To: Clearwater River Watershed District Board of Managers
From: Rebecca Carlson Kluckhohn, District Engineer
Copy: Cole Loewen, District Administrator
Date: 23 August 2016
Subject: Inspection, Operation & Maintenance Plan
Cedar Lake Restoration Project

This memo describes the proposed inspection schedule and operation and maintenance plans for two of the best management practices (BMPs) that comprise the Cedar Lake Watershed Protection & Improvement Project.

BACKGROUND:
In 2002 citizens began to notice severe algal blooms in Cedar Lake, a high value recreational lake with exceptional clarity and fisheries habitat. Those observations, coupled with a sharp rise in average summer phosphorus and chlorophyll-a prompted additional monitoring. Through intensive lake and watershed monitoring, CRWD identified the major source of nutrients to the lake: three nutrient impaired shallow lakes (Swartout, Albion and Henshaw Lakes) in the upper watershed and impaired wetlands discharged excess amounts of soluble phosphorus to Cedar Lake. The CRWD’s TMDL Study for the three upstream lakes confirmed the findings; this study was approved by EPA in 2009. The MPCA approved a Watershed Wide Implementation plan in 2009.

CRWD identified a suite of in-lake and watershed BMPs to improve water quality in the impaired shallow lakes to protect Cedar Lake. Implementation of these projects began in 2007 (CRWD Project 06-01). Between 2007 and 2013, CRWD implemented as many capital and programmatic BMPs as possible with available funding and landowner participation, but additional load reductions were needed to meet water quality goals.

The CRWD identified two additional BMPs to reduce loads:
- The East Swartout Lake Restoration Soluble Phosphorus Filter and
- The Highway 55 Project

The Board of Water and Soil Resources awarded CRWD a grant for implementation of both BMPs in 2013. Both BMPs target reductions to the largest watershed sources of nutrient to Cedar and Swartout Lakes by installing filters to remove soluble phosphorus currently exported from degraded wetlands and lakes.

Both BMPs target treatment of baseflow and the 1.25-inch event to provide the maximum cost/benefit while preserving upstream hydrology. The BMPs target reductions from the largest watershed sources of nutrients, providing 80% of the necessary watershed load reductions to Swartout Lake (800 lbs/yr), and 40% of the necessary watershed load reductions to Cedar Lake (480 lbs/yr).
EAST SWARTOUT LAKE RESTORATION SOLUBLE PHOSPHORUS FILTER:

This BMP (shown in Appendix A) is located on the western edge of the Minnesota Department of Natural Resources’ (DNR) Swartout Wildlife Management Area (WMA) and this plan will need to be reviewed and approved by the DNR prior to implementation. Once the plan is approved, the CRWD plans to notify the area hydrologist, the area wildlife manager and the area fisheries supervisor prior to annual maintenance.

This project element contains three main components:

- Two adjustable weirs,
- A passive soluble phosphorus filter, and
- A fish migration barrier.

Weir Operation:

Weir #1 is located upstream (offline of main channel) and weir #2 is located downstream, nearer to County Road 6. Both weirs have aluminum stop logs with slides that are lockable. These are shown in Attachment 1, along with copies of the as-built drawings for the BMP.

<table>
<thead>
<tr>
<th>Season</th>
<th>Swartout Lake Elevation 1,016.5-1,017.5</th>
<th># of stop logs in place</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Weir #1 (upstream)</td>
<td></td>
</tr>
<tr>
<td>Spring</td>
<td></td>
<td>0 logs- remove plug</td>
<td>4 logs</td>
</tr>
<tr>
<td>Summer</td>
<td></td>
<td>0 logs</td>
<td>4 logs</td>
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<tr>
<td>Fall</td>
<td></td>
<td>0 logs</td>
<td>4 logs</td>
</tr>
<tr>
<td>Winter</td>
<td></td>
<td>4 logs- Install Plug, leave in place for winter</td>
<td>0 (avoid ice damage)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0 logs</td>
<td></td>
</tr>
<tr>
<td>Swartout Lake Elevation &gt;1,017.5</td>
<td></td>
<td>0 logs- remove plug</td>
<td>4 logs</td>
</tr>
<tr>
<td>Spring</td>
<td></td>
<td>0 logs</td>
<td></td>
</tr>
<tr>
<td>Summer</td>
<td></td>
<td>0 logs</td>
<td>4 logs</td>
</tr>
<tr>
<td>Fall</td>
<td></td>
<td>0 logs</td>
<td>0-4 logs</td>
</tr>
<tr>
<td>Winter</td>
<td></td>
<td>4 logs- Install Plug, leave in place for winter</td>
<td>0 (avoid ice damage)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 logs</td>
<td></td>
</tr>
</tbody>
</table>

To Offline System- dry out filter

Recommend late fall to coincide with winter operation (Oct. / Nov. weather permitting- for 48 hrs. or as needed)

|                | 4 logs | 0 | Install plug at filter outlet, run submersible pump |

Inspection & Monitoring:

The District will monitor the function of the iron sand filter by measuring water quality and flow monthly during the flow season. Inflow will be measured above weir #2 and outflow will be measure at the drain tile outlet below weir #2. District staff will also perform monthly visual observation of the filter, weirs, drain tile outlet, and vegetation. Such monitoring is performed without heavy equipment and will not disturb vegetation or wildlife in the wetland.
A full project inspection will be conducted annually—or more frequently when needed. District will notify the DNR prior to this spring-summer inspection to provide the opportunity for joint inspections.

**System Operation:**
The system is passive and typically only requires annual adjustment of the weirs. The District will off-line the filter for the winter by increasing the elevation of weir #1 (the one that is parallel to the wetland outlet channel) and blocking off the drain tile outlet from the filter. This will prevent flow from entering the filter in the winter—though will not keep the filter dry over the winter. The filter will be dewatered to encourage aeration of the filter media. To do so, once the filter is offline, pumping will occur to drain ponded water from the filter. This will typically be done over a two-day period during the late fall, low flow period (October/November), after which time pump equipment will be removed. Pumping will occur during the week to minimize impact to weekend use of the WMA.

An additional pump is required in the channel area between the weir and the liner to achieve full drawdown. Following drawdown, fill system via outlet pipe.

In the spring, once tailwater conditions have subsided, weirs #1 and #2 would be adjusted to their operational height. These activities can be done without heavy equipment and will minimally disturb vegetation or wildlife in the wetland. Stoplog surface should be cleaned and prepared before installation. The District will notify the DNR when/if it adjusts the weir heights and when annually off-lining occurs.

**Maintenance:**
The District annually compiles inspection findings and recommendations for maintenance in its Operation and Maintenance Report. The Board of Managers then votes to approve expenditures.

**Vegetation:** The filter itself will not be seeded. Significant amounts of volunteer vegetation are not expected to grow on the filter within a five year period. This is based on observation of similar systems in other watershed districts. It is important to note that current research is not clear as to whether the growth of the volunteer vegetation on the filter will hinder system performance. Volunteer vegetation has not presented problems at the oldest system in Minnesota, located in Ramsey Washington Watershed District.

If vegetation does grow on the filter, the system will be monitored to determine if the vegetation is hindering system performance. If it is hindering performance, hand removal of the volunteer vegetation on the filter itself may be needed on a 5 to 10 year interval. Because vegetative removal is by hand and is not done using heavy equipment, disturbance to the WMA is minimal. The filter is located entirely outside the wetland area and there would be no disturbance to the wetland.

Around the filter the District has seeded native vegetation as part of project installation. Currently the District retains a native vegetation maintenance contractor to manage this seeding to promote robust native growth. Current management is primarily hand-removal and spot spraying to minimize competition from non-native species. It is expected this level of management will continue for a couple years until full establishment, at which time management will shift to selective removal of non-natives as needed. This management is done by hand, without heavy equipment and is outside the wetland area, so minimal disturbance to the WMA is expected.

**Iron-Sand Filter:** Should monitoring show that the sand filter permeability is significantly reduced or phosphorus sorption capacity and project phosphorus load reduction goals are no longer being achieved, the District will contemplate replacement of the filter material and drain tile as necessary. Any such replacement will involve the input/approval of the DNR. Though measured sediment loads at this location are low, replacement of the filter may be required through the life of the project (30 years).

CRWD will be monitoring performance of other soluble filters in the District, some of which were designed with crushed limestone as the filter media. If CRWD finds this to be a more effective media than iron/sand, and the iron/sand loses treatment capacity, the CRWD will coordinate with the DNR to evaluate costs and benefits of replacing the iron-sand filter with crushed limestone. Monitoring data evaluated annually and reported in the District’s annual report will direct replacement schedule.

**Weirs:** Clean and prepare surface of stop logs and weirs prior to log installation.

**Fish Barrier:** A fish migration barrier has been in place at this location since 2009. The barrier will be replaced with a new barrier installed on top of weir #2. The current design for this barrier involves movable fingers to allow debris to pass without impacting hydrology. The barrier will require inspection at least weekly in the spring melt and after rain events throughout the summer. These barriers can generally be cleaned with a rake if needed, without the use of heavy equipment.
Little or no disturbance of wetland vegetation is anticipated; maintenance needs for the replacement fish barrier should be less than for the previous barrier.

**Emergency /Unforeseen Maintenance:**
Should the system require emergency or unforeseen maintenance, the District will work cooperatively with the DNR to provide notice and determine the best course of action. If inspection and operation indicates that modifications to this plan are required, the District will work with the DNR to modify the plan as needed.

**CEDAR LAKE HIGHWAY 55 BYPASS CHANNEL AND LIMESTONE FILTER BERM:**
This BMP, shown in Appendix B, is comprised of 3 main elements:
- A low-flow treatment channel
- A permeable limestone filter berm
- A sheet pile weir on the main, existing channel

There are no active operational elements of this BMP, so only inspection and maintenance will be necessary.

**Inspection and Maintenance:**
Inspection of the BMP will occur annually as part of the District’s annual inspection program.

**Channel**
The low-flow channel should be free flowing, free of debris and maintained in its design cross section. Any debris found to be causing an issue should be removed. The existing channel, especially the bridged portion immediately downstream of the BMP, should be inspected for free flowing condition. Any obstruction could negatively impact BMP performance and may need to be removed.

The channel banks should be inspected for erosion. Both the channel banks and a small portion of the upland area adjacent to the banks were seeded with native vegetation as part of project installation. Currently the District retains a native vegetation maintenance contractor to inspect and maintain this seeded area to promote robust native growth; this practice should continue.

**Permeable filter weir**
Visual inspection of the limestone filter berm shall focus on maintaining the berm free of nuisance vegetation and flowing freely. Removal and treatment of nuisance vegetation is expected over time. Clogging of the filter berm will be evidenced by major differences in water surface elevation from upstream to downstream.

The berm should be inspected for settling, with a survey of the entire berm every 3 to 5 years to verify the berm is functioning at design elevation. Wetland soils in the area may cause minor settling in some areas of the berm. Dissolution of the limestone to bind with the phosphorus may cause shifts in elevation which may require addition of limestone to the surface of the berm.
Sheet pile weir
The sheet pile weir should be inspected for erosion, replacing riprap along the bank tie-in areas as needed. The signage along the weir to warn snowmobiles of its presence should be inspected to ensure they are anchored properly and remain visible for winter conditions. Any debris that blocks the weir should be removed when discovered. As part of the surveying schedule of the limestone filter berm, the weir and surrounding riprap should be surveyed to ensure the weir is functioning at design elevation.
CONTRACT DRAWINGS
EAST SWARTOUT STORMWATER IMPROVEMENTS
CLEARWATER RIVER WATERSHED DISTRICT
DECEMBER 2014

INDEX OF SHEETS
C-101 TITLE SHEET
C-101 EXISTING CONDITIONS & REMOVAL PLAN
C-201 SWPPP PLAN
C-202 EROSION & SEDIMENT CONTROL PLAN
C-301 GRADING PLAN
C-801 DETAILS
C-802 DETAILS
C-803 DETAILS

INDEX OF CHANGE ORDERS
C-002

WARNING:
THE CONTRACTOR SHALL BE RESPONSIBLE FOR CALLING FOR LOCATIONS OF ALL EXISTING UTILITY LINES. THE CONTRACTOR SHALL NOT PERFORM ANY WORK WITHIN 5 FEET OF EXISTING UTILITY LINES UNTIL THEY ARE NO LONGER HAMMERED OR RELOCATED, AND A 10 FT CLEARANCE MUST BE MAINTAINED. THE CONTRACTOR SHALL NOTIFY THE OWNERS OF THE EXISTING UTILITY LINES OF THE LOCATION OF THEIR LINES AND PROVIDE THE LOCATION OF ALL EXISTING UTILITY LINES TO THE OWNER AT THE TIME OF THE BIDDING PROCESS.

RECORD PLANS
CONTRACTOR: JEFFERSON COMPANIES
DATE: 08/23/16

RECORD DRAWINGS ARE BASED ON INFORMATION OBTAINED THROUGH ON-SITE OBSERVATION OF CONSTRUCTION AND FIELD SURVEY WORK COLLECTED BY ACM.

ENLARGED PROJECT LOCATION MAP

Gopher State One Call
Toll Free 1-800-252-6066
EROSION AND SEDIMENT CONTROL PRACTICES

To any site disturbance the erosion prevention measures, including rock construction entrances and silt fence, will be installed at the site as shown on Sheets C-202.

All exposed soil areas within 7 days or as soon as possible must have temporary erosion protection (slush muck, erosion control blanket, seed) or permanent cover year round.

CONTRACTOR shall implement appropriate construction phasing, vegetative buffer strips, horizontal slope grading, and other construction practices that minimize erosion when practical.

The normal wetted perimeter of any temporary or permanent drainage ditch that drains water from a construction site, or that enters a site, must be stabilized within 200 linear feet of the property edge, or from the point of discharge to any surface water. Stabilization must be completed within 24 hours of connecting to a surface water. Pipe outlets must be provided with temporary or permanent energy dissipation within 24 hours of connection to a surface water.

Sediment control practices must minimize sediment from entering surface waters, including curb and gutter systems and storm sewer inlets. The following measures will be taken as sediment control practices in order to minimize sediment from entering surface waters:

1. Installation of sediment control practices on all down gradient perimeters prior to land disturbing activities.
2. Minimize vehicle tracking by use of the rock construction entrances.
3. Street sweeping of tracked sediment when necessary.

Dewatering is anticipated for the excavation work of this project. Discharge filtration should be incorporated into the dewatering activities. Energy dissipation shall be provided at all discharge points to prevent scour.

Because the project is less than 5 acres, temporary sedimentation basins are not required.

Record Retention

The SWPPP, all changes to it, and inspection and maintenance records must be kept on-site during construction. The OWNER must retain a copy of the SWPPP along with the following records for a period of three (3) years after submittal of the Notice of Termination.

1. Any other permits required for the project.
2. Records of all inspection and maintenance conducted during construction;
3. All permanent operations and maintenance agreements that have been implemented, including all right of way, contract, covenants and other binding requirements regarding perpetual maintenance; and
4. All required calculations for design of the temporary and permanent stormwater management systems.

Pollution Prevention Measures

Solid Waste

Solid waste, including but not limited to, collected asphalt and concrete millings, floating debris, paper, plastic, fabric, construction and demolition debris and other waste must be disposed of properly and must comply with MPCA disposal requirements.

Hazardous Materials

Hazardous materials, including but not limited to oil, gasoline, paint and any hazardous substance must be properly stored including secondary containments, to prevent spills, leaks or other discharge. Restricted access to storage areas must be provided to prevent vandalism. Storage and disposal of hazardous waste must be in compliance with MPCA regulations.

Washing of Construction Vehicles

External washing of trucks and other construction vehicles must be limited to a defined area of the site. Runoff must be contained and waste properly disposed. No engine degreasing is allowed on site.

Concrete Washout Area

Concrete washout is not anticipated for this project.

In accordance with Part III.A.2 of the General Permit Authorization to Discharge Stormwater Associated with Construction Activity under the NPDES, the preparer of this document was trained under the University of Minnesota Erosion and Sediment Control Certification Program. Mr. Louis Sigtermans’ certification in Design of SWPPP is valid through May 31, 2017.

CERTIFICATION

In accordance with Part III.A.2 of the General Permit Authorization to Discharge Stormwater Associated with Construction Activity under the NPDES, the preparer of this document was trained under the University of Minnesota Erosion and Sediment Control Certification Program. Mr. Louis Sigtermans’ certification in Design of SWPPP is valid through May 31, 2017.

IMPAIRED WATERS, SPECIAL WATERS, AND WETLANDS

This Project is located within 1 mile of a special water. This Project is located within 1 mile of an impaired water (Figure 4 this sheet):

Albion Lake impaired for Nutrients
Swartout Lake impaired for Nutrients

Because of the proximity of the project to an impaired water during construction:

1. All exposed soil areas must be stabilized as soon as possible to limit soil erosion but in no case later than seven (7) days after the construction activity in that portion of the site has temporarily or permanently ceased.

2. Temporary sediment basins are required to handle runoff for common drainage locations that serve an area with 5 or more acres disturbed at one time.

This Project will temporarily impact wetlands. A wetland delineation has been performed and wetland permits have been obtained.

303(d) Impaired Waters and Wetlands Map

Figure 4
EXTENDED LINER TO ELEV. 1016.5

60 MIL SMOOTH HDPE LINER INCLUDING GEOTEXTILE FABRIC.

CHANGE ORDER #1

INSTALLED ADDITIONAL SITE STABILIZATION INCLUDING 1.5" WASHED ROCK, GEOTEXTILE FABRIC, & DRAINTILE APPROXIMATELY 12" THICK UNDERNEATH IESF SYSTEM.
Cumulative Impervious Surface
Existing impervious surface - 0.00 acres
Proposed impervious surface - 0.00 acres

Total Area Disturbed by Construction - 1.5 acres

Construction Dates: February 2015 - December 2015

Party Responsible for Long Term Operation and Maintenance of the Site - OWNER
Clearwater River Watershed District
75 Elm St E, Box 481
Annandale, MN 55301
320-274-3935

Party Responsible for Implementation of the SWPPP - CONTRACTOR (TBD)

Erosion and Sediment Control Practices
Prior to any site disturbance the erosion prevention measures, including rock construction entrances and silt fence, will be installed at the site as shown on Sheets C-202.

- All exposed soil areas within 7 days or as soon as possible must have temporary erosion protection (silt mulch, erosion control blanket, seed) or permanent cover year round.

CONTRACTOR shall implement appropriate construction phasing, vegetative buffer strips, horizontal slope grading, and other construction practices that minimize erosion when practical.

The normal wetted perimeter of any temporary or permanent drainage ditch that drains water from a construction site, or diverts water around a site, must be stabilized within 200 lineal feet from the property edge, or from the point of discharge to any surface water. Stabilization must be completed within 24 hours of connecting to a surface water.

Pipe outlets must be provided with temporary or permanent energy dissipation within 24 hours of connection to a surface water.

Sediment control practices must minimize sediment from entering surface waters, including curb and gutter systems and storm sewer inlets. The following measures will be taken as sediment control practices in order to minimize sediments from entering surface waters:

1. Installation of sediment control practices on all down gradient perimeters prior to land disturbing activities.
2. Minimize vehicle tracking by use of the rock construction entrances.
3. Street sweeping of tracked sediment when necessary.

Dewatering is anticipated for the excavation work of this project. Discharge filtration should be incorporated into the dewatering activities. Energy dissipation shall be provided at all discharge points to prevent sour.

Because the project is less than 5 acres, temporary sedimentation basins are not required.

Record Retention
The SWPPP, all changes to it, and inspection and maintenance record must be kept on site during construction. The OWNER must retain a copy of the SWPPP along with the following records for three (3) years after submittal of the Notice of Termination:

1. Any other permits required for the project;
2. Records of all inspection and maintenance conducted during construction;
3. All permanent operations and maintenance agreements that have been implemented, including all right of way, contract, covenants and other binding requirements regarding perpetual maintenance; and
4. All required calculations for design of the temporary and permanent stormwater management systems.

Pollution Prevention Measures
Solid Waste
Solid waste, including but not limited to, collected asphalt and concrete millings, floating debris, paper, plastic, fabric, construction and demolition debris and other waste must be disposed of properly and must comply with MPCA disposal requirements.

Hazardous Materials
Hazardous materials, including but not limited to oil, gasoline, paint and any hazardous substance must be properly stored including secondary containments, to prevent spills, leaks or other discharge. Restricted access to storage areas must be provided to prevent vandalism. Storage and disposal of hazardous waste must be in compliance with MPCA regulations.

Washing of Construction Vehicles
External washing of trucks and other construction vehicles must be limited to a defined area of the site. Runoff must be contained and waste properly disposed of. No engine degreasing is allowed on site.

Concrete Washout Area
Concrete washout is not anticipated for this project.

Inspections
The inspection log will be completed by the CONTRACTOR for the construction site. Inspections at the site will be completed as follows:

- Once every seven (7) days during active construction and,
- Within 24 hours after a rainfall event greater than 0.5 inches in 24 hours.

The individual performing inspections must be trained as required by part IV.E of the Permit. CONTRACTOR to provide OWNER with proof of training. Inspections must include stabilized areas, erosion prevention and sediment control BMPs, and infiltration areas. Corrective actions must be identified and date of correction must be noted as identified in Section IV.E. of the Permit.

Final Stabilization
All areas disturbed by construction will receive seed and mulch or sod according to the plans and specifications within the specified vegetative time schedule. Final stabilization will occur when the site has a uniform vegetative cover with a density of 70% over the entire disturbed area. All temporary synthetic erosion prevention and sediment control BMPs (such as silt fence) must be removed as part of the site final stabilization. All sediment must be cleaned out of conveyances and temporary sedimentation basins if applicable.

Notice of Termination (NOT) must be submitted within 30 days of final stabilization.

Impaired Waters, Special Waters, and Wetlands
This Project is not located within 1 mile of a special water. This Project is located within 1 mile of an impaired waters (Figure 3 this sheet): Cedar Lake impaired for HgF

Swartout Lake impaired for Nutrients

Because of the proximity of the project to an impaired water during construction:

1. All exposed soil areas must be stabilized as soon as possible to limit soil erosion but in no case later than seven (7) days after the construction activity in that portion of the site has temporarily or permanently ceased.
2. Temporary sediment basins are required to handle runoff for common drainage locations that serve an area with 5 or more acres disturbed at one time.