. The SRP Reduction Project includes installing an in-stream filter between the Cherokee wetland and BCP to determine if dissolved P can be removed in-situ.
- Prepare for follow up assessment post aluminum sulfate treatments on Bass and Pomerleau Lakes. Consider both water quality and submerged aquatic vegetation sampling.
- Prepare for assisting with AIS management of CLP on Bass Lake.

**Lower Shingle Creek Management Unit**

- Continued common carp removals and post removal water quality, fisheries and SAV monitoring.
- CLP treatment, annual delineation and report will be conducted by the commission on the Twin Lakes for 2019 and 2020.
- Investigation into the severely degraded Crystal Lake is needed. Possible internal loading concern occurring on the lake.

**Shingle Creek Watershed-Wide**

- Identify bacteria sources and high potential loading areas.
- Continue to review and understand filter media that reduce bacteria and nutrient loading into Shingle Creek.
- Evaluate opportunities for additional stream restoration and habitat enhancement.
- Continue updating biotic community information in lakes and begin efforts to restore biotic health across the watershed.
- Continue to stabilize streambanks and enhance habitat along and in Shingle and Bass Creeks as opportunities arise.
SERVICES AGREEMENT

This Agreement is between the County of Hennepin, State of Minnesota, A-2300 Government Center, Minneapolis, Minnesota 55487 (the “County”), on behalf of the Hennepin County Department of Environment and Energy, 701 Fourth Avenue South, Suite 700, Minneapolis, Minnesota 55415 (the “Department”) and the Shingle Creek Watershed Management Commission located at 3235 Fernbrook Lane, Plymouth, MN 55447, a watershed commission duly organized under the laws of the State of Minnesota (the “Commission”).

The parties agree as follows:

1. TERM OF THE AGREEMENT

   The County agrees to furnish River Watch and Wetland Health Evaluation program services to the Commission commencing May 1, 2019 and terminating December 31, 2019, unless terminated earlier in accordance with the Default and Cancellation provisions of this Agreement.

2. SERVICES TO BE PROVIDED

   The County agrees to provide River Watch and Wetland Health Evaluation Program services to the Commission as more fully described in Exhibit A, attached hereto and incorporated herein by reference.

3. PAYMENT FOR SERVICES

   The Department will bill the Commission for services rendered. Payment shall be made within thirty-five (35) days from receipt of the invoice.

   The total cost of this Agreement shall not exceed Four Thousand Dollars ($4,000).

4. INDEPENDENT CONTRACTOR

   The County shall select the means, method, and manner of performing the services. Nothing is intended or should be construed as creating or establishing the relationship of a partnership or a joint venture between the parties or as constituting either party as the agent, representative, or employee of the other party for any purpose. The County is and shall remain an independent contractor for all services performed under this Agreement.
5. **LIABILITY**

Each party shall be responsible for its own acts and deeds and the results thereof. The County’s liability shall be governed by the provisions of Minnesota Statutes, Chapter 466 and other applicable law.

6. **INSURANCE**

A. Both parties agree at all times during the term of this Agreement, and beyond such term when so required, to have and keep in force the following insurance coverages:

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B. A self-insurance program is an acceptable method to provide the required insurance limits.

C. **Duty to Notify.** Each party shall promptly notify the other party of any claim, action, cause of action or litigation brought against it, its employees, officers, agents or subcontractors, which arises out of the services contained in this Agreement. Each party shall also notify the other party whenever it has a reasonable basis for believing that it and/or its employees, officers, agents or subcontractors, might become the subject of a claim, action, cause of action, or litigation arising out of and/or related to the services contained in this Agreement.
7. DATA PRACTICES

Each party, its officers, agents, owners, partners, employees, volunteers and subcontractors shall abide by the provisions of the Minnesota Government Data Practices Act, Minnesota Statutes, Chapter 13 (MGDPA), the Health Insurance Portability and Accountability Act of 1996 (HIPAA) and the Health Information Technology for Economic and Clinical Health Act (HITECH), adopted as part of the American Recovery and Reinvestment Act of 2009, and implementing regulations, if applicable, and all other applicable state and federal laws, rules, regulations and orders relating to data privacy or confidentiality. The terms of this section shall survive the cancellation or termination of this Agreement.

8. SUCCESSORS AND ASSIGNMENTS

A. Each party binds itself, its partners, successors, assigns and legal representatives to the other party for all covenants, agreements and obligations contained in the contract documents.

B. Neither party shall assign, transfer or pledge this Agreement and/or the services to be performed, whether in whole or in part, without the prior written consent of the other party.

9. MERGER AND MODIFICATION

A. It is understood and agreed that the entire Agreement between the parties is contained herein and that this Agreement supersedes all oral agreements and negotiations between the parties relating to the subject matter. All items that are referenced or that are attached are incorporated and made a part of this Agreement. If there is any conflict between the terms of this Agreement and referenced or attached items, the terms of this Agreement shall prevail.

B. Any alterations, variations, modifications, or waivers of provisions of this Agreement shall only be valid when they have been reduced to writing as an amendment to this Agreement signed by the parties.

10. DEFAULT AND CANCELLATION

A. If each party fails to perform any of the provisions of this Agreement or so fails to administer the work as to endanger the performance of the Agreement, it shall be in default. Unless the defaulting party’s default is excused by the other party, the non-defaulting party may upon written notice immediately cancel this Agreement in its entirety.

B. A party’s failure to insist upon strict performance of any provision or to exercise any right under this Agreement shall not be deemed a relinquishment or waiver of
the same, unless consented to in writing. Such consent shall not constitute a general waiver or relinquishment throughout the entire term of the Agreement.

C. This Agreement may be canceled with or without cause by either party upon thirty (30) day written notice.

11. SURVIVAL OF PROVISIONS

Provisions that by their nature are intended to survive the term, cancellation or termination of this Agreement include but are not limited to: INDEPENDENT CONTRACTOR; LIABILITY; INSURANCE; DATA PRACTICES; DEFAULT AND CANCELLATION; PROMOTIONAL LITERATURE; and MINNESOTA LAW GOVERNS.

12. CONTRACT ADMINISTRATION

In order to coordinate the services being provided to the Commission with the activities of the Department, Mary L Karius, or successor, shall manage this Agreement on behalf of the County and serve as liaison between the County and the Commission.

13. COMPLIANCE AND NON-DEBARMENT CERTIFICATION

Both parties shall comply with all applicable federal, state and local statutes, regulations, rules and ordinances currently in force or later enacted.

14. NOTICES

Any notice or demand which must be given or made by a party under this Agreement or any statute or ordinance shall be in writing, and shall be sent registered or certified mail. Notices to the County shall be sent to the County Administrator with a copy to the originating Department at the address given in the opening paragraph of the Agreement. Notice to the Commission shall be sent to the address stated in the opening paragraph of the Agreement.

15. MEDIA OUTREACH

Commission shall not use the term “Hennepin County”, or any derivative thereof in Commission’s advertising, external facing communication and/or marketing, including but not limited to advertisements of any type or form, promotional ads/literature, client lists and/or any other form of outreach, without the written approval of the Hennepin County Public Affairs/Communications Department, or their designees.
16. **MINNESOTA LAWS GOVERN**

The Laws of the State of Minnesota shall govern all questions and interpretations concerning the validity and construction of this Agreement and the legal relations between the parties and their performance. The appropriate venue and jurisdiction for any litigation will be those courts located within the County of Hennepin, State of Minnesota. Litigation, however, in the federal courts involving the parties will be in the appropriate federal court within the State of Minnesota. If any provision of this Agreement is held invalid, illegal or unenforceable, the remaining provisions will not be affected.

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COUNTY ADMINISTRATOR AUTHORIZATION

Reviewed by the County Attorney’s Office

COUNTY OF HENNEPIN
STATE OF MINNESOTA

By: ________________________________
David Hough, County Administrator

By: ________________________________
Assistant County Administrator - Public Works

Date:______________________________

Recommended for Approval

By:____________________________________
Director, Department of Environment and Energy

Date:______________________________

Shingle Creek Watershed Management Organization
The Organization certifies that the person who executed this Agreement is authorized to do so on behalf of the Organization as required by applicable articles, bylaws, resolutions or ordinances.*

Printed Name:_____________________________

Signed: __________________________________

Title: _____________________________________

Date:_____________________________________

* Organization shall submit applicable documentation (articles, bylaws, resolutions or ordinances) that confirms the signatory’s delegation of authority. This documentation shall be submitted at the time Organization returns the Agreement to the County. Documentation is not required for a sole proprietorship.
EXHIBIT A

SCHEDULE OF SERVICES

The Wetland Health Evaluation Project (WHEP) is a partnership between the Minnesota Pollution Control Agency, Hennepin County, Dakota County and cooperating cities and watershed organizations. In the program, citizen volunteers use biological monitoring criteria established by the MPCA to monitor local wetlands. Hennepin County Department of Environment and Energy is the coordinating agency in Hennepin County. The project began in Dakota County in 1998 and was piloted in Hennepin County in 2001. The details of the program responsibilities are as follows:

- Take proper precautions to ensure the safety of those involved in activities relating to WHEP.
- Recruit and manage volunteers
- Convene WHEP meetings as necessary.
- Coordinate and facilitate training sessions.
- Provide site selection forms and site selection assistance as needed.
- Provide all Quality Assurance/Quality Control checks.
- Manage program finances.
- Manage program contracts.
- Maintain communication with all parties.
- Implement any corrective actions necessary based upon recommendations from the monitoring coordinators, local sponsors, or the Minnesota Pollution Control Agency.
- Keep accessible all data sheets, site selection forms, financial records, and reports.
- Provide copies of checked data sheets as requested.
- Coordinate outreach educational opportunities.
- Coordinate volunteer appreciation efforts.
- Develop and distribute Year End Results to all interested parties upon request and via Hennepin County website.
- Two WHEP sites

River Watch is a volunteer monitoring program coordinated by Hennepin County Environment and Energy and highlights a partnership between cooperating cities and watershed organizations. In the program, teachers and youth volunteers use biological monitoring criteria established by the MPCA to monitor local streams. Teachers use this as a unique hands-on research experience in the classroom setting. The details of the program responsibilities are as follows:

- Take proper precautions to ensure the safety of those involved in activities relating to River Watch.
- Recruit and manage teachers and students to monitor sites within the Shingle Creek Watershed.
- Coordinate and facilitate training sessions in field collection techniques and macroinvertebrate identifications including all in-person, hands-on training.
- Provide all necessary equipment and resources for successful collection of data.
- Provide funds to cover internal teacher costs including busing.
• Provide all Quality Assurance/Quality Control checks.
• Manage program finances.
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   The Department will bill the Organization for services rendered. Payment shall be made within thirty-five (35) days from receipt of the invoice.

   The total cost of this Agreement shall not exceed Three Thousand Dollars ($3,000).

4. **INDEPENDENT CONTRACTOR**

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2. Workers’ Compensation and Employer’s Liability:

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<td>Disease—Policy Limit</td>
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<td>Disease—Each Employee</td>
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3. Professional Liability—Per Claim

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| 2,000,000                      |

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B. A self-insurance program is an acceptable method to provide the required insurance limits.

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COUNTY ADMINISTRATOR AUTHORIZATION

Reviewed by the County Attorney's Office

Assistant County Attorney

COUNTY OF HENNEPIN
STATE OF MINNESOTA

By: ________________________________
David Hough, County Administrator

By: ________________________________
Assistant County Administrator - Public Works

Date: ______________________________

Recommended for Approval

By: ________________________________
Director, Department of Environment and Energy

Date: ______________________________

West Mississippi Watershed Management Organization
The Organization certifies that the person who executed this Agreement is authorized to do so on behalf of the Organization as required by applicable articles, bylaws, resolutions or ordinances.*

Printed Name: ________________________________

Signed: ________________________________

Title: ________________________________

Date: ________________________________

* Organization shall submit applicable documentation (articles, bylaws, resolutions or ordinances) that confirms the signatory's delegation of authority. This documentation shall be submitted at the time Organization returns the Agreement to the County. Documentation is not required for a sole proprietorship.
EXHIBIT A

SCHEDULE OF SERVICES

The Wetland Health Evaluation Project (WHEP) is a partnership between the Minnesota Pollution Control Agency, Hennepin County, Dakota County and cooperating cities and watershed organizations. In the program, citizen volunteers use biological monitoring criteria established by the MPCA to monitor local wetlands. Hennepin County Department of Environment and Energy is the coordinating agency in Hennepin County. The project began in Dakota County in 1998 and was piloted in Hennepin County in 2001. The details of the program responsibilities are as follows:

- Take proper precautions to ensure the safety of those involved in activities relating to WHEP.
- Recruit and manage volunteers
- Convene WHEP meetings as necessary.
- Coordinate and facilitate training sessions.
- Provide site selection forms and site selection assistance as needed.
- Provide all Quality Assurance/Quality Control checks.
- Manage program finances.
- Manage program contracts.
- Maintain communication with all parties.
- Implement any corrective actions necessary based upon recommendations from the monitoring coordinators, local sponsors, or the Minnesota Pollution Control Agency.
- Keep accessible all data sheets, site selection forms, financial records, and reports.
- Provide copies of checked data sheets as requested.
- Coordinate outreach educational opportunities.
- Coordinate volunteer appreciation efforts.
- Develop and distribute Year End Results to all interested parties upon request and via Hennepin County website.
- 2 WHEP sites.

River Watch is a volunteer monitoring program coordinated by Hennepin County Environment and Energy and highlights a partnership between cooperating cities and watershed organizations. In the program, teachers and youth volunteers use biological monitoring criteria established by the MPCA to monitor local streams. Teachers use this as a unique hands-on research experience in the classroom setting. The details of the program responsibilities are as follows:

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- Recruit and manage teachers and students to monitor sites within the West Mississippi Watershed.
- Coordinate and facilitate training sessions in field collection techniques and macroinvertebrate identifications including all in-person, hands-on training.
- Provide all necessary equipment and resources for successful collection of data.
- Provide funds to cover internal teacher costs including busing.
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- Manage program contracts.
- Maintain communication with all parties.
- Coordinate outreach educational opportunities.
- Coordinate volunteer appreciation efforts.
- Develop and distribute Year End Results to all interested parties upon request and via Hennepin County website.
- 1 River Watch site
A meeting of the Technical Advisory Committee (TAC) of the Shingle Creek and West Mississippi Watershed Management Commissions was called to order by Vice Chairman Mark Ray at 11:32 a.m., Thursday, March 14, 2019, at the Clubhouse at Edinburgh USA, 8700 Edinbrook Crossing, Brooklyn Park, MN.

Present were: Andrew Hogg, Brooklyn Center; Mitchell Robinson, Brooklyn Park; Todd Tuominen, Champlin; Mark Ray, Crystal; Derek Asche, Maple Grove; Liz Stout, Minneapolis; Megan Hedstrom, New Hope; Marta Roser, Robbinsdale; Ed Matthiesen, Wenck Associates, Inc.; and Judie Anderson, JASS.

Not represented: Osseo and Plymouth.

Also present were: Burt Orred, Crystal, and Rich Harrison and Laura Scholl, Metro Blooms.

I. Motion by Ray, second by Asche to approve the agenda.* Motion carried unanimously.

II. Motion by Ray, second by Hogg to approve the minutes of the January 24, 2019 meeting.* Motion carried unanimously.

III. Cost Share Applications. The Commission has on hand approximately $100,057 (2018 audit hasn’t been completed) in the Partnership Cost Share account, with another approximately $50,500 levied to be received in 2019.

A. Autumn Ridge Apartments.* The City of Brooklyn Park has submitted a Partnership Cost Share application on behalf of Sherman Associates and Metro Blooms for Phase II of improvements on the Autumn Ridge multi-family housing site at 63rd and Boone Avenues North. The amount requested is $50,000. The proposed project is additional on-site water quality treatment, including 7-8 new rain gardens, additional pollinator habitat, and educational signage. The west half of the multi-family complex drains directly to the Cherokee Wetland and Bass Creek, while the east half drains through storm sewer on 63rd Avenue to a channel that discharges into wetland 639W. Representatives from Metro Blooms were present to describe the proposed project in more detail.

[Tuominen arrived 12:09 pm.]

The application includes an overview of the results of Phase 1, which was partly funded by a $50,000 Partnership Cost Share grant from the Commission. In Phase 1 five rain gardens and a pollinator garden were added to the site and three ash trees were removed and eight new trees were planted in conjunction with planned stormwater BMPs. These BMPs provide an estimated volume reduction of 62.74% of rainfall runoff annually from a 4.9-acre sub-catchment area.

The project also includes extensive resident education and participation, both in the design process and in installation and planting. In addition, the project includes Smart Salting education and training for the on-site property managers. Staff recommends that the TAC and Commission approve the application.
Motion by Asche, second by Tuominen to approve Staff’s recommendation. Motion carried unanimously.

B. Speed Thru Car Wash.* The City of New Hope has submitted a Partnership Cost Share application on behalf of LAMA Holdings LLC, Chris Robbins, for a capture and reuse project at the Speed Thru Car Wash at 7201 Bass Lake Road. The amount requested is $50,000. The proposed project is the installation of five 20,000-gallon storage tanks and a filtration system to capture runoff from the site for reuse as car wash water. The site drains to the Bass Lake Road trunk storm sewer and then to Upper Twin Lake.

Runoff from nearly all impervious surface on site will be collected and routed to the storage tanks which will be treated by aerobic bacteria. All petroleum-based products will be consumed, and the only byproducts are CO₂ and water. After bacteria treatment the water will be further purified using a reverse osmosis system before being dispensed in the car wash tunnel.

To determine whether the system truly has the capacity to retain 1.3” of runoff on site to meet Commission water quality requirements, Staff obtained expected usage volumes from the applicant and analyzed use compared to expected precipitation replenishment. On average, there is a 0.34-inch rainfall every 72 hours, which would generate an estimated 1,385 gallons of runoff every three days. The car wash uses 8 gallons per vehicle with an estimated 100 vehicles per day, using 2,400 gallons every three days. Therefore, every three days on average the volume in the tanks is drawn down by 1,015 gallons. While that, on average, uses more water than is added through rainfall, the larger, less frequent storms would make up those deficits and replenish the tanks. With the tanks drawn down to a nominal 5% full, they have the capacity to capture a 3.1” storm. When the tanks are full, the system will be bypassed into the storm sewer system similar to any other practice designed to capture the first 1.3” and overflow the remainder. The storage tanks are capable of holding 280 days of average precipitation. Staff recommends that the TAC and Commission approve the application.

Motion by Ray, second by Asche to recommend to the Commission denial of this application pending receipt of additional information from the applicant. Motion carried unanimously.

C. Enhanced Street Sweeper.* The TAC has previously debated the use of capital or cost share funds for high performance street sweeping equipment. While the TAC and Commissions are favorable of this idea, it is ultimately the decision of Hennepin County as to whether this meets the state statutes regulating their capital bonding. Staff have been in contact with Karen Galles at Hennepin County Energy and Environment, who is supportive of the idea. She has been discussing this idea with various upper level managers and county attorneys but a decision has not yet been made.

The City of Plymouth is requesting the Shingle Creek Commission to add a regenerative air sweeper to its 2020 CIP. This item is on the City’s CIP. According to their application, the City is bringing its street sweeping program in-house in 2019 and is committed to expanding the program to address water quality concerns going forward. All water resources within and downstream of the City of Plymouth could be affected by the enhanced street sweeping effort. Enhanced street sweeping was identified in the Bass, Schmidt and Pomerleau TMDL, the Cedar Island, Pike and Eagle Lake TMDL, and the Pike Lake Subwatershed Assessment as a cost-effective BMP for nutrient reductions.

Motion by Ray, second by Roser to recommend to the Commission approval of this application conditioned that before-and-after performance reporting parameters be developed. Motion carried unanimously.

IV. Other Business.

A. Upcoming discussion – Maple Grove wetlands district revisions.
B. The next meeting of the Technical Advisory Committee is scheduled for 8:30 a.m., Thursday, April 25, 2019, Crystal City Hall.

C. The meeting was adjourned at 12:09 p.m.

Respectfully submitted,

Judie A. Anderson
Recording Secretary
Watershed Commission Receives Award from Environmental Initiative

Plymouth, MN. (March 29, 2019). The Shingle Creek Watershed Management Commission is pleased to announce that the nonprofit Environmental Initiative has awarded the Commission an Honorable Mention for Environmental Innovation in its 2019 Environmental Initiative Awards. The award recognizes the Biochar- and Iron-Enhanced Sand Filters Project, an innovative new method of reducing bacteria contamination in stormwater runoff. The goal of the project is to help prevent beach closures due to bacteria contamination in stormwater runoff and to make lakes and streams cleaner and safer.

The Watershed Management Commission is a consortium of nine cities in Hennepin County that jointly manage the lakes and streams in the 44 square mile Shingle Creek watershed. Environmental Initiative is a nonprofit group of leading Minnesota businesses, environmental advocacy nonprofits and state agencies that develops innovative solutions to environmental problems. Each year, Environmental Initiative honors projects and people who are working to not only address environmental challenges, but also to create holistic solutions that promote economic and community vitality.

The Biochar- and Iron-Enhanced Sand Filter Project is a first in the nation application of a relatively simple filter method that until now has only been tested in the lab. Biochar – a special type of charcoal – is added to sand filters that are also enhanced with iron filings. These filters were tested in storm sewer catch basins, stormwater ponds, and a special filter box to directly treat water from Shingle Creek. The filters removed 70 to 90 percent of the bacteria from stormwater runoff, bringing the concentration down to safe levels.
In urban areas, bacteria sources are widespread and diffuse: waste from pets, song birds, wildlife, and waterfowl. When it rains, stormwater washes bacteria into storm sewers and then into our lakes and streams. There are limited ways to protect our waters from this contamination. This project demonstrated that biochar has the potential to be a powerful new tool in the stormwater management toolbox. Learn more about the project at shinglecreek.org/biochar-filters.html.


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Technical questions and media requests about the Biochar project may be directed to the Watershed Engineer Ed Matthiesen, 763-252-6851 or ematthiesen@wenck.com
<table>
<thead>
<tr>
<th>Date</th>
<th>From</th>
<th>To</th>
<th>SC</th>
<th>WM</th>
<th>Description</th>
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<tbody>
<tr>
<td>3-4-19</td>
<td>Stephen Mastey @ Landscape Architecture Inc.</td>
<td>Ed M.</td>
<td>X</td>
<td></td>
<td>Meeting re: apartments and hospice near or on Upper Twin Lake in Crystal and Brooklyn Center</td>
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<tr>
<td>3-4-19</td>
<td>Resident, Maple Grove</td>
<td>SCWM WMC</td>
<td>X</td>
<td>X</td>
<td>Maple Grove Arbor Committee interested in learning more about trees planted in parking lots and potential for stormwater management</td>
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<tr>
<td>3-5-19</td>
<td>Ted @ HR Green</td>
<td>Ed M.</td>
<td>X</td>
<td></td>
<td>MCES interceptor project in Brooklyn Park</td>
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<td>3-6-19</td>
<td>Wayne Sicora @ ERM</td>
<td>Ed M.</td>
<td>X</td>
<td></td>
<td>Project review requirements for pipeline</td>
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<tr>
<td>3-7-19</td>
<td>Webber 44 meeting</td>
<td>Sarah/Diane</td>
<td>X</td>
<td></td>
<td>Met with Hennepin County and HZ United about stormwater BMPs for 44th Ave improvements in North Minneapolis near Webber Park</td>
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<tr>
<td>3-7-19</td>
<td>David Knaeble @ Civil Site Group</td>
<td>Diane</td>
<td>X</td>
<td></td>
<td>Questions about SC requirements for 4600 Lake Rd on Lower Twin Lake</td>
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<tr>
<td>3-8-19</td>
<td>Dorothy Peterson @ landscape design company</td>
<td>Ed M.</td>
<td>X</td>
<td></td>
<td>Commission rules regarding a proposed landscaping and boathouse remodel on the Mississippi River.</td>
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<tr>
<td>3-8-19</td>
<td>Karen Galles</td>
<td>Diane S</td>
<td>X</td>
<td>X</td>
<td>Phone call on status of her discussions with county staff about using county levy for sweepers or other durable equipment</td>
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<tr>
<td>3-12-19</td>
<td>Nick Maslowski @ landscaping company</td>
<td>Ed M.</td>
<td>X</td>
<td></td>
<td>Question on Commission rules regarding retaining wall replacement on Twin Lake in Crystal</td>
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<tr>
<td>3-12-19</td>
<td>Sadie Wolf @ Met Council</td>
<td>Ed M.</td>
<td>X</td>
<td></td>
<td>Champlin Interceptor update</td>
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<tr>
<td>3-13-19</td>
<td>David Knaeble @ Civil Site Group</td>
<td>Sarah N</td>
<td>X</td>
<td></td>
<td>Questions about fee/submission of application for 4600 Lake Rd on Lower Twin Lake in Robbinsdale</td>
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<tr>
<td>3-13-19</td>
<td>Sonya @ Channel 6 News</td>
<td>Tom L.</td>
<td>X</td>
<td></td>
<td>Followed up with Sonya’s inquiry about fish removal work on Twin Lakes. Will contact her in spring when removals occur.</td>
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<tr>
<td>3-15-19</td>
<td>Josh Potter, Hennepin County</td>
<td>Ed M and Diane S</td>
<td>X</td>
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<td>Notes from meeting re: Webber 44 project</td>
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<td>3-18-19</td>
<td>Environmental Initiative</td>
<td>SC WMC</td>
<td>X</td>
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<td>Notice that the Biochar project was selected to receive an Honorable Mention for Environmental Innovation</td>
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<td>3-19-19</td>
<td>Sue Nissan, SOS</td>
<td>SCWM WMC</td>
<td>X</td>
<td>X</td>
<td>Update from the Stop Over Salting Coalition about HF 1502</td>
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<td>3-25-19</td>
<td>Nick Hennen @ Momentum Design Group</td>
<td>Ed M.</td>
<td>X</td>
<td></td>
<td>Proposed project at 4600 Lake Road Robbinsdale</td>
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<td>3-26-19</td>
<td>Nathan Dingle @ Civil Site Group</td>
<td>Ed M.</td>
<td>X</td>
<td></td>
<td>Proposed project review requirements.</td>
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<td>3-26-19</td>
<td>Karen Galles, HCEE</td>
<td>Diane S</td>
<td>X</td>
<td>X</td>
<td>Proposed schedule for 2019 plan amendments and maximum levy notices</td>
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<td>3-27-19</td>
<td>Selby Moottz @ Lake Restoration</td>
<td>Ed M.</td>
<td>X</td>
<td></td>
<td>DNR permitting for curly leaf pondweed treatment on Twin Lake.</td>
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<td>3-29-19</td>
<td>Jason Swenson @ Hennepin County Environment and Energy</td>
<td>Judie Anderson</td>
<td>X</td>
<td></td>
<td>Local drainage issue in Plymouth</td>
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Technical Memo

To: Shingle Creek/West Mississippi WMC Commissioners
From: Ed Matthiesen, P.E.
Ali Stone
Date: April 5, 2019
Subject: Limited Liability Legislation

This is an update of the current status of HF 1502 / SF 1667, also known as the proposed Limited Liability legislation. The bill would establish a program to offer voluntary “water-friendly applicator” certification to interested commercial salt applicators. This certification is similar to what current public road authority applicators take. Upon successful completion of the training program, passing examination, and contingent on maintenance of recertification requirements, the commercial applicator receives this certification and in turn limited liability in snow or ice related accidents. This is the reason for the name limited liability legislation.

Limited Liability is important in reducing the overapplication of chloride for deicing. The public sector has made strides in reducing chloride use through implementation of BMPs which minimize the amount of deicer used to a ‘just right’ amount. The private sector on the other hand continues to err on the side of too much in order to reduce the chance they get charged with a slip-and-fall lawsuit. The limited liability bill provides protection from these lawsuits for applicators that are trained, certified and using best management practices for deicing. This bill expands the MPCA Smart Salting training program to offer it statewide and allow them to charge a fee for training and certification.

The House bill has been heard in the Environment and Natural Resources and Ways and Means Committees, and will be heard in the Judiciary Committee on April 3. The Senate bill has been introduced in the Environment and Natural Resources Committee.

There current authors of the bills are:

**HF 1502**
- Rep. Peter Fischer (Maplewood)
- Rep. Rick Hansen (South Saint Paul)
- Rep. Paul Torkelson (Hanska)
- Rep. Heather Edelson (Edina)
- Rep. Josh Heintzman (Nisswa)
- Rep. Kelly Moller (Shoreview)
- Rep. Alice Hausman (St. Paul)
- Rep. Robert Bierman (Apple Valley)
- Rep. Jay Xiong (St. Paul)

**SF 1667**
- Sen. Carrie Ruud (Breezy Point)
- Sen. Paul Anderson (Plymouth)
- Sen. Bill Ingebrigtsen (Alexandria)
- Sen. David Tomassoni (Chisholm)
- Sen. Dan Hall (Burnsville)

Other supporters of the bill include:
- Stop-Over-Salting (a citizens group) stopoversalting.org
- Minnesota Association of Watershed Districts
- Clean Water Council
- Minnesota Nursery and Landscape Association
- Various cities
- Bassett Creek WMO
A bill for an act
relating to environment; establishing certified salt applicator program; limiting liability; proposing coding for new law in Minnesota Statutes, chapter 116.

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF MINNESOTA:

Section 1. [116.2025] SALT APPLICATORS; VOLUNTARY CERTIFICATION PROGRAM.

Subdivision 1. Definitions. For purposes of this section, the following terms have the meanings given:

(1) "certified commercial applicator" means an individual who applies deicer, completed training on snow and ice removal and deicer application approved by the commissioner, and passed an examination after completing the training;

(2) "commercial applicator" means an individual who applies deicer for hire, but does not include a municipal, state, or other government employee;

(3) "deicer" means any substance used to melt snow and ice, or used for its anti-icing effects, on privately owned surfaces traveled by pedestrians and vehicles; and

(4) "owner" means a person that owns or leases real estate and that enters into a written contract with a certified commercial applicator for snow and ice removal and deicer application.

Subd. 2. Voluntary certification program; best management practices. (a) The commissioner of the Pollution Control Agency must develop a training program that promotes
(b) The commissioner, in consultation with the University of Minnesota, must provide additional training under this section for certified commercial applicators renewing certification after their initial training and certification.

(c) The commissioner, in consultation with the University of Minnesota, must provide the training and testing module at locations statewide and may make the recertification training available online.

(d) The commissioner, in consultation with the University of Minnesota, must annually post the best management practices and a list of certified commercial applicators on the agency's website.

(e) The commissioner may charge a fee of no more than $350 per certified commercial applicator for the training or recertification under this section. Fees collected under this subdivision must be deposited in the environmental fund.

Subd. 3. Liability. (a) A certified commercial applicator or an owner is not liable for damages arising from hazards resulting from the accumulation of snow and ice on any real estate maintained by the certified commercial applicator when the hazard is solely caused by snow or ice and the certified commercial applicator used the best management practices for snow and ice removal and deicing approved by the commissioner.

(b) Nothing in paragraph (a) prevents or limits the liability of a certified commercial applicator or owner if the certified commercial applicator or owner:

(1) commits an act or omission that constitutes negligence or willful or wanton disregard for the safety of entrants onto real estate of the owner that is maintained by the certified commercial applicator and that act or omission proximately causes injury, damage, or death;

(2) has actual knowledge or reasonably should have known of a dangerous condition on the real estate of the owner maintained by the certified commercial applicator;

(3) intentionally injures an entrant on real estate of the owner that is maintained by the certified applicator; or

(4) fails to comply with the best management practices for snow and ice removal and deicer application approved by the commissioner.

(c) The liability of a commercial applicator who applies deicer but is not certified under item 09b-2
(1) a copy of the applicator's certification approved by the commissioner and any recertification;

(2) evidence of passing the examination approved by the commissioner;

(3) copies of the winter maintenance assessment tool requirements developed by the commissioner;

(4) a written record describing the road, parking lot, and property maintenance practices used. The written record must include the type and rate of application of deicer used, the dates of treatment, and the weather conditions for each event requiring deicing. The records must be kept for a minimum of six years; and

(5) proof of compliance with the reporting requirements under subdivision 7.

Subd. 5. **Penalty.** The commissioner may revoke or decline to renew the certification of a commercial applicator who violates this section or rules adopted under this section.

Subd. 6. **Relation to other law.** Nothing in this section affects municipal liability under section 466.03.

Subd. 7. **Reporting required.** By July 1 each year, a certified commercial applicator must submit to the commissioner on a form prescribed by the commissioner the amounts and types of deicers used in the previous calendar year.

Subd. 8. **Expiration.** This section expires August 1, 2026.

**EFFECTIVE DATE.** This section is effective August 1, 2019, and applies to claims arising on or after that date.