Riley-Purgatory-Bluff Creek Watershed District

Board of Managers Workshop and Regular Meeting

Wednesday, **April 5, 2017**
5:30pm Board Workshop
7:00pm Regular Board Meeting
DISTRICT OFFICE
18681 Lake Drive East
Chanhassen

Agenda

1. Call to Order

2. **Board Workshop - 10 Year Plan** **Information**

3. **Approval of the Agenda** (Additions/Corrections/Deletion)

4. **Public Hearing** - Change of Business Address **Action**
5. **Public Hearing** - Bluff Creek Tributary Plan Amendment **Action**
6. **Public Hearing** - Lake Susan Park Pond and Stormwater Reuse **Action**

7. Matters of general public interest

   Welcome to the Board Meeting. Anyone may address the Board on any matter of interest in the watershed. Speakers will be acknowledged by the President; please come to the podium, state your name and address for the record. Please limit your comments to no more than three minutes. Additional comments may be submitted in writing. Generally, the Board of Managers will not take official action on items discussed at this time, but may refer the matter to staff for a future report or direct that the matter be scheduled on a future agenda.

8. **Reading and approval of minutes** **Action**

   Board of Manager Meeting, March 1, 2017

9. **Consent Agenda**
   (The consent agenda is considered as one item of business. It consists of routine administrative items or items not requiring discussion. Any manager may remove an item from the consent agenda for action.)
   a. Accept Engineer's Report (with attached Inspection Report)
   b. Accept Staff Report
   c. Approve Permit 2017-008 Prairie Meadows with recommendations

d. Authorize bid solicitation for the Chanhassen High School Reuse System
e. Approve Permit 2017-007 Cedarcrest Stables review timeline extension
f. Accept 2016 Annual Report
g. Approve Hire of Permitting and Natural Resource Project Manager

10. Citizen Advisory Committee **Information**

11. Action Items **Action**

a. Approve paying of the bills
b. Accept February Treasurer's Report
c. Approve Task Order No. 21b – Bluff Creek Reach BT3A Stabilization Project: Final Design and Construction Administration Services without the optional task 2-17

12. Discussion Items **Information**

a. Upcoming Meeting

13. Upcoming Events **Information**

- Citizen Advisory Committee, District Office, April 17th, 6:30pm, 18681 Lake Drive East, Chanhassen, 5:30pm
- Builder's Workshop, District Office, April 26th, 9:00am-11:00am
- District Regular Board Workshop, Board Workshop and Regular Meeting, Wednesday, May 3, 2017, 18681 Lake Drive East, Chanhassen, 5:30pm

Public Notice
(Official Publication)
Notice of Public Hearing
Riley Purgatory Bluff Creek Watershed District
Change of Principal Place of Business to 18681 Lake Drive East, Chanhassen

PLEASE TAKE NOTICE that the Board of Managers of the Riley Purgatory Bluff Creek Watershed District will hold a public hearing consistent with Section 103D.321 of Minnesota Statutes, on April 5, 2017 at 7:00 p.m. at District Office, 18681 Lake Drive East, Chanhassen, MN to proposing change of principal place of business to 18681 Lake Drive East, Chanhassen.

All interested parties are invited to appear at the public hearing to offer comments and ask questions in order to advise the board of managers on whether to approve the proposed pilot projects. Further information is available by contacting the District Administrator, Claire Bleser, cbleser@rpbcwd.org, or 952-607-6512, or by visiting the District website: www.rpbcwd.org.

Dated: March 15, 2017

BY ORDER OF THE BOARD OF MANAGERS

Mary Bisek, Secretary

Public Notice
(Official Publication)
Notice of Public Hearing
Riley Purgatory Bluff Creek Watershed District
Bluff Creek Southwest Branch Stabilization and Restoration Project

PLEASE TAKE NOTICE that the Board of Managers of the Riley Purgatory Bluff Creek Watershed District will hold a public hearing consistent with Section 103B.251 of Minnesota Statutes, on April 5, 2017 at 7:00 p.m. at District Office, 18681 Lake Drive East, Chanhassen, MN to consider implementing a stabilization and restoration project on Bluff Creek Southwest Branch located west of Audubon and north of Pioneer Trail.

The total estimated project cost for this project is $200,000. The District proposes to pay for the estimated $200,000 project cost through its ad valorem property tax levy authorized by Minnesota Statutes Section 103B.241 for the implementation of its water management plan. Approximately 77% of this levy will be paid by properties in Hennepin County, and 23% paid by properties in Carver County.

All interested parties are invited to appear at the public hearing to offer comments and ask questions in order to advise the board of managers on whether to approve the proposed pilot projects. Further information is available by contacting the District Administrator, Claire Bleser, cbleser@rpbcwd.org, or 952-607-6512, or by visiting the District website: www.rpbcwd.org.

Dated: March 10, 2017

BY ORDER OF THE BOARD OF MANAGERS

Mary Bisek, Secretary

RILEY PURGATORY BLUFF CREEK WATERSHED DISTRICT

18681 Lake Drive East
Chanhassen, MN 55317
952-607-6512
www.rpbcwd.org

Date: Thursday, March 30, 2017

To: Cities, Counties, Met Council, and State Review Agencies

From: Claire Bleser, Riley-Purgatory-Bluff Creek Watershed District

Re: Minor Plan Amendment

The Riley-Purgatory-Bluff Creek Watershed District proposed a plan amendment to its 2011 Comprehensive Watershed Resources Management Plan. The Bluff Creek Southwest Branch and Stabilization is in the top tier for restoration projects. This reach was rated as being unstable, with poor water quality, moderately poor habitat, and a moderate risk to infrastructure. In addition, if the head cut continues towards the wetland it could result in the drainage of the wetland.

The proposed amendment was sent out on February 6th with the comment period ending on March 23, 2017. Minnesota Department of Natural Resources submitted comments. After careful review of the comments, the Riley-Purgatory-Bluff Creek Watershed District modified it's plan amendment to provide further details on the proposed restoration. The board adopted this amendment at their April 5, 2017 board meeting.

Enclosed is the additional section of the plan that was adopted. The full plan is available on the RPBCWD website: www.rpbcwd.org. Hard copies are available upon request.
Thank you for taking part in the review process of the District's plan amendment.

Sincerely,

Claire Bleser

Minnesota Department of Natural Resources
Ecological and Water Resources Division
Central Region Headquarters
1200 Warner Road, St Paul MN 55106

03/22/2017

Claire Bleser
District Administrator
Riley Purgatory Bluff Creek Watershed District
14500 Martin Drive Suite 1500
Eden Prairie, MN 55344

Re: Plan Amendment: Bluff Creek Southwest Branch

The DNR appreciates the opportunity to review and comment on the Riley-Purgatory-Bluff Creek Watershed District's Plan Amendment "to restore the School Forest and improve water quality in the Purgatory Creek subwatershed, and to restore an ecologically diverse and safe outdoor learning environment that promotes sound forest and watershed stewardship for future generations in partnership with Minnetonka Public Schools".

Our Area Hydrologist has reviewed the plan and offers the following comments for your consideration.

She suggests that the 5th paragraph (below) is not clearly stated. She also recommends that a figure to illustrate what is occurring would be helpful in describing what is occurring .

However, in arecent field visit 1 12-inch culvert from a stormwater pond outlet in the left overbank of this reach is severely eroded and perched approximately 6 feet above the channel bed. An adjacent wetland located south of the project reach has a natural overflow point that contributes flow to a secondary tributary. Significant channel incision has occurred in this tributary with a 4 to 5□foot tall headcut very near the tributary origin from the wetland. Continued migration of the headcut to the wetland could result in draining the wetland.

A description of the methods for the proposed work is recommended, or at a minimum, perhaps discussion that the minimal impact solution will be selected for implementation.

Thank you for the opportunity to comment on the RPBCWD Plan Amendment. If you have questions, feel free to contact Area Hydrologist, Jennie Skancke at jennie.skancke@state.mn.us or by phone at (651)259-5790.

Sincerely,

Jeanne M. Daniels

Jeanne Daniels, District Manager
Jeanne.daniels@state.mn.us

651-259-5784

ec. Terri Yearwood, EWR
Jennie Skancke, EWR
Steve Christopher, BWSR

Minnesota Department of Natural Resources • Division of Ecological and Water Resources
1200 Warner Road, St. Paul, MN, 55106

7.4a.7 Bluff Creek Southwest Branch Stabilization and Restoration

Need

Bluff Creek, within the municipal boundary of Chanhassen, Carver County, has a catchment of 5.8 square miles with the main stem being 6.8 miles long. Bluff Creek is a small tributary of the Lower Minnesota River. The upper reach of the watershed is primarily comprised of urban land use with some areas of forested upland and meadow. The middle reach is a mixture of various land uses but is rapidly urbanizing. The lower reach has steep valley walls, is highly sinuous, and lined with trees.

In 2002, Bluff Creek was listed on the 303(d) list of impaired waters for elevated turbidity levels measured at the Metropolitan Council Environmental Services (MCES) Watershed Outlet Monitoring Program (WOMP) station located on the main stem of the creek downstream of Old Highway 212. In 2004, Bluff Creek was placed on the Minnesota Pollution Control Agency's (MPCA) list of impaired waters in need of a Total Maximum Daily Load (TMDL) study for impaired biota due to low fish IBI scores. In 2013, the TMDL Implementation Plan was published identifying the projects that would reduce sediment loads to the creek but also address habitat fragmentation.

The 2015 CRAS Report evaluated segments of all creeks in the watershed by dividing the key categories for prioritizing restoration efforts into two tiers. The first tier was defined as consisting of categories that affect public health and safety, align with the goals in the District's Plan, and represent the key reasons why restoration projects are undertaken. These categories include: infrastructure risk, erosion and channel stability, ecological benefit, and water quality. The second tier of categories include those that provide supporting benefit to stream restoration, including watershed benefits, public education, partnership opportunities, and project cost per pound of phosphorus.

The CRAS report identified reaches BT-3A as a being in the top tier for prioritizing restoration projects. Reach BT-3A was rated as being unstable, with poor water quality, moderately poor habitat, and a moderate risk to infrastructure.

However, in a recent field visit one 12-inch culvert from a stormwater pond outlet in the left overbank of this reach is severely eroded and perched approximately 6 feet above the channel bed. An adjacent wetland located south of the project reach has a natural overflow point that contributes flow to a secondary tributary. Significant channel incision has occurred in this tributary with a 4 to 5 foot tall headcut very near the tributary origin from the wetland. Continued migration of the headcut to the wetland could result in draining the wetland. The attached Figure 1-2 from the Bluff Creek Stream Stabilization Assessment shows both the perched culvert and the headcut near the wetland.

Claire Bleser 3/30/2017 3:29 PM
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Claire Bleser 3/30/2017 3:29 PM
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Stabilization approach

The Bluff Creek Stream Stabilization Assessment included concept plans to stabilize the reach by either raising the stream bed to reconnect to the floodplain or modifying the incised channel to create a Rosgen Type B channel to provide more long term stability. The ravine with the head

cut moving toward the wetland will be stabilized with grade control to prevent further migration of the head cut toward the wetland. Specific approaches and techniques for both the main channel and the tributary from the wetland will be determined during final design; however natural-looking techniques that minimize disturbance are preferred.

Description

Reach BT3A is approximately 2,200 feet long and is the head of a tributary to Bluff Creek. The reach starts at a storm sewer outlet from Audubon Road and ends at Pioneer Trail. It was a watershed area of approximately 205 acres. The upper approximately 1,700 feet of the reach are on property owned by the City of Chanhassen and the lower approximately 500 feet of the reach are on property owned by MnDOT.

Estimated Construction Cost: $200,000

Funding

The District would expect to fund these project elements by means of its watershed-wide ad valorem levy. However, if there are cost-sharing or grant opportunities with other public agencies, the District would explore these as sources of funding as well. Some of this work may be suited for the District's cost-share program, in which case procedures and funding would be determined under those program criteria.


RILEY PURGATORY BLUFF CREEK WATERSHED DISTRICT
Stream Reaches - Tier 1 Score
<= 12 (Best)
13 - 17
18 - 21
>= 22 (Worst)
Unsurveyed Stream Reach
3-ft tall eroding banks
5-ft tall eroding banks
Eroded culvert outfall perched 6-ft above channel
7-8 ft tall eroding banks
Head cut near wetland outfall
6-ft tall eroding banks downstream of culvert outfall
Channel widens with minimal erosion for downstream third of reach
BT3A
BT3B
Feet
200
0
200
BLUFF CREEK
REACH BT3A
Bluff Creek Feasibility Study
Riley Purgatory Bluff Creek
Watershed District

Public Notice
(Official Publication)
Notice of Public Hearing
Riley Purgatory Bluff Creek Watershed District
Lake Susan Park Pond Treatment and Stormwater Reuse Project

PLEASE TAKE NOTICE that the Board of Managers of the Riley Purgatory Bluff Creek Watershed District will hold a public hearing consistent with Section 103B.251 of Minnesota Statutes, on April 5, 2017 at 7:00 p.m. at District Office, 18681 Lake Drive East, Chanhassen, MN to consider implementing the Lake Susan Park Pond Treatment and Stormwater Reuse Project.

The total estimated project cost for this project is $480,000. The District proposes to pay for the project with $200,000 in grant funds from the Clean Water Fund Grant and the remaining funds will come from the city of Chanhassen ($50,000) and the District's ad valorem property tax levy authorized by Minnesota Statutes Section 103B.241 for the implementation of its water management plan. Approximately 77% of this levy will be paid by properties in Hennepin County, and 23% paid by properties in Carver County.

All interested parties are invited to appear at the public hearing to offer comments and ask questions in order to advise the board of managers on whether to approve the proposed pilot projects. Further information is available by contacting the District Administrator, Claire Bleser, cbleser@rpbcwd.org, or 952-607-6512, or by visiting the District website: www.rpbcwd.org.

Dated: March 15, 2017

BY ORDER OF THE BOARD OF MANAGERS

Mary Bisek, Secretary

MEETING MINUTES

Riley-Purgatory-Bluff Creek Watershed District

March 1, 2017, Board of Managers Plan Workshop and Monthly Meeting

PRESENT:

Managers:	Mary Bisek, Secretary	
	Richard Chadwick	
	Jill Crafton, Treasurer	
	Perry Forster, President	
	Leslie Yetka, Vice President	
Staff:	Claire Bleser, District Administrator	
	Zach Dickhausen, District Staff	
	Michelle Jordan, Water Quality Outreach Coordinator	
	Josh Maxwell, Water Resources Coordinator	
	Louis Smith, Attorney (Smith Partners)	
	Scott Sobiech, Engineer (Barr Engineering Company)	
Other attendees:	Paul Bulger, CAC*	Dave Modrow, City of Eden Prairie*
	Kristie Elfering, Elfering & Assoc.*	Justin Schmidt, Life Time Fitness*
	Larry Koch, Chanhassen Resident	Laurie Susla, LLCA
	Sharon McCotter, CAC*	David Ziegler, CAC

*Indicates attendance at the monthly board meeting but not the plan workshop

1. Plan Workshop

President Forster called to order the Wednesday, March 1, 2017, Board of Managers Plan Workshop at 5:40 p.m. in the District Office, 18681 Lake Drive East, Chanhassen, MN 55317.

Administrator Bleser stated that the 10-year plan is a guiding document outlining what the next 10 years may look like. She pointed out that some components in the plan may move from one year to another based on logistics. She said that the District is always re-evaluating and at the last meeting the Board discussed reassessing halfway through the 10 years.

Administrator Bleser updated the group on what has been happening with the plan since the previous Board workshop. She noted that staff met with the Technical Advisory Committee (TAC) and the Citizen Advisory Committee (CAC) and gave them the same presentation staff had presented to the Board. She reported that the TAC had no concerns with the scoring of any projects in their communities.

Administrator Bleser said she had told the TAC about the Board's interest in wetlands and all of the TAC members agreed that there was a need to do something with wetlands. She explained that the idea of wetland banking was raised along with the huge concern that right now if wetlands are impacted it is necessary to go to Blue Earth County to find a replacement to that wetland. She said that the current process doesn't benefit the local region. Administrator Bleser reported that the TAC was in favor of the District looking further into the wetlands and to consider revising the first draft of the 10-year plan to include wetlands. She noted that the City of Chaska's

TAC representative talked about wetland restoration and possibly wetland banking outside of the watershed district but within their community, such as wetland that drains to the lower Bluff Creek and Minnesota River area. She said that there is interest in the overall regional approach.

Administrator Bleser gave the highlights of what was discussed with the TAC, including that alternative ideas of water quality projects were provided.

Administrator Bleser talked further about the meeting earlier this week with the Citizens Advisory Committee. She said that the CAC raised the idea of possibly increasing funds to Education and Outreach. Administrator Bleser reported that there were pretty favorable comments about the wetlands element. She said that staff shared with the CAC what the TAC had shared with staff about wetland banking. She noted that the CAC asked for additional time in which to comment and so the CAC has until March 13 to provide comments.

Administrator Bleser responded to questions.

Administrator Bleser said that she would like to spend time now discussing possible ideas about what the District would like to do with wetlands and their management. She pointed out that the District hasn't really done wetland data collection. She talked about the idea of conducting a functional value inventory. She reviewed the District's goals and strategies related to wetlands:

- The District would create a wetland inventory based on available data.
- Preserve and enhance the quantity as well as the function and value of wetlands.

She said that in talking with the TAC, it seems that there is an interest in the District possibly leading a wetland banking system. Administrator Bleser stated that the first step would be the inventory and then deciding how to protect and restore the wetlands in the area. She explained that staff would like to engage the Board in discussion about the idea of a banking program and the idea of an incentive program. She asked for the managers' thoughts. President Forster asked Administrator Bleser to describe how the wetland banking system works. She described the system. She talked about the Wetland Conservation Act and how the cities have the authority regarding the Wetland Conservation Act.

Administrator Bleser stated that if the Board is interested in the wetland inventory, she would encourage including it in the District's 10-year plan. Manager Yetka commented that she would support including it in the 10-year plan. Engineer Sobiech noted that the cities in the watershed do have data but it is dated. There was discussion. Manager Bisek asked if the cities would be willing to help pay for the costs of the research. Administrator Bleser responded that they might be interested.

Administrator Bleser said that she is hearing that the Board is interested in pursuing this discussion and this direction further. She said that the other concept the Board could consider is an incentive program that would help with wetland restoration.

Manager Chadwick stated that he believes it is the sense of the Board to work to have these issues of wetlands in the 10-year plan. He said that he thinks it is important to preserve as much of the wetlands as possible, even enhancing and enlarging the existing wetlands. Manager Crafton mentioned that corporate campuses could be a sector that would be interested in partnering with the District in such work. Administrator Bleser said she thinks staff has enough direction to be able to move forward with working on a wetland section for the 10-year plan.

Administrator Bleser touched on the 10-year plan process timeline. She said that the District is running two to three months behind the timeline originally presented to the Board. She explained that the District is entering the draft plan development phase and is estimated to enter the 90-day plan review by the end of this year.

Administrator Bleser handed out a first working draft of the 10-year plan table of contents and talked about the requirements of state statute 8410. She went through the table of contents with the group. There was discussion about the implementation section, and Administrator Bleser noted that rules and regulations should be identified as well and that the cost share program should be taken out of this section. Manager Yetka commented that the Goals and Strategies under the Public Input Process section could be a separate section unto itself.

Administrator Bleser reported on the Community Resiliency Workshop that took place. She asked the Board for comments on her idea of incorporating some of those findings into the 10-year plan. President Forster asked where. Administrator Bleser said that it could fit under the Goals and Strategies subsection related to climate change. Manager Yetka noted that the individual watersheds will have their own sections, so the information could fit there, too. The Board indicated favor with including workshop findings into the plan.

Administrator Bleser stated that the idea was raised during previous 10-year plan workshops about working into the plan opportunity projects. She said these are projects that arise that present an opportunity for the District to participate and achieve steps toward District goals. Administrator Bleser said that the idea is to build a little flexibility into the plan and it is not yet known whether the Board of Water and Soil Resources will accept this. Attorney Smith said that he thinks there is a growing interest to make sure that watershed plans are dynamic in that way and the key thing is to show that the District has thought about its goals and that it isn't going to respond to just any project that knocks on the door and that aren't relevant to the District's goals. President Forster said that he thinks the District needs to have a reference in the document explaining that while the document may seem fixed, it is not and that other things could come into play.

Manager Chadwick requested that the District Attorney keeps the District's 10-year plan consistent with the other watersheds, to the extent possible, because it would be helpful for the District in working with its partners, cities, and the other watershed districts. Manager Chadwick requested from Administrator Bleser a copy of the management table.

President Forster closed the Plan Workshop at 6:47 p.m.

2. Monthly Board Meeting Call to Order

President Forster called to order the Wednesday, March 1, 2017, Board of Managers Monthly Meeting at 7:05 p.m. in the District Office, 18681 Lake Drive East, Chanhassen, MN 55317. He noted that immediately prior to this meeting, the Board had a 10-year plan workshop starting at 5:30 and ending at approximately 6:45 p.m.

3. Approval of the Agenda

President Forster requested the addition of Discussion item 9b – Bob Adomaitis letter. He noted that the agenda lists 8b as the December Treasurer's Report but it should be listed as the January Treasurer's Report. Manager Chadwick corrected the date of the Board's next monthly meeting as listed on the agenda in upcoming events.

Manager Chadwick moved to approve the agenda as amended. Manager Crafton seconded the motion. Upon a vote, the motion carried 5-0.

4. Matters of General Public Interest

President Forster explained the procedure for bringing forward matters of general public interest, and he opened the floor.

Ms. Laurie Susla of Dakota Lane, Chanhassen, complimented the Board and staff on the District's new office space. She noted that she won't be able to stay at tonight's meeting for the agenda item about the letter submitted to the Board by Bob Adomaitis. Ms. Susla said she thinks the letter contained a lot of very important information and that she agrees with him that there were several of the members who were let go from the Citizens Advisory Committee (CAC) who were working diligently at fulfilling the statutory role of the CAC and so she fully supports the letter that Bob wrote.

She asked if any of the projects that are being considered for the new 10-year plan and that are being fed into the prioritization tool are coming from anything other than just from the Use Attainability Analyses. Administrator Bleser responded yes. Ms. Susla remarked that the City of Chanhassen is going through its 10-year Surface Water Management Plan planning process at this time and there is a lot of movement in organizations in getting their 10-year plans together. She explained that a project that doesn't seem to have made it into a project pool is working on the antiquated storm water systems that are dumping untreated storm water into lakes such as Lotus Lake. Ms. Susla said this seems like a good opportunity to reach out to the cities to get partnerships going for projects that would result in significant phosphorous reductions for the lakes.

Ms. Susla talked about the internal phosphorous loading in Lotus Lake and said that she doesn't know what percentage of the internal load is from phosphorous release from sediment and wondered if that information is available anywhere. Ms. Susla said that she thinks that until the District includes in the ten-year plan something to address the Curlyleaf pondweed and the carp, there may remain an internal phosphorous loading problem in Lotus Lake even after the alum treatment. She wondered what was the District's process for adding, changing, and reconsidering projects that are making their way at this point into the 10-year plan. President Forster said that the TAC met and is working hard on coordinating what is in the District's 10-year plan and the cities' plans. He said that the goal of having a level of flexibility in the District's plan will help the District and the cities capitalize on opportunity projects. Ms. Susla reiterated that she thinks this would be a golden opportunity to attack some of the storm water issues.

Mr. Larry Koch of Bighorn Drive, Chanhassen, echoed Ms. Susla's comments about the District's new office space. He commended Attorney Smith about the presentation he gave to the CAC at its last meeting. Mr. Koch said that the suggestions that Attorney Smith would be good suggestions for the Board to make regarding running its meetings. Mr. Koch requested a copy of the scoring presentation given to the TAC. He said he has some concerns about the scoring. He said he doesn't understand it. He said he has a difficulty reconciling those projects with any logic. He said that with the looks given him, he would like to remind everyone that with the Bylaws adopted at the Board's previous meeting, the Board adopted a statement that people would keep an open mind and would listen so he asks everyone to follows that. Mr. Koch asked if there is an open permit on Hunter Trail because he goes by there every day and he wanted to bring that project to the District's attention.

President Forster called several times for additional comments on matters of public interest. Upon hearing none, he moved on to the next agenda item.

5. Reading and Approval of Minutes

a. February 1, 2017, RPBCWD Board of Managers Plan Workshop and Monthly Meeting

President Forster requested a correction to the attendee list to clarify that Laurie Susla is no longer a member of the CAC. He requested that the minutes reflect that Dennis Yockers is the one who pointed out that the District did not have the wetland information in the plan. President Forster requested that the title for agenda item 5 be amended to include the address of the permit. President Forster requested that addition of the word "some" into the fourth sentence under 12b. on page 8, so that the sentence reads,

"...the District reallocates some funds..." Manager Bisek noted that staff member Michelle Jordan has a new position title that should be reflected in the minutes. Manager Crafton requested the removal of the word "to" under agenda item 1, page 1 second paragraph, third sentence. She also noted that the District was awarded "Watershed District of the Year" and asked that the word District be added to the sentence on page 3, under item 4, paragraph 3. She requested that a correction be made on page 6 under item 8 to correctly label CRAS as Creek Restoration Action Strategy. Manager Crafton asked that on page 8, under item 12b, paragraph 4, that the public hearing date be correctly listed as March 1. Manager Chadwick requested to amend his comments on page 2 under item 1, paragraph 7 to read, "...that we also previously talked about including recreational activities as a factor." He requested to amend his comments on the same page and in the same section, paragraph 10 to read, "...that he would hate to see recreational activities left out..."

Manager Crafton moved to accept the minutes as amended. Manager Chadwick seconded the motion. Upon a vote, the motion carried 5-0.

6. Consent Agenda

President Forster read aloud the Consent Agenda items: a. Accept Engineer's Report (with attached inspection report); b. Accept Staff Report; c. Approve TO 23 Scenic Heights Restoration; d. Approve Permit 2016-0046 Chanhassen Life Time Fitness; e. Approve Permit Review Timeline Extension for Permit 2017-001 Kopesky 2nd Addition; f. Approve Master Water Steward Capstone Project Cost-share Application; g. Approve Advertising of Permitting and Natural Resource Project Manager; h. Approve Advertising of Professional Services Solicitation.

Manager Crafton moved to approve the Consent Agenda as read. Manager Chadwick asked that item 6b – Staff Report – be remove from the Consent Agenda and asked that Agenda items 8a – Approve Paying Bills and 8b – Accept December Treasurer's Report – be taken in reverse order. President Forster commented that in the future, requests to amend the agenda should be raised during that agenda item and not during the Consent Agenda item. He moved item 6b to Action Item 8e. There was no second to Manager Crafton's motion.

Manager Crafton moved the Consent Agenda as revised. Manager Chadwick seconded the motion. Upon a vote, the motion carried 5-0.

7. Citizen Advisory Committee (CAC)

Sharon McCotter updated the Board on what the CAC went through at its meeting on Monday. She said that the CAC appreciated Attorney Smith's presentation and guidance. She reported that the CAC held elections and Dorothy Pederson will be the 2017 CAC president, Sharon McCotter will be the vice president, and Joan Palmquist will be the recorder. Ms. McCotter stated that for 2017 the CAC will continue to hold its meetings on the third Monday of each month at 6:30 p.m. and will address any conflicts with the meeting time at least two months in advance. She reported on clauses that the CAC adopted and will discuss at its next meeting. Ms. McCotter described the number of comments raised at the CAC's meeting about the meeting minutes of the Board's January 2017 meeting. She said that there is a level of discomfort within the CAC regarding how the CAC appointments were made. She said that the CAC is interested in making the process more transparent. Ms. McCotter reported that the CAC made a motion that the CAC requests that the Board articulate the CAC selection process, qualifications, and criteria and share this information by summer 2017. She listed the topics that the CAC plans to cover at its March meeting.

8. Action Items

a. Accept the January Treasurer's Report

Manager Crafton moved to accept the Treasurer's Report as submitted. She highlighted an item on page 2 in the fund performance analysis that shows a negative amount. She explained that it indicates that money that is still going to come in from partners. She recommended that the incoming funds be recognized as other income. The Board agreed with her recommendation. Manager Chadwick pointed out a correction to be made where the report lists the 2016 budget that should be labeled 2017. He asked Manager Crafton, as Treasurer, to highlight each month the Treasurer's Report items that she sees as most significant. He also commented that if there is something unusual in the report that the report uses a footnote to explain it. Manager Bisek seconded the motion to accept the Treasurer's Report. Upon a vote, the motion carried 5-0.

b. Approve Paying of the Bills

Manager Crafton described the process undertaken to review the bills. She moved to pay the bills. Manager Yetka seconded the motion. Upon a vote, the motion carried 5-0.

c. MAWD Special Meeting

President Forster explained that the Minnesota Association of Watershed Districts (MAWD) will need to hold a special meeting in July during its summer tour because there is a need to change MAWD's bylaws and the process in which it collects dues. He went into further detail about the issues and stated that Administrator Bleser is asking for Board authorization to send a letter to MAWD indicating that the District would like to participate in the special meeting. Manager Crafton moved to authorize Administrator Bleser to send the letter. Manager Chadwick seconded the motion. Upon a vote, the motion carried 5-0.

d. Recycling Association Minnesota Rainbarrel Sale

Ms. Jordan described staff's proposal for doing a District coupon toward the cost of a rainbarrel at the May 5 and 6 Recycling Association of Minnesota rainbarrel sale that the District is hosting. She provided details and talked about the educational component of the rainbarrel sale. Ms. Jordan asked for Board authorization to use up to $1,250 of education and outreach funds toward the coupon initiative. Manager Crafton moved to approve use of education and outreach funds up to $1,250. Manager Yetka seconded the motion. Upon a vote, the motion carried 5-0.

e. Staff Report

Manager Chadwick requested that the staff enlighten the Board about two or three items that are on the horizon and that the Board may need to take action on at an upcoming meeting. Administrator Bleser provided the information. Manager Chadwick moved to accept the Staff Report. Manager Bisek seconded the motion. Upon a vote, the motion carried 5-0.

f. January 24, 2017, Letter from Robert Adomaitis to the Board

Attorney Smith said that that the Board received a January 24, 2017, letter from Robert Adomaitis raising his concerns about the District's CAC appointment process. Attorney Smith said he would like to do four things:

- Speak to the main issues that are raised in the letter and offer a response from a legal point of view about the issues that are raised;

- Distribute the survey forms that the Board members completed for the CAC process late last year, and he is going to discuss that process;
- Share a draft letter responding to Mr. Adomaitis' concerns;
- Share a draft amendment to the Board's bylaws, prepared at the request of the Administrator, regarding dealing with this information gathering and balloting process as it was used in the CAC selection.

Attorney Smith stated that the decision the Board made regarding the CAC appointments was a lawful decision. He talked about the authority that the Board has in selecting CAC members. He addressed the specific issues that Mr. Adomaitis raised including:

- The process had too much staff control;
- The CAC's will that the CAC be a 15-member committee in 2017 was ignored and instead the opinion of staff that the committee be a 13-member committee was controlling of the Board's decision;
- The Open Meeting Law;
- The elimination of three incumbent members of the CAC resulted in a lack of proper geographic representation especially of Riley and Lotus lakes not having representation on the CAC.

Attorney Smith stated that none of the role of the staff ends up in a legal sense controlling the advice offered by the CAC or controlling the decisions that the Board made or makes. Attorney Smith said that the CAC is very free to offer the advice that a 15-member committee is what it sees is in the best interest of the watershed and the staff is free to offer an opinion and information on why a different number is in the best interest. He pointed out that the CAC's bylaws say that a 12-member committee is the typical arrangement. He said the Board is free to consider the issue of the number of members and to make a decision.

Attorney Smith stated that the Open Meeting Law's legal requirement is that no quorum of the Board can discuss or consider anything related to watershed business without doing so in a noticed meeting that is open to the public. He said that based on his understanding, the District staff sent out a survey document, each Board member individually completed it and sent it back to the staff, and no quorum discussed it, the staff gathered and compiled the information and included it in the meeting packet. Attorney Smith said that the requirement of the Open Meeting Law was fully met because all discussion that involved a quorum occurred in an open public meeting.

Attorney Smith pointed out that two of the three incumbent members that Mr. Adomaitis references in his letter voluntarily withdrew their application to be on the CAC. He described the legal requirement of membership, which is that citizen members of the committee be residents of the watershed and the statutory requirements that where practicable the membership includes a representative from the soil and water conservation districts, a representative from the counties, a representative from a sporting organization and a representative from an agricultural organization. speak to seeking broad representation of the watershed. He stated that in his view the CAC that the Board selected still broadly represents the various areas and communities of the watershed. He said that the Board does not legally need to appoint CAC members from any specific place.

Attorney Smith then addressed Mr. Adomaitis' concerns regarding transparency. Attorney Smith said

that he thinks the interest of transparency in the process could be advanced by his passing out copies of the five completed evaluation ballots from the managers and the managers identifying for the record which of the five evaluation ballots was the one he or she completed and returned to staff. Attorney Smith said that the discussion the Board had at its meeting revealed that each manager had a point of view about the appointments. He said that the managers were able to express their points of view and the discussion allowed the managers and the public and the managers to know each manager's point of view.

Attorney Smith requested that each manager identify his or her own comments on the evaluation ballot. President Forster read aloud his comments and identified survey C as his. Manager Crafton read aloud her comments and identified survey B as hers. Manager Bisek identified survey D as hers and noted that she made no additional comments on her form. Manager Yetka identified survey A as hers and read aloud her comments. Manager Chadwick stated that his unofficial ballot, identified in emails to him as not being an official poll or vote, was E. He read aloud his comments and explained his thought process about completing the form. He noted that he emailed to the Administrator in response to one of her emails that he felt that the "unofficial ballot" was inappropriate at this stage in the process. He reiterated previous comments that he thinks that this year's CAC appointment process reflects poorly on the staff and the Board through staff initiating a matter in a staff report without direction from the Board and orchestrating the ballot the way it was and he still feels that the process was tainted.

Manager Yetka remarked that she had no problem with the way the process was handled because it gave the managers a basis on which to have a conversation. She said that she felt in no way was staff trying to direct the Board's discussion or decision and the Board made its own decisions, the Board members made their opinions clear, and the Board had a good, long, and robust discussion. Manager Yetka said that in the discussion the Board members went down the line and stated his or her opinions. She said she respectfully disagrees with Manager Chadwick's statements and said that she thinks it was a fine process, the Board members were forthright in their opinions, there were no violations of the Open Meeting Law, and the Board made a decision as a Board.

President Forster said there are different opinions here, but it seems like the Board needs to come back with a different process next year. He said that doesn't think that staff was trying to manipulate the process and was trying to be helpful, and he stated that there is no one that respects the Open Meeting Law more than he does.

Manager Bisek moved that the structure of the CAC remains as it was voted on it the Board's previous meeting and that in the future there be a subcommittee to talk about how to possibly format in the future the discussion of the appointments. President Forster asked Manager Bisek to break that into two resolutions. Manager Bisek restated her motion to move that the CAC membership remains as the Board previously appointed. Manager Crafton seconded the motion. Upon a vote, the motion carried 4-1 [Manager Chadwick voted against the motion].

Manager Bisek moved that the Board have a committee to discuss a process for CAC appointments with the timing of such being well in advance of the appointment process for 2018. Manager Chadwick said that he would like to be on that committee and to be sure that the committee, Board, and staff solicit actively members for the CAC within the directives of the statute. Manager Yetka volunteered as well. President Forster noted that the committee membership is separate from the motion put forth by Manager Bisek. Manager Crafton seconded Manager Bisek's motion. Upon a vote, the motion carried 5-0. The Administrator collected the handouts passed out earlier in the discussion of this agenda item.

Attorney Smith read aloud the draft letter with the District's response to Robert Adomaitis and responding to his concerns. Manager Crafton stated that she supports the letter. Manager Chadwick remarked that it is a very good letter and if he was the attorney representing the Board he would put the same spins on the letter. He said that the courts are the only ones that ultimately do interpret the actions and intents and wording and interpretation of the Open Meeting Law. He said that the City of Waconia just went through several years of litigation over the Open Meeting Law and what it meant and several of the former members of the City Council were reprimanded by the court for actions involved. He said that in order to avoid litigation and negative comments, he thinks that the process was inappropriate and in his opinion was tainted by process because he doesn't believe the Board of Managers ever involved the staff and the staff took it upon itself in sending out their suggestions and the ballots without the direction from the Board, be it with the suggestion of a manager or two he doesn't know. Manager Chadwick said that one or two managers do not constitute the Board or direction from the Board and he thinks his feelings have been expressed here.

Manager Bisek reiterated the comment that she made at a previous Board meeting that she suggested to staff that a ballot would be a way to move the discussion along, make it more efficient, and help the Board members proceed through a large number of candidates for the CAC. She said that she did not put the ballot together but she suggested it and said it was a good idea and that she has been a member of other organizations that use that format to make decisions regarding appointments. She stated that was her involvement. Manager Chadwick said that he appreciated her coming forward with that and he doesn't imply any ill will or improper conduct on her part or on the staff. He said he just thinks the process that the Board went through without an opportunity for full discussion by the Board was not a proper and good reflection of the staff or the Board.

Manager Crafton commented that she thought it was a great tool that made her think about how she wanted to vote and what she wanted to do and why.

Manager Yetka said that throughout the discussion of this issue she has heard statements and read written comments including the phrase "statutory requirements" and the connotation is to the point that there is a statutory requirement regarding who exactly the Board appoints, where the appointees exactly live, what exactly are the backgrounds of the appointees, and the exact number of CAC members that the Board appoints. She addressed Attorney Smith asking him if he can confirm, in order to be absolutely clear, that the Board has fulfilled its statutory requirements in its decision-making process related to the CAC. Attorney Smith responded definitely yes.

Manager Crafton moved that the District proceed with the publication and distribution of the letter under President Forster's signature. Manager Yetka seconded the motion. Upon a vote, the motion carried 4-1 [Manager Chadwick voted against the motion].

Attorney Smith circulated a draft amendment to the Board's bylaws. He reminded the Board that it must provide 30-days advance notice before taking action to change its bylaws so tonight the draft amendment is simply being introduced. Attorney Smith said that from a legal perspective, the Board is not legally required to adopt this amendment and that the amendment is merely a response to the Administrator's questions of how the bylaws could provide guidance in light of the questions about the CAC appointment process. He read aloud the draft amendment to Section V – I of the Riley Purgatory Bluff Creek Watershed District Bylaws:

Voting – When the chair puts a question to the Board, every manager present will vote, except as

a manager elects to abstain. The manner of voting on any business coming before the Board may be by voice vote. An affirmative or negative vote by any member will be entered in the minutes on his or her request. Affirmative and negative vote will be recorded on any motion at the request of a manager and the results entered in the minutes. Unless provided otherwise by law, any vote or ballot completed by a manager, whether binding or not, will be disclosed at the meeting at which it is taken; a survey of managers shall be presented at the next scheduled meeting at which the relevant item of business is considered, including the vote results and vote of each member.

Attorney Smith noted that there will be some circumstances in which items need to be handled in executive closed session and those items would not be subject to this proposed amendment to the bylaws. There was discussion about the intent of the bylaw change.

Manager Crafton moved to add this proposed amendment to the RPBCWD's bylaws onto the Board's next meeting agenda. Manager Crafton seconded the motion. Manager Chadwick said that he thinks it is important that any ballot be designated as official or unofficial. Attorney Smith said that Manager Chadwick's language suggestion can be considered as part of the discussion at the meeting in which the Board considers the proposed change. Manager Chadwick asked if Attorney Smith could provide a revised draft. Attorney Smith said that he could bring some options. Upon a vote, the motion carried 5-0.

Manager Yetka moved to appoint Manager Chadwick and Manager Yetka to the subcommittee tasked with discussing the process of appointing the 2018 CAC. Manager Chadwick seconded the motion. Upon a vote, the motion carried 5-0.

9. Discussion Items

a. Upcoming Meetings

Administrator Bleser announced that President Forster and Manager Crafton are going to the Legislative Days organized by MAWD. She said that any other managers interested in attending Legislative Days should contact her. President Forster said that he provided a letter to Administrator Bleser that will be sent to all of the state senators that fall within this watershed district to make them aware of the Legislative Days events.

10. Upcoming Events

- District Board Workshop, Public Hearing, and Monthly Meeting, Wednesday, April 5, 2017, 18681 Lake Drive East, Chanhassen, 5:00pm

11. Adjourn

Manager Crafton moved to adjourn the meeting of the Board of Managers. Manager Chadwick seconded the motion. Upon a vote, the motion carried 5-0. The meeting adjourned at 8:46 p.m.

Respectfully submitted,

_____

Mary Bisek, Secretary

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BARR

Memorandum

To: Riley-Purgatory-Bluff Creek Watershed District Board of Managers and District Administrator
From: Barr Engineering Co.
Subject: Engineer's Report Summarizing March 2017 Activities for April 5, 2017, Board Meeting
Date: March 29, 2016

The purpose of this memorandum is to provide the Riley-Purgatory-Bluff Creek Watershed District (RPBCWD) Board of Managers and the District Administrator with a summary of the activities performed by Barr Engineering Co., serving in the role of District Engineer, during March 2017.

General Services

a. Responded to question about the 100-year flood elevation at 19405 Vine Ridge Road in Shorewood. Based on the profile information in the RPBCWD's Engineer's Report: 100-Year Floodplain Vulnerability Evaluation, the flood elevation at 19405 Vine Ridge Road in Shorewood is roughly 897.8 (NGVD29).

b. Responded to inquiry about the 100-year flood elevation at 6976 Center Drive in Eden Prairie. Based on the profile information in the RPBCWD's Engineer's Report: 100-Year Floodplain Vulnerability Evaluation, the flood elevation at 6976 Center Drive in Eden Prairie is roughly 844.3 (NGVD29).

c. Participated in a three interviews for the Permit and Natural Resources Project manager on March 17th and March 24th with Administrator Bleser and President Forster.

d. Replied to questions from the city of Minnetonka related to the potential replacement of the failing culvert conveying Purgatory Creek under Covington Road.

e. Continued working with Administrator Bleser and District Counsel to revise a cooperative agreement between the RPCWD, city of Chanhassen, and ISD 112 for the Chanhassen High School stormwater reuse system.

f. Worked with Administrator Bleser to schedule the initial stakeholder meeting kick off for the Scenic Heights forest restoration project.

g. Assisted Administrator Bleser with preparation and presentation of revised wetland opportunities for inclusion in the 10-year plan update to Board of Manager's at March 1st workshop.

h. Participated in March 1st, 2017 Board of Manager's regular meeting.

i. Prepared Engineer's Report for engineering services performed during March 2017.

j. Regular and frequent communication and coordination with Administrator Bleser discussing Board workshop, agendas, CRAS assessment modifications, online permit application, job description for permitting position, and status updates for various task orders.

k. Overall project management, administration, webmap data management, and coordination of task orders.

Permitting Program

a. *Permit 2015-025: Eden Prairie Lifetime Fitness Medispa Addition:* This project involves construction of a building expansion along the east side of the Lifetime Fitness at 755 Prairie Center Drive in Eden Prairie and associated parking lot and stormwater modifications. Conditional permit was approved at the July 2015 Board meeting. Discussed permit closeout with the project engineer.

b. *Permit 2015-050: Arbor Glen:* This project involves construction of a 21 lot residential subdivision at 9170 Great Plains Blvd in Chanhassen. The permit was conditionally approved at the October 5th 2016 Board meeting. Discussed possible site modifications with the project engineer.

c. *Permit 2016-014: Chanhassen Chick-fil-a:* This project involves the demolition of an existing building and construction of a new Chick-fil-a restaurant in Chanhassen. The project triggers erosion control and stormwater management rules. The project was conditionally approved at the August 2016 Board meeting. Reviewed trench drain design and provided comments to project engineer.

d. *Permit 2016-026*: Foxwood Development: This project includes the construction of a single family home development, including mass grading and utility installation in Chanhassen. The project triggers RPBCWD Rules C, D, G, and J. The permit was conditionally approved at the August 3rd 2016 Board meeting. Reviewed submittal for potential impervious surface increase and need for a permit modification.

e. *Permit 2016-033*: Anderson Lakes and Purgatory Creek Trail: This project includes the construction of 1,070 feet of sidewalk linking the Carmody Drive neighborhood to the Purgatory Creek Trail System. The 5 foot wide sidewalk will be disconnected from Anderson Lakes Parkway and the Purgatory Creek Trail with a 5 foot minimum pervious downgradient buffer. The proposed project triggers RPBCWD Rule C. The project was conditionally approved by Administrator Bleser. Reviewed revised submittal for compliance with conditions.

f. *Permit 2016-046*: Lifetime Fitness Chanhassen: This project involves a building expansion and associated parking lot modifications on the west side of the building at the Lifetime Fitness at 2901 Corporate Place in Chanhassen. The project will trigger Rules C and J. Reviewed original and revised submittals and provided two rounds of comments to the applicant. The project is considered complete on January 16, 2017. Drafted permit. Responded to questions from project engineer.

g. *Permit 2017-001*: Kopesky 2nd Addition: This project involves construction of an 8-lot single family home subdivision at 18340 82nd Street in Eden Prairie. The project will trigger Rules B, C, D, and J. Reviewed original and revised submittals and provided two rounds of comments to the applicant. The project is considered complete on January 18, 2017. Discussed comments and options for revisions to meet rule requirements with the project engineer.

h. *Permit 2017-006*: 6687 Horseshoe Curve – Chanhassen: This project involves installation of a sand blanket and shoreline restoration at a single family home at 6687 Horseshoe Curve in Chanhassen. The project will trigger Rules B, C, D, and F. Reviewed submittal and provided comments to the applicant. The project is considered incomplete for the following information: (1) permit application signed by the property owner(s) and (2) providing a permit application fee.

i. *Permit 2017-007:* Cedarcrest Stables: This project involves construction of a 17-lot single family home subdivision. The project will trigger Rules C and J. Reviewed submittal and provided comments to applicant. Application is complete on February 10, 2017. Reviewed revised submittal and provided comments to applicant. Conference call with applicant to discuss comments.

j. *Permit 2017-008*: Prairie Meadows: This project involves pavement rehabilitation, sidewalk reconstruction, and retaining wall reconstruction. The project will trigger Rules C and J. Reviewed submittal and provided comments to applicant. Reviewed revised submittal. Application is complete on March 1, 2017. Drafted review summary for consideration at the April meeting.

k. *Permit 2017-009*: Emerson Process East Renovation: This project involves construction of a building addition and associated sitework. The project will trigger Rules C and J and may trigger Rule D depending on the area of site disturbance. Reviewed submittal and provided comments to the applicant. Application is considered incomplete for the following information: (1) 10-day snowmelt modeling, (2) proving low floor elevation of the building and (3) confirming there will be no site disturbance upgradient of the wetland.

l. *Permit 2017-010*: Riley Lake Park: This project involves construction of site improvements at Riley Lake Park and the public boat launch. The project will trigger Rules B, C, E, F, G, and J. Reviewed submittal and provided comments to applicant. Application is considered incomplete for the following information: (1) computations by a professional engineer of cut and fill below the 100-year flood elevation of Lake Riley, (2) low floor elevation of the picnic shelters, (3) volume of material removed from Lake Riley and the disposal location, (4) sequencing analysis for use of riprap, (5) clarify area of beach expansion, (6) soil boring at bottom contour of each BMP, and (7) 10-day snowmelt modeling.

m. *Permit 2017-011*:Galpin Blvd Watermain Improvements: This project involves construction of watermain improvements on Galpin Blvd from Longacres Drive to Lake Lucy Road. The project will trigger Rules B, C and D. Reviewed submittal and provided comments to applicant. Application is considered incomplete for the following information: (1) electronic copy of the application materials (2) cut and fill below the 100-year elevation of the wetland at the intersection of Galpin Blvd and Lake Harrison Road, (3) wetland buffer location map including buffer marker signs and buffer average computations.

n. *Permit 2017-012*: 9667 Sky Lane: This project involves construction of a new single family home on an existing single family home site at 9667 Sky Lane in Eden Prairie. The project will trigger Rule C. The application is considered complete on March 1, 2017. Reviewed submittal and provided comments to applicant.

o. *Permit 2017-013*:16201 Berger Drive: This project involves construction of a new single family home on an existing single family home site at 16201 Berger Drive in Eden Prairie. The project will trigger Rule C. The application is considered complete on March 16, 2017. Reviewed submittal and provided comments to applicant.

p. *Permit 2017-014*:3410 Groveland Lane: This project involves construction of a new single family home on an existing single family home site at 3410 Groveland Lane in Minnetonka. The project will trigger Rule C. The application is considered complete on March 20, 2017. Reviewed submittal and provided comments to applicant.

q. *Permit 2017-015*: 9995 Lawson Lane: This project involves construction of a new single family home on an existing single family home site at 9995 Lawson Lane in Eden Prairie. The project will trigger Rule C. The application is considered complete on March 20, 2017. Reviewed submittal and provided comments to applicant.

r. *Permit 2017-016*: 9982 Windsor Terrace: This project involves construction of a new single family home on an existing single family home site at 9982 Windsor Terrace in Eden Prairie. The project will trigger Rule C. The application is considered complete on March 20, 2017. Reviewed submittal and provided comments to applicant.

s. *Permit 2017-017*:9989 Windsor Terrace: This project involves construction of a new single family home on an existing single family home site at 9989 Windsor Terrace in Eden Prairie. The project will trigger Rule C. The application is considered complete on March 20, 2017. Reviewed submittal and provided comments to applicant.

t. *Permit 2017-018*: Bloomington 2017-102 Street Maintenance Project: This project involves mill and overlay of roadway with spot curb and sidewalk repair on Bloomington Ferry Road between Pioneer Trail and West 96th Street. The project will trigger Rule C. Reviewed submittal and provided review summary for Administrator consideration.

u. *Permit 2017-019*: Bloomington 2017-110 Trail Improvement Project: This project involves trail reconstruction along Lindstrom Drive from Bloomington Ferry Road to South Bay Drive (East Leg). The trail will be widened from varying widths of 6-7 feet to 8 feet. The project will trigger Rule C. Reviewed submittal and provided review summary for Administrator consideration.

v. *Permit 2017-020*:8512 Ellet Circle: This project involves construction of a new single family home on an existing single family home site at 8512 Ellet Circle in Eden Prairie. The project will trigger Rule C. The application is considered complete on March 17, 2017. Reviewed submittal and provided comments to applicant.

w. *Permit 2017-021*: 8544 Ellet Circle: This project involves construction of a new single family home on an existing single family home site at 8544 Ellet Circle in Eden Prairie. The project will trigger Rule C. The application is considered complete on March 20, 2017. Reviewed submittal and provided comments to applicant.

x. *Permit 2017-022*: Chanhassen High School Water Reuse: This project involves construction of infrastructure to construct a water reuse system to reuse water from a pond on the site to irrigate ballfields and landscaped area on the property. The project will trigger Rules C, D, and J. Reviewed the submittal and provided comments to the applicant.

y. *Permit 2017-023*: Eden Prairie Assembly of God: This project involves construction of a building addition and associated site modifications at 16591 Duck Lake Trail. The project will trigger Rules C and J. Reviewed the submittal and provided comments to the applicant.

z. *Permit 2017-024*: Prairie Bluffs Senior Living: This project involves construction of a senior living facility, parking lot, and landscaping at 10280 Hennepin Town Road in Eden Prairie. The project will trigger Rules C, D, and J. Reviewed the submittal and provided comments to the applicant.

aa. *Permit 2017-025*: 735 Pleasant View Drive: This project This project involves construction of a new single family home on an existing single family home site at 735 Pleasant View Drive in Eden Prairie. The project will trigger Rules C and J. Reviewed submittal and provided comments to applicant. The project is considered incomplete for the following information: (1) design plans for a stormwater management BMP.

bb. *Permit 2017-026*: 6135 Ridge Road: This project involves construction of a new single family home on an existing single family home site at 6135 Ridge Road in Eden Prairie. The project will trigger Rule C, Erosion Control and Rule J Storm water Management. Reviewed submittal and provided comments to applicant.

cc. Performed erosion control inspections of active sites during the week of March 17th (see attached inspection report).

dd. Conversations with several project engineers/developers about permit requirements for potential development and redevelopment projects.

ee. Met with Pemtom land developer on March 7th to discuss the RPBCWD regulatory program process when they typically develop the road and infrastructure then sell the lots to individual builders.

ff. Participated in a preapplication meeting on March 7th with Administrator Bleser, city of Eden Prairie (Dave Modrow) and developer to discuss potential redevelopment plans for a mixed use project at SW Station.

gg. Participated in two preapplication meetings on March 13th with Administrator Bleser, city of Chanhassen and land developers to discuss which rules would apply to a proposed apartment building near Santa Vera and retail store redevelopment near the Chanhassen Theater in Chanhassen.

hh. Attended a preapplication meeting on March 16th with Administrator Bleser and applicant for the proposed stormwater work at the Chanhassen Holiday gas station.

ii. Assisted Administrator Bleser with a preapplciation meeting on March 17th with Swanson Homes for a proposed single family home site tear down and rebuild at 7500 Chanhassen Road in Chanhassen.

jj. Completed a preliminary review of submittal for the Eidsness Subdivision in Chanhassen and provided comments to the City of Chanhassen.

kk. Coordinated and participated in a meeting with HDR to discussion online permit application tool.

ll. Performed security updates for the inspection/database tool.

mm. Updated inspections tool to include photo collection.

Data Management/Sampling/Equipment Assistance

a. Uploaded and verified 1 RMB laboratory reports.

b. Entered surface water data into EQuIS.

c. Updated 2016 field pH sampling results in EQuIS, per field staff.

Task Order 6: WOMP Station Monitoring

Purgatory Creek Monitoring Station at Pioneer Trail

a. Prepare for 2017 monitoring season – mobilize field equipment, calibrate field instruments, and organize project files.

b. Downloaded and reviewed data.

c. Review and file grab sample field sheets.

Purgatory Creek Monitoring Station at Valley View Rd

a. Prepare for 2017 monitoring season – mobilize field equipment, calibrate field instruments, and organize project files.

b. Downloaded and reviewed data.

c. Review and file grab sample field sheets.

d. Review MCES lab invoice.

Task Order 7b: Purgatory Creek Stabilization near Hwy 101—Construction

a. Worked with the contractor and city of Minnetonka to work through plant substitutions because some specified species are not available or are not available in the specified sizes.

b. Construction of this project is substantially complete. Trees and shrubs will be planted in the spring.

Task Order 12: Downtown Chanhassen BMP Retrofit Assessment

a. A draft summary report for District and city of Chanhassen review was provided on January 27 as electronic copies to Administrator Bleser and city Water Resources Coordinator Terry Jeffery.

Task Order 13a: Lake Susan Watershed Treatment and Stormwater Reuse Enhancements

a. Internal discussions regarding changes to address comments/suggestions from District and city of Chanhassen staff.

b. Finalized and sent Engineer's report. Scheduled public hearing.

Task Order 14b: Lower Riley Creek Final Design

a. Continued developing plan sheets for 30% design.

b. Completed hydraulic modeling to assist with design.

Task Order 16: Watershed Management Plan Refresh

a. Continued work on draft of the 2017 Watershed Management Plan document, including drafting sections on Goals and Strategies, project prioritization, public engagement strategy, and issue identification.

b. Met with Administrator on March 8th to discuss 10-year plan format, responsibilities for draft text, figures, etc.

c. In the next month, Barr staff will provide Administrator Bleser draft "Goals and Strategies" and "Public Engagement and Issue Identification" sections for Manager review and will continue working on outstanding portions of the Plan.

Task Order 17: Creek Restoration Action Strategy 2: Upper Riley Creek Sediment Source Assessment

a. Made edits to the report to address Administrator Bleser's comments.

Task Order 18: MPCA Resiliency Grant

a. The resilience workshop series has been completed. Now, graduate students are processing the data gathered at the workshops. Barr staff will create final written/graphic documents summarizing the results of this work.

Task Order 19: Chanhassen High School Stormwater Reuse Design

a. Continued coordination with Magellan Pipeline Company and Chanhassen High School regarding encroachment agreement.

b. Modeling associated with system performance in relation to the RPBCWD rules, including HydroCAD and MIDS modeling and development of RPBCWD permit submittals items.

c. Development of 90% design construction plan set and technical specifications.

d. Outline of system operations and maintenance.

e. Worked with Administrator Bleser and legal counsel to develop draft of the stakeholder agreements between the three parties.

f. Preparation for and attendance of the 90% design review meeting.

g. Future work tasks include continued agreement refinements and finalizing design for bidding and construction in 2017.

Task Order 21: Bluff Creek Feasibility Study

a. Processed survey data and developed hydraulic model to assist with project design.

Task Order 22: Groundwater Assessment

a. Conducted preliminary assessment of groundwater and surface water interactions for all lakes, streams, and wetlands in the District

b. Developed initial screening criteria to inform potential risk of slope failure due to enhanced infiltration.

Task Order 23: Scenic Heights School Forest Restoration

a. Meeting scheduling and initial stakeholder group coordination.

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BARR

To: RPBCWD Board of Managers

From: Dave Melmer

Subject: March 17, 2017—Erosion Inspection

Date: March 27, 2017

Project: 23/27-0053.14 PRMT 9016

Barr staff has inspected construction sites in the Riley Purgatory Bluff Creek Watershed District for conformance to erosion and sediment control policies. Listed below are construction projects and the improvement needed for effective erosion control. The sites were inspected on March 17, 2017.

Site Inspections

2015-005	**CSAH 101 Mntka**	**2017-03-18**
	Eastern side streets have had final top coat laid-vegetation is established-catch basin protection has been removed in many ares. BMP's look good. Site is inspected and well maintained by contractor/site inspector. Construction is completed at creek crossing-BMP's look good at this location. Curb/gutter/side walk installation at south end and eastern side of project is underway. Many areas have been spray-tac'd. Street cleanup is done quite frequently. Paving and sidewalk work continues. Entire site had exposed soils spray tac'd prior to snowfall. Work has idled for winter.(March-2017)	
2015-008	**3520 Meadow Lane**	**2017-03-18**
	Construction has stalled. Site BMP's are adequate. Silt fence is down in some areas on west side--will not affect site runoff. (March-2017)	
2015-010	**Children's Learning Adventure**	**2017-03-17**
	Building construction complete. Inlet protection has been removed. Site BMP's look good. Onsite storm water ponds to west has been constructed. Parking lot curb/gutter installation complete. Asphalt has been installed. Grading and hydro mulching has been completed in some locations. Landscaping is complete. Sod was installed and application of spray tac to exposed soils. Site not snow covered/fall spray tac'd areas look good.	
2015-011	**Eden Prairie Ponds**	**2017-03-17**
	Construction complete. Gas line needs to be buried. BMP's in place. Minor tracking to street observed. Exposed soils covered with hay. (March)	

2015-012	**Meditech Site Improvements**	**2017-03-18**
	Construction activities complete. Inlet protection has been removed. Bio-logs still in place SE parking lot between parking lot and sidewalk--this slope is all weed growth and has not had final landscaping--may be part of HWY 101 work.	
2015-014	**12420 Sunnybrook Road**	**2017-03-17**
	Site has been surveyed. No construction has started.	
2015-016	**Blossom Hill**	**2017-03-17**
	Construction on second, third and fourth homesites has begun. BMP' look good. All corrective actions have been addressed.	
2015-020	**Dawn Valley Chapel**	**2017-03-17**
	Site construction is complete. Some Site BMP's are still in place as of March inspection--bio-logs are visible-some have been removed-others are frozen in still. Landscaping is complete. Will need to inspect after spring snowmelt.	
2015-027	**Bloomington Hyland Greens Pond Storm Sewer Maintenance**	**2017-03-17**
	Construction has not started.	
2015-031	**10089 Purgatory Road**	**2017-03-17**
	Site construction complete. Access to location is stable. Yellow silt curtain has been. Soils above installed stabilization rock at creeks edge appear unstable and susceptible to erosion. Monthly inspections will continue to monitor potential loose soils. Corrective action (1/9/16)will remain open. This was addressed in Technical Memo from Wenck (January 19, 2016). Monthly photo will be taken with I-Pad.	
2015-035	**LaMettry's Chanhassen**	**2017-03-17**
	Building construction continues. Erosion control measures have reinstalled on north slope and swale--adequate for winter late spring control. Rock entrances have been upgraded and tracking to street has been addressed. Minor tracking to street observed.	
2015-036	**Saville West Subdivision**	**2017-03-18**
	No earthwork has begun to date. Trees have been tagged along street side and trees/brush has been cleared near power lines.	
2015-037	**Purgatory Creek at Hwy 101 Restoration**	**2017-03-18**
	Prior to snow fall-->Construction appears to be completed. BMP's are in place. Erosion mats are installed.and stream stabilization is underway.	

	Exposed soils have been covered with spray tac-some areas have vegetation sprouting. Will inspect after spring snowmelt. (March-2017)	
2015-038	**Improvements to Field 8 at Miller Park**	**2017-03-17**
	BMP's look good. Site construction complete. Soils have been covered---will have to inspect for vegetation growth in spring 2017.	
2015-039	**Miracle Field**	**2017-03-17**
	Construction complete. Inlet protection (SE side of project site) needs to be removed prior to site being closed. Site representative was notified concerning removal of inlet protection--multiple times. Inlet protection is still in place as of March-2017 inspection. Site is stable.	
2015-048	**Pagel II Ice Facility Addition**	**2017-03-18**
	Construction of building foundation/walls complete. Silt fences in place. Rock entrance installed. Site BMP's look good. Site grading underway. Tie into sewer is complete and back filling underway. Parking lot torn up. Slope on south side of building needs attention--slope and potential erosion repairs completed. Erosion and silt runoff to catch basins on southwest corner of site need to be cleaned up--Catch basins still need protection and some site cleanup. Site supervisor was notified again. Photos are in March corrective action inspection.	
2015-050	**Arbor Glen Chanhassen**	**2017-03-17**
	No construction observed to date.	
2015-051	**Chapel Hill**	**2017-03-17**
	Site construction complete. Site has been graded and seeded-- vegetation growing. Site looks good. Catch basin protection still in place.	
2015-053	**RBSC Chanhassen LLC**	**2017-03-17**
	No construction has begun. Site was being used as lay down yard for Hwy. 5 construction. Demobilization is complete. Catch basin protection still in place. Exposed soils have been covered and now vegetation is established.	
2015-055	**Hampton Inn Eden Prairie**	**2017-03-17**
	No construction has started.	
2015-056	**Oster Property**	**2017-03-17**
	Construction complete. Silt fences /bio-logs have been removed. Vegetation mats and wood chips have been installed on all bare soils. All other BMP's look good. No vegetation established to date. Will have to inspect after spring thaw.	

2015-058	**Prairie Center Clinic Addition**	**2017-03-17**
	Construction continues on building. BMP's are good.	
2015-059	**19108 Twilight Trail**	**2017-03-17**
	Landscaping complete. Orange silt fence on west and north still installed--site is stable. Photo taken of orange silt fence.	
2015-060	**Optum Parking Expansion**	**2017-03-17**
	Construction complete. BMP's installed and look good. East parking lot is complete and stable-catch basin protection still installed. Asphalt on west lot is complete and curb-gutter have been installed. Vegetation mats installed (fall-2016)-no vegetation growth to date. Overall site conditions are good.	
2015-061	**Ingram Property**	**2017-03-17**
	No construction observed to date.	
2015-062	**MnDOT SP 1002-100 TH5**	**2017-03-17**
	Construction complete. Bio-logs have been removed.Site looks good. (March). Vegetation established . One 40ft section of silt fence still in place- east of McDonalds. Site is stable.	
2016-004	**Round Lake Park Improvements**	**2017-03-17**
	BMP's look good. Site construction complete--parking lot/lots- curb gutter and asphalt has been installed. (November). Final construction has idled. Will have to inspect for vegetation growth in spring 2017	
2016-005	**Staring Lake Play Area**	**2017-03-17**
	Construction complete. Vegetation is growing. All temporary BMP's are removed. Vegetation on north slopes not established.	
2016-006	**Soccer Field 10 at Miller Park**	**2017-03-17**
	BMP's look good. Site construction complete. Will have to inspect for vegetation growth in spring 2017	
2016-007	**Meditech Phase II**	**2017-03-18**
	Construction complete. Site is stable. Catch basin protection has been removed.	

2016-009	**Stratus Court Stormsewer Outfall**	**2017-03-17**
	No construction has started.	
2016-010	**Minnetonka HS Parking Improvements**	**2017-03-18**
	Construction is complete. Temporary BMPs have been removed. All exposed soils have been spray-tac'd and vegetation has started growing. Should be stable after spring-2017 growing season.	
2016-012	**Minnetonka HS Parking Additions**	**2017-03-18**
	Construction is complete. Parking lot curb/gutter installed-asphalt is in place. Most BMPs have been removed except a couple of bio-logs. All exposed soils have been spray-tac'd and vegetation has started growing. Should be stable after spring 2017 growing season.	
2016-013	**Eden Prairie Schools Parking Expansion**	**2017-03-17**
	No construction observed to date.	
2016-014	**Chanhassen Chick-Fil-A**	**2017-03-17**
	Construction continues. BMP's in place. Catch basin on southwest corner of site needs protection- catch basin not protected to date. Parking lot to west of site that drains to catch basin has been cleaned up. Site representative was notified.	
2016-015	**18321 Heathcote Lane**	**2017-03-18**
	Silt fences installed/in good condition-one area down to provide access for pool installation-fence needs to be reinstalled--has been repaired. Site grading underway. Rock/gravel entrance is good. BMP's look good. House construction continues. (March-2017) corrective action closed	
2016-017	**SWLRT**	**2017-03-17**
	No construction observed to date.	
2016-018	**6830 Utica Terrace**	**2017-03-17**
	House construction continues. Silt fences are in place. Rock walls are complete. Some minor tracking to street. BMP's look good.	
2016-019	**Powers Ridge Lot 2**	**2017-03-17**
	No construction has begun to date.	
2016-021	**Cedar Hills Park**	**2017-03-17**

	Clearing of site appears to be complete. Wood chip site entrance has been replaced with rock. No earthwork has begun to date--heavy equipment is onsite. Exposed soils have been covered with straw. Silt fences have been installed. Work near creek is underway. BMP's look good. Same as February inspection.	
2016-022	**SP 1017-105 Cable Barrier**	**2017-03-17**
	Construction complete. Vegetation mats in place. Will have to inspect after spring snowmelt for vegetation growth.	
2016-024	**Bandimere Park Improvements**	**2017-03-17**
	Construction complete. Silt fences installed. BMP's are good. Sprayed tac and landscaping completed prior to snowfall. Ice rink installation completed.	
2016-025	**18374 Heathcote Lane**	**2017-03-18**
	Construction of additions complete--remodel continues. Driveway installed and grading complete. Site BMPs looks good. (March-2017)	
2016-026	**Foxwood Development**	**2017-03-17**
	House construction has begun-BMP's look good- silt fences and rock entrances installed- good perimeter control. Asphalt has been installed near entrance to site. Silt fences installed on entire site. BMP's look. Some areas of exposed soils have been covered with straw. Heavy equipment onsite for storm sewer installation on backside of site. Slight tracking to street.	
2016-027	**Taco Bell**	**2017-03-17**
	Construction complete. Landscaping needs to be completed. Site in good condition.	
2016-028	**Summit Place Apartments Drainage Improvements**	**2017-03-17**
	No construction observed.	
2016-030	**IDI Distribution Building Expansion**	**2017-03-17**
	Construction of addition continues. Catch basin protection has been installed. Silt fences on north side installed. Some over topping of first row of silt fence- 2 additional fences have been installed. Rock entrance installed at new entrance location. Catch basin protection at Basin east southeast of entrance has been installed. Stockpiles of dirt not covered. Will notify owner that they need to be covered. No action taken on installing BMP's to exposed soil piles as of March 17th inspection.	
2016-031	**MN River Bluffs Trail Crossing**	**2017-03-17**
	Construction complete. BMP's in place. Catch basin protection has been removed. Site was spray tac'd prior to snowfall. Will have to inspect after	

	spring snowmelt.	
2016-032	**County Highway 61**	**2017-03-17**
	No construction started.	
2016-033	**Anderson Lakes-Purgatory Trail**	**2017-03-17**
	No construction observed to date.	
2016-034	**Staring Lake Trail**	**2017-03-17**
	Construction complete. Vegetation mats installed. Site looks good. Will inspect for vegetation growth in spring.	
2016-035	**Riley Lake Road Sidewalk**	**2017-03-17**
	Construction complete. Sidewalk in place. BMP's installed. Sod and vegetation mats installed. Catch basin protection installed. Sod was installed last fall--looks good. Some areas have erosion mats in place--no vegetation established.	
2016-036	**Collegeview Drive Sidewalk**	**2017-03-17**
	Construction complete. Spray tac applied to soils-fall 2016. No vegetation growing. Will have to inspected after spring snowmelt. Wood chip bio-logs in place. (March)	
2016-037	**Prestige Day Care**	**2017-03-17**
	No construction to date.	
2016-038	**Optum Technology Drive Improvements**	**2017-03-17**
	Hillside has been scraped and covered with erosion mats. BMP's installed and are good.	
2016-039	**Powers Ridge Senior Apartments**	**2017-03-17**
	Construction continue. Corrective Actions have been addressed with exception of catch basin protection on southeast corner of site. Catch basin protection at southeast corner not installed to date. (March) --Site representative was notified.	
2016-040	**18995 Minnetonka Blvd**	**2017-03-18**
	Construction of house continues. Silt fence in place. Backfilling and grading complete. Northeast and south side of construction site slope needs BMP maintenance similar to what is installed on east slope. Site representative was	

	notified in January and February. Will notify again that BMP's need to be installed as soon as ground thaws. Materials onsite--frozen ground is not allowing for anchoring matting. Photos in January corrective action inspection.	
2016-041	**Chanhassen West Water Treatment Plant**	**2017-03-17**
	Silt fences have been installed on site. Construction has started. Earthwork underway. Rock entrance has been installed. BMP's look good to date. Minor tracking to street observed.	
2016-042	**18663 St. Mellion Place--Eden Prairie (Bear Path)**	**2017-03-17**
	Construction continues. BMP's are good.	
2016-043	**Bongards Redevelopment**	**2017-03-17**
	Construction has started. BMP's are adequate. Parking lot installed-- catch basins installed and protected--awaiting spring for pavement installation.	
2016-044	**Dell Rd & Riley Creek Repair Project**	**2017-03-17**
	Construction complete. Site will be straw/mat covered until spring. Vegetation will be installed in spring-2017. BMP's are good. Observed some erosion near new beehive catch basin-city is aware of erosion and will repair.	
2016-045	**MCES Blue Lake Interceptor Rehab**	**2017-03-17**
	No construction observed to date.	
2016-046	**Lifetime Fitness Chanhassen**	**2017-03-17**
	No construction to date. Site control fence installed.	
2016-047	**9507 Sky Lane Eden Prairie**	**2017-03-17**
	Construction has started. Tracking to street. Catch basin protection is in place--needs to be cleaned out and maintained. Silt fence on north side needs some minor maintenance. Rock entrances to be homesites need to be maintained. Both homesites are Swanson Homes. Site representative was notified.	
2016-FT02	**Mitchell and McCoy Lake Outlet Sediment Removal**	**2017-03-17**
	BMP's look good. Site construction complete. Site is snow covered---will have to inspect for vegetation growth in spring 2017. Bio-log still in place., BMP's look good. Site construction complete. Site is snow covered---will have to inspect for vegetation growth in spring 2017. Bio-log still in place.	
2016-FT02	**Mitchell and McCoy Lake Outlet Sediment Removal**	**2017-03-17**
	BMP's look good. Site construction complete. Site is snow covered---will have	

	to inspect for vegetation growth in spring 2017. Bio-log still in place., BMP's look good. Site construction complete. Site is snow covered---will have to inspect for vegetation growth in spring 2017. Bio-log still in place.	
2017-001	**Kopesky 2nd Addition**	**2017-03-17**
	No recent activity to date.	
2017-002	**7012 Dakota Ave**	**2017-03-18**
	Tree removal has begun. Erosion control supplies onsite. No construction or earth work observed.	
2017-003	**18761 Heathcote Dr Building Addition**	**2017-03-18**
	Demolition of house complete. House construction and earthwork has begun. BMP's are adequate for stockpile-silt fence would've been best--bio-logs used. See attached photos in March inspection.	
2017-004	**9627 Sky Lane Eden Prairie**	**2017-03-17**
	Open CA(s): Tracking to street. No perimeter control. No dirt stockpile perimeter control. Deadline: 4/17/2017 Tracking to street. No perimeter control for stockpile behind house. Representative was notified after February inspection via email.	
2017-005	**9527 Sky Lane Eden Prairie**	**2017-03-17**
	Open CA(s): Tracking/catch basin maintenance needed/silt fence down. Deadline: 4/17/2017 Construction has started. Tracking to street. Catch basin protection is in place--needs to be cleaned out and maintained. Silt fence on north side needs some minor maintenance. Rock entrances to be homesites need to be maintained. Both homesites are Swanson Homes. Site representative was notified.	
2017-006	**6687 Horseshoe Curve Chanhassen**	**2017-03-18**
	No activity observed to date.	
2017-007	**Cedarcrest Stables**	**2017-03-17**
	No activity observed to date.	
2017-008	**Prairie Meadows Site Renovation**	**2017-03-17**
	No site activity observed.	

2017-009	**Emerson Chanhassen East Renovation**	**2017-03-17**
	No activity observed to date.	
2017-010	**Riley Lake Park Renovations**	**2017-03-17**
	No activity observed to date.	

Please contact me at 952.832-2687 or dmelmer@barr.com if you have questions on the projects listed above or any additional items that need to be addressed for the erosion control inspections.

Staff Report
April 5, 2017

Administrative

10-Year Plan
Work continues on our 10-year plan.

Aquatic Invasive Species
No additional updates.

Audit
Administrator Bleser has been working with the auditor as part of our auditing process.

Budget
No new updates.

Data Request
Request have been processed

Grants
No new updates.

Hiring Process
Please see packet for hire letter.

Office
Administrator Bleser continues to work with CSM while adjusting to our new location. Technological enhancement were added and hopefully will be finalized by the board meeting.

Permitting
Administrator Bleser issued to existing single family home permits 2017-020 8512 Ellet Circle and 2017-021 8544 Ellet Circle. This past month was busy. Over 10 homes were identified as conducting work without permit. The District identified the homeowners and contacted both the contractor and homeowners. Administrator Bleser spoke to all the builders that were notified and explained how their work was triggering our rules. District Engineer and Administrator Bleser will be leading a Builder's Workshop on April 26th. More information below.

Does your company build, develop, or redevelop in the Riley Purgatory Bluff Creek Watershed District? Unsure? If you do work in Bloomington, Chanhassen, Chaska, Deephaven, Eden Prairie, Minnetonka, or Shorewood, chances are you might.

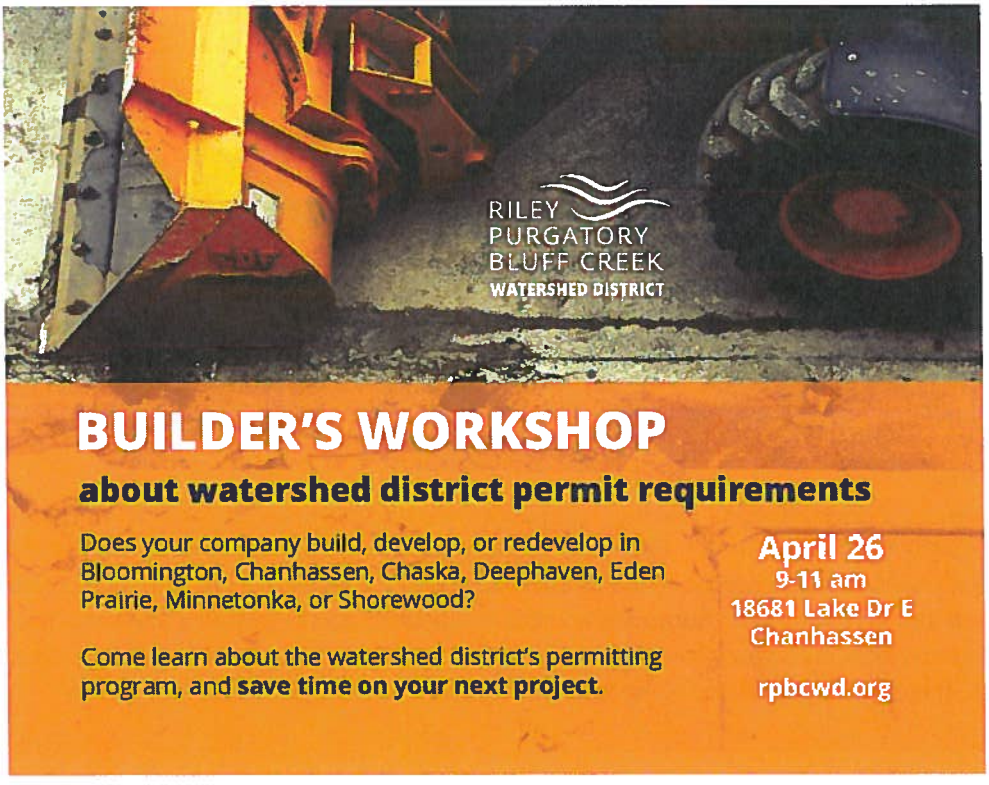
Come to the Builder's Workshop on April 26 and learn about the watershed district's permitting program. Find out what kinds of work require a permit, get your questions answered, and save time on your next project.

RSVP at: https://buildersworkshop.eventbrite.com

Details

- Wednesday, April 26th
- 9-11 am
- District Office: 18681 Lake Drive East, Chanhassen (on the south side of Lake Drive East)
- Topics we'll cover:
    - What kinds of work require a permit
    - What materials need to be submitted
    - When permits need to be received

There will be time for questions, as well as networking with other builders and developers.



Site Investigations
Three site visits occurred around Lotus Lake this past month. All three were not permitted with the District and were lacking proper bmp's (mainly proper perimeter protection). The district administrator contacted each site and has been working to get each into compliance.

- 735 Pleasantview Rd Chanhassen, MN 55317
- 7603 Frontier Trail Chanhassen, MN 55317
- 7405 Frontier Trail Chanhassen, MN 55317

Citizens Advisory Committee

March Meeting
The CAC met for their regular monthly meeting on March 20th. Draft minutes are included in the board packet.

Technical Advisory Committee

No additional updates.

Programs and Projects

District-Wide

Cost-share program

Staff have been responding to interest in the cost share program and conducting site visits when applicable. The cost share program was promoted at two community events: Shorewood Garden Fair (March 11) and the Eden Prairie Everything Spring Expo (March 18).

MPCA Community Resiliency Grant

All workshops have been successful and we are currently analyzing the data and summarizing this information for our communities that participated. Additionally, we had a community table for local citizens to discuss how the district can address resiliency.

Total Maximum Daily Load

No additional updates.

Data Collection (J. Maxwell)

Rice Marsh Aeration
The aeration unit was turned off on February 17th due to the very warm weather and large open water area. Staff will pick up signs soon. Overall oxygen conditions were good to excellent this winter. Staff will pulse the unit once a month to make sure lines remain clear. Barr Engineering will repair the motor that went down this year and we have purchased another one as a back up.

Winter Field Season

Staff continued monitoring the Riley Chain of Lakes this winter including: Lake Lucy, Lake Ann, Lake Susan, Rice Marsh Lake, and Lake Riley. Staff also have been monitoring stormwater ponds near Eden Prairie Center to assess salt levels (Pond A, Pond B, Eden Lake, Pond K). Staff will be monitoring the Purgatory Chain of Lake for the next three years beginning next year which includes: Silver Lake, Lotus Lake, Staring, Mitchell, and Red Rock with perhaps some additional lakes. Staff will also monitor the same ponds near Eden Prairie Center to assess salt levels (Pond A, Pond B, Eden Lake, Pond K).

Most lakes opened up the week of March 20th with the exception of Lake Ann which opened a week earlier. Most lakes opened up earlier this month, however the cold temperatures caused most to refreeze. Most lake level sensors were placed by the end of March which is along the same time frame that they were out last year. Stormwater ponds were sampled once at the end of March and will be sampled one more time. A fisheries permit was sent to the MN DNR at the beginning of the month to allow for carp management this year. On 2 March, 2017, staff Dickhausen assisted Barr Engineering Surveyor, Jim Staberg, in surveying a stretch of the southern tributary of Bluff Creek, subreach BT3A. This surveying is a part of assessment and preparation for future, planned restoration of this section of the creek. This was the second day of surveying this subreach, the first taking place 22 February, 2017. On 24 March, 2017, Staff Dickhausen attended the MNDNR's Lake Service Provider training, hosted by the Northwest Sportshow at the Minneapolis Convention Center. The training provided education on best practices and laws pertaining to preventing the spread of Aquatic Invasive Species within Minnesota, as well as LSP AIS certification. This training includes service provider vehicle stickers which are valid for three calendar years. Overall, this month has been mainly comprised of preparing for the upcoming field season.

Carp Management
The barrier was opened on March 3rd to allow northern pike to move up into the recreational area to spawn and return to Staring Lake. Staff has monitored temperatures which have risen steadily late in March. Soon the barrier will be closed to block fish movement. Staff will be tracking carp movement via telemetry this spring. As of yet no fish have moved.

Creek Restoration Action Strategy
Barr Engineering and District staff has been working on a new addition of the CRAS and on a future publication for a professional journal. Additionally, staff has been working on a final creek walk summary book to have on hand to easily reference.

WOMP Station - Metropolitan Council
Staff has visited the WOMP stations twice this month and have been using the Met Council's new procedures. On March 18th staff attended the annual WOMP meeting to discuss changes and updates to the WOMP program. At the meeting discussion topics included the new data sheet and any problems with it (not many). Macroinvertebrate sampling, increasing the E. coli handling time to 24 hrs, and new equipment the will begin upgrading this year (upgrading new conductivity/temp probes, updating the Campbell CR10x to CR1000) was also discussed. We will be also collecting equipment blanks once a year and duplicates 2/site/year.

On March 20th, staff and METC staff went out and installed conductivity, temperature, and pressure probes at regular water quality monitoring site R1 located off of Eden Prairie Road. This temporary station will be in place until road construction is complete downstream on Flying Cloud Drive. District staff will be monitoring and downloading the equipment this summer.

Service Learners
No new update.

Education and Outreach (M. Jordan)

Adopt a Dock Program
Previous years participants have been contacted to gage interest in participating this year. Staff reached out the the Lotus Lake Conservation Alliance to see if someone from the Lake would be interested in participating. Two new volunteers have been found. Staff will also be reaching out to Lake Susan residents. Plates will be going out to volunteers in April and May.

AIS Jr Inspector
Staff were invited to present at the Trout In The Classroom Summit on March 17. This annual event is a part of the Trout In The Classroom program from Trout Unlimited. Students raise trout from eggs and learn about their lifecycle, habitat requirements, and the importance of clean water for trout health. The summit is a chance for students to learn about other water resource and natural resource topics, as well as careers in the field. Jordan attended, utilizing the districts sampling boat to do the AIS Jr Inspector activity. Approximately 100 students (3 fifth grade classes, one 6/7 grade group) were engaged in learning about aquatic invasive species and how to prevent their spread.

Community events
The district was represented at two community fairs: the Shorewood Garden Expo, and the Eden Prairie Everything Spring Exp. CAC member Dorothy Pedersen volunteered to table for the Shorewood event, and staff member Jordan along with CAC member and volunteer Joan Palmquist worked the Eden Prairie Event.

Earth Day Mini Grants
6 applications were received for the mini-grants (in its first year, three applications were received). 5 of the applications were approved and notified. One of the applications did not have a strong water resources connection, and staff are working with the teacher to explore whether that component could be bolstered. The approved grants included: a small raingarden planting, funding for a field trip to a nature center, creating terrariums to learn about the water cycle, purchasing a rainbarrel, and purchasing binoculars to better observe wildlife that live in an along Purgatory Creek.

Earth Day Clean up
The district will be participating in Eden Prairie's annual Earth Day Park Cleanup on Saturday April 22. Our team has been assigned to the Lower Purgatory Creek Conservation Area. We are recruiting a team of 12 volunteers to help with the cleanup.

Lakes and Creeks Water Quality Report
Completed for 2016. Fact sheets have been published to the website and are being printed for sharing. Staff are looking into having info boxes at parks around earth day to share the sheets.

Master Water Stewards Program
This year's cohort of stewards are beginning to plan their capstone projects. Last year's cohort are beginning to work on their volunteer hours.

Outdoor Learning Center
Staff will be attending the Animal Open House on April 8th, and talking about native and invasive fish and their management. This popular event draws several hundred people each year.

Rain-barrel sale
Rain-barrel sales are open, and staff are working to promote the sale.

Website & Newsletter
Staff have been working on updating the website. A draft mock-up of a potential new homepage, and get involved page were created by the district's web technician. These were shared with the CAC at their last meeting to get feedback. A second iteration will be developed, incorporating CAC thoughts and ideas. Our newsletter was sent out on March 20th.

Winter & Turf Maintenance Training
The turf training was well attended. 40 maintenance professionals representing both public and private entities attended and learned practices to keep lawns healthy while protecting clean water. This was the first training in the new office space and the meeting room worked quite well.

Bluff Creek One Water

Bluff Creek
Work is ongoing.

Riley Creek One Water

Chanhassen Town Center
We will be presenting the report at our May board meeting.

Lake Susan Park Pond
See results in the 2017 Lakes and Creeks Report. Staff will electrofish the pond in 2017 to check carp numbers for an additional year of data. Public Hearing was scheduled for the April Board Meeting.

Lake Susan Water Quality CIP Project
Project completed.

Riley Creek
Staff is still working on a term sheet with the city of Eden Prairie

Lake Riley Water Quality Project (Alum)
No additional updates.

Purgatory Creek One Water

Purgatory Recreational Area Berm
No new update.

Purgatory Creek at 101
No additional work has begun.

Professional Workgroups and Continuing Education

Institute for Non-formal Climate Change Education
Staff member Jordan attended the Institute for Non-formal Climate Change Education, put on by the nonprofit Climate Generation (formerly the Will Steger Foundation). The 2.5 day workshop was geared toward anyone interested in learning skills on how to communicate about climate change in non-formal educational settings. Some of the participants included naturalists, zoo employees, government workers, and a few watershed district representatives. The institute has offered training for teachers in the past, but this was the first time that it was offered for non-formal educators. One day was led by the National Network for Ocean and Climate Change Interpretation (NNOCCI). There was a mix of presentation, group work, and hands-on activities. The workshop began with presentations to create a common understanding of climate change causes and impacts. It included an activity adapted from Project WET that the district has often used with students where you follow the journey of a drop of water through the water cycle. However this version followed the journey of carbon before and after industrialization. There were similar opportunities to try out other pieces of curricula. The curriculum guide "Minnesota's Changing Climate" was indicated to have the most direct links to water, and the digital copy is available free from their website. Staff are exploring whether some of this might be used in the Water Explorers camp the district is partnering with Staring Outdoor center on this summer. The second day of the workshop, led by NNOCCI, presented a research-based, strategic framework for communicating climate change based on four elements: tone, values, explanatory chains & metaphors, and solutions. The goal is to connect with your audience's values and move to solutions. Participants were introduced to a metaphor for talking about the relationship between carbon dioxide and climate change, where carbon dioxide is compared to a "heat trapping blanket" around the earth. The focus is on solutions beyond the individual and into how to connect to larger movements in the community. This framework has similarities to Water Words that Work, and Community Based Social Marketing strategies and could be adapted beyond climate change and into other topics around water quality and habit change.

Minnesota Association of Watershed District
Administrator Bleser attended the Minne

Watershed Partners
A new set of articles are up on the Clean Water MN website, and will be used in communications.

Freshwater Cyanobacteria Workshop - Saint Anthony Falls Laboratory
Administrator Bleser was invited to be part and present.
Cyanobacteria is everywhere from Voyageurs National Park all the way down to Iowa. People are more aware of algal bloom. It is weather dependent - some summers are worse than others - hot and dry summers seem to have more blooms. Recreational water exposures most common in Minnesota. Minnesota Control Agency gets calls for dog death and partnered with MDNR, MDH and Minnesota Veterinary Medicine Association. 2006 MPCA begins monitoring in eutrophic lakes in Blue Earth and McLeod County and has expanded their monitoring since then.

Algal blooms are naturally occurring and are found across the state. Blooms reported from May to October. Blue-green algae dominate when there are hot, sunny, calm conditions; especially as water temperature exceed 75 degrees. They are buoyant and resistant to grazers. Not all blue-green algae can produce toxins.It is present even if it is not green paint and can blow away pretty quickly.

How do you do risk management? Changing environmental conditions between exposure, reporting, and site investigation (blooms one day and gone the next), expensive - finding balance adequate and public outreach.

Some questions researchers are tacklings are:
What is driving cyanobacteria abundance - not just phosphorus
When can they produce toxins and do they produce toxins
When are exotic cyanobacterial colonizations
When will happen in oligotrophic lakes.
Develop Coordinating messages.

The workshop also engaged the participants to identify needs in this field.
Additional

RILEY PURGATORY BLUFF CREEK WATERSHED DISTRICT

18681 Lake Drive East
Chanhassen, MN 55317
952-607-6512
www.rpbcwd.org

Riley Purgatory Bluff Creek Watershed District Permit Application Review

Permit No: 2017-008

Received complete: March 1, 2017

Applicant: Sally Rabban

Consultant: Joey Diederichs and Dave Knaeble, Civil Site Group

Project: Prairie Meadows Renovation Site – Pavement rehabilitation and trail reconstruction on an existing site including retaining wall reconstruction. Two biofiltration basins with elevated underdrains will provide storm water quantity, volume and quality control.

Location: 11205 Westwind Drive, Eden Prairie, MN

Reviewer: Candice Kantor and Scott Sobiech, Barr Engineering

Rules: Applicable rules checked

	Rule B: Floodplain Management		Rule H: Appropriation of Public Waters
X	Rule C: Erosion and Sediment Control		Rule I: Appropriation of Groundwater
	Rule D: Wetland and Creek Buffers	X	Rule J: Stormwater Management
	Rule E: Dredging and Sediment Removal		Rule K: Variances and Exceptions
	Rule F: Shoreline/Streambank Stabilization	X	Rule L: Permit Fees
	Rule G: Waterbody Crossings	X	Rule M: Financial Assurances

Rule Conformance Summary

Rule	Issue		Conforms to RBPCWD Rules?	Comments
C	**Erosion Control Plan**		See Comment	See Rule Specific Permit Condition C1.
J	**Stormwater Management**	Rate	Yes	
		Volume	Yes	See Rule Specific Permit Condition J1.
		Water Quality	Yes	
		Low Floor Elev.	Yes	See Rule Specific Permit Condition J2-J3.
		Maintenance	See Comment	See Rule Specific Permit Condition J4.
L	**Permit Fee**		Yes	$1,500 was received on February 22, 2017.
M	**Financial Assurance**		See Comment	The financial assurance has been calculated at $29,000.

Project Description

The project proposes the reconstruction of sidewalks and retaining walls within the project area. The project includes two biofiltration basins with elevated underdrains to provide storm water quantity, volume and quality control. The project site information is summarized below:

1. Total Site Area: 9.4 acres
2. Existing Site Impervious Area: 8.7 acres (378,972 square feet)
3. Decrease in total Site Impervious Area: 0.016 acres (706 square feet) (0.19% decrease in site impervious area)
4. Fully reconstructed impervious surface: 0.046 acres (2,000 square feet) (0.53% disturbance)
5. Total Disturbed Area: 1.02 acres

Exhibits:

1. Permit Application dated February 22, 2017.
2. Design Plan Sheets (Sheets C0.0 – SW1.9) dated February 21, 2017 (revised March 9, 2017).
3. Stormwater Management Report dated February 21, 2017 (revised March 9, 2017).
4. Simple Method Water Quality Computations dated February 21, 2017 (revised March 9, 2017).
5. Response to Comments e-mail received March 9, 2017.

Rule Specific Permit Conditions

Rule C: Erosion and Sediment Control

Because the project will alter 1.02 acres (44,431 square feet) of land-surface area the project must conform to the requirements in the RPBCWD Erosion and Sediment Control rule (Rule C, Subsection 2.1).

The erosion control plan prepared by Civil Site Group includes installation of silt fence, inlet protection for storm sewer catch basins, a rock construction entrance, placement of a minimum of 6 inches of topsoil, decompaction of areas compacted during construction, and retention of native topsoil onsite. To conform to the RPBCWD Rule C requirements the following revisions are needed:

C1. The Applicant must provide the name and contact information of the individual responsible for erosion control at the site. RPBCWD must be notified if the responsible individual changes during the permit term.

Rule J: Stormwater Management

Because the project will alter 1.02 acres (44,431 square feet) of surface area, approval under the RPBCWD Stormwater Management Rule is required. The proposed land-disturbing activities will

decrease the imperviousness of the entire site by 0.19% (i.e., well less than the 50 percent increase threshold in section 2.3 for application of the stormwater criteria to all impervious area of the project site), and disturb 0.53% of the existing impervious area (i.e., less than 50 percent of the existing impervious area), therefore under the paragraph 2.3 redevelopment framework, the RPBCWD stormwater management criteria apply only to the new and disturbed impervious surface on the site.

The Applicant is proposing two biofiltration basins with elevated underdrains to provide the required rate control, volume abstraction and water quality management on the site. Pretreatment for the biofiltration basins is provided by vegetated filter strips.

Rate Control

In order to meet the rate control criteria listed in Subsection 3.1.a, the 2-, 10-, and 100-year post development peak runoff rates must be equal to or less than the existing discharge rates at all locations where stormwater leaves the site. The Applicant used a HydroCAD hydrologic model to simulate runoff rates for pre- and post-development conditions for the 2-, 10-, and 100-year frequency storm events using a nested rainfall distribution, and a 100-year frequency, 10-day snowmelt event. The site includes four watersheds with four discharge locations from the site (southwest to Preserve Blvd., west to Preserve Blvd, north to Westwind Drive, and south to Anderson Lakes Pkwy). The project will decrease the impervious area in three of the watersheds by reconfiguring retaining walls and utilizing pervious pavers. Decreasing the impervious area will result in either no change in discharge rate from the site or a decrease in discharge rate from the site. One watershed (west to Preserve Blvd.) will have in increase in impervious area in proposed conditions. The existing and proposed 2-, 10-, and 100-year frequency discharges from the site where there is an increase in impervious area are summarized in the table below. The proposed project is in conformance with RPBCWD Rule J, Subsection 3.1.a.

Modeled Discharge Location	2-Year Discharge (cfs)		10-Year Discharge (cfs)		100-Year Discharge (cfs)		10-Day Snowmelt (cfs)	
	Ex	Prop	Ex	Prop	Ex	Prop	Ex	Prop
West to Preserve Blvd.	2.9	2.9	5.0	5.0	8.9	8.9	0.2	0.2

Volume Abstraction

Subsection 3.1.b of Rule J requires the abstraction onsite of 1.1 inches of runoff from all impervious surface of the parcel. An abstraction volume of 184 cubic feet is required from the 0.046 acres (2,000 square feet) of new or reconstructed impervious area on the project for volume retention. The Applicant proposed two biofiltration basins with elevated underdrains with pretreatment of runoff provided by vegetated filter strips. The table below summarizes the volume abstraction on the site.

Required Abstraction Depth (inches)	Required Abstraction Volume (cubic feet)	Provided Abstraction Volume (cubic feet)
1.1	184	283

Soil borings for the site were not provided to determine soils on the site or groundwater depth. The Applicant assumed clay soils (Hydrologic Soil Group D) on the site based on previous projects at the site; the MN Stormwater Manual indicates an infiltration rate of 0.06 inches per hour for clay soils. To conform to the RPBCWD Rule J requirements the following revisions are needed:

J1. The Applicant must submit documentation verifying the groundwater elevation at the proposed biofiltration basin sites. This can be accomplished by soil boring, hand auger, potholing or other methods. The groundwater elevation documentation must extend at least three feet below the bottom of the section for the proposed underlying infiltration section below the biofiltration basins. The investigation must be done within the bottom contour of the proposed BMPs.

Water Quality Management

Subsection 3.1.c of Rule J requires the Applicant provide for at least 60 percent annual removal efficiency for total phosphorus (TP), and at least 90 percent annual removal efficiency for total suspended solids (TSS) from site runoff. The Applicant is proposing two biofiltration basins with elevated underdrains to achieve the required TP and TSS removals and submitted Simple Method calculations to estimate the TP and TSS removals. Barr developed P8 models for the site to confirm the estimated TP and TSS removals. Based on information reviewed, the proposed project conforms to Rule J, Subsection 3.1.c.

Receiving Waterbody	Pollutant of Interest	Regulated Site Loading (lbs/yr)	Required Load Removal (lbs/yr)[1]	Provided Load Reduction (lbs/yr)
Eden Lake	Total Suspended Solids (TSS)	23.5	21.2 (90%)	68.3 (>100%)[2]
	Total Phosphorus (TP)	0.08	0.05 (60%)	0.17 (89%)
Neill Lake	Total Suspended Solids (TSS)	25.7	23.1 (90%)	23.6 (92%)
	Total Phosphorus (TP)	0.08	0.05 (60%)	0.07 (88%)

[1]Required load reduction is calculated based on the removal criteria in Rule J, Subsection 3.1c and the new and reconstructed impervious area site load.

[2]The TSS and TP removal is higher than required removal because the infiltration/filtration system treats a larger, undisturbed area of the existing impervious area.

Low floor Elevation

No structure may be constructed or reconstructed such that its lowest floor elevation is less than 2 feet above the 100-year event flood elevation and no stormwater management system may be constructed or reconstructed in a manner that brings the low floor elevation of an adjacent structure into noncompliance according to Rule J, Subsection 3.6.

No soil borings were provided as part of the submittal. The Applicant has assumed that the depth to groundwater is at least 15 feet at BMP 2 (east biofiltration basin) based on the elevation of an adjacent intersection of Anderson Lake Parkway and Center Way.

The low floor elevations of the structures and the adjacent stormwater management feature are summarized below.

Location Riparian to Stormwater Facility	Low Floor Elevation of Building (feet)	100-year Event Flood Elevation of Adjacent Stormwater Facility (feet)	Freeboard (feet)	Provided Distance Between Building and Adjacent Stormwater Feature (feet)	Required Separation to Groundwater based on Appendix J, Plot 1 (feet)	Provided Separation to Groundwater based on Appendix J, Plot 1 (feet)
Building 11445	834	828.38 (BMP 1)	5.62			
Building 11265	844	849.27 (BMP 2)	Utilized Appendix J1	32	10	15 (assumed)
Building 11295	851.96	849.27 (BMP 2)	2.69			

The low floor elevation of existing building #11265 is less than the 100-year event flood elevation of BMP 2 (eastern biofiltration basin). An analysis in accordance with Appendix J1 was completed for the existing building and BMP 2. The actual distance between the existing building and BMP 2 is 32 feet; therefore, the required depth to groundwater at the building is 10 feet in order to be in compliance with Plot 1 in Appendix J1. The Applicant has assumed that the depth to groundwater is at least 15 feet based on the elevation of an adjacent intersection of Anderson Lake Parkway and Center Way. Supporting information is needed to confirm the Applicant's assumed groundwater depth and compliance with Rule J, Subsection 3.6.

To conform to the RPBCWD Rule J requirements the following revisions are needed:

J2. The Applicant must confirm the low floor elevation of Building 11295 is the first floor elevation of 851.96 that is listed on the plans.

J3. The Applicant must submit documentation verifying the groundwater elevation at Building 11265. The groundwater elevation documentation must extend at least 10 feet below the low floor elevation of the existing building.

Maintenance

Subsection 3.7 of Rule J requires the submission of a maintenance plan. All stormwater management structures and facilities must be designed for maintenance access and properly maintained in perpetuity to assure that they continue to function as designed.

J4. Permit applicant must provide a draft maintenance and inspection plan. Once approved by RPBCWD, the plan must be recorded on the deed in a form acceptable to the District.

Rule L: Permit Fee:

Fees for the project are:

Rule C & J $1,500

Rule M: Financial Assurance:

Rules C: Silt fence: 4,799 L.F. x $2.50/L.F. = ... $12,000

Restoration: 1.02 acres x $2,500/acre = ... $2,600

Rules J: Infiltration: 943 sq. ft. x $6.00/sq. ft. = ... $5,700

Contingency (10%) $2,000

Administration (30%) $6,700

Total Financial Assurance $29,000

Applicable General Requirements:

1. The RPBCWD Administrator shall be notified at least three days prior to commencement of work.
2. Construction shall be consistent with the plans and specifications approved by the District as a part of the permitting process. The date of the approved plans and specifications is listed on the permit.
3. Return or allowed expiration of any remaining surety and permit close out is dependent on the permit holder providing proof that all required documents have been recorded and providing as-built drawings that show that the project was constructed as approved by the Managers and in conformance with the RPBCWD rules and regulations.

Findings

1. The proposed project includes the information necessary, plan sheets and erosion control plan for review.
2. The proposed project will conform to Rules C and J if the Rule Specific Permit Conditions listed above are met.

Recommendation:

Approval, contingent upon:

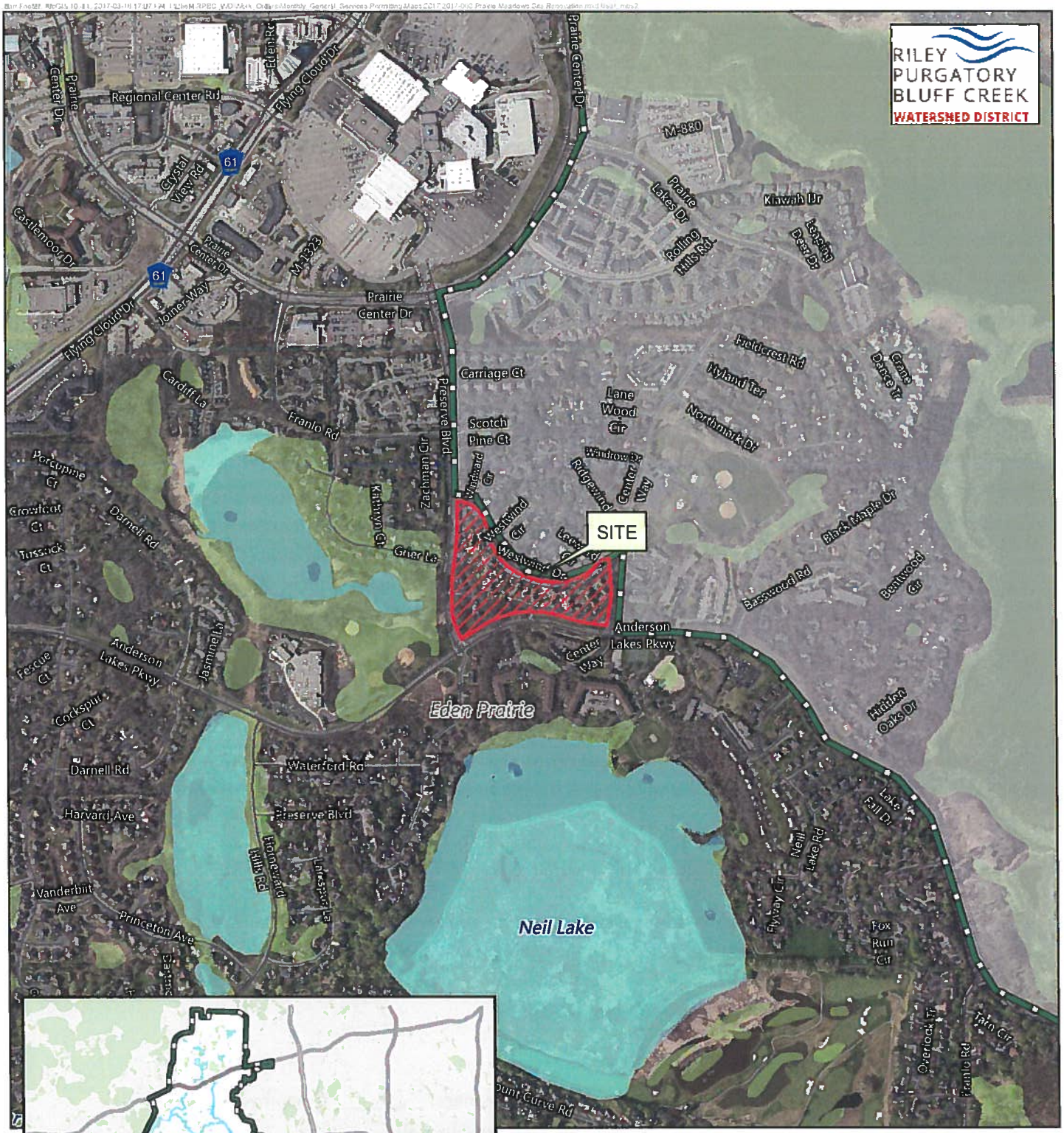
1. Continued compliance with General Requirements.
2. Financial Assurance in the amount of $29,000.
3. Applicant providing the name and contact information of the individual responsible for erosion and sediment control for the project.
4. The Applicant providing documentation verifying the groundwater elevation at the proposed biofiltration basin sites. The groundwater elevation documentation must extend at least three feet below the bottom of the section for the proposed underlying infiltration section below the biofiltration basins. The investigation must be done within the footprint of the proposed BMPs.
5. Submission of data confirming the low floor elevation of Building 11295 is the first floor elevation of 851.96 that is listed on the plans.
6. Submission of documentation verifying the groundwater elevation at Building 11265. The documentation must show that groundwater is at least 10 feet below the low floor elevation of the existing building.
7. Submission of a receipt showing recordation of a maintenance declaration for the storm water management facilities. A draft of the declaration must be approved by the District prior to recordation.

By accepting the permit, when issued, the applicant agrees to the following stipulations:

1. Per Rule J Subsection 4.5, upon completion of the site work, the permittee must submit as-built drawings demonstrating that at the time of final stabilization, stormwater facilities conform to design specifications as approved by the District.

Board Action

It was moved by Manager _____, seconded by Manager _____ to approve permit application No. 2017-008 with the conditions recommended by staff.



Permit Location Map

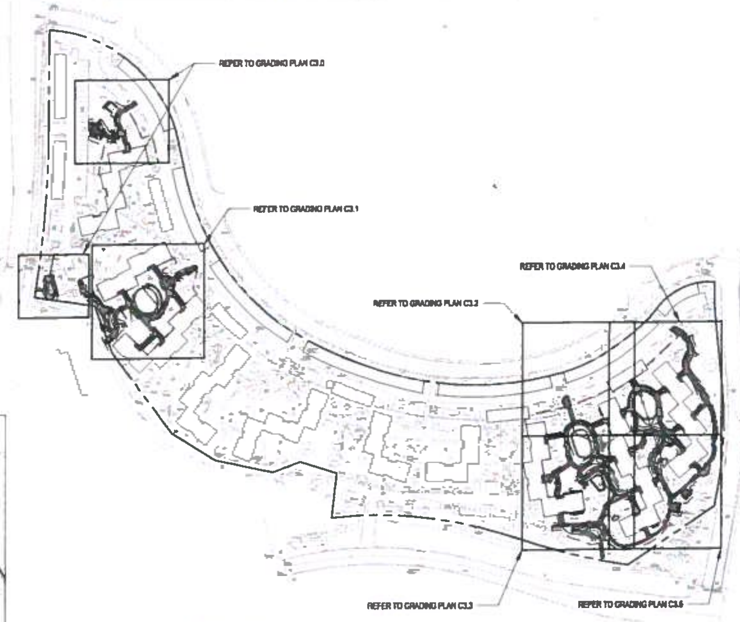
PRAIRIE MEADOWS
SITE RENOVATION
Permit 2017-008
Riley Purgatory Bluff Creek
Watershed District

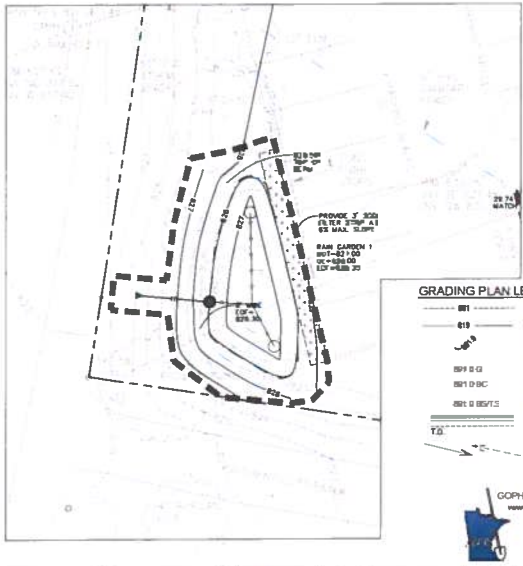
GENERAL GRADING NOTES:

1. SEE SITE PLAN FOR HORIZONTAL LAYOUT & GENERAL GRADING NOTES.
2. THE CONTRACTOR SHALL COMPLETE THE SITE GRADING CONSTRUCTION (INCLUDING BUT NOT LIMITED TO SITE PREPARATION, SOIL CORRECTION, EXCAVATION, EMBANKMENT, ETC.) IN ACCORDANCE WITH THE REQUIREMENTS OF THE OWNER'S SOILS ENGINEER. ALL SOIL TESTING SHALL BE COMPLETED BY THE OWNER'S SOILS ENGINEER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING ALL REQUIRED SOIL TESTS AND INSPECTIONS WITH THE SOILS ENGINEER.
3. GRADING AND EXCAVATION ACTIVITIES SHALL BE PERFORMED IN ACCORDANCE WITH THE NATIONAL POLLUTION DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT REQUIREMENTS & PERMIT REQUIREMENTS OF THE CITY.
4. PROPOSED SPOT GRADES ARE FLOW-LINE FINISHED GRADE ELEVATIONS, UNLESS OTHERWISE NOTED.
5. GRADES OF WALKS SHALL BE INSTALLED WITH 5% MAX. LONGITUDINAL SLOPE AND 1% MIN. AND 2% MAX. CROSS SLOPE, UNLESS OTHERWISE NOTED.
6. PROPOSED SLOPES SHALL NOT EXCEED 3:1 UNLESS INDICATED OTHERWISE ON THE DRAWINGS. MAXIMUM SLOPES IN MAINTAINED AREAS IS 4:1
7. PROPOSED RETAINING WALLS, FREESTANDING WALLS, OR COMBINATION OF WALL TYPES GREATER THAN 4' IN HEIGHT SHALL BE DESIGNED AND ENGINEERED BY A REGISTERED RETAINING WALL ENGINEER. DESIGN DRAWINGS SHALL BE SUBMITTED FOR REVIEW AND APPROVAL PRIOR TO CONSTRUCTION.
8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTENANCE OF GRADE STAKES THROUGHOUT THE DURATION OF CONSTRUCTION TO ESTABLISH PROPER GRADES. THE CONTRACTOR SHALL ALSO BE RESPONSIBLE FOR A FINAL FIELD CHECK OF FINISHED GRADES ACCEPTABLE TO THE ENGINEER/LANDSCAPE ARCHITECT PRIOR TO TOPSOIL AND SODDING ACTIVITIES.
9. IF EXCESS OR SHORTAGE OF SOIL MATERIAL EXISTS, THE CONTRACTOR SHALL TRANSPORT ALL EXCESS SOIL MATERIAL OFF THE SITE TO AN AREA SELECTED BY THE CONTRACTOR, OR IMPORT SUITABLE MATERIAL TO THE SITE.
10. EXCAVATE TOPSOIL FROM AREAS TO BE FURTHER EXCAVATED OR REGRADED AND STOCKPILE IN AREAS DESIGNATED ON THE SITE. THE CONTRACTOR SHALL SALVAGE ENOUGH TOPSOIL FOR RESPREADING ON THE SITE AS SPECIFIED. EXCESS TOPSOIL SHALL BE PLACED IN EMBANKMENT AREAS, OUTSIDE OF BUILDING PADS, ROADWAYS AND PARKING AREAS. THE CONTRACTOR SHALL SUBCUT CUT AREAS, WHERE TURF IS TO BE ESTABLISHED, TO A DEPTH OF 6 INCHES. RESPREAD TOPSOIL IN AREAS WHERE TURF IS TO BE ESTABLISHED TO A MINIMUM DEPTH OF 6 INCHES.
11. FINISHED GRADING SHALL BE COMPLETED. THE CONTRACTOR SHALL UNIFORMLY GRADE AREAS WITHIN LIMITS OF GRADING, INCLUDING ADJACENT TRANSITION AREAS. PROVIDE A SMOOTH FINISHED SURFACE WITHIN SPECIFIED TOLERANCES, WITH UNIFORM LEVELS OR SLOPES BETWEEN POINTS WHERE ELEVATIONS ARE SHOWN, OR BETWEEN SUCH POINTS AND EXISTING GRADES. AREAS THAT HAVE BEEN FINISH GRADED SHALL BE PROTECTED FROM SUBSEQUENT CONSTRUCTION OPERATIONS, TRAFFIC AND EROSION. REPAIR ALL AREAS THAT HAVE BECOME RUTTED BY TRAFFIC OR ERODED BY WATER OR HAS SETTLED BELOW THE CORRECT GRADE. ALL AREAS DISTURBED BY THE CONTRACTOR'S OPERATIONS SHALL BE RESTORED TO ORIGINAL CONDITION OR TO THE REQUIREMENTS OF THE NEW WORK.
12. PRIOR TO PLACEMENT OF THE AGGREGATE BASE, A TEST ROLL WILL BE REQUIRED ON THE STREET AND/OR PARKING AREA SUBGRADE. THE CONTRACTOR SHALL PROVIDE A LOADED TANDEM AXLE TRUCK WITH A GROSS WEIGHT OF 25 TONS. THE TEST ROLLING SHALL BE AT THE DIRECTION OF THE SOILS ENGINEER AND SHALL BE COMPLETED IN AREAS AS DIRECTED BY THE SOILS ENGINEER. THE SOILS ENGINEER SHALL DETERMINE WHICH SECTIONS OF THE STREET OR PARKING AREA ARE UNSTABLE. CORRECTION OF THE SUBGRADE SOILS SHALL BE COMPLETED IN ACCORDANCE WITH THE REQUIREMENTS OF THE SOILS ENGINEER.
13. TOLERANCES
    - 13.1. THE BUILDING SUBGRADE FINISHED SURFACE ELEVATION SHALL NOT VARY BY MORE THAN 0.30 FOOT ABOVE, OR 0.30 FOOT BELOW, THE PRESCRIBED ELEVATION AT ANY POINT WHERE MEASUREMENT IS MADE.
    - 13.2. THE STREET OR PARKING AREA SUBGRADE FINISHED SURFACE ELEVATION SHALL NOT VARY BY MORE THAN 0.05 FOOT ABOVE, OR 0.10 FOOT BELOW, THE PRESCRIBED ELEVATION OF ANY POINT WHERE MEASUREMENT IS MADE.
    - 13.3. AREAS WHICH ARE TO RECEIVE TOPSOIL SHALL BE GRADED TO WITHIN 0.30 FOOT ABOVE OR BELOW THE REQUIRED ELEVATION, UNLESS DIRECTED OTHERWISE BY THE ENGINEER.
    - 13.4. TOPSOIL SHALL BE GRADED TO PLUS OR MINUS 1/2 INCH OF THE SPECIFIED THICKNESS.
14. MAINTENANCE
    - 14.1. THE CONTRACTOR SHALL PROTECT NEWLY GRADED AREAS FROM TRAFFIC AND EROSION, AND KEEP AREA FREE OF TRASH AND DEBRIS.
    - 14.2. CONTRACTOR SHALL REPAIR AND REESTABLISH GRADES IN SETTLED, ERODED AND RUTTED AREAS TO SPECIFIED TOLERANCES. DURING THE CONSTRUCTION AND DURING THE WARRANTY PERIOD, ERODED AREAS WHERE TURF IS TO BE ESTABLISHED SHALL BE RESEEDED AND MULCHED.
    - 14.3. WHERE COMPLETED COMPACTED AREAS ARE DISTURBED BY SUBSEQUENT CONSTRUCTION OPERATIONS OR ADVERSE WEATHER, CONTRACTOR SHALL SCARIFY, SURFACE, RESHAPE, AND COMPACT TO REQUIRED DENSITY PRIOR TO FURTHER CONSTRUCTION.

CITY OF EDEN PRAIRIE GRADING NOTES

1. RESERVED FOR CITY SPECIFIC GRADING NOTES.





GRADING PLAN LEGEND

- EX. 1' CONTOUR ELEVATION INTERVAL
- 1.0' CONTOUR ELEVATION INTERVAL
- SPOT GRADE ELEVATION (FLOW LINE UNLESS OTHERWISE NOTED)
- SPOT GRADE ELEVATION GUTTER
- SPOT GRADE ELEVATION BACK OF CURB (TOP OF CURB)
- SPOT GRADE ELEVATION BOTTOM OF STAIRS/TOP OF STAIRS
- TIP OUT (T.O.) CURB AND GUTTER WHERE APPLICABLE - TAPER GUTTERS TO DRAIN AS SHOWN
- EXISTING AND PROPOSED DRAINAGE ARROWS

GOPHER STATE ONE CALL
WWW.GOPHERSTATEONECALL.ORG

1" = 10'-0"

CivilSite GROUP

PROJECT
PRAIRIE MEADOWS SITE RENOVATION
WESTWIND DRIVE EDEN PRAIRIE, MN 55344

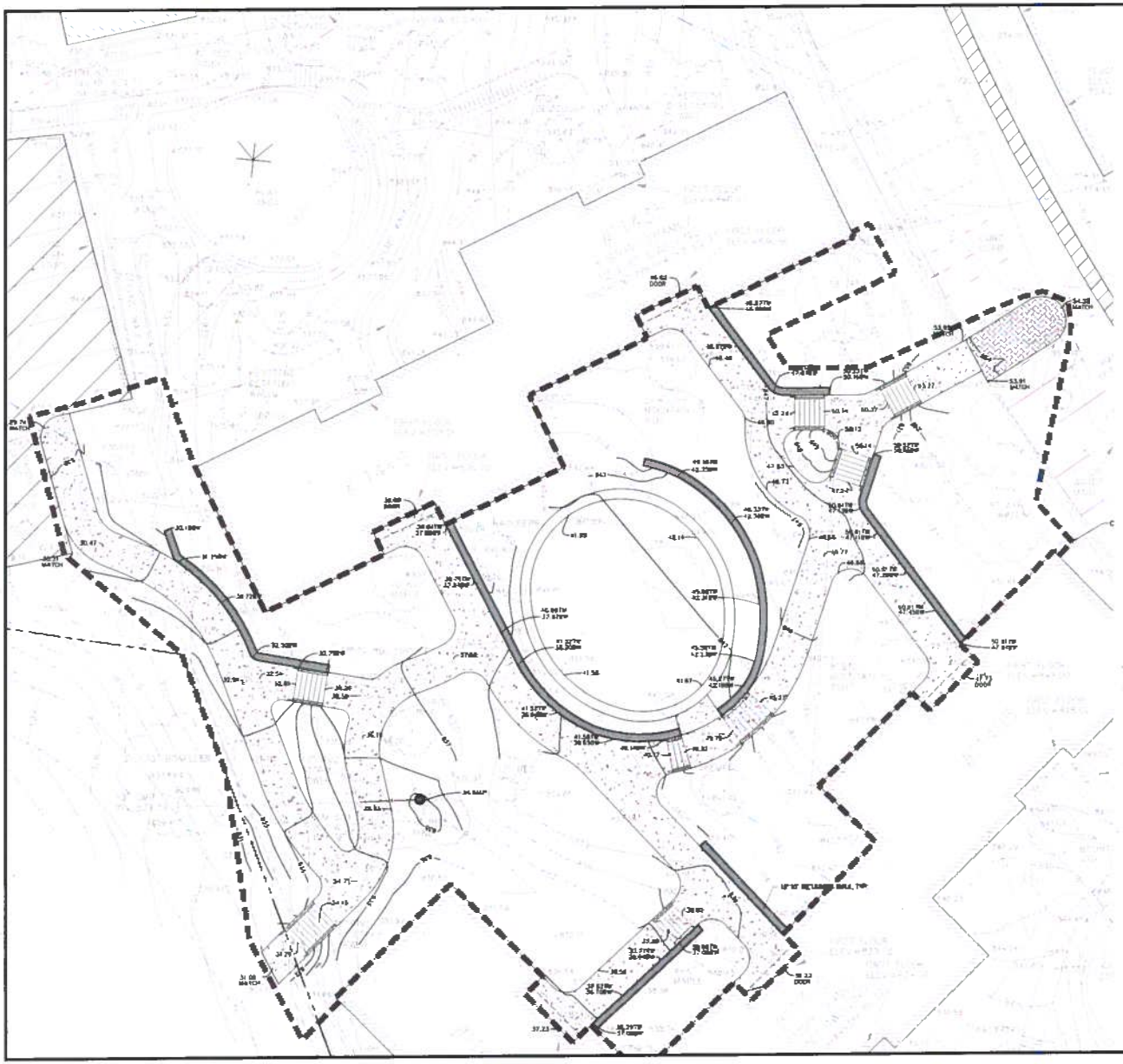
COMMUNITY HOUSING DEVELOPMENT CORPORATION
614 NORTH FIRST STREET, SUITE 100, MINNEAPOLIS, MN 55401-3101

ISSUE/SUBMITTAL SUMMARY

REVISION SUMMARY

GRADING PLAN

C3.0



CivilSite GROUP
4931 W. 35TH ST. SUITE 200
ST. LOUIS PARK, MN 55416
CivilSiteGroup.com
Matt Pavek
763-213-3644
Pat Sarver
952-258-3003

PROJECT

PRAIRIE MEADOWS SITE RENOVATION

WESTWIND DRIVE EDEN PRAIRIE, MN 55344

COMMUNITY HOUSING DEVELOPMENT CORPORATION

6141 NORTH FIRST STREET, SUITE 100, MINNEAPOLIS, MN 55401-3101

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

Matthew R Pavek

DATE 3/2017 LICENSE NO. 44263

ISSUE/SUBMITTAL SUMMARY

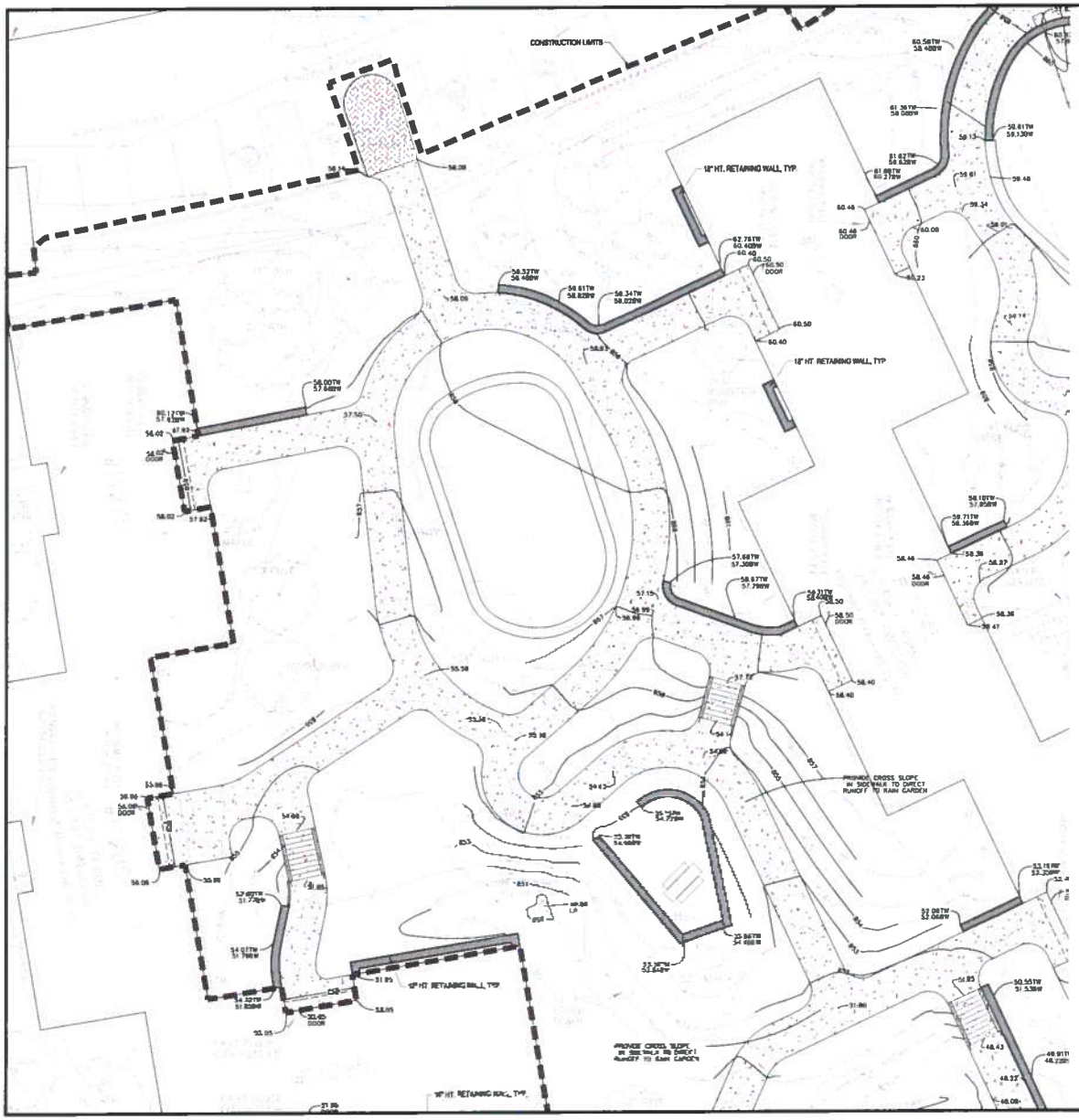
DATE	DESCRIPTION
12/01/16	PERMIT SET
02/21/17	WATERSHED SUBMITTAL
3/9/17	WATERSHED RESUBMITTAL

REVISION SUMMARY

DATE	DESCRIPTION

GRADING PLAN

C3.1



GRADING PLAN LEGEND:

- 881 — EX. 1' CONTOUR ELEVATION INTERVAL
- 879 — 1.0' CONTOUR ELEVATION INTERVAL
- SPOT GRADE ELEVATION (FLOW LINE UNLESS OTHERWISE NOTED)
- SPOT GRADE ELEVATION GUTTER
- SPOT GRADE ELEVATION BACK OF CURB (TOP OF CURB)
- SPOT GRADE ELEVATION BOTTOM OF STAIRS/TOP OF STAIRS
- TIP OUT (T.O.) CURB AND GUTTER WHERE APPLICABLE - TAPER GUTTERS TO DRAIN AS SHOWN
- EXISTING AND PROPOSED DRAINAGE ARROWS

GOPHER STATE ONE CALL

1" = 10'-0"

CivilSite GROUP

PROJECT

PRAIRIE MEADOWS SITE RENOVATION

WESTWIND DRIVE, EDEN PRAIRIE, MN 55344

COMMUNITY HOUSING DEVELOPMENT CORPORATION

614 NORTH FIRST STREET, SUITE 100, MINNEAPOLIS, MN 55401-3101

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Matthew N. Parish

DATE 10/9/17 LICENSE NO. 44263

ISSUE/SUBMITTAL SUMMARY

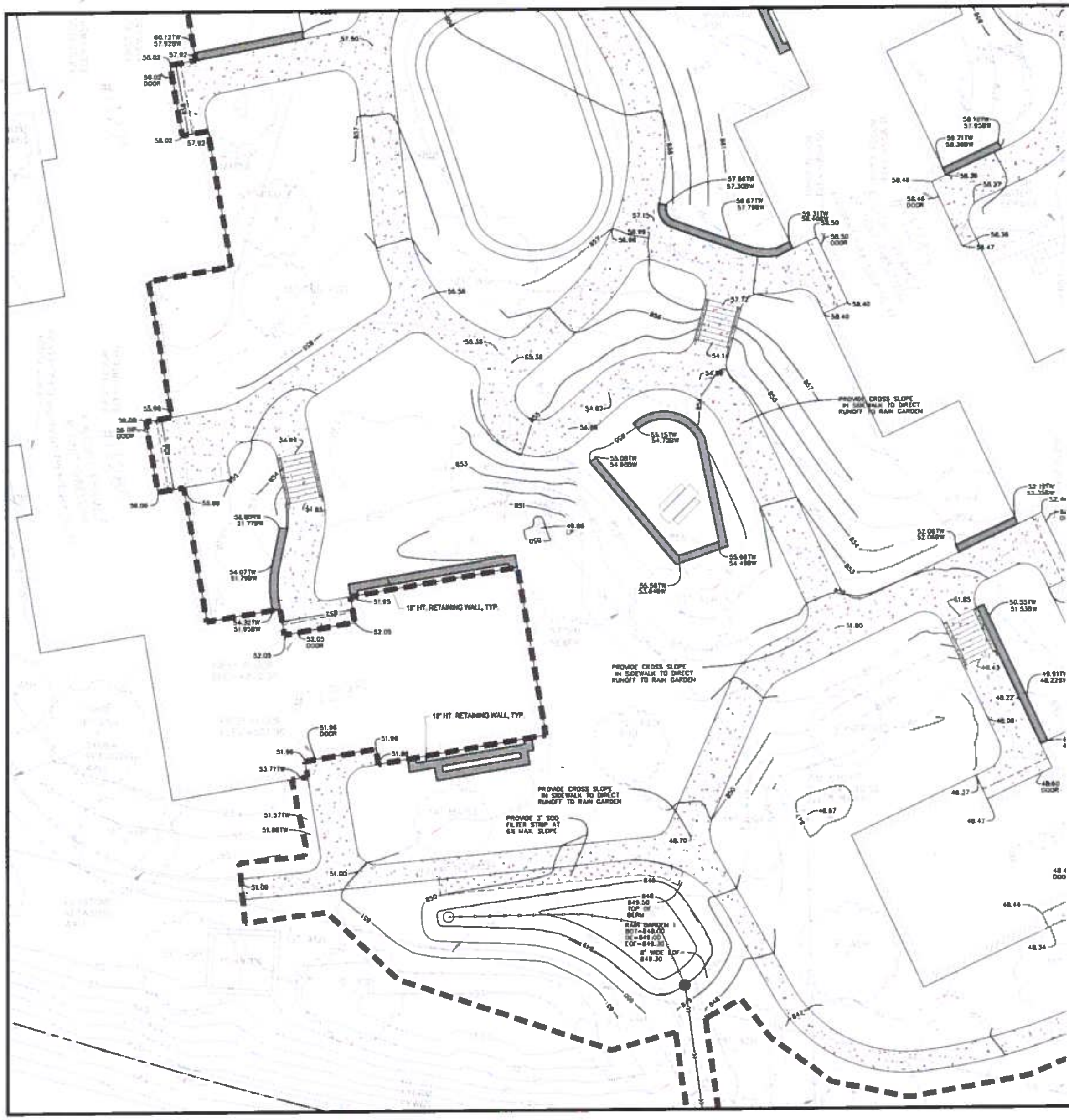
DATE	DESCRIPTION
10/9/17	PERMIT SET
8/7/2017	WATERSHED SUB MITTAL
9/9/17	WATERSHED RESUB MITTAL

REVISION SUMMARY

DATE	DESCRIPTION

GRADING PLAN

C3.2



GRADING PLAN LEGEND

891	EX. 1' CONTOUR ELEVATION INTERVAL
818	1.0' CONTOUR ELEVATION INTERVAL
	SPOT GRADE ELEVATION (FLOW LINE UNLESS OTHERWISE NOTED)
891 G	SPOT GRADE ELEVATION GUTTER
891 BC	SPOT GRADE ELEVATION BACK OF CURB (TOP OF CURB)
891 BS/TS	SPOT GRADE ELEVATION BOTTOM OF STAIRS/TOP OF STAIRS
T.O.	TIP OUT (T.O.) CURB AND GUTTER WHERE APPLICABLE - TAPER GUTTERS TO DRAIN AS SHOWN
	EXISTING AND PROPOSED DRAINAGE ARROWS

GOPHER STATE ONE CALL

1" = 10'-0"

5'-0" 0 10'-0"

CivilSite GROUP

PROJECT

PRAIRIE MEADOWS SITE RENOVATION

WESTWIND DRIVE, EDEN PRAIRIE, MN 55344

COMMUNITY HOUSING DEVELOPMENT CORPORATION

614 NORTH FIRST STREET, SUITE 100, MINNEAPOLIS, MN 55401-3101

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Matthew R. Pavek

DATE 3/9/17 LICENSE NO. 44263

ISSUE/SUBMITTAL SUMMARY

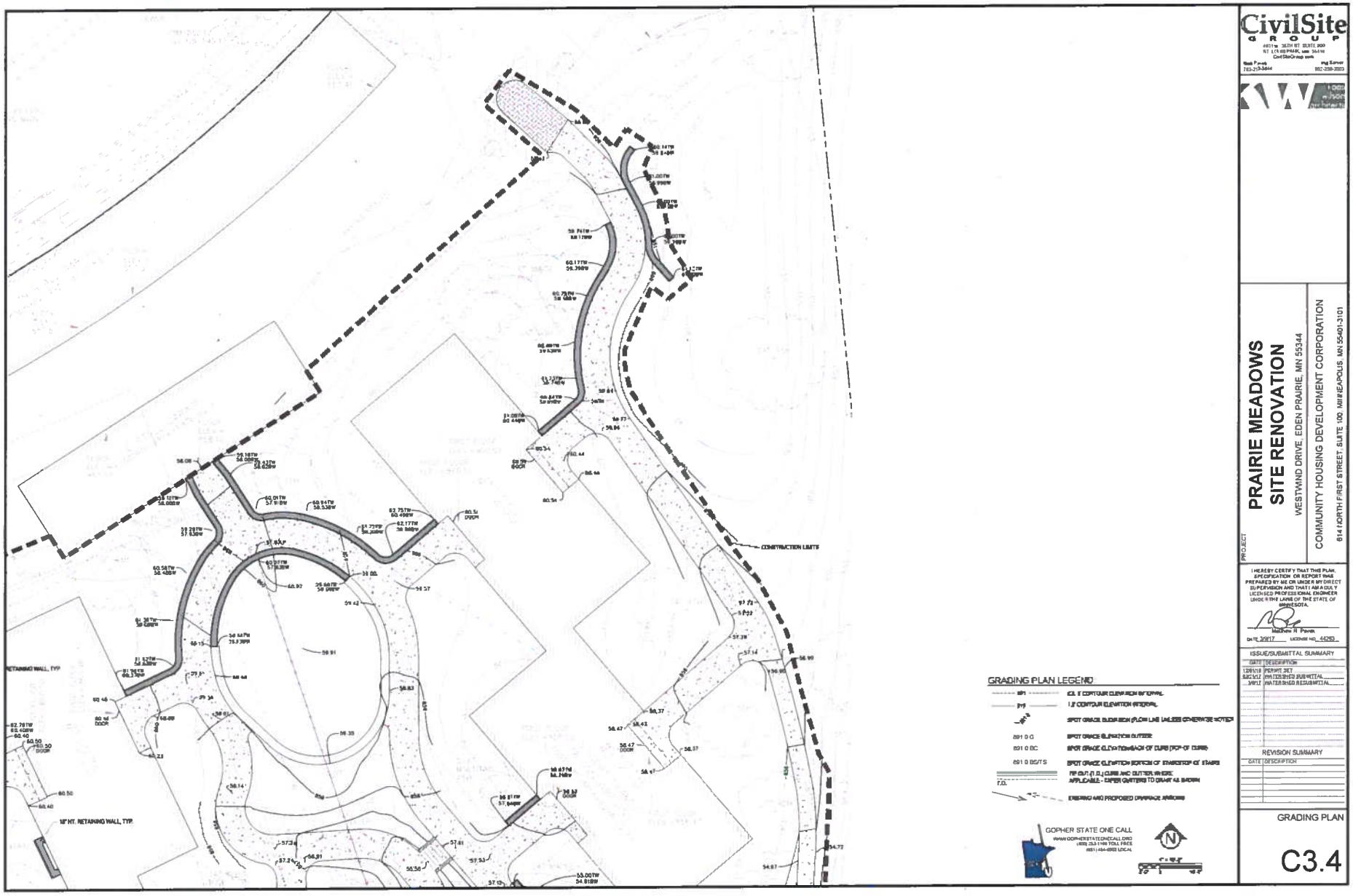
DATE	DESCRIPTION
12/8/16	PERMIT SET
[illegible]	WATERSHED SUBMITTAL
3/9/17	WATERSHED RESUBMITTAL

REVISION SUMMARY

DATE	DESCRIPTION

GRADING PLAN

C3.3



CivilSite GROUP

PROJECT

PRAIRIE MEADOWS SITE RENOVATION

WESTWIND DRIVE, EDEN PRAIRIE, MN 55344

COMMUNITY HOUSING DEVELOPMENT CORPORATION

814 NORTH FIRST STREET, SUITE 100, MINNEAPOLIS, MN 55401-3101

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

Matthew H. Peven

DATE 3/9/17 LICENSE NO. 44253

ISSUE/SUBMITTAL SUMMARY

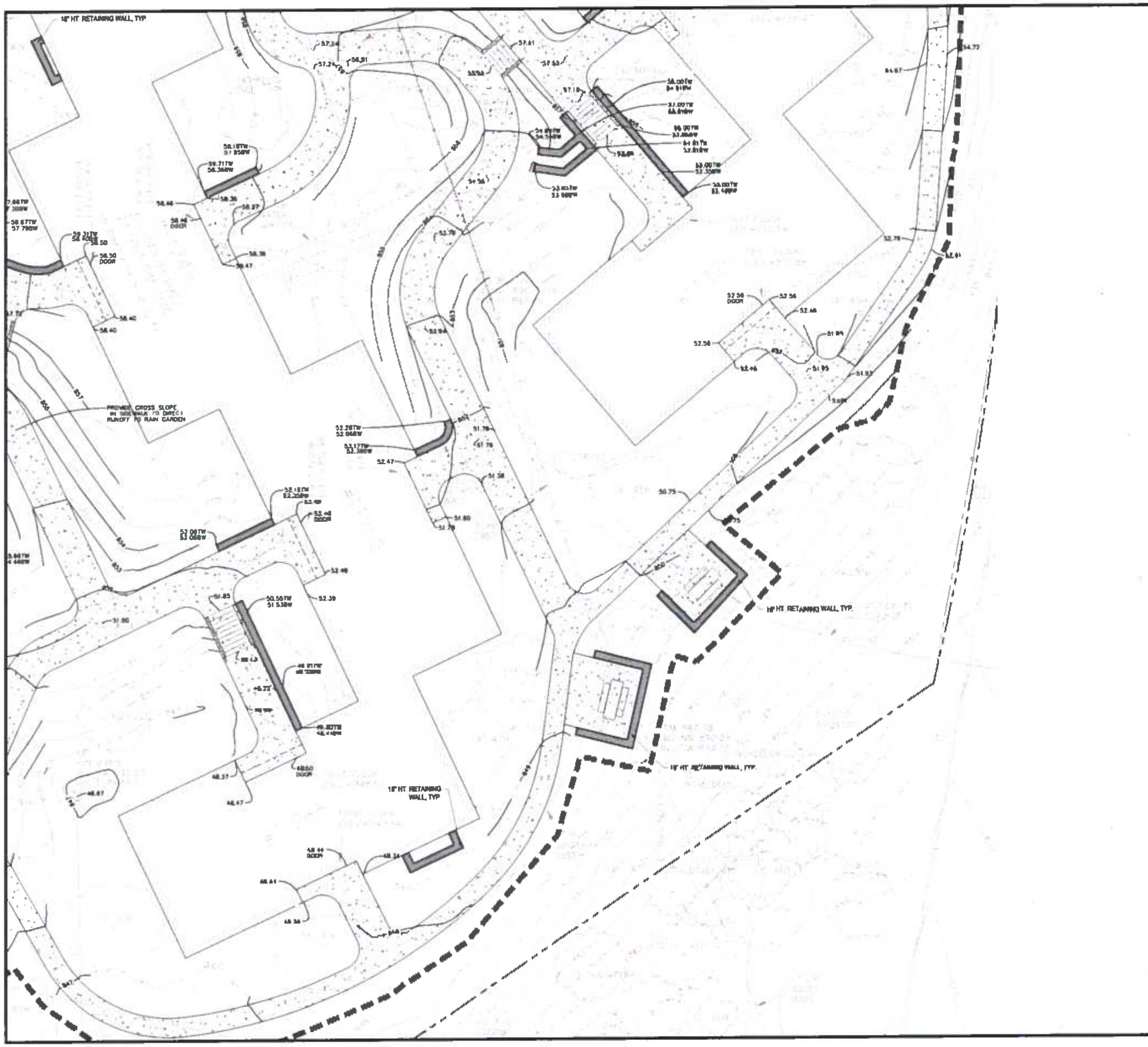
DATE	DESCRIPTION
12/01/16	PERMIT SET
02/03/17	WATERSHED SUBMITTAL
3/9/17	WATERSHED RESUBMITTAL

REVISION SUMMARY

DATE	DESCRIPTION

GRADING PLAN

C3.4



GRADING PLAN LEGEND

- EX. 1' CONTOUR ELEVATION INTERVAL
- 1.0' CONTOUR ELEVATION INTERVAL
- SPOT GRADE ELEVATION (FLOW LINE UNLESS OTHERWISE NOTED)
- SPOT GRADE ELEVATION GUTTER
- SPOT GRADE ELEVATION BACK OF CURB (TOP OF CURB)
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CivilSite GROUP
CivilSiteGroup.com

PROJECT

PRAIRIE MEADOWS SITE RENOVATION

WESTWIND DRIVE, EDEN PRAIRIE, MN 55344

COMMUNITY HOUSING DEVELOPMENT CORPORATION

614 NORTH FIRST STREET, SUITE 100, MINNEAPOLIS, MN 55401-3101

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

Matthew R. Pavek

DATE 3/3/17 LICENSE NO. 44263

ISSUE/SUBMITTAL SUMMARY

DATE	DESCRIPTION
12/01/16	PERMIT SET
2/2/17	WATERSHED SUBMITTAL
3/3/17	WATERSHED RESUBMITTAL

REVISION SUMMARY

DATE	DESCRIPTION

GRADING PLAN

C3.5

resourceful. naturally.
engineering and environmental consultants

BARR

Memorandum

To: Riley-Purgatory-Bluff Creek Watershed District Board of Managers
From: Barr Engineering
Subject: Chanhassen High School Stormwater Reuse Project – Request Board Authorization to Solicit Bids for Construction
Date: 3/30/2017
Project: 23/27-0053.14 019
c: Claire Bleser – RPBCWD Administrator

In 2016, the RPBCWD completed a feasibility study for the reuse for stormwater from an existing stormwater pond at the Chanhassen High School site. The project proposes to draw stormwater from an existing stormwater pond on site and use in an existing irrigation system that irrigates the site's athletic fields and select landscaped areas around the school. The goal of this project is to reduce runoff volumes and pollutant loads to Bluff Creek, an impaired water, located immediately downstream from the site. In October 2016, RPBCWD staff secured a $200,000 stormwater management grant from the Metropolitan Council. In October 2016, the RPBCWD Board of Managers authorized final design and preparation of construction documents for the reuse system recommended in the feasibility study.

Enclosed are the nearly 100 percent draft design plans for the Chanhassen High School Stormwater Reuse system. The 90 percent design review meeting with RPBCWD, City, and ISD 112 staff was held on 3/20/2017 and we are in the process of finalizing the plans and specifications for bid. The design of the proposed system includes, but not limited to, construction of a small pump station and water treatment system and shelter, installation of the necessary piping and valves to connect to the existing irrigation mainline, installation of electrical and control lines to coordinate the pond water level monitoring with the existing irrigation control system and, erosion control, and site restoration.

The engineer's opinion of probable construction cost based on the 100 percent design is $190,900. The opinion of probable cost provided is made on the basis of Barr Engineering's experience and qualifications and represents our best judgment as experienced and qualified professionals familiar with the project. Because we have no control over the cost of labor, materials, equipment or services furnished by others, or over the contractor's methods of determining prices, or over competitive bidding or market conditions, Barr Engineering cannot and does not guarantee that proposals, bids, or actual costs will not vary from the opinion of probable cost presented.

It is requested that the RPBCWD Board of Managers authorize Barr Engineering Co. to solicit of bids for the construction of the stormwater reuse system at Chanhassen High School, pending review of the final contract documents by the RPBCWD legal counsel and execution of the joint cooperative agreement with

the city of Chanhassen and ISD 112. If the Board of Managers authorizes solicitation of bids to construct the reuse system, the following is the tentative schedule for the project:

- 100% design plans and specifications (mid-April) – for RPBCWD attorney review & submittal to Magellan Pipeline for review and encroachment agreement
- Advertisement to bid submitted(late-April)
- Bid package final/bidding begins (early-May)
- Bid opening (late-May)
- Bidder recommendation to RPBCWD Managers for consideration at 6/7/2017 meeting
- Notice of Award (early-June)
- Notice to Proceed (late-June)
- Construction (late-June to mid-August)

Attachments

- Drawings (100% draft) for the Chanhassen High School stormwater reuse system

CHANHASSEN HIGH SCHOOL STORMWATER REUSE PROJECT
RILEY-PURGATORY-BLUFF CREEK WATERSHED DISTRICT
CARVER COUNTY, MINNESOTA

PROJECT LOCATION

LOCATION MAP
NOT TO SCALE

VICINITY MAP
NOT TO SCALE

LOCATION:

CHANHASSEN HIGH SCHOOL
2200 LYMAN BLVD
CHANHASSEN, MN 55317

SHEET INDEX

WARNING
HIGH-PRESSURE PIPELINE(S)
EXCAVATION AND/OR CONSTRUCTION PROHIBITED
WITHOUT COMPLIANCE WITH STATE ONE-CALL, AND
WITHOUT WRITTEN PERMISSION FROM
MAGELLAN PIPELINE COMPANY, L.P.
A MAGELLAN REPRESENTATIVE MUST BE PRESENT DURING
WORK AROUND PIPELINE(S)

GOPHER STATE ONE CALL
CALL BEFORE YOU DIG
1-800-252-1166

NOTES:

1. TOPOGRAPHIC SURVEY PERFORMED BY BARR ENGINEERING CO ON DEC. 2, 2016 AND JAN. 23, 2017
2. HIGH RESOLUTION ORTHOIMAGERY FOR CARVER COUNTY, MINNESOTA BY MINNESOTA GEOSPATIAL INFORMATION CENTER, TAKEN APRIL, 2016.
3. ALL UTILITIES SHOWN ARE CONSIDERED LEVEL D, UNLESS OTHERWISE NOTED, IN ACCORDANCE WITH ASCE STANDARD C/ASCE38-02.
4. CONTRACTOR SHALL FIELD-LOCATE ALL SITE UTILITIES PRIVATE AND PUBLIC PRIOR TO STARTING THE WORK. ALL UTILITIES SHOWN ON THE PLANS ARE APPROXIMATE. ANY UTILITIES DAMAGED BY CONTRACTOR SHALL BE REPAIRED TO THE SATISFACTION OF UTILITY OWNER.
5. THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES

COORDINATE SYSTEM:

HORIZONTAL DATUM – CARVER COUNTY, NAD83 (2011) REF. VRS
VERTICAL DATUM – NAVD88 REF. VRS

PROJECT ENGINEER CONTACT:

JENNIFER KOEHLER
BARR ENGINEERING CO.
4300 MARKETPOINTE DRIVE
SUITE 200
MINNEAPOLIS, MN 55435
952-832-2750
JKOEHLER@BARR.COM

DISTRICT ENGINEER CONTACT:

SCOTT SOBIECH
BARR ENGINEERING CO.
4300 MARKETPOINTE DRIVE
SUITE 200
MINNEAPOLIS, MN 55435
952-832-2755
SSOBIECH@BARR.COM

DISTRICT ADMINISTRATOR CONTACT:

CLAIRE BLESER
18681 LAKE DRIVE EAST
CHANHASSEN, MN 55317
952-294-5976
CBLESER@RPBCWD.ORG

SCHOOL'S REPRESENTATIVE CONTACT:

MICHAEL MCLAUGHLIN
11 PEAVEY ROAD
CHASKA, MN 55318
952-556-6294
MCLAUGHLIN@DISTRICT112.ORG

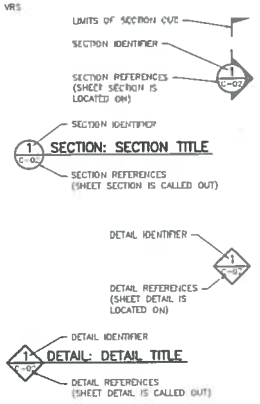
CITY CONTACT:

TERRY JEFFERY
7700 MARKET BOULEVARD
CHANHASSEN, MN 55317
952-227-1168
TJEFFERY@CI.CHANHASSEN.MN.US

ABBREVIATIONS AND SYMBOLS

APPROX	APPROXIMATE
ASCE	AMERICAN SOCIETY OF CIVIL ENGINEERS
ASTM	AMERICAN SOCIETY FOR TESTING MATERIALS
BMPS	BEST MANAGEMENT PRACTICES
C.C.C.	CONCRETE CLEAR COVER
C.F	CUBIC FEET
CONT	CONTINUOUS
CPEP	CORRUGATED POLYETHYLENE PIPE
EL.	ELEVATION
ELEV	ELEVATION
EPDM	ETHYLENE PROPYLENE DIENE MONOMER
E.W.	EACH WAY
FT	FEET
GALV	GALVANIZED
GND	GROUND
H	HORIZONTAL
HDPE	HIGH DENSITY POLYETHYLENE
HP	HORSE POWER
I.E.	INVERT ELEVATION
INV	INVERT
LB.	POUNDS
MAX.	MAXIMUM
MIN.	MINIMUM
MNDOT	MINNESOTA DEPARTMENT OF TRANSPORTATION
MPH	MILES PER HOUR
O.C.	ON CENTER
PLC	PROGRAMMABLE LOGIC CONTROLLER
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
PVC	POLYVINYL CHLORIDE
RPZ	REDUCED PRESSURE ZONE
SPECS	SPECIFICATIONS
TBD	TO BE DETERMINED
T.O.C	TOP OF CONCRETE
TYP	TYPICAL
UV	ULTRAVIOLET
V	VERTICAL
VERT	VERTICAL
YR	YEAR
ø	DIAMETER

REFERENCING



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PRINTED NAME
SIGNATURE
DATE LICENSE #

CLIENT
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DATE RELEASED						

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

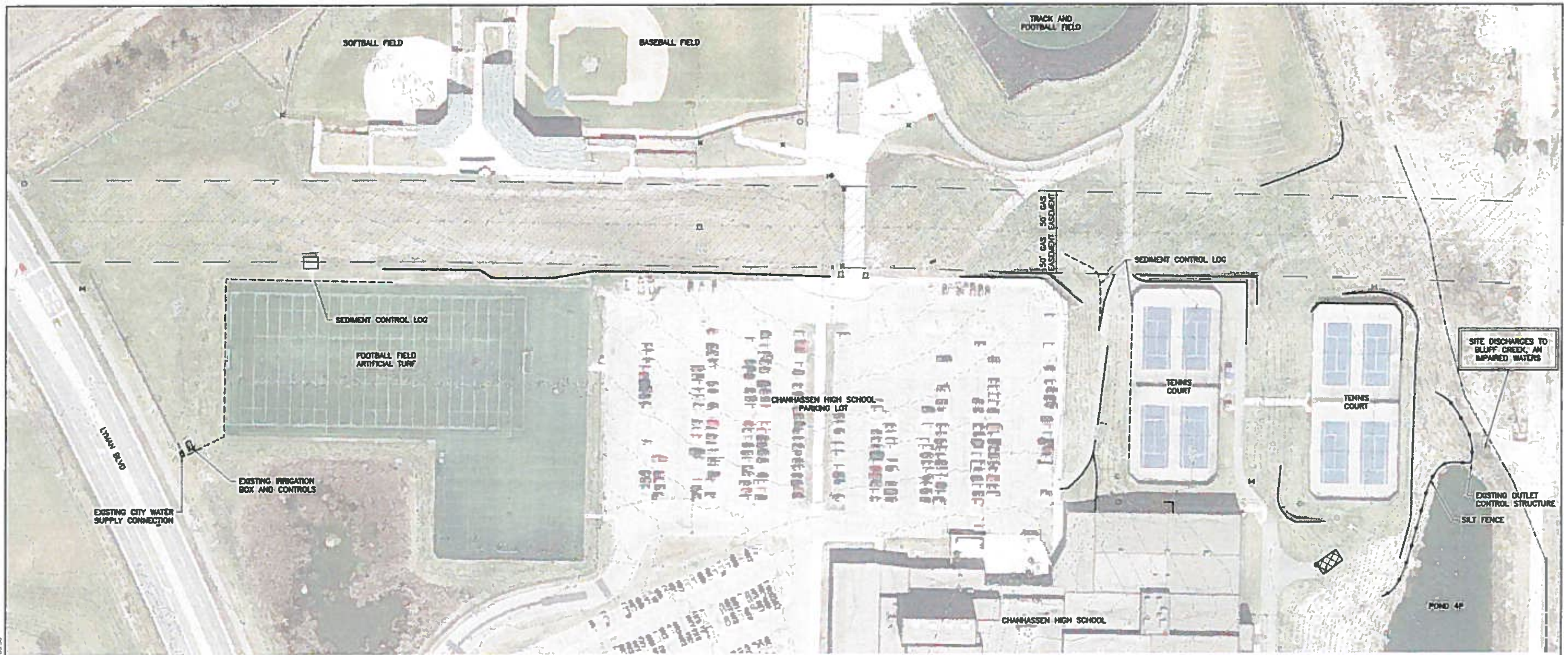
Scale	AS SHOWN
Date	01/13/2017
Drawn	BDP
Checked	JAK2
Designed	BARR
Approved	

RILEY-PURGATORY-BLUFF CREEK WATERSHED DISTRICT

CHAN HIGH SCHOOL STORMWATER REUSE
CHANHASSEN, MINNESOTA

INDEX, LOCATION MAP, AND VICINITY MAP

BARR PROJECT No. 23/27-0053.14
CLIENT PROJECT No.
DWG. No. G-01
REV. No C



WARNING

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(1) PLAN: EXISTING CONDITIONS, REMOVALS, AND EROSION CONTROL

0 60 120
SCALE IN FEET

EROSION CONTROL NOTES:

1. NATURAL TOPOGRAPHY AND SOIL CONDITIONS MUST BE PROTECTED, INCLUDING RETENTION ONSITE OF NATIVE TOPSOIL TO THE GREATEST EXTENT POSSIBLE.
2. ADDITIONAL MEASURES, SUCH AS HYDRAULIC MULCHING AND OTHER PRACTICES AS SPECIFIED BY THE DISTRICT MUST BE USED ON SLOPES OF 3:1 (H:V) OR STEEPER TO PROVIDE ADEQUATE STABILIZATION.
3. FINAL SITE STABILIZATION MEASURES MUST SPECIFY THAT AT LEAST SIX INCHES OF TOPSOIL OR ORGANIC MATTER BE SPREAD AND INCORPORATED INTO THE UNDERLYING SOIL DURING FINAL SITE TREATMENT WHEREVER TOPSOIL HAS BEEN REMOVED.
4. CONSTRUCTION SITE WASTE SUCH AS DISCARDED BUILDING MATERIALS, CONCRETE TRUCK WASHOUT, CHEMICALS, LITTER AND SANITARY WASTE MUST BE PROPERLY MANAGED.
5. ALL TEMPORARY EROSION AND SEDIMENT CONTROL BMPS MUST BE MAINTAINED UNTIL COMPLETION OF CONSTRUCTION AND VEGETATION IS ESTABLISHED SUFFICIENTLY TO ENSURE STABILITY OF THE SITE, AS DETERMINED BY THE DISTRICT.
6. ALL TEMPORARY EROSION AND SEDIMENT CONTROL BMPS MUST BE REMOVED UPON FINAL STABILIZATION.
7. SOIL SURFACES COMPACTED DURING CONSTRUCTION AND REMAINING PERVIOUS UPON COMPLETION OF CONSTRUCTION MUST BE DECOMPACTED THROUGH SOIL AMENDMENT AND/OR RIPPING TO A DEPTH OF 18 INCHES (8 INCHES FOR SINGLE-FAMILY HOME PROPERTIES) WHILE TAKING CARE TO AVOID UTILITIES, TREE ROOTS AND OTHER EXISTING VEGETATION PRIOR TO FINAL REVEGETATION OR OTHER STABILIZATION.
8. ALL DISTURBED AREAS MUST BE STABILIZED WITHIN 7 CALENDAR DAYS AFTER LAND-DISTURBING WORK HAS TEMPORARILY OR PERMANENTLY CEASED ON A PROPERTY THAT DRAINS TO AN IMPAIRED WATER, WITHIN 14 DAYS ELSEWHERE.
9. THE PERMITTEE MUST, AT A MINIMUM, INSPECT, MAINTAIN AND REPAIR ALL DISTURBED SURFACES AND ALL EROSION AND SEDIMENT CONTROL FACILITIES AND SOIL STABILIZATION MEASURES EVERY DAY WORK IS PERFORMED ON THE SITE AND AT LEAST WEEKLY UNTIL LAND-DISTURBING ACTIVITY HAS CEASED. THEREAFTER, THE PERMITTEE MUST PERFORM THESE RESPONSIBILITIES AT LEAST WEEKLY UNTIL VEGETATIVE COVER IS ESTABLISHED. THE PERMITTEE WILL MAINTAIN A LOG OF ACTIVITIES UNDER THIS SECTION FOR INSPECTION BY THE DISTRICT ON REQUEST.

LEGEND

- CONSTRUCTION LIMITS
- WETLAND BOUNDARY
- EXISTING 10' CONTOUR
- EXISTING 2' CONTOUR
- EXISTING FENCE
- EXISTING SANITARY SEWER
- EXISTING STORM SEWER
- EXISTING IRRIGATION
- EXISTING WATER SUPPLY
- EXISTING NATURAL GAS
- EXISTING TELEVISION CABLE
- EXISTING OVERHEAD ELECTRIC
- EXISTING UNDERGROUND ELECTRIC
- EXISTING WALL
- APPROXIMATE NATURAL GAS EASEMENT

EROSION CONTROL LEGEND

- SILT FENCE (SEE PLATE 5300 ON SHEET C-07)
- SEDIMENT CONTROL LOG (SEE DETAIL 1 ON SHEET C-07)
- INLET PROTECTION (SEE PLATE 5302 ON SHEET C-07)
- INLET PROTECTION (SEE DETAIL 2 ON SHEET C-07)
- CONSTRUCTION ENTRANCE (SEE PLATE 5301 ON SHEET C-07)

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	A	B	C	0	1	2	3
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BID							
CONSTRUCTION							
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Approved	

RILEY-PURGATORY-BLUFF CREEK WATERSHED DISTRICT

CHAN HIGH SCHOOL STORMWATER REUSE
CHANHASSEN, MINNESOTA

EXISTING CONDITIONS, REMOVALS, AND EROSION CONTROL PLAN

BARR PROJECT No. 23/27-0053.14
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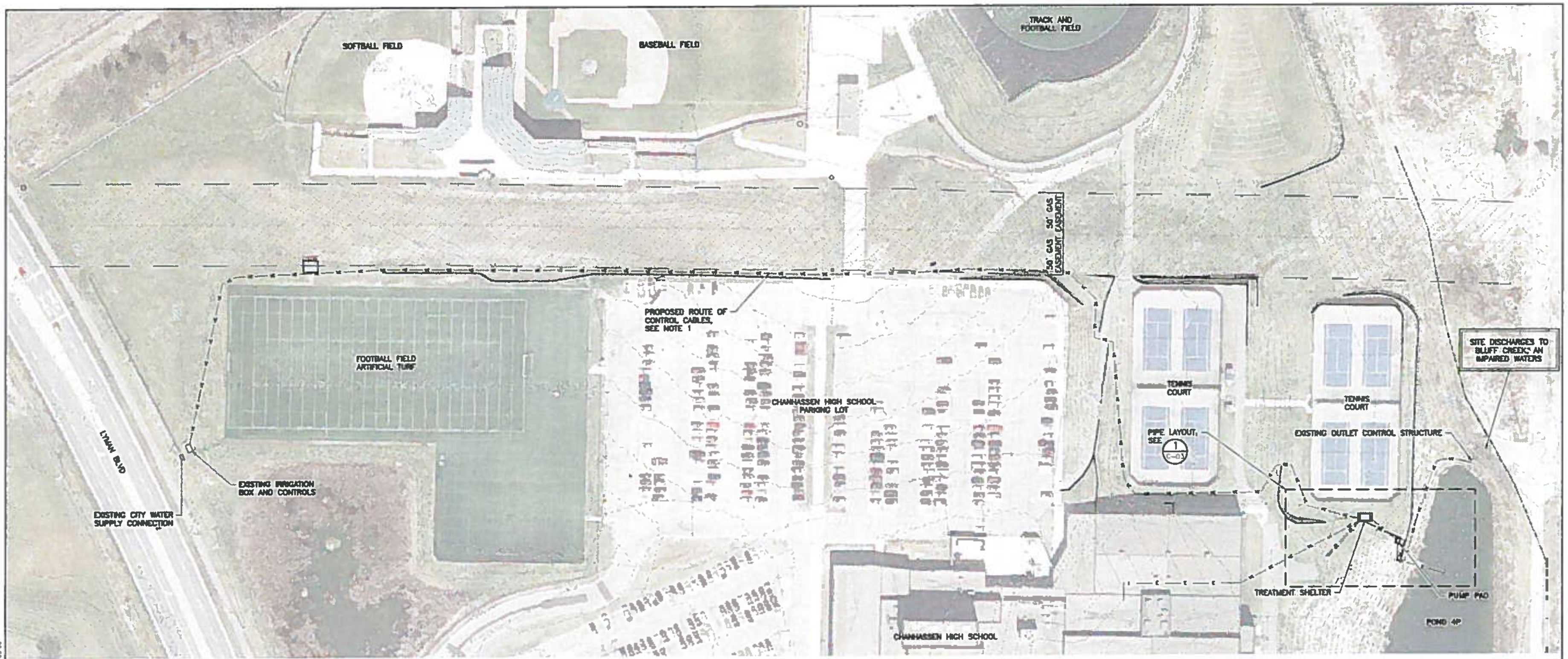

1 PLAN: PROPOSED SITE – OVERALL

SCALE IN FEET (0, 60, 120)

WARNING

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NOTES:

1. SEE SHEET E-01 THROUGH E-04 FOR ADDITIONAL ELECTRICAL INFORMATION

LEGEND

- CONSTRUCTION LIMITS
- WETLAND BOUNDARY
- EXISTING 10' CONTOUR
- EXISTING 2' CONTOUR
- EXISTING FENCE
- EXISTING SANITARY SEWER
- EXISTING STORM SEWER
- EXISTING IRRIGATION
- EXISTING WATER SUPPLY
- EXISTING NATURAL GAS
- EXISTING TELEVISION CABLE
- EXISTING OVERHEAD ELECTRIC
- EXISTING UNDERGROUND ELECTRIC
- EXISTING WALL
- APPROXIMATE NATURAL GAS EASEMENT

LEGEND – CONTINUED

- PROPOSED IRRIGATION
- PROPOSED PIPING
- PROPOSED UNDERGROUND ELECTRIC (SEE NOTE 1)
- PROPOSED ELECTRIC (SEE NOTE 1)

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Designed	BARR
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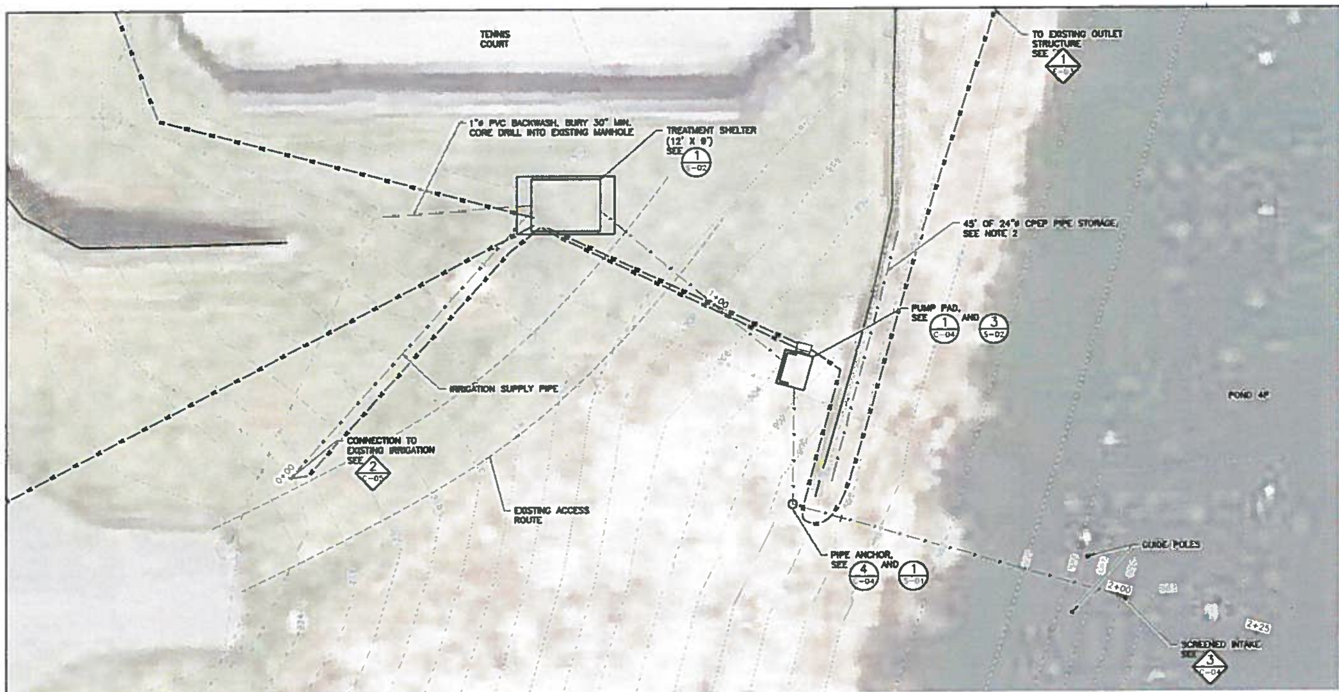
RILEY–PURGATORY–BLUFF CREEK WATERSHED DISTRICT

CHAN HIGH SCHOOL STORMWATER REUSE
CHANHASSEN, MINNESOTA

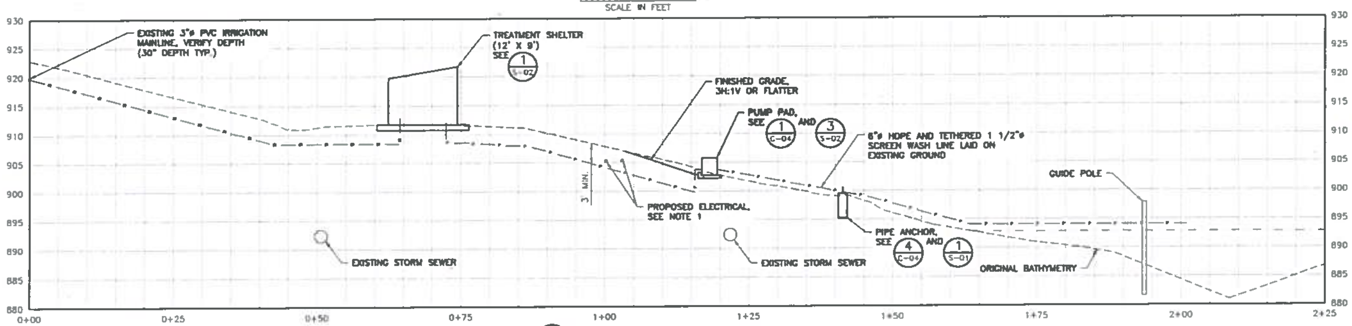
PROPOSED SITE
PLAN OVERALL

BARR PROJECT No. 23/27-0053.14
CLIENT PROJECT No.
DWG. No. C-02
REV. No. C



1 PLAN: PUMPING & PIPING

0 10 20 SCALE IN FEET



2 PROFILE: PUMPING & PIPING

0 10 20 SCALE IN FEET

LEGEND

- CONSTRUCTION LIMITS
- EXISTING 10' CONTOUR
- EXISTING 2' CONTOUR
- EXISTING STORM SEWER
- EXISTING IRRIGATION
- EXISTING UNDERGROUND ELECTRIC
- EXISTING WALL
- PROPOSED UNDERGROUND ELECTRIC, SEE NOTE 1
- PROPOSED IRRIGATION
- PROPOSED PIPING
- PROPOSED BACKWASH PIPING

STRUCTURE COORDINATES

TREATMENT SHELTER PAD		
Location	Northing	Easting
Northwest	175206.048	550294.584
Southwest	175196.048	550294.084
Northeast	175206.048	550311.084
Southeast	175196.048	550311.084

PUMP PAD		
Location	Northing	Easting
Northwest	175175.827	550341.231
Southwest	175170.057	550339.587
Northeast	175174.456	550346.040
Southeast	175168.686	550344.395

NOTES:

1. SEE SHEET E-01 THROUGH E-04 FOR ADDITIONAL ELECTRICAL INFORMATION.
2. ANCHOR PIPE STORAGE AT 10' INTERVALS WITH BENT REBAR OR OTHER ENGINEER APPROVED MEANS

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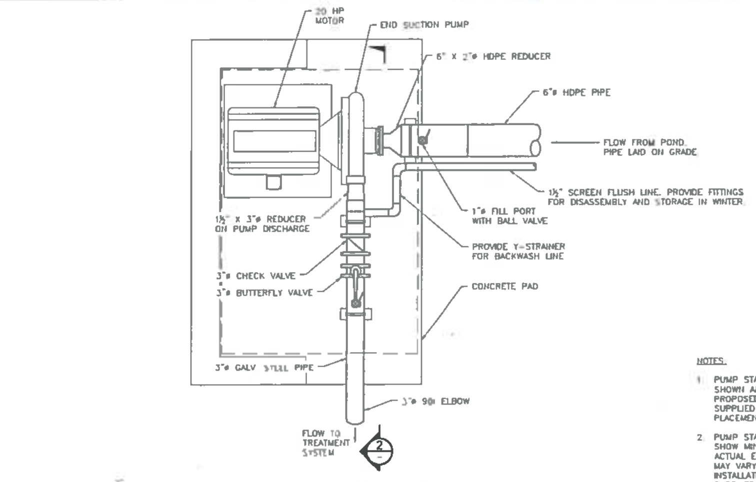
Checked	JAK2
Designed	BARR
Approved	

RILEY–PURGATORY–BLUFF CREEK WATERSHED DISTRICT

CHAN HIGH SCHOOL STORMWATER REUSE
CHANHASSEN, MINNESOTA

PIPE LAYOUT
PLAN AND PROFILE

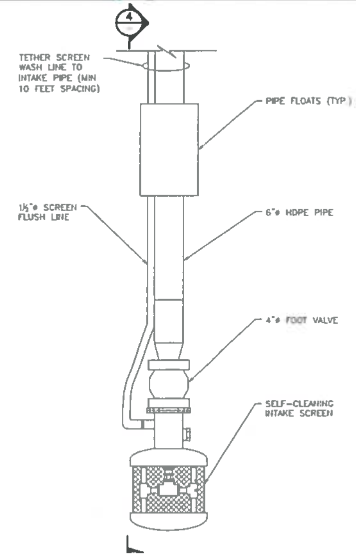
BARR PROJECT No. 23/27-0053.14
CLIENT PROJECT No.
DWG. No. C-03
REV. No. C



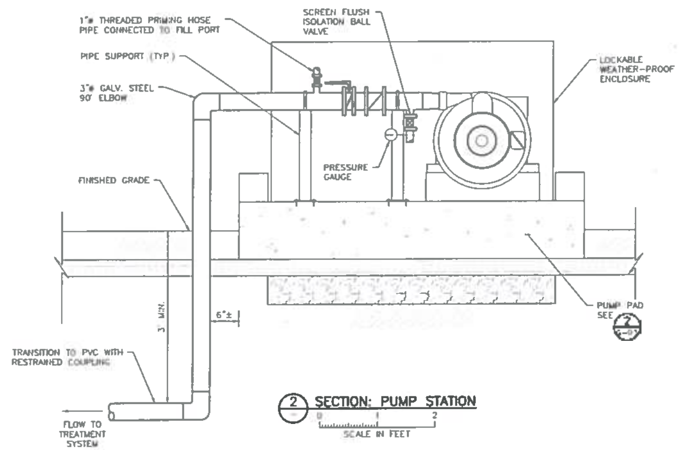
1 PLAN: PUMP STATION
SCALE IN FEET

NOTES:

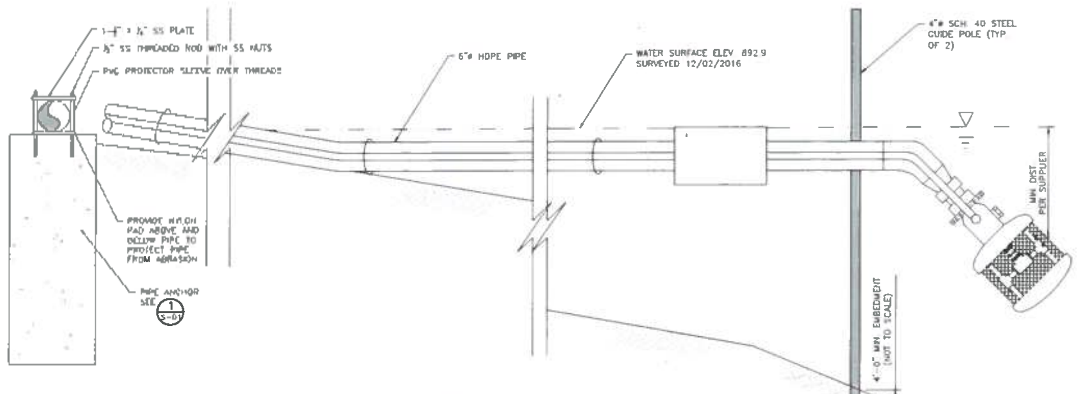
1. PUMP STATION AND INTAKE DIMENSIONS AND LOCATIONS SHOWN ARE APPROXIMATE. FIELD VERIFY DIMENSIONS AND PROPOSED EQUIPMENT LOCATIONS BASED ON EQUIPMENT SUPPLIED. COORDINATE WITH ENGINEER FOR FINAL PLACEMENT.
2. PUMP STATION AND INTAKE LAYOUTS ARE APPROXIMATE AND SHOW MINIMUM REQUIRED FUNCTIONALITY OF THE STATION. ACTUAL EQUIPMENT SIZE, LOCATION, AND CONFIGURATION MAY VARY BASED ON STATION SUPPLIED. MODIFY INSTALLATION AS REQUIRED TO ACCOMMODATE STATION SUPPLIED.
3. INSTALL PIPE ANCHOR ON UPSTREAM SIDE OF ELBOW TO ALLOW MINOR VERTICAL ROTATION AS WATER LEVEL VARIES AND TO LIMIT LATERAL MOVEMENT UPHILL.
4. TETHER INTAKE SCREEN FLUSH LINE TO INTAKE PIPE. PROVIDE PROTECTION AT PIPE CLAMP TO PREVENT CRUSHING OF FLUSH LINE.



3 DETAIL: PUMP INTAKE
SCALE IN FEET



2 SECTION: PUMP STATION
SCALE IN FEET



4 SECTION: PUMP INTAKE
SCALE IN FEET

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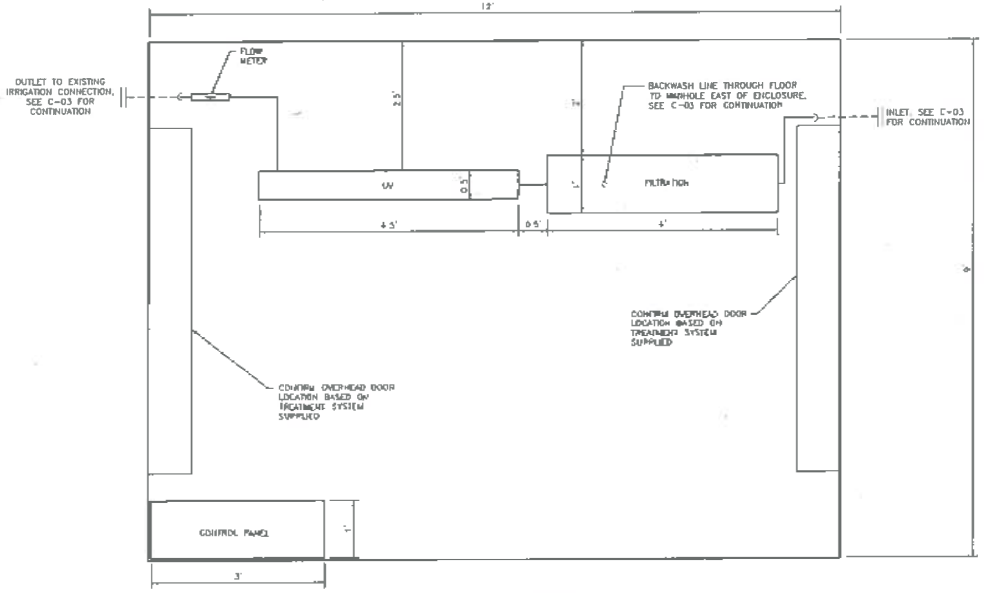
Scale	AS SHOWN
Date	01/13/2017
Drawn	AMP
Checked	AMP
Designed	MTS
Approved	JAK2

RILEY-PURGATORY-BLUFF CREEK WATERSHED DISTRICT

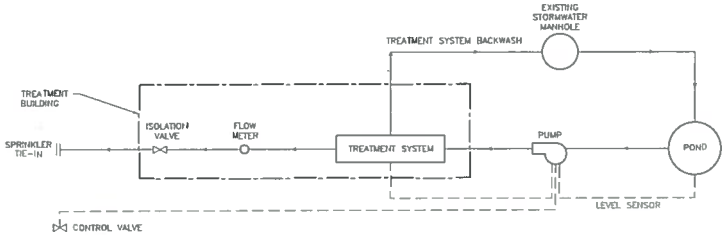
CHAN HIGH SCHOOL STORMWATER REUSE
CHANHASSEN, MINNESOTA
PUMPING AND PIPING
PLANS, SECTIONS, AND DETAILS

BARR PROJECT No. 23/27-0053.14
CLIENT PROJECT No.
DWG. No. C-04
REV. No. C



1 PLAN: TREATMENT SYSTEM BUILDING

SCALE IN FEET

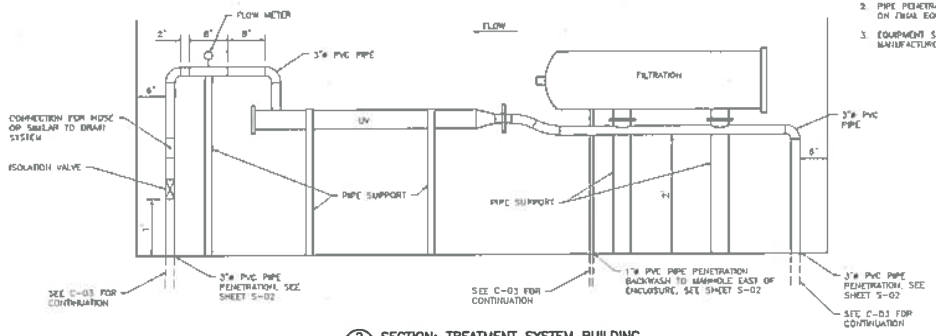


3 PROCESS FLOW DIAGRAM: TREATMENT SYSTEM

NO SCALE

NOTES:

1. FINAL PIPING AND EQUIPMENT DIMENSIONS SUBJECT TO CHANGE/FINAL EQUIPMENT SELECTION
2. PIPE PENETRATIONS WILL BE DETERMINED BASED ON FINAL EQUIPMENT SELECTION
3. EQUIPMENT SUPPORTS TO BE SUPPLIED BY MANUFACTURER



2 SECTION: TREATMENT SYSTEM BUILDING

SCALE IN FEET

100% DRAFT
NOT FOR CONSTRUCTION

NO.	BY	CHK	APP	DATE	REVISION DESCRIPTION

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

PRINTED NAME

SIGNATURE

DATE LICENSE #

	8/31/17	8/31/17	8/31/17				
CLIENT							
BID							
CONSTRUCTION							
RELEASED TO/FOR	A	B	C	0	1	2	3
DATE RELEASED							

BARR

Project Office
BARR ENGINEERING CO.
4300 MARKETPOINTE DRIVE
Suite 200
MINNEAPOLIS, MN 55435

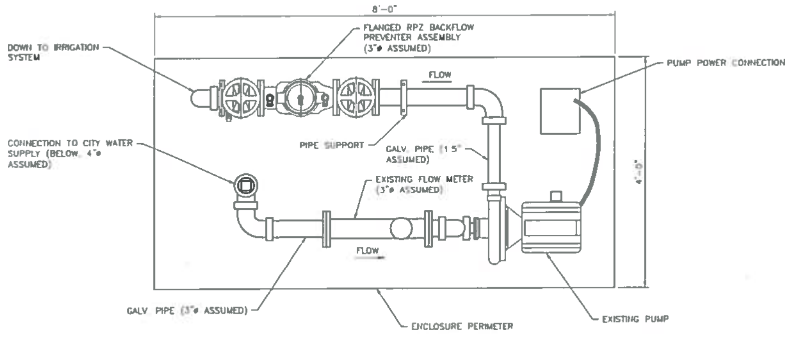
Scale	AS SHOWN
Date	01/16/2017
Drawn	EBF
Checked	MAS
Designed	KMB
Approved	JAR 2

RILEY–PURGATORY–BLUFF CREEK WATERSHED DISTRICT

CHAN HIGH SCHOOL STORMWATER REUSE
CHANHASSEN, MINNESOTA

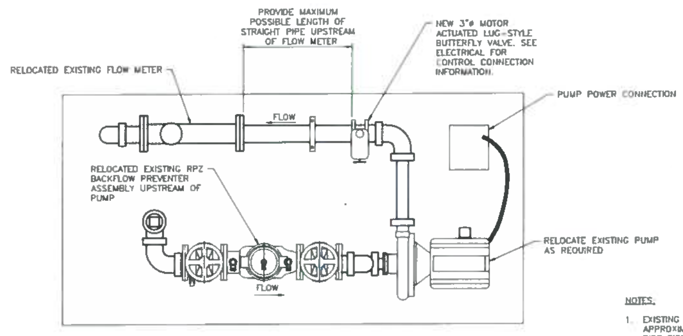
TREATMENT SYSTEM
PLAN, SECTION, AND PROCESS FLOW DIAGRAM

BARR PROJECT No. 23/27–0053.14
CLIENT PROJECT No.
DWG No. C–05
REV No. C



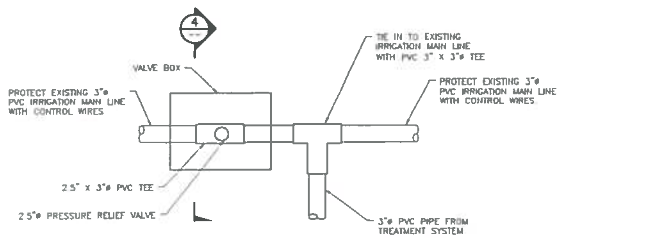
1 PLAN: EXISTING CITY WATER CONNECTION BOX

0 1 2 SCALE IN FEET



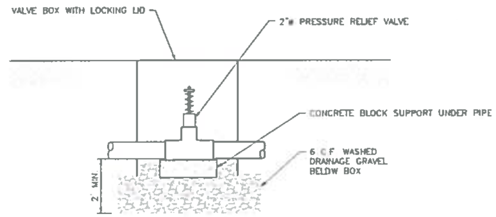
2 PLAN: CITY WATER CONNECTION BOX MODIFICATIONS

0 1 2 SCALE IN FEET



3 DETAIL: IRRIGATION CONNECTION
NOT TO SCALE

NOTE: SEE ELECTRICAL FOR INFORMATION ABOUT NEW WIRE CONNECTIONS FROM THE TREATMENT SYSTEM



4 SECTION: PRESSURE RELIEF VALVE
NOT TO SCALE

NOTES:

1. EXISTING CITY WATER CONNECTION BOX LAYOUT SHOWN IS APPROXIMATE. FIELD VERIFY LAYOUT, DIMENSIONS AND PIPE SIZES.
2. PROTECT EXISTING EQUIPMENT. REPLACE IN-KIND EQUIPMENT DAMAGED BY CONTRACTOR DURING CONSTRUCTION WITH NEW EQUIPMENT AT NO COST TO OWNER.
3. SUBMIT CHANGES TO MODIFIED LAYOUT SHOWN FOR ENGINEER APPROVAL PRIOR TO EXECUTION.

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NO.	BY	CHK.	APP.	DATE	REVISION DESCRIPTION

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SIGNATURE ______
DATE ______ LICENSE # ______

RELEASED TO/FOR	A	B	C	0	1	2	3
CLIENT							
BID							
CONSTRUCTION							
	DATE RELEASED						

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Corporate Headquarters: Minneapolis, Minnesota Ph: 1-800-632-2277
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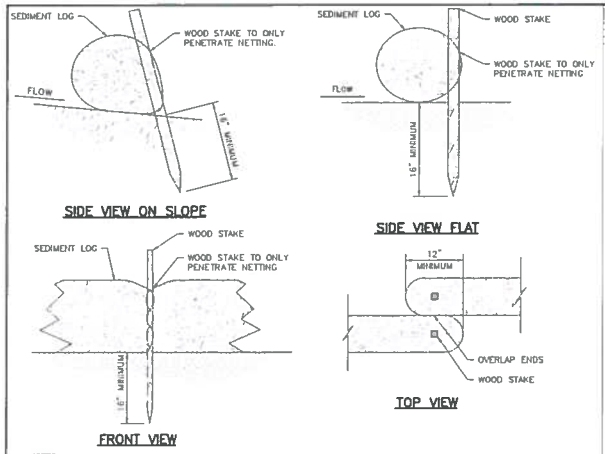
Scale	AS SHOWN
Date	02/17/2017
Drawn	AMP
Checked	JAK2
Designed	AMP
Approved	JAK2

RILEY-PURGATORY-BLUFF CREEK WATERSHED DISTRICT

CHAN HIGH SCHOOL STORMWATER REUSE
CHANHASSEN, MINNESOTA

IRRIGATION SYSTEM MODIFICATONS
PLANS, SECTION, AND DETAIL

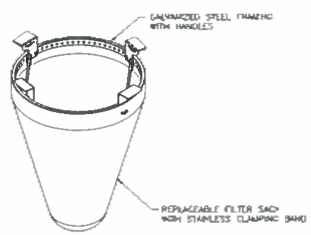
BARR PROJECT No. 23/27-0053.14
CLIENT PROJECT No.
DWG. No. C-06
REV. No. C



NOTES

1. INSTALL SEDIMENT LOG ALONG CONTOURS (CONSTANT ELEVATION)
2. NO GAPS SHALL BE PRESENT UNDER SEDIMENT LOG. PREPARE AREA AS NEEDED TO SMOOTH SURFACE OR REMOVE DEBRIS.
3. REMOVE ACCUMULATED SEDIMENT WHEN REACHING 1/3 OF LOG HEIGHT
4. MAINTAIN SEDIMENT LOG THROUGHOUT THE CONSTRUCTION PERIOD AND REPAIR OR REPLACED AS REQUIRED

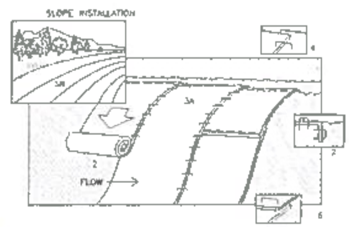
1 / C-01 DETAIL: EROSION LOG – STAKING
NOT TO SCALE



NOTES

1. INSTALL INLET PROTECTION PRIOR TO ANY GRADING WORK IN THE AREA TO BE PROTECTED OR IMMEDIATELY FOLLOWING ANY CATCHBASIN INSTALLATION AND MAINTAIN THROUGHOUT THE CONSTRUCTION PERIOD.
2. MATERIALS SHALL BE SUFFICIENT TO ALLOW FLOW WHILE BLOCKING SEDIMENT. NO HOLES OR GAPS SHALL BE PRESENT IN/AROUND FILTER SACK
3. CLEAN FILTER SACK AND REMOVE ACCUMULATED SEDIMENT AS REQUIRED TO ALLOW FLOW INTO THE CATCHBASIN AND PREVENT SEDIMENT FROM LEAVING THE DEVICE
4. REMOVE DEVICE AND ANY ACCUMULATED SEDIMENT IN CONJUNCTION WITH THE FINAL GRADING AND SITE STABILIZATION.

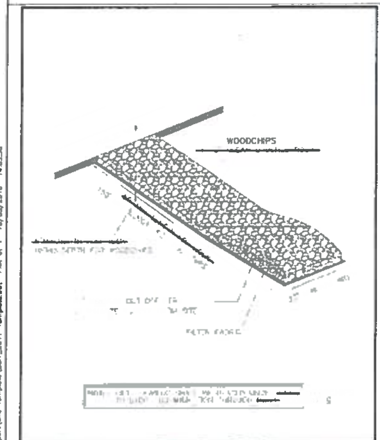
2 / C-01 DETAIL: INLET PROTECTION – FILTER SACK
NOT TO SCALE



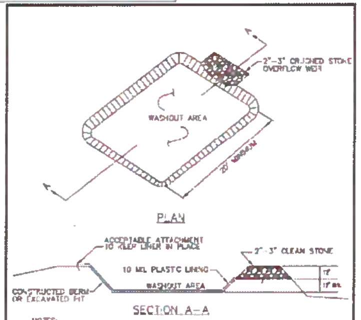
NOTES

1. REFER TO MANUFACTURER RECOMMENDATIONS FOR STAPLE PATTERNS FOR SLOPE INSTALLATIONS.
2. PREPARE SOIL BY LOOSENING TOP 1–2 INCHES AND APPLY SEED (AND FERTILIZER WHERE REQUIRED) PRIOR TO INSTALLING BLANKETS. GROUND SHOULD BE SMOOTH AND FREE OF DEBRIS.
3. BEGIN (A) AT THE TOP OF THE SLOPE AND ROLL THE BLANKETS DOWN OR (B) AT ONE END OF THE SLOPE AND ROLL THE BLANKETS HORIZONTALLY ACROSS THE SLOPE.
4. THE EDGES OF PARALLEL BLANKETS MUST BE STAPLED WITH APPROXIMATELY 6" OVERLAP WITH THE UPHILL BLANKET ON TOP
5. WHEN BLANKETS MUST BE SPLICED DOWN THE SLOPE, PLACE BLANKETS END OVER END (SHINGLE STYLE) WITH APPROXIMATELY 6" OVERLAP. STAPLE THROUGH OVERLAPPED AREA, APPROXIMATELY 12" APART
6. BLANKET MATERIALS SHALL BE AS SPECIFIED OR AS APPROVED BY ENGINEER

3 / C-01 DETAIL: EROSION CONTROL BLANKET – INSTALLATION
NOT TO SCALE

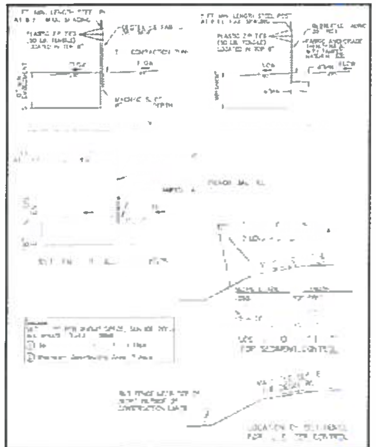


CITY OF CHANHASSEN — ~~ROCK~~ WOODCHIP CONSTRUCTION ENTRANCE — ENGINEERING DEPARTMENT — PLATE NO: 5301

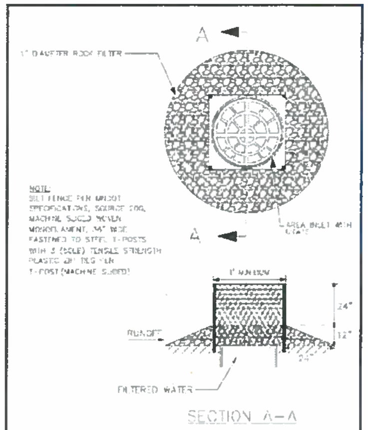


NOTES:
1) LOCATION OF THE WASHOUT AREA SHALL BE AT THE DISCRETION OF THE CONTRACTOR BUT IT MUST BE SHOWN ON THE PLANS AND MUST BE IDENTIFIED ON-SITE USING SIGNAGE. THE WASHOUT AREA SHALL BE AT LEAST THE MINIMUM DISTANCE FROM THE RIGHT OF WAY AS REQUIRED BY LOCAL JURISDICTION. THE WASHOUT AREA SHALL BE LOCATED IN SUCH A MANNER SO THAT CONCRETE TRUCKS MAY PASS THROUGH THE WASHOUT AREA PRIOR TO THE STABILIZED ROCK CONSTRUCTION EXIT.
2) HARDENED MATERIAL SHALL BE BROKEN UP AND CLEANED OUT AS NEEDED TO MAINTAIN A FUNCTIONING WASHOUT AREA VOLUME OR AS DIRECTED BY THE ENGINEER.
3) THE WASHOUT AREA MUST BE GREATER THAN 50 FEET FROM ANY TREES.
4) THE WASHOUT AREA MUST BE SELF CONTAINED AND WATER TIGHT.

CITY OF CHANHASSEN — CONCRETE WASHOUT AREA — ENGINEERING DEPARTMENT — PLATE NO: 5304



CITY OF CHANHASSEN — SILT FENCE — ENGINEERING DEPARTMENT — PLATE NO: 5300



CITY OF CHANHASSEN — OFFROAD CATCHBASIN FILTER BARRIER — ENGINEERING DEPARTMENT — PLATE NO: 5302

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Scale	AS SHOWN
Date	01/16/2017
Drawn	BDP
Approved	JAK2
Client	RILEY–PURGATORY–BLUFF CREEK WATERSHED DISTRICT
Project	CHAN HIGH SCHOOL STORMWATER REUSE, CHANHASSEN, MINNESOTA
Title	EROSION CONTROL DETAILS
BARR PROJECT No.	23/27-0053.14
DWG. No.	C-07
REV. No.	C

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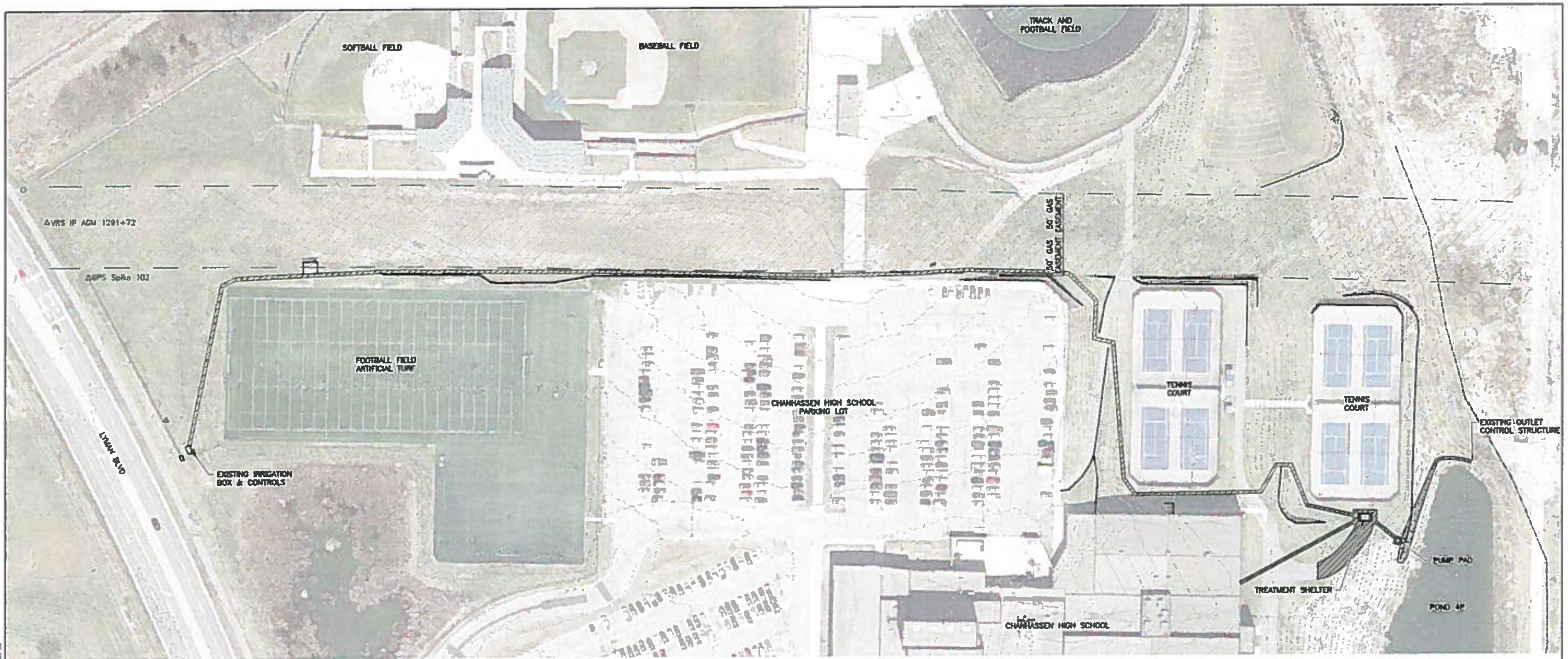

1 PLAN: LANDSCAPE RESTORATION

0 60 120
SCALE IN FEET

LEGEND

- CONSTRUCTION LIMITS
- WETLAND BOUNDARY
- EXISTING 10' CONTOUR
- EXISTING 2' CONTOUR
- EXISTING FENCE
- EXISTING OVERHEAD ELECTRIC
- EXISTING STORM SEWER
- EXISTING WALL
- APPROXIMATE NATURAL GAS EASEMENT
- LOW-MAINTENANCE TURF SEEDING
- PRAIRIE SEEDING MESIC PRAIRIE SOUTHEAST
- EROSION CONTROL BLANKET. SEE DETAIL 3 ON SHEET C-07

100% DRAFT
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NO.	BY	CHK.	APP.	DATE	REVISION DESCRIPTION

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Scale	AS SHOWN
Date	01/16/2017
Drawn	BDP
Checked	
Designed	
Approved	JAK2

RILEY-PURGATORY-BLUFF CREEK WATERSHED DISTRICT

CHAN HIGH SCHOOL STORMWATER REUSE
CHANHASSEN, MINNESOTA

LANDSCAPE RESTORATION PLAN

BARR PROJECT No. 23/27-0053.14
CLIENT PROJECT No.
DWG. No. L-01
REV. No. C

CADD USER: Bryan D. Pittorle FILE: M:\DESIGN\23270053.14\23270053.14_CHAN_HIGH_L-01.DWG PLOT SCALE: 1:2 PLOT DATE: 3/29/2017 3:21 PM
BARR: M:\AutoCAD 2011\AutoCAD 2011 Support\wru\Template\Barr_2011_Template.dwt Plot at 1 10/05/2010 14:03:50

1.0 GENERAL REQUIREMENTS

A. GENERAL
1. THESE NOTES ARE COMPLEMENTARY TO THE SPECIFICATIONS AND DRAWINGS AND REPRESENT MINIMUM REQUIREMENTS. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
2. DO NOT SCALE DRAWINGS.
3. THE STRUCTURAL DRAWINGS REPRESENT THE FINISHED STRUCTURE AND, EXCEPT WHERE SPECIFICALLY SHOWN, DO NOT INDICATE THE METHOD OR MEANS OF CONSTRUCTION.
4. FOLLOW MANUFACTURER'S INSTRUCTIONS FOR PREPARATION AND INSTALLATION OF PURCHASED MATERIALS AND EQUIPMENT.
5. TESTS WILL BE PAID FOR BY THE OWNER. HOWEVER, IN THE EVENT THAT WORK IS DEFECTIVE, THE CONTRACTOR WILL PAY FOR THE TESTS AND ANY ADDITIONAL TESTING AND WORK REQUIRED TO CONFIRM THAT THE DEFECTIVE WORK HAS BEEN CORRECTED AND COMPLIES WITH THIS SPECIFICATION.

B. GOVERNING CODES
1. PERFORM WORK IN COMPLIANCE WITH APPLICABLE FEDERAL, STATE AND LOCAL CODES AND REGULATIONS.
   a. 2012 INTERNATIONAL BUILDING CODE AND REFERENCED STANDARDS W/ 2015 MINNESOTA STATE BUILDING CODE (MSBC) AMENDMENTS.

C. DESIGN CRITERIA FOR LOADS
1. GENERAL:
   a. PER ASCE 7-10
   b. RISK CATEGORY I
2. DEAD LOAD:
   a. MECHANICAL/PIPING = 5 PSF
   b. ROOF DEAD LOAD = 10 PSF
3. LIVE LOAD
   a. FLOOR LIVE LOAD (EQUIPMENT AREAS) LL = 100 PSF OR CONCENTRATED LOAD OF 1000 LBF
   b. ROOF LIVE LOAD = 20 PSF
4. EQUIPMENT LOAD
   a. TBD
5. SNOW LOAD
   a. GROUND SNOW (P_g) = 50 PSF
   b. FLAT ROOF SNOW (P_f) = 31 PSF
   c. EXPOSURE FACTOR (C_e) = 0.9
   d. IMPORTANCE FACTOR (I) = 0.8
   e. THERMAL FACTOR (C_t) = 1.2 (UNHEATED)
6. WIND LOAD:
   a. ULTIMATE DESIGN WIND SPEED (3-SECOND GUST) [V_{ult}] = 105 MPH
   b. INTERNAL PRESSURE COEFFICIENT (GC_{pi}) = +0.18/-0.18
   c. EXPOSURE CATEGORY = C
   d. SURFACE ROUGHNESS = C
   e. WIND DIRECTIONALITY FACTOR (K_d) = 0.85
   f. TOPOGRAPHIC FACTOR (K_{zt}) = 1.0
   g. GUST EFFECT FACTOR = 0.85
   h. ENCLOSURE CLASSIFICATION = ENCLOSED
   i. VELOCITY PRESSURE EXPOSURE COEFFICIENT (K_z) = 0.85
   j. COMPONENTS AND CLADDING DESIGN WIND PRESSURE = VARIES
7. SEISMIC LOAD (NOT APPLICABLE MSBC RULE 1305.0811 SUBP 4)
   a. IMPORTANCE FACTOR (I) = 1.0
   b. MAPPED SPECTRAL RESPONSE ACCELERATIONS (S_s) = 0.030 g (S_1) = 0.02A g
   c. SITE CLASS D
   d. SPECTRAL RESPONSE COEFFICIENTS (S_{DS}) = 0.053 g (S_{D1}) = 0.043 g
   e. SEISMIC DESIGN CATEGORY = A
   f. BASIC SEISMIC-FORCE-RESISTING SYSTEM(S): N/A
   g. DESIGN BASE SHEAR = N/A
   h. SEISMIC RESPONSE COEFFICIENT (C_S) = N/A
   i. RESPONSE MODIFICATION FACTOR (R) = N.A
   j. ANALYSIS PROCEDURE USED: N/A

D. GEOTECHNICAL INFORMATION
1. BARR ENGINEERING COMPANY, "GEOTECHNICAL INVESTIGATION", FEBRUARY 2017

E. EXISTING CONDITIONS
1. PRIOR TO CONVENCING WORK AT THE SITE, CONTACT GOPHER STATE ONE AND HAVE ALL EXISTING UTILITIES FIELD LOCATED AND MARKED. PROTECT EXISTING UTILITIES UNLESS OTHERWISE INDICATED. REPAIR OR REPLACE ANY UTILITIES DAMAGED BY CONTRACTOR AT CONTRACTOR'S EXPENSE.
2. VERIFY ALL EXISTING CONDITIONS SHOWN ON DRAWINGS FOR ACCURACY. VERIFICATION OF FIELD DIMENSIONS ARE NOT PART OF THE ENGINEER'S RESPONSIBILITY.
3. NOTIFY OWNER IMMEDIATELY IF SITE CONDITIONS OR UTILITIES DIFFER SIGNIFICANTLY FROM THAT SHOWN.
4. DO NOT DISTURB EXISTING VEGETATION AREAS OUTSIDE OF CONSTRUCTION LIMITS.

F. SAFETY:
1. CONTRACTOR IS RESPONSIBLE FOR JOB-SITE CONDITIONS AND SAFETY PROCEDURES AND PROGRAMS. THIS REQUIREMENT APPLIES CONTINUOUSLY AND IS NOT LIMITED TO NORMAL WORKING HOURS.
2. MEET ALL FEDERAL, STATE, AND LOCAL RULES AND REGULATIONS PERTAINING TO SAFETY, INCLUDING OSHA AND MNOSHA RULES.
3. SECURE THE SITE FOR PUBLIC SAFETY FOR THE DURATION OF THE WORK.

G. PHASING
1. COORDINATE CONSTRUCTION PHASING WITH OWNER. COORDINATE CONSTRUCTION LIMITS FOR ALL PHASES OF WORK.
2. PHASE WORK TO MINIMIZE EXPOSED SOIL AND EROSION POTENTIAL.

H. TRAFFIC MANAGEMENT
1. TAKE ALL NECESSARY PRECAUTIONS TO EFFECTIVELY ADDRESS VEHICLE AND PEDESTRIAN TRAFFIC, ACCESSIBILITY AND WORKER SAFETY DURING CONSTRUCTION.

2.0 EXCAVATION, SUBGRADE PREPARATION, BACKFILL, & COMPACTION

A. GENERAL
1. COORDINATE THE EXCAVATION, SUBGRADE PREPARATION, BACKFILL, COMPACTION, AND GRADING ACTIVITIES WITH THE DRAWINGS.

B. SUBMITTALS
1. GROUNDWATER AND SURFACE WATER CONTROL PLAN.
2. SUBGRADE STRENGTH AND UNIFORMITY VERIFICATION METHOD.
3. SUBGRADE INSPECTION REPORT FOR EACH FOUNDATION COMPLETED BY A GEOTECHNICAL ENGINEER.
4. GRAIN SIZE ANALYSIS, NATURAL MOISTURE CONTENT, STANDARD PROCTOR MAXIMUM DRY DENSITY AND ATTERBERG LIMITS (FOR COHESIVE MATERIALS) FOR FILL MATERIALS.
5. COMPACTION TEST RESULTS FOR FILL INDICATING LOCATION OF TEST, DRY DENSITY, AND MOISTURE CONTENT OF PLACED FILL.

C. PRODUCTS
1. STRUCTURAL FILL
   a. WELL GRADED (PER UNIFIED SOIL CLASSIFICATION SYSTEM) GRANULAR SOIL CONSISTING OF GRAVEL AND SAND, OR
   b. CRUSHED STONE WITH A MAXIMUM PARTICLE SIZE OF 1½" AND LESS THAN 5% PASSING THE NO. 200 SIEVE AND FREE OF VEGETATION, DEBRIS, ROOTS, STICKS, BRUSH, AND NON-SOIL MATERIALS
2. NON-FROST SUSCEPTIBLE FILL: GRANULAR SOIL CONSISTING OF GRAVEL, SAND OR CRUSHED STONE HAVING A MAXIMUM PARTICLE SIZE OF 4", NO LESS THAN 70% PASSING THE 3" SIEVE, AND LESS THAN 5% PASSING THE NO. 200 SIEVE AND FREE OF VEGETATION, DEBRIS, ROOTS, STICKS, BRUSH, AND NON-SOIL MATERIALS.
3. COMMON FILL: SUITABLE UNFROZEN MATERIALS EXCAVATED FROM THE FOUNDATION SITE OR IMPORTED AS NECESSARY AND PROCESSED TO THE SPECIFIED REQUIREMENTS BELOW.
   a. MATERIALS BACKFILLED WITHIN 1' FROM OF ANY CONCRETE: FINE, WELL GRADED MATERIAL WITH PARTICLE SIZE NO GREATER THAN 3".
   b. REMAINING BACKFILL TO MEET THE DENSITY REQUIREMENTS, FREE OF VEGETATION, DEBRIS, ROOTS, STICKS, BRUSH AND NON-SOIL MATERIALS, AND PLACED USING METHODS THAT WILL PREVENT VOIDS FROM OCCURRING.
   c. COHESIVE MATERIALS HAVING LIQUID LIMIT VALUES OF 40% OR LESS AND PLASTICITY INDICES OF 15% OR LESS.

D. EXECUTION
1. EXCAVATE SOILS TO THE LIMITS INDICATED, USING TECHNIQUES THAT WILL MINIMIZE DISTURBANCE.
2. CONTROL SURFACE AND GROUNDWATER FLOWS INTO THE EXCAVATION.
3. IF GRANULAR SOILS ARE ENCOUNTERED ACROSS THE ENTIRE FOOTPRINT OF THE FOUNDATION, SURFACE COMPACT THE TOP OF THE SUBGRADE TO CONSOLIDATE LOOSE SOILS CREATED DURING EXCAVATION. REFER TO THE GEOTECHNICAL REPORT FOR RECOMMENDED SUBGRADE PREPARATION TECHNIQUES.
4. PRIOR TO PLACING CONCRETE, HAVE A PROFESSIONAL GEOTECHNICAL ENGINEER (OR A PERSON UNDER THE GEOTECHNICAL ENGINEER'S DIRECT SUPERVISION) INSPECT THE SUBGRADE CONDITIONS AND RECORD THE SOIL TYPE ENCOUNTERED, GROUNDWATER CONDITIONS, OR OTHER SUBSURFACE CONDITIONS. PREPARE AND SUBMIT A SUBGRADE INSPECTION REPORT FOR EACH FOUNDATION THAT INCLUDES THE FOLLOWING:
   a. VERIFICATION THAT OBSERVATIONS TAKEN ARE CONSISTENT WITH THE OBSERVATIONS CONTAINED IN THE GEOTECHNICAL REPORT.
   b. METHODS AND RESULTS TO VERIFY SUBGRADE STRENGTH AND UNIFORMITY.

   IF SOIL CONDITIONS ARE ENCOUNTERED THAT ARE NOT CONSISTENT WITH THE GEOTECHNICAL REPORT, SUBGRADE IS NON-UNIFORM, OR STRENGTH IS INSUFFICIENT, OBTAIN WRITTEN INSTRUCTIONS FROM THE FOUNDATION ENGINEER AS TO THE MEANS OF CORRECTION TO BE UNDERTAKEN. OBTAIN WRITTEN CONFIRMATION FROM THE GEOTECHNICAL ENGINEER THAT THE SPECIFIED CORRECTIVE ACTIONS WERE COMPLETED.
5. BACKFILL AND COMPACTION: PLACE AND COMPACT MATERIALS TO THE LIMITS, DEPTH AND DRY DENSITY INDICATED ON THE DRAWINGS.
   a. STRUCTURAL FILL – PLACE IN MAXIMUM LOOSE LIFTS OF 9 INCHES OR LESS TO ACHIEVE THE SPECIFIED DENSITY. COMPACT TO A MINIMUM OF 98% STANDARD PROCTOR.
   b. GRANULAR FILL – PLACE IN MAXIMUM LOOSE LIFTS OF 12 INCHES OR LESS TO ACHIEVE THE SPECIFIED DENSITY. COMPACT TO A MINIMUM OF 98% STANDARD PROCTOR.
   c. COMMON FILL – PLACE IN MAXIMUM LOOSE LIFTS OF 12 INCHES OR LESS TO ACHIEVE THE SPECIFIED DENSITY. COMPACT TO A MINIMUM OF 95% STANDARD PROCTOR.
   d. BACKFILL MAY BE PLACED WHEN THE ADJACENT CONCRETE HAS REACHED 2,000 PSI.
   e. BACKFILL ALL SIDES OF FOUNDATION WALLS OR PIERS EVENLY.
6. GRADING TOLERANCE: ± 0.1 FEET

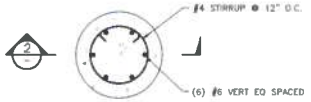
E. TESTING
1. FOR EVERY 1000 CUBIC YARDS (OR CHANGE IN MATERIAL TYPE) OF PLACED STRUCTURAL, GRANULAR, OR COMMON FILL, OBTAIN SAMPLES OF MATERIALS AND PERFORM AND SUBMIT GRAIN SIZE ANALYSIS PER ASTM D422, MOISTURE CONTENT PER ASTM D2216, STANDARD PROCTOR MAXIMUM DRY DENSITY PER ASTM D698, AND ATTERBERG LIMITS (FOR COHESIVE MATERIALS) PER ASTM D4318.
2. FOR ALL PLACED AND COMPACTED STRUCTURAL, GRANULAR, OR COMMON FILL, PERFORM AND SUBMIT ONE DENSITY TEST PER LIFT (PER 1000 SQUARE FEET ON SLABS-ON-GRADE AND PER 25 LINEAL FEET ON WALLS AND FOOTINGS) INDICATING TEST LOCATION, DRY DENSITY AND MOISTURE CONTENT PER ASTM D6938.

3.0 CONCRETE

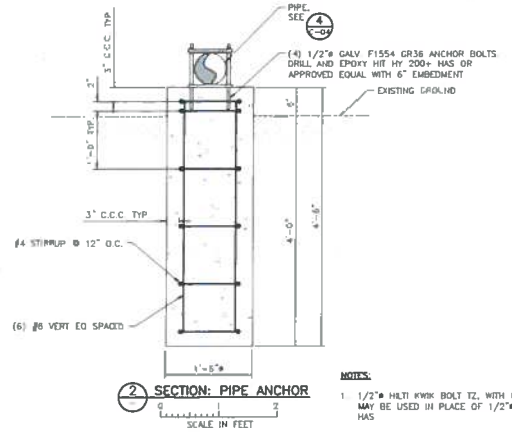
A. SEE DIVISION 03 SPECIFICATIONS

4.0 PRE-ENGINEERED BUILDING

A. SEE DIVISION 13 SPECIFICATIONS



1 PLAN: PIPE ANCHOR
SCALE IN FEET



2 SECTION: PIPE ANCHOR
SCALE IN FEET

NOTES:
1. 1/2"ø HILTI KWIK BOLT TZ, WITH 6" EMBEDMENT MAY BE USED IN PLACE OF 1/2"ø HIT HY 200+ HAS

100% DRAFT
NOT FOR CONSTRUCTION

NO.	BY	CHK	APP	DATE	REVISION DESCRIPTION

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PRINTED NAME _____
SIGNATURE _____
DATE _____ LICENSE # _____

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DATE RELEASED							

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

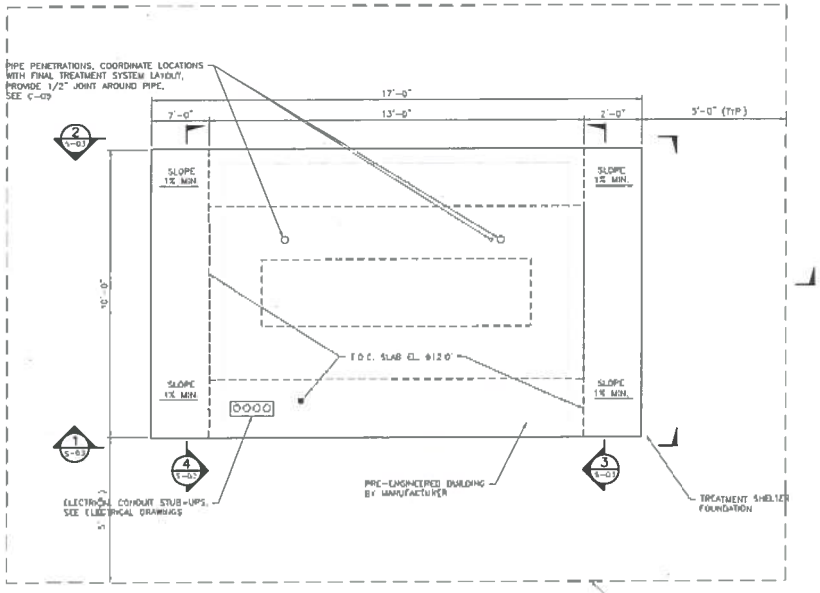
Scale	AS SHOWN
Date	01/16/2017
Drawn	BDP
Checked	WBJ
Designed	BARR
Approved	

RILEY–PURGATORY–BLUFF CREEK WATERSHED DISTRICT

CHAN HIGH SCHOOL STORMWATER REUSE
CHANHASSEN, MINNESOTA

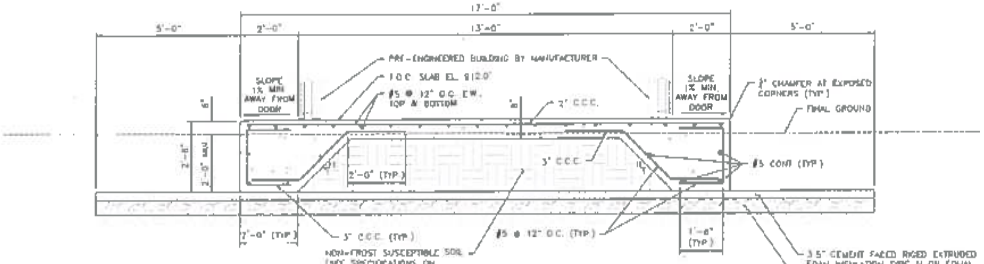
STRUCTURAL NOTES AND SPECIFICATIONS

BARR PROJECT No. 23/27-0053.14
CLIENT PROJECT No.
DWG No. S-01
REV No. C



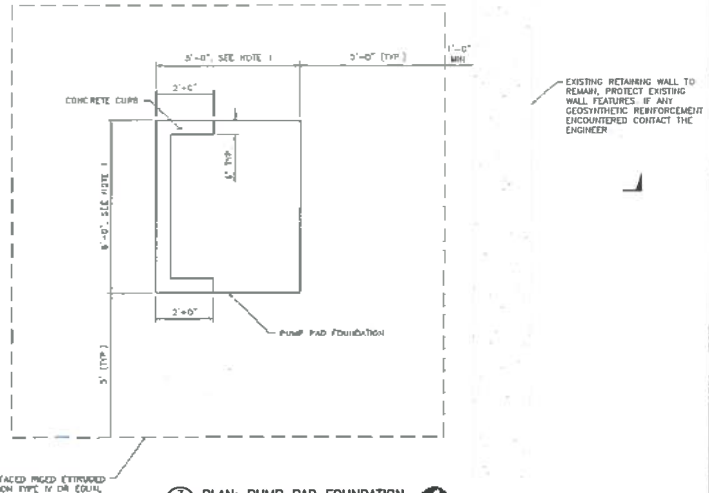
1 PLAN: TREATMENT SHELTER FOUNDATION

SCALE IN FEET



2 SECTION: TREATMENT SHELTER FOUNDATION

SCALE IN FEET

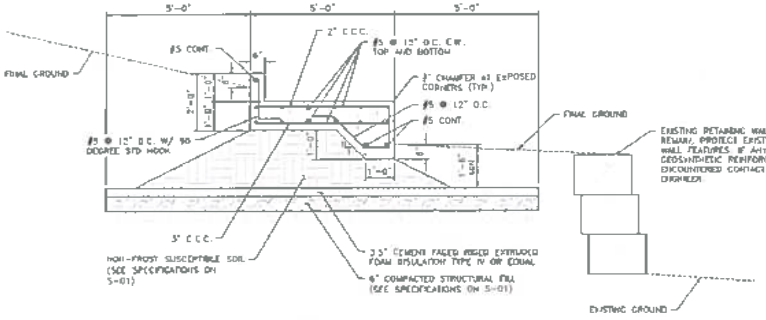


3 PLAN: PUMP PAD FOUNDATION

SCALE IN FEET

NOTES:

1. CONTRACTOR TO COORDINATE PAD DIMENSIONS WITH FINAL EQUIPMENT SELECTION.



4 SECTION: PUMP PAD FOUNDATION

SCALE IN FEET

NOTES:

1. CONTRACTOR TO COORDINATE PAD DIMENSIONS WITH FINAL EQUIPMENT SELECTION.

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SIGNATURE

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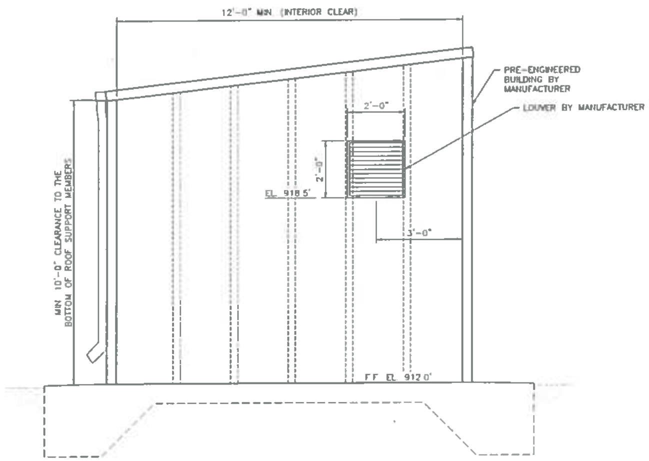
RILEY-PURGATORY-BLUFF CREEK WATERSHED DISTRICT

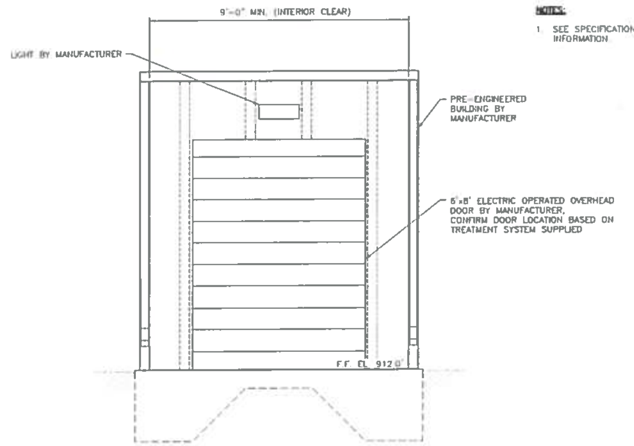
CHAN HIGH SCHOOL STORMWATER REUSE
CHANHASSEN, MINNESOTA

TREATMENT SHELTER AND PUMP PAD FOUNDATIONS

BARR PROJECT No. 23/27-0053.14
CLIENT PROJECT No.
DWG. No. S-02
REV. No. C



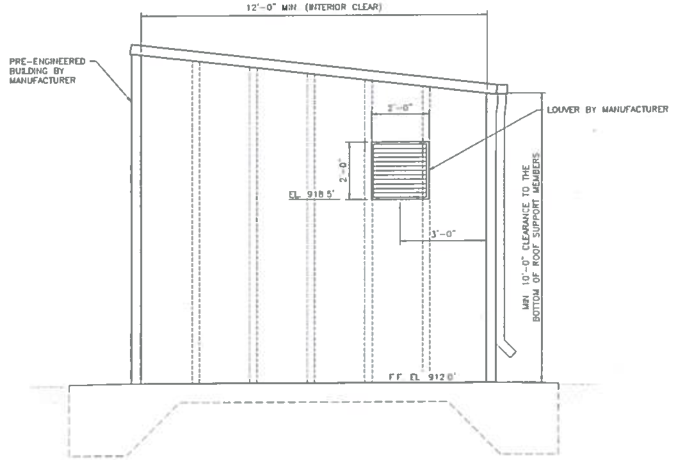
1 S-02 ELEVATION: SOUTH
0 1 2 3 4
SCALE IN FEET



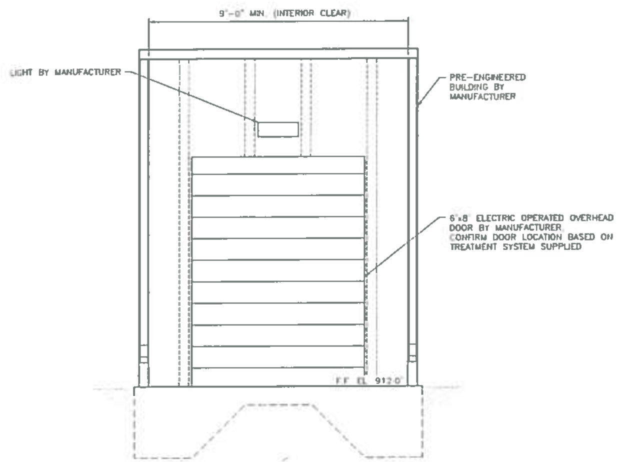
3 S-02 ELEVATION: WEST
0 1 2 3 4
SCALE IN FEET

NOTES:

1. SEE SPECIFICATIONS FOR ADDITIONAL INFORMATION



2 S-02 ELEVATION: NORTH
0 1 2 3 4
SCALE IN FEET



4 S-02 ELEVATION: EAST
0 1 2 3 4
SCALE IN FEET

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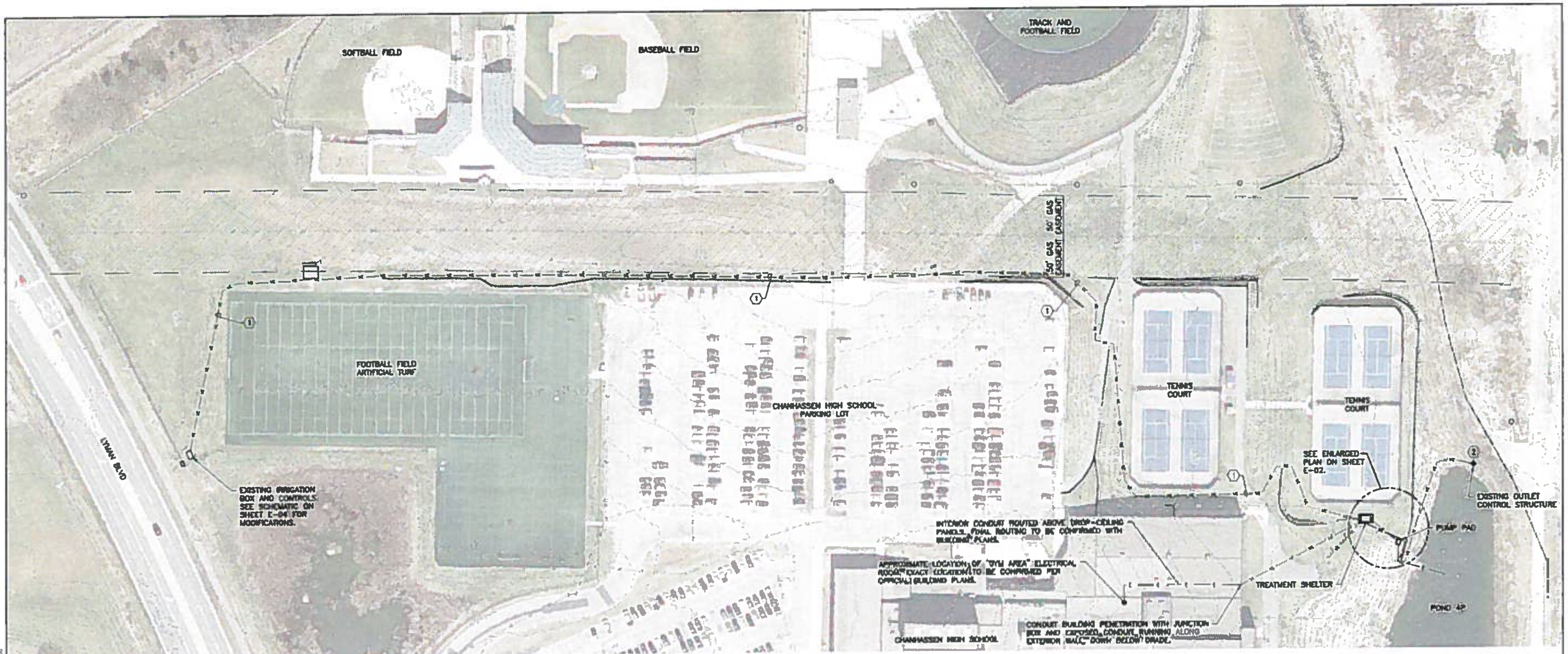
Designed	BARR
Approved	

RILEY-PURGATORY-BLUFF CREEK WATERSHED DISTRICT

CHAN HIGH SCHOOL STORMWATER REUSE
CHANHASSEN, MINNESOTA

TREATMENT SHELTER
ELEVATIONS

BARR PROJECT No. 23/27-0053.14
CLIENT PROJECT No.
DWG. No. S-03
REV. No. C



GENERAL NOTES:

1. CONDUCT ALL WORK SO THAT EXISTING FACILITIES REMAIN IN OPERATION DURING CONSTRUCTION. COORDINATE ALL OUTAGES AND CUTOVERS WITH OWNER AT LEAST TWO (2) WEEKS IN ADVANCE, AND ONLY TO OCCUR AT TIMES AND IN DURATIONS AS APPROVED BY OWNER.
2. FIELD CONFIRM LOCATIONS OF ALL EXISTING UNDERGROUND UTILITIES, CABLES, CONDUITS, ETC PRIOR TO CONSTRUCTION. CONTRACTOR SHALL REPAIR SUCH ITEMS AT NO COST IF DAMAGED BY CONTRACTOR.
3. PROVIDE TEMPORARY SUPPORT FOR EXISTING UNDERGROUND FACILITIES THAT WILL BE EXPOSED DUE TO GENERAL, STRUCTURAL AND PROCESS CONSTRUCTION.
4. EXISTING UNDERGROUND CIRCUITRY THAT IS TO REMAIN IS NOT ALL SHOWN.
5. NOT ALL NEW CIRCUITRY IS SHOWN ON PLAN. SEE ENLARGED PLANS, ONE-LINES, SCHEMATICS AND CABLE & CONDUIT SCHEDULE FOR ADDITIONAL CIRCUITRY REQUIREMENTS.
6. FIELD CONFIRM ALL CONDUIT AND CIRCUIT ROUTING.
7. USE DIRECTIONAL BORING OR SIMILAR METHOD FOR NEW CONDUITS TO BE INSTALLED UNDER EXISTING SIDEWALKS AND PAVEMENTS. WHERE PITS ARE OPENED, PATCH ALL SURFACES TO MATCH EXISTING.
8. CORE DRILL EXISTING STRUCTURES AS REQUIRED FOR NEW CONDUIT INSTALLATION. PATCH ALL SURFACES TO MATCH EXISTING. ALL CORE DRILL LOCATIONS SHALL BE VERIFIED WITH FIELD ENGINEER.
9. SEAL ALL CONDUITS TO EXTERIOR USING DUCTSEAL OR 1/2" THICKNESS SILICONE CAULK.

NUMBERED NOTES:

(1) FOUR (4) #14 TWISTED PAIR IRRIGATION CONTROL WIRES. HUNTER DECODER CABLE OR APPROVED EQUAL. PLACE 6" WIDE VINYL MARKING TAPE 15" ABOVE BURIED WIRES. MCMASTER-CARR NO. 8288T12 OR APPROVED EQUAL.

(2) SUBMERSIBLE LEVEL TRANSDUCER. SEE DETAIL ON SHEET E-03.

(1) PLAN: PROPOSED SITE – ELECTRICAL

0 60 120
SCALE IN FEET

WARNING

HIGH-PRESSURE PIPELINE(S)
EXCAVATION AND/OR CONSTRUCTION PROHIBITED WITHOUT COMPLIANCE WITH STATE ONE-CALL, AND WITHOUT WRITTEN PERMISSION FROM MAGELLAN PIPELINE COMPANY, L.P.
A MAGELLAN REPRESENTATIVE MUST BE PRESENT DURING WORK AROUND PIPELINE(S)

LEGEND

- CONSTRUCTION LIMITS
- WETLAND BOUNDARY
- EXISTING 10' CONTOUR
- EXISTING 2' CONTOUR
- EXISTING FENCE
- EXISTING SANITARY SEWER
- EXISTING STORM SEWER
- EXISTING IRRIGATION
- EXISTING WATER SUPPLY
- EXISTING NATURAL GAS
- EXISTING TELEVISION CABLE
- EXISTING OVERHEAD ELECTRIC
- EXISTING UNDERGROUND ELECTRIC
- EXISTING WALL
- APPROXIMATE NATURAL GAS EASEMENT

LEGEND – CONTINUED

- PROPOSED IRRIGATION
- PROPOSED UNDERGROUND ELECTRIC

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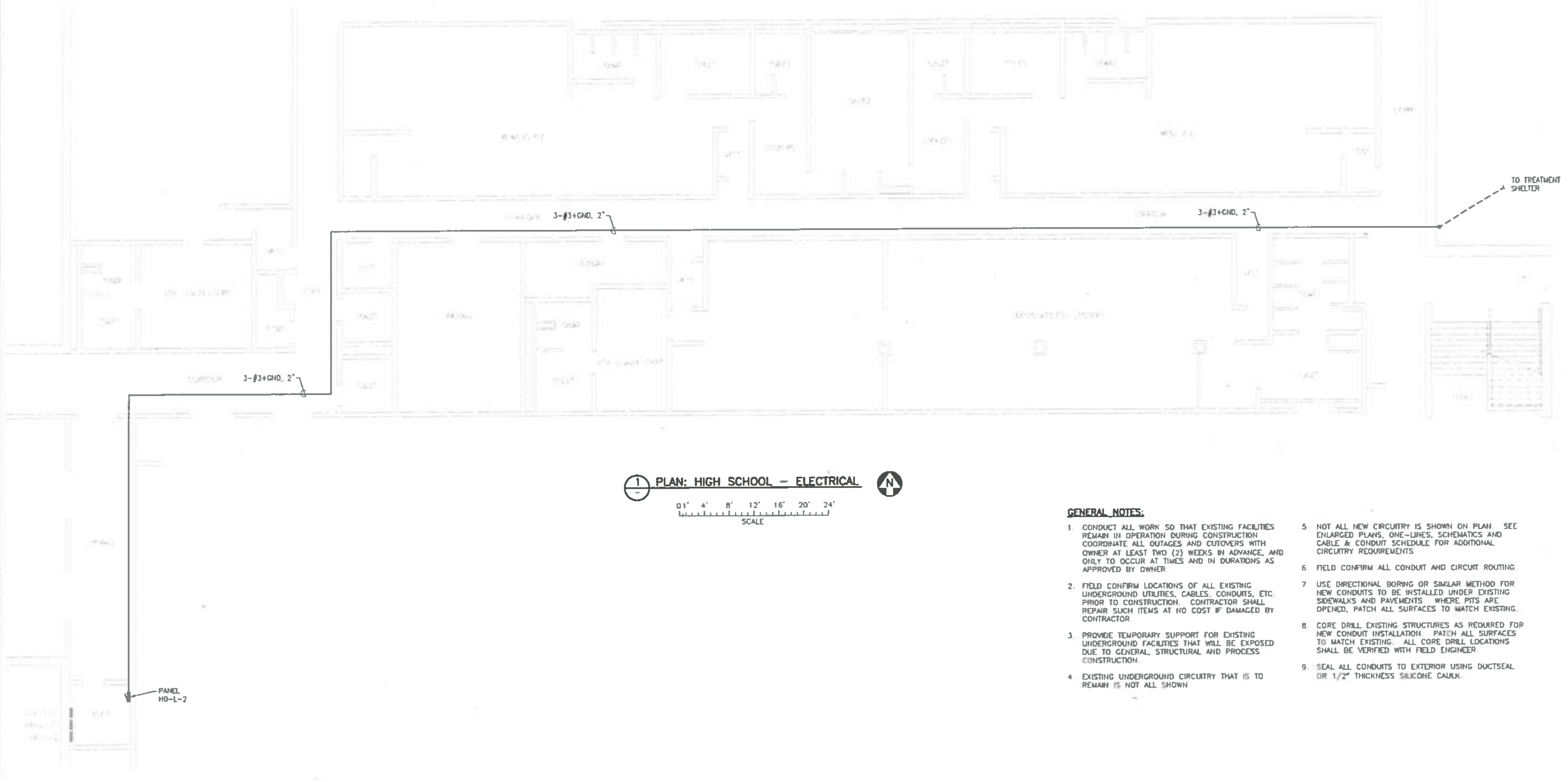
Scale	AS SHOWN
Date	01/16/2017
Drawn	BOP
Checked	JAK2
Designed	BARR
Approved	

RILEY–PURGATORY–BLUFF CREEK WATERSHED DISTRICT

CHAN HIGH SCHOOL STORMWATER REUSE
CHANHASSEN, MINNESOTA
ELECTRICAL SITE PLAN

BARR PROJECT No. 23/27-0053.14
CLIENT PROJECT No.
DWG. No. E-01
REV. No. B



1 PLAN: HIGH SCHOOL – ELECTRICAL

0 1' 4' 8' 12' 16' 20' 24' SCALE

GENERAL NOTES:

1. CONDUCT ALL WORK SO THAT EXISTING FACILITIES REMAIN IN OPERATION DURING CONSTRUCTION. COORDINATE ALL OUTAGES AND CUTOVERS WITH OWNER AT LEAST TWO (2) WEEKS IN ADVANCE, AND ONLY TO OCCUR AT TIMES AND IN DURATIONS AS APPROVED BY OWNER.
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6. FIELD CONFIRM ALL CONDUIT AND CIRCUIT ROUTING.
7. USE DIRECTIONAL BORING OR SIMILAR METHOD FOR NEW CONDUITS TO BE INSTALLED UNDER EXISTING SIDEWALKS AND PAVEMENTS. WHERE PITS ARE OPENED, PATCH ALL SURFACES TO MATCH EXISTING.
8. CORE DRILL EXISTING STRUCTURES AS REQUIRED FOR NEW CONDUIT INSTALLATION. PATCH ALL SURFACES TO MATCH EXISTING. ALL CORE DRILL LOCATIONS SHALL BE VERIFIED WITH FIELD ENGINEER.
9. SEAL ALL CONDUITS TO EXTERIOR USING DUCTSEAL OR 1/2" THICKNESS SILICONE CAULK.

100% DRAFT
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Date	01/16/2017
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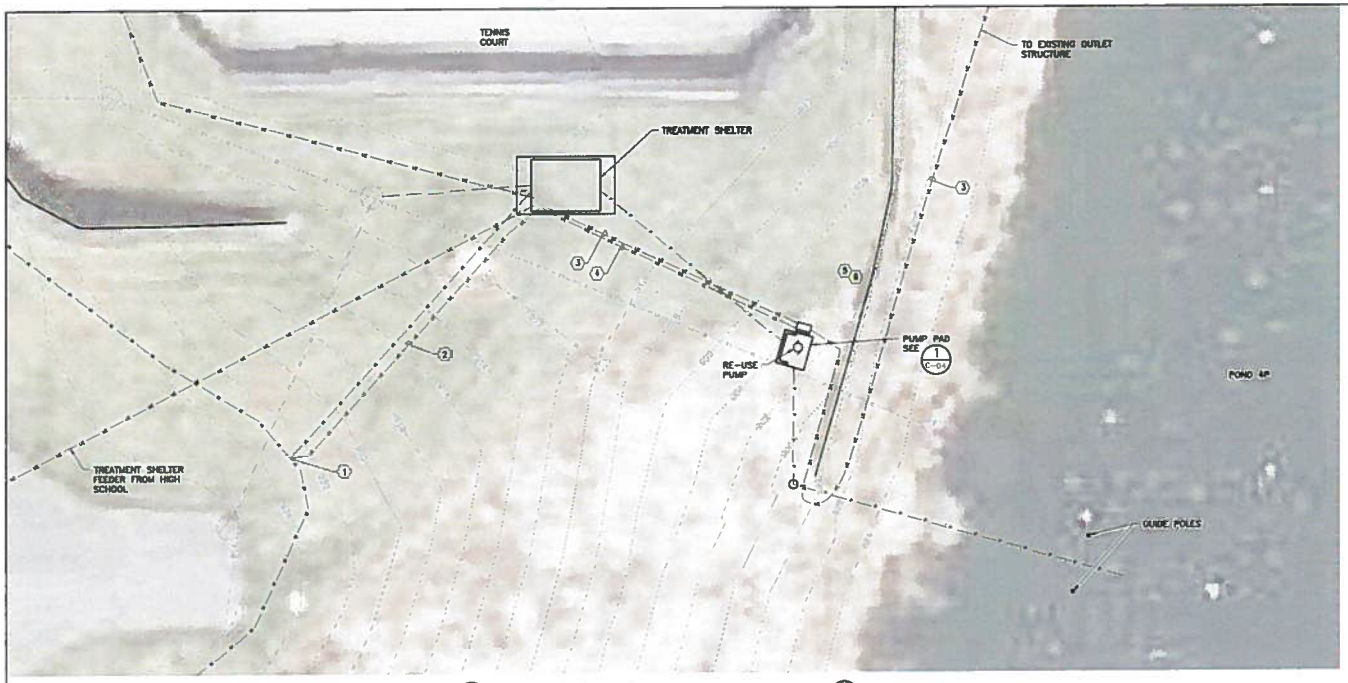
Checked	JAK2
Designed	BARR
Approved	

RILEY–PURGATORY–BLUFF CREEK WATERSHED DISTRICT

CHAN HIGH SCHOOL STORMWATER REUSE
CHANHASSEN, MINNESOTA

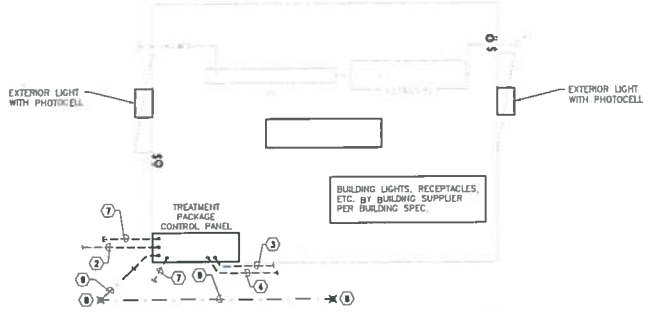
HIGH SCHOOL ELECTRICAL PLAN

BARR PROJECT No. 23/27-0053.14
CLIENT PROJECT No.
DWG. No. E-02
REV. No. B



1 PLAN: TREATMENT SHELTER AREA – ELECTRICAL

SCALE IN FEET



2 PLAN: TREATMENT SYSTEM BUILDING – ELECTRICAL

SCALE

LEGEND

- CONSTRUCTION LIMITS
- EXISTING 10' CONTOUR
- EXISTING 2' CONTOUR
- EXISTING STORM SEWER
- EXISTING IRRIGATION
- EXISTING UNDERGROUND ELECTRIC
- EXISTING WALL
- PROPOSED IRRIGATION
- PROPOSED UNDERGROUND ELECTRIC
- PROPOSED TREATMENT SHELTER
- PROPOSED PUMP PAD

GENERAL NOTES:

1. CONDUCT ALL WORK SO THAT EXISTING FACILITIES REMAIN IN OPERATION DURING CONSTRUCTION. COORDINATE ALL OUTAGES AND CUTOVERS WITH OWNER AT LEAST TWO (2) WEEKS IN ADVANCE, AND ONLY TO OCCUR AT TIMES AND IN DURATIONS AS APPROVED BY OWNER.
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9. SEAL ALL CONDUITS TO ENTHYDN USING DUCTSEAL OR 1/2" THICKNESS SILICONE CAULK.

NUMBERED NOTES:

1. CONNECT TO IRRIGATION MAIN COMMUNICATION LINE. SPLICE WIRES PER MANUFACTURER REQUIREMENTS.
2. DIRECT BURY #14 TWISTED PAIR IRRIGATION CONTROL WIRE. HUNTER DECODER CABLE OR APPROVED EQUAL.
3. 1" SCHEDULE 80 PVC CONDUIT FOR LEVEL SENSING INSTRUMENT CABLE.
4. 2" SCHEDULE 80 PVC CONDUIT FOR PUMP CABLES.
5. FABRICATE STAINLESS STEEL STRUT STAND. SEE DETAIL ON SHEET E-03.
6. PUMP DISCONNECT SWITCH AND INSTRUMENT CABLE JUNCTION BOX PER SCHEMATIC.
7. STUB 1" CONDUIT 24" BEYOND CONCRETE PAD FOR IRRIGATION CONTROL CIRCUITS.
8. 3/8" X 10' COPPER-CLAD GROUND ROD WITH EXOTHERMIC WELD TO CONDUCTORS SHOWN. SET TOP 12" DEEP.
9. #4/0 BARE COPPER GROUND CONDUCTOR, 12" DEEP.

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SIGNATURE _____

DATE _____ LICENSE # _____

CLIENT	SUBMITTAL DATE
BID	
CONSTRUCTION	

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Minneapolis, Minnesota
Ph: 1-800-632-2277

Scale	AS SHOWN
Date	01/16/2017
Drawn	BDP
Checked	JAK2
Designed	BARR
Approved	

RILEY–PURGATORY–BLUFF CREEK WATERSHED DISTRICT

CHAN HIGH SCHOOL STORMWATER REUSE
CHANHASSEN, MINNESOTA

TREATMENT SHELTER ELECTRICAL PLANS

BARR PROJECT NO. 23/27-0053.14
CLIENT PROJECT NO.
DWG. NO. E-03
REV. NO. B

CAD USER: Chad Larson FILE: W:\DESIGN\23270053.14\23270053314_CHAN_HIGH_E-01DWG PLOT SCALE: 1:2 PLOT DATE: 3/30/2017 9:23 AM
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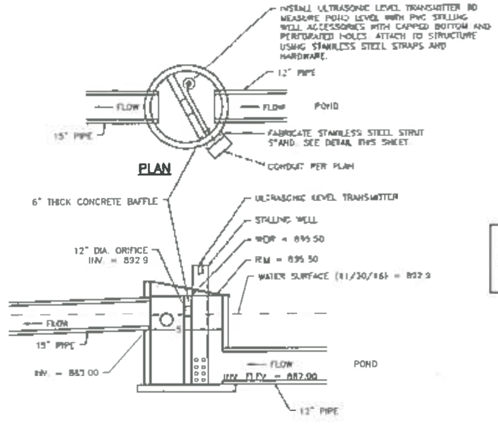
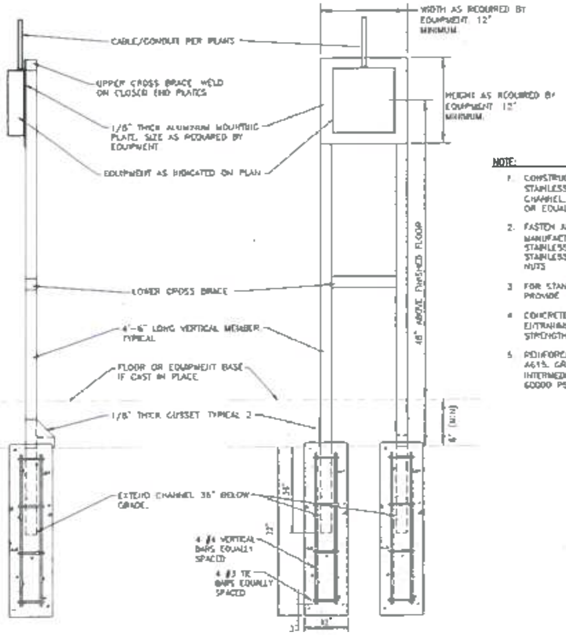


1 DETAIL: OUTLET CONTROL STRUCTURE

10 YEARS	893
2 YEAR	894
100 YEAR	896.65



2 STRUT MOUNTING STAND DETAIL

NOTE:

1. CONSTRUCT STAND USING TYPE 316 STAINLESS STEEL 1 5/8" x 1 5/8" CHANNEL B-LINE SERIES B24, OR OR EQUAL.
2. FASTEN ALL CONNECTIONS USING MANUFACTURER'S TYPE 316 STAINLESS STEEL CONNECTORS & STAINLESS STEEL BOLTS, WASHERS & NUTS
3. FOR STANDS WIDER THAN 24", PROVIDE THIRD VERTICAL MEMBER.
4. CONCRETE SHALL HAVE 6% AIR ENTRAINMENT AND A "28 DAY" STRENGTH OF 4000 PSI
5. REINFORCING STEEL SHALL BE ASTM A615, GRADE 60, NEW BILLET, INTERMEDIATE GRADE, DEFORMED W/ 60000 PSI YIELD STRENGTH

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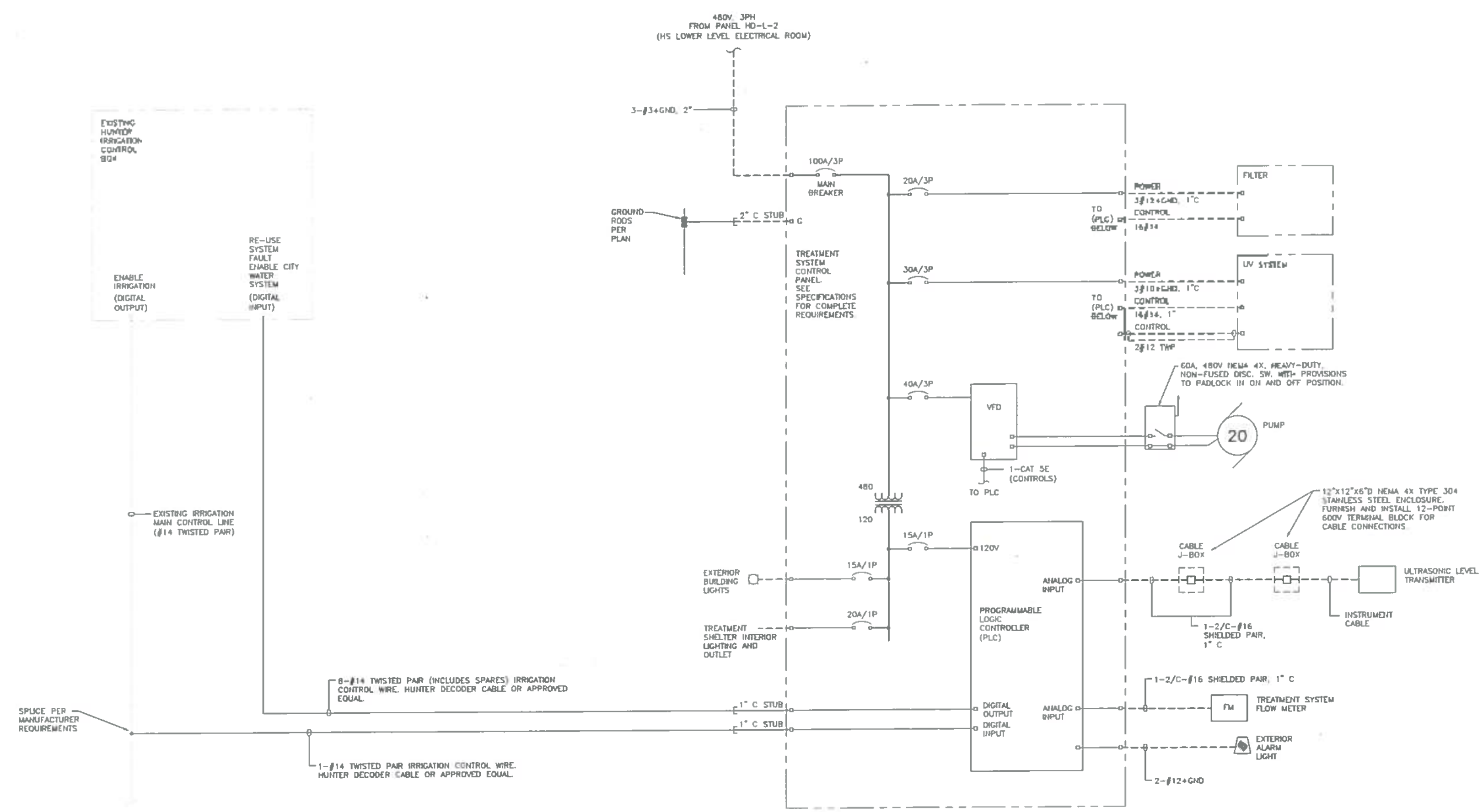
Approved	

RILEY–PURGATORY–BLUFF CREEK WATERSHED DISTRICT

CHAN HIGH SCHOOL STORMWATER REUSE
CHANHASSEN, MINNESOTA
ELECTRICAL DETAILS

BARR PROJECT No. 23/27-0053.14
CLIENT PROJECT No.
DWG. No. E-04
REV. No. B



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BID							
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RILEY-PURGATORY-BLUFF CREEK WATERSHED DISTRICT

CHAN HIGH SCHOOL STORMWATER REUSE
CHANHASSEN, MINNESOTA

ELECTRICAL SCHEMATICS

BARR PROJECT No. 23/27-0053.14
CLIENT PROJECT No.
DWG. No. E-05
REV. No. B

CADD USER: Chad Lorimer FILE: M:\DESIGN\23270053.14\23270053.14_CHAN_HIGH_E-04.DWG PLOT SCALE: 1:2 PLOT DATE: 3/30/2017 9:22 AM
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resourceful. naturally.
engineering and environmental consultants

BARR

Memorandum

To: Riley Purgatory Bluff Creek Watershed District Board of Managers
From: Barr Engineering Company
Subject: Permit Application 2017-007: Cedarcrest Stables – Extension of Review Period
Date: March 30, 2017
Project: 23270053.14

Project Description

Permit No: 2017-007

Received complete: February 10, 2017

Applicant: Pemtom Land Company
Consultant: John Bender, Westwood Professional Services
Project: Cedarcrest Stables – Construction of a 17-lot single family home subdivision. Three infiltration basins and a wet sedimentation basin will provide stormwater quantity, volume and quality control.
Location: 16870 Cedarcrest Drive, Eden Prairie
Rules Implicated:

	Rule B: Floodplain Management		Rule H: Appropriation of Public Waters
X	Rule C: Erosion and Sediment Control		Rule I: Appropriation of Groundwater
	Rule D: Wetland and Creek Buffers	X	Rule J: Stormwater Management
	Rule E: Dredging and Sediment Removal		Rule K: Variances and Exceptions
	Rule F: Shoreline/Streambank Stabilization	X	Rule L: Permit Fees
	Rule G: Waterbody Crossings	X	Rule M: Financial Assurances

Recommendation

On February 10, 2017, Pemtom Land Company submitted a complete permit application for construction of a 17-lot single family home subdivision. The Applicant is proposing three infiltration basins and a wet sedimentation basin to provide storm water quantity, volume, and quality control. The latest round of revised design information was received on March 21, 2017.

Based on the Engineer's review of the submitted plans, the latest site designs and stormwater management approach do not provide the required rate control, volume abstraction, and water quality treatment.

The review period for Permit 2017-007 expires on April 11, 2017 which is before the Board's regular May meeting. Staff recommends that the Board extend, in accordance with Minnesota Statutes section 15.99, the review period by 60 days to June 10, 2017, for permit 2017-007 Cedarcrest Stables to allow the Applicant time to supply revised submissions and give the Engineer time to complete a review.

RILEY PURGATORY BLUFF CREEK WATERSHED DISTRICT

18681 Lake Drive East
Chanhassen, MN 55317
952-607-6512
www.rpbcwd.org

Monday, March 27, 2017

Mr. **Terry Jeffery**

Re: Proposed Statement of Hire – Permitting and Natural Resource Project Manager

Dear Mr. **Jeffery**:

I am pleased to propose an offer of employment to you as the Riley Purgatory Bluff Creek Watershed District's Permitting and Natural Resource Project Manager, subject to approval by the Board of Managers at its next meeting on **April 5, 2017**. The District's proposed offer of employment includes the following terms:

1. Compensation. You will be paid a base salary of $**76,000** annually. You will be paid on the first and fifteenth of each month. The District will conduct a performance review following your first six months of employment, and thereafter annually, at which time a cost of living or other appropriate increase will be considered.

2. Fringe Benefits. You will be eligible to participate in the Public Employee Retirement Act (PERA) retirement plan, pursuant to Minnesota law. The District will provide health insurance, short-term disability, long-term disability, term life, and dental insurance benefits pursuant to District plans.

3. Vacation and Sick Leave. You will begin to accrue **2** days of vacation/sick leave per month beginning the first day of your employment with the District. In the first twelve months of continuous employment you will be eligible to receive **24** days of paid time off. You will be credited with seven (8) years of service on the District's Paid Time Off Time Accrual Schedule, which means that under the current schedule, you will be eligible for 27 days of paid time off in two years. Accrued vacation or sick leave that is not used at the end of the year may be accumulated in the next year, up to a maximum carryover of 90 days. In the event you voluntarily terminate your employment, the District will pay you for all earned, unused paid time off, so long as you provide a minimum of 30 days advance notice of the termination. No unused paid time off will be paid if you are involuntarily terminated. You may take all federal holidays, plus one floating holiday per year.

4. Expenses. The District will reimburse you for all reasonable and necessary out-of-pocket expenses incurred in the course of performing your duties, provided appropriate receipts or vouchers are presented in accordance with District policy.

5. Employment Term. Your employment with the District will commence on **April 24**, 2017. Your employment with the District is for no specific term. You will serve at the pleasure of the District and may be terminated at any time, with or without cause. You should not construe or interpret anything in this Statement of Hire or stated to you otherwise as a guarantee of employment for a specified term.

6. Entire Agreement. This Statement of Hire constitutes the entire agreement between you and the District. No offers of contract, promises, or representations are being made to you concerning employment with the District other than what is set forth in this Statement of Hire. In the event that there are employment policy issues that arise that are not addressed in this Statement of Hire or the District's Personnel Handbook, the policies of Hennepin County will govern.

Please let us know no later than March 31, 2017, whether you accept this proposed offer of employment by signing this letter below and returning the original to me and retaining a copy for your files. If you have any questions concerning this proposed offer, or the District, please feel free to contact me. We are excited about the opportunity to work with you and look forward to working toward common goals for the District.

Sincerely,

Claire Bleser

Claire Bleser, Administrator
Riley Purgatory Bluff Creek Watershed District

* * *

I have read and considered the terms in this Proposed Statement of Hire and accept all such terms and the complete offer presented to me by the District.

_____ March 30, 2017
Terry Jeffery Date

Cc: Board of Managers

POSITION TITLE: Permitting and Natural Resource Project Manager

REPORTS TO: Administrator

STATUS: Exempt FLSA

SALARY: $65,000 - $85,000

PRIMARY OBJECTIVE:

This position is responsible for the permitting program as well as managing some natural resources projects. The individual would also lead efforts to help restore, maintain and enhance District wetlands. Responsibilities may include preparing work plans and cost estimates, interpreting data, preparing technical reports, and coordinating site activities. He or She should be comfortable in preparing reports and presenting findings to the board.

JOB DUTIES AND RESPONSIBILITIES:

Administer Regulatory Program (50%)

1. Assists in the development of District Rules, policies and procedures relating to permitting.
2. Review initial permit applications, site plans, and other materials; Work with permitting review team in investigating and researching to make recommendations to the board.
    - Be point of contact for the District.
    - Help in our inspection Program.
    - Process permit application that fall under the Administrator issuance authority.
    - Responsible for record management (eg. financial assurances, maintenance declarations) of the regulatory program.
3. Serve on the Technical Environmental Panel.

Natural Resource Project Coordinator (50%)

1. Assist the District in the development and implementation of a program to preserve and enhance the quantity, as well as the function and value of wetlands.
2. Assist in the planning and implementation of structural and nonstructural best management practices designed to restore and protect surface and groundwater quality and quantity.
3. Oversee capital improvement and restoration project implementation.
4. Assist in preparing and submitting grant proposals.
5. Other Duties as assigned

REQUIRED KNOWLEDGE, SKILLS AND ABILITIES:

1. Bachelors Degree in Biology, Environmental Resource Management, Hydrology, or related field required or equivalent experience.
2. Experience in water resource management
3. Familiarity with local, state and federal water resources regulatory programs and management.
4. Ability to communicate effectively both verbally and in writing to a wide range of individuals and groups.
5. Ability to traverse difficult terrain.
6. Ability to work with minimal supervision.
7. Valid driver's license.
8. Some irregular work hours involving evening and weekend work is required.
9. Certified Wetland Scientist preferred.
10. Experience supervising and implementing natural resource capital improvement projects.
11. Flexible working style, self-initiative, self-motivation, and a willingness to work with teams to meet project needs and schedules
12. Demonstrated experience meeting timelines and achieving project expectations
13. Project management experience and interpersonal skills
14. Demonstrated project organization and management/leadership skills
15. Knowledge of Microsoft products, P8, Hydrocad, and Arc GIS.
16. Ten years of relevant experience.

Send Resume with three references along with letter of interest to District Administrator, Claire Bleser to cbleser@rpbcwd.org

DEADLINE MARCH 20, 2017

Minutes: Monday March 21, 2017

RPBCWD Citizen's Advisory Committee Monthly Meeting

Location: **RPBCWD new offices: 18681 Lake Street, Chanhassen**

CAC MEMBERS		Peter Iverson	E	Joan Palmquist	P
Jim Boettcher	P	Matt Lindon	E	Dorothy Pedersen	P
Paul Bulger	P	Judy McClellan	P	Dennis Yockers	P
Anne Deuring	P	Sharon McCotter	P	David Ziegler	P

Others

Jill Crafton	RPBCWD Board of Managers	
Michelle Jordan	District Liaison	

Summary of key actions/motions for the Board of Managers:

1. **Rain Barrel Decorating Contest**

   The Board asked the CAC to consider a rain barrel decorating contest, in conjunction with the sale at the office in early May. Due to set up and types of barrels being sold, the CAC decided instead to do a photo contest of installed barrels, using social media for and our Facebook page.

2. **Lake Susan Park Pond project**

   The Board requested CAC input (thank you!) on which option we would recommend for the Lake Susan Park Pond project. A motion was made (McCotter/Bulger) and passed unanimously that 4a and 4b be pursued and that 4b is recommended if Emerson is willing to be a financial partner and pay the difference between the costs of reuse on ballfields only vs. ballfields and the Emerson property.

3. **Bluff Creek**

   A motion was made (Ziegler/Palmquist) and carried to support this amendment.

Meeting:

4. **Call to Order**: Meeting was called to order at 6:32 by chair Dorothy Pedersen. Attendance noted above.

5. **Approval of the Agenda:** Approved agenda with no modifications: Ziegler/Bulger, passed unanimously.

6. **Approval of meeting minutes**, February 2017: Motion to approve minutes as amended made by Boettcher/Ziegler and passed unanimously.

Discussion: Dennis felt there was not enough detail in the notes on teacher feedback (Old Business, 10-year Plan). He agreed to summarize his points and submit these additional notes to the recorder, for inclusion in the final, amended minutes. In the future, the recorder will capture main points, and if members think something is missing, they can suggest additions, as amendments.

7. **Matters of general public interest:** None: no petitioners present.

   Welcome to the RPBCW CAC regular meeting. Anyone may address the committee on any matter of interest in the watershed. Speakers will be acknowledged by the President; please step forward, state your name and address for the record. Please limit your comments to no more than three minutes. Additional comments may be submitted in writing. Generally, the Citizen Advisory Council will not take official action on items discussed at this time, but may refer the matter to staff for a future report or direct that the matter be scheduled on a future agenda.

8. **March Board of Managers meeting**, if any questions (Sharon): None expressed.

9. **Education:** The RPBCWD Cost share process (Michelle/Inform):
   Liaison Jordan provided an overview of the cost sharing program, its purpose and operation. Staff is now doing site visits for technical assistance earlier in the process, so potential applicants get estimates of costs sooner. Also, they use a site visit screening form to roughly score the inquiries before full designs are done, to use resources appropriately. Michelle explained that when the CAC sees them, she has already made her assessment.

   McCotter made a motion (Ziegler seconded) recommending we maintain the process as designed and do the consent agenda for approval this year, pulling out the applications that we feel need to be discussed individually. This addressed a concern Yockers had to ensure the process was understood, and it was not a done deal before comments are considered so we could provide feedback like suggestions for different items to plant, etc. A subcommittee might be established to deal with cost share applications. The motion passed unanimously. Point of information: The Minnehaha CAC, only does cost sharing and uses a point system to determine who is funded. Currently prioritizing is not a problem for us but may be in the future, as we encourage more applications.

10. **Old Business**

    a. **Civility Clause:** Vote on proposed wording (Dorothy)

       Every member will act with courtesy, civility, and respect in all interactions as a member of the Citizen's Advisory Council, maintaining an open mind, and participating in open communication; members should refrain from abusive conduct, personal charges or verbal attacks upon the character or motives of other members, staff, or any member of the public.

Motion to approve clause, as written above by McCotter, seconded by Palmquist, and passed unanimously.

b. **Modification of general public interest motion:** "staff" to "CAC Officers" (Dorothy)
A new motion was made (McCotter/Ziegler) to modify the general public interest wording which was approved last month, to change the words "staff" to "CAC Officers". The motion carried, unanimously.

Discussion: We want to encourage the public to attend CAC meetings and give them an opportunity to speak at the beginning of the meeting. If comments or a letter, etc. are submitted from non-CAC members, our group will see them as part of our minutes. However, if non-members attend, they should not be allowed to comment throughout the meeting, or be disruptive. The Chairperson will control the discussion, and we may or may not choose to take action, or have the authority to do so. The officers could choose to add the topic to the agenda for the next meeting, or report to the board from our meeting.

Paul suggested we add a sentence to indicate the CAC meetings are open for the public to attend. He will draft wording and distribute it for consideration next month.

c. **Review of 2017 CAC Calendar (Dorothy/All)**
Dorothy and several Board Members attended a Climate Change workshop recently and she believes we should start talking about climate change. Specifically, she suggested bringing in a guest speaker (Fred Rusmalski from BARR Engineering) to talk about what climate change is doing in our district. Dennis asked if we should bring this to the board, as it would be of interest to them, too. It was suggested that this might be something that the CAC takes on, and that we start with a speaker, invite the board to attend, and then decide what our involvement will be.

Dennis asked that we give ourselves enough time to work with the 10-year plan so things like education and outreach are properly funded. Water conservation, as an example, is an aspect of education and outreach that we can work through and bring our thoughts and concerns back to the Board. We need to be ready with our thoughts and recommendations. We will get the first three chapters in May, and the final three chapters in July. We will build this into our calendar, and spend much of the June meeting talking about the 10-year plan. We were reminded that the

calendar is a guideline, not static, and that we should all speak up on what we feel needs attention.

Ziegler stated that there is a gap in information on wetlands; we don't have the information on them that we have on lakes and creeks. This is a good topic for a guest speaker and to determine what information we should be gathering, etc., — potentially in combination with holding ponds. It is unclear how much information is available about wetlands, if the work cities are doing is being shared, and how they relate to the Watershed. The Board recognizes this information gap.

d. **Subcommittees:** general discussion/decision to form/volunteers (Dorothy/All)
We agreed we should create subcommittees to do deeper dives into topics, and more efficiently use our time together. In addition, they will allow us to focus on topics we are more interested in and get more done. Furthermore, we agreed that each would be a standing item on the agenda and if there is no update that would be fine. If there is something to discuss, those materials must be distributed in advance with other meeting materials (Friday before CAC meeting).

Discussion: Many of the topics may overlap, and so defining scope will be important. McCotter suggested that the participants in each subcommittee should write their own statement of purpose, and determine their scope, based on who and how many are involved, and how much time they have, and where they can provide the most value.

We generated a list of possible subgroups. After the meeting, Bulger will group and summarize them, and provide an update for the next meeting. Each of us should think about where we want to be involved. His list is attached as Appendix A.

e. **Water Conservation initiative (Dorothy/All)**
This topic was a carry-over from last month's agenda. Please see the letter, distributed earlier, that Bulger drafted. The request was for a district to draft a position to have holistic policies between cities regarding water conservation and specifically watering, with the District taking a leadership positon, perhaps supplementing with education.

Pedersen investigated existing studies and found no conclusive information that odd/even watering has a big impact, and shared that probes too don't work that well, concluding that technology has not caught up with needs.

McCotter loves the idea of endorsing something, but expressed desire for some measurable, concrete benefits, e.g. something that could show that an average resident would save this amount if they took these actions.

There was general agreement that it makes no sense to use so much water for watering grass, and the desire to figure out a way to address this. Yockers pointed out a lot of developments are still putting in lawns, and it's not just relevant to individuals, but also school districts, large property owners. He suggested we put money towards encouraging low-mow nor no-mow grass. Deuring reminded us that grass is very resilient and can go for long periods with little or no watering. Our challenge is to re-educate people.

We were reminded that there are experts like US Geological Services, U of M, EPA which have many technical publications, and cities in our community that already advocate and have guidelines. No need to reinvent the wheel.

f. **Update on 10-year plan proces**s (Michelle)(INFORM)
As stated earlier, the first three chapters will be available to us in May, and the final three chapters in July.

11. New Business

a. **Website update concept**/feedback (Michelle/All)
The original website has been tweaked and modified and it is time to create a new one, especially since it needs to work on mobile devices. The platform is not changing, and our current consultant continues to work on the details, but loading content remains the district's responsibility. Liaison Jordan led us through an exercise to provide feedback on drafts of the new website. Her handouts were designed not as final renderings, but to generate discussion about what we want and don't want as part of the new site. Jordan is summarizing our discussion and will submit her recap, separately.

b. **Board request:** Rain barrel contest (Michelle/All)
The Board asked the CAC to consider a rain barrel decorating contest, in conjunction with the sale at the office in early May. Administrator Bleser was involved in a contest previously, but the circumstances were quite different in that they were repurposing unattractive (okay, ugly) barrels, so decoration made sense. Our new barrels are plastic, which won't lend themselves to decorations. In lieu of this, the CAC recommended using our Facebook site to publicize the event and ask people who buy barrels to take a picture of them/their families when the

rain barrel is installed. We will post these on Facebook and have a contest for best picture. Jordan will come up with something to offer as a prize. Flyers will be distributed at Public Library, and we will promote in our newsletter, at events, etc. Instructions on how to install them will be obtained from the Master Water Stewards and Pederson will bring some "low-mow" grass to the sale. Several CAC members volunteered to be at the office, during the distribution. Jordan asked that anything related to rain barrels that we see in the next few weeks be sent to her, for use in promotion.

c. **Lake Susan Park Pond project** (Michelle/INFORM)
The Board requested CAC input (thank you!) on which option we would recommend for the Lake Susan Park Pond project. CAC agreed that 4a or 4B were the best alternatives, and that the reuse of water is a tremendous benefit of this plan. It could provide a demonstration project and example of best practices.
Discussion centered around whether the Watershed should be subsidizing Emerson, by providing the watering of their property. A motion was made (McCotter/Bulger) and passed unanimously that 4a and 4b be pursued and that 4b is recommended if Emerson is willing to be a financial partner and pay the difference between the costs of reuse on ballfields only vs. ballfields and the Emerson property.

d. **Bluff Creek (**Michelle/INFORM):
It will go to public hearing at the next board meeting. A motion was made (Ziegler/Palmquist) and carried to support this amendment.

Upcoming Events

Board Workshop, Wednesday, April 5, 5:30 pm District Office
Regular Board Meeting, Wednesday, April 5, 7:00 pm, District Office
Animal Open House at Outdoor Center: April 08, 2017 1:00 p.m. - 4:00 p.m.
First deadline for Cost Share applications: April 10
Next CAC meeting: April 17, 2017, District Office, 6:30 pm

Adjournment

Motion to adjourn was made by McCotter at 9:49, seconded by Ziegler, and passed unanimously.

Topics for next meeting:

Subcommittees, second draft web site, change to the clause on matters of public interest, discussion of what areas each of us are interested in.

Respectfully submitted,

Joan E. Palmquist, recorder

Attachment A: Possible Subcommittees: Generated 3-20-17 by CAC

Education and Outreach

a. Education – various subcategories

b. Outreach – various subcategories

c. Cost share

d. Water stewards

e. RPBCWS website - communication / future vision

f. Lake Associations -

g. Speakers bureau –

h. Volunteerism – citizen monitoring

Vision / Planning

a. Climate change - education

b. Lake Matrix – prior draft, capture characteristics, historical projects

c. Budget – tracking by project, watershed, annual forecast

Technical Topics

a. Lake Water Quality Restoration – alum, phosphorus removal, TSS, tec.

b. Aquatic Invasive Species – monitoring, treatment, short term response

c. Other Invasive Species – carp, buckthorn

d. Groundwater – water conservation, protection, RPBCWS leadership

e. Wetlands – mapping, health, habitat benefit, floodplain management, regulations

f. TAC – updates – interface

g. Major reports - review and comments, feedback to Board

h. Topic specific – Board directed - i.e. rain barrel social media

RILEY
PURGATORY
BLUFF CREEK
WATERSHED DISTRICT

14500 Martin Drive | Suite 1500
Eden Prairie, MN 55344
952-607-6512
www.rpbcwd.org

Friday, March 31, 2017

Re: Item 11 a and b – February Treasurer's report

Dear Managers,

As per District's Internal Controls and Procedures for Financial Management, the Administrator and Treasurer have reviewed the bills and recommends payment as outlined on page 2 of the Treasurer's report.

Sincerely,

Claire Bleser
Administrator

Jill Crafton
Treasurer.

RILEY PURGATORY BLUFF CREEK WATERSHED DISTRICT

Treasurers Report

February 28, 2017

REPORT INDEX

RILEY PURGATORY BLUFF CREEK WATERSHED DISTRICT
Cash Disbursements
February 28, 2017

Accounts Payable		Amount
Amy Herbert LLC	$	797.94
Barr Engineering Company		77,246.10
BlueCross BlueShield of Minnesota		3,610.18
Carver County Taxpayer Services Department		300.00
Claire Bleser		130.64
Dell Five Business Park G-I		12,617.78
Delta Dental		360.75
Fe Security, LLC		4,106.37
HDR Engineering, Inc.		4,599.21
Jacquelyn Ginter		300.00
JMSC Futurity, PLLC		1,395.00
Josh Maxwell		6.43
JR Copier of Minnesota, LLC		1,750.00
Klein Bank Visa		9,004.13
M.W. Wireworks, Inc.		10,235.00
Magnolia Landscape & Design Co.		6,459.90
MN Association of Watershed Districts		4,000.00
Randy's Sanitation and Recycling		49.08
Smith Partners PLLP		12,538.35
Southwest Newspapers		325.17
Spotless Cleaning Service LLC		572.01
Swanson Homes		500.00
The Lincoln Nathional Life Insurance Company		288.21
Uline		56.95
Xcel Energy		83.79
Xcel Energy		23.18
Zachary Dickhausen		10.68
Total Accounts Payable	**$**	**151,366.85**

Payroll Disbursements		Amount
Payroll Processing Fee	$	145.00
Manager Payroll Taxes		103.28
Employee Salaries		18,682.42
Employee Payroll Taxes		1,351.96
PERA Match		1,401.18
Total Payroll Disbursements	**$**	**21,683.84**

Total Disbursements	**$**	**173,050.69**

Memos

The 2016 mileage rate is 0.54¢ per mile. The 2017 mileage rate is 53.5¢. Klein Bank Visa will be paid online.

RILEY PURGATORY BLUFF CREEK WATERSHED DISTRICT
Fund Performance Analysis - Table 1
February 28, 2017

	2017 Budget	Month Ended Feb. 28, 2017	Year to Date Feb. 28, 2017
REVENUES			
Other Income - Refunds	0.00	1,875.00	1,875.00
Other Income - District Floodplain	0.00	14,400.00	22,080.00
Plan Implementation Levy	2,859,000.00	0.00	9,476.83
Permit Income	15,000.00	10,000.00	10,300.00
TOTAL REVENUES	**$ 2,874,000.00**	**$ 26,275.00**	**$ 43,731.83**
EXPENDITURES			
Administration			
Accounting/Audit	$ 39,500.00	$ 1,840.00	$ 3,380.00
Advisory Committee	4,000.00	2,796.93	2,796.93
Engineering Services	103,000.00	8,617.50	16,976.00
Insurance and Bonds	12,000.00	783.58	1,567.17
Legal Services	75,000.00	8,739.54	18,821.16
Manager Expenses	18,500.00	195.73	1,190.07
Dues and Memberships	8,000.00	4,000.00	4,000.00
Office Costs	95,000.00	37,655.42	37,742.72
Permit Review and Inspection	90,000.00	13,755.51	24,720.18
Recording Services	15,000.00	1,123.11	2,991.73
Employee Cost	450,000.00	26,409.95	51,154.22
Total Administration Costs	**$ 910,000.00**	**$ 105,917.27**	**$ 165,340.18**
Programs and Projects			
District Wide			
‡ Education & Outreach	$ 114,000.00	1,587.33	2,813.64
AIS Inspection and Early Response	75,000.00	0.00	0.00
Cost Share Program	200,000.00	190.71	1,102.78
District Wide Floodplain Eval- Atlas 14	30,000.00	0.00	0.00
Data Collection	180,000.00	3,044.64	17,339.21
U of M Plant Restoration	75,000.00	0.00	0.00
TMDL	10,000.00	75.00	878.00
Watershed - 10 Year Plan	75,000.00	7,257.00	14,847.44
○ Repair and Maintanance	100,000.00	0.00	0.00
○ ♦ Community Resilience MPCA	0.00	3,301.10	23,996.55
Creek Restoration Action Straegies Phase 2	20,000.00	1,208.00	5,354.50
District Groundwater Assessment	30,000.00	3,832.50	3,832.50
Total District Wide Costs	**$ 909,000.00**	**$ 20,496.28**	**$ 70,164.62**
Bluff Creek One Water			
○ Bluff Creek Tributary	$ 0.00	5,244.46	15,709.05
○ ♦ Chanhassen HS reuse	50,000.00	25,884.00	54,473.70
Total District Wide Costs	**$ 50,000.00**	**$ 31,128.46**	**$ 70,182.75**
Riley Creek One Water			
Lake Riley EWM Treatment	$ 25,000.00	0.00	0.00
○ Lake Riley Alum Treatment	0.00	0.00	491.95

○ Denotes Multi-Year Project - See Table 2 for details
♦ Grants are supplementing the projects - See table 3 for further details
* Denotes the project will be overlapping by one year as it was not fully complete by year end.
‡ Includes the Master Design Items - See Table 2 to details

See Accountants Compilation Report

RILEY PURGATORY BLUFF CREEK WATERSHED DISTRICT
Fund Performance Analysis - Table 1
February 28, 2017

	2017 Budget	Month Ended Feb. 28, 2017	Year to Date Feb. 28, 2017
○ ♦ Lake Susan Improvement Phase 2	0.00	2,491.35	12,420.35
○ ♦ Chanhassen Town Center	0.00	174.50	10,644.50
Rice Marsh Lake Aeration	0.00	0.00	267.23
Lake Riley - CLP Treatment	10,000.00	0.00	0.00
Lake Susan - CLP Treatment	10,000.00	0.00	0.00
Rice Marsh Lake WQ Improvement - Phase 1	20,000.00	0.00	0.00
Rice Marsh Lake Winter Fish Kill Prevention	10,000.00	83.79	83.79
Riley Creek Restoration	600,000.00	3,699.00	4,792.00
Total Riley Creek One Water Costs	**$ 675,000.00**	**$ 6,448.64**	**$ 28,699.82**
Purgatory Creek One Water			
○ Purgatory Creek Restoration	$ 0.00	0.00	320.00
Mitchell Lake Plant Management	15,000.00	0.00	0.00
Red Rock Lake Plant Management	15,000.00	0.00	0.00
Starring Lake Plant Management	20,000.00	0.00	0.00
♦ Fire Station 2 Water Reuse	20,000.00	126.60	126.60
Purgatory Creek Rec Area	50,000.00	0.00	0.00
Hyland Lake UAA	20,000.00	0.00	14.00
Lotus Lake - Phase 1	20,000.00	0.00	0.00
Silver Lake Restoration - Phase 1	20,000.00	0.00	0.00
○ ♦ Scenic Heights	0.00	395.00	1,108.00
Total Purgatory Creek One Water Costs	**$ 180,000.00**	**$ 521.60**	**$ 1,568.60**
Contingency Reserve			
Contingency Reserve	$ 135,000.00	$ 0.00	$ 0.00
Total Contingency Reserve Costs	**$ 135,000.00**	**$ 0.00**	**$ 0.00**
TOTAL EXPENDITURES	**$ 2,859,000.00**	**$ 164,512.25**	**$ 335,955.97**
Excess (Deficiency)	**$ 15,000.00**	**$ (138,237.25)**	**$ (292,224.14)**

○ Denotes Multi-Year Project - See Table 2 for details
♦ Grants are supplementing the projects - See table 3 for further details
* Denotes the project will be overlapping by one year as it was not fully complete by year end.
‡ Includes the Master Design Items - See Table 2 to details

See Accountants Compilation Report

RILEY PURGATORY BLUFF CREEK WATERSHED DISTRICT
Multi-Year Project Performance Analysis - Table 2
February 28, 2017

		Total Available for Project	2017 Budget	Month Ended Feb. 28, 2017	Year to Date Feb. 28, 2017	Lifetime Costs	Remaining Budget Funds
	Projects						
○ ♦	Chanhassen Town Center	63,000.00	0.00	174.50	10,644.50	33,235.50	29,764.50
○ ♦	Fish Passage Bluff Creek	415,000.00	0.00	0.00	0.00	24,793.39	390,206.61
○	Lake Lucy Iron Enhanced	85,000.00	0.00	0.00	0.00	62.32	84,937.68
○	Lake Riley Alum Treatment	260,000.00	0.00	0.00	491.95	235,469.51	24,530.49
○	Lake Susan Improvements	275,000.00	0.00	0.00	0.00	272,134.10	2,865.90
○ ♦	Lake Susan Improvement Ph 2	383,400.00	0.00	2,491.35	12,420.35	29,162.13	354,237.87
○	Purgatory Creek Restoration	661,094.00	0.00	0.00	320.00	331,545.56	329,548.44
○ ♦	Chanhassen HS Reuse	250,000.00	50,000.00	25,884.00	54,473.70	65,610.80	184,389.20
○ ♦	Community Resilience MPCA	47,000.00	0.00	3,301.10	23,996.55	42,171.68	4,828.32
○ ♦	Scenic Heights	260,000.00	0.00	395.00	1,108.00	1,108.00	258,892.00
○	Bluff Creek Tributary	200,000.00	0.00	5,244.46	15,709.05	15,709.05	184,290.95
	Total Multi-Year Project Costs	**$ 2,899,494.00**	**$ 50,000.00**	**$ 37,490.41**	**$ 119,164.10**	**$ 1,051,002.04**	**$ 1,848,491.96**
	Programs						
○	Repair and Maintenance	$102,005.00	100,000.00	0.00	0.00	0.00	102,005.00
○	Survey and Analysis	37,257.00	0.00	0.00	0.00	24,165.26	13,091.74
	Total Program Costs	**$ 139,262.00**	**$ 100,000.00**	**$ 0.00**	**$ 0.00**	**$ 24,165.26**	**$ 115,096.74**
	Other						
	Total Other	**$ 0.00**	**$ 0.00**	**$ 0.00**	**$ 0.00**	**$ 0.00**	**$ 0.00**
	Total Multi-Year Project Costs	**$ 3,038,756.00**	**$ 150,000.00**	**$ 37,490.41**	**$ 119,164.10**	**$ 1,075,167.30**	**$ 1,963,588.70**

Grant and Other Income Performance Analysis - Table 3
February 28, 2017

		Total Available for Project	Total Grant Amount	Required District Match	Additional District Funds	Partner Funds
○ ♦	Chanhassen Town Center	$ 63,000.00	$ 48,000.00	$ 12,000.00	$ 3,000.00	$ 0.00
○ ♦	Fish Passage Bluff Creek	415,000.00	150,000.00	168,300.00	77,500.00	19,200.00
○ ♦	Lake Susan Improvement Ph 2	383,400.00	233,400.00	58,350.00	91,650.00	0.00
♦	Metropolitan Council - WOMP	5,000.00	5,000.00	0.00	0.00	0.00
○ ♦	Chanhassen HS Reuse	250,000.00	200,000.00	50,000.00	0.00	0.00
♦	Fire Station 2 Water Reuse	98,287.00	73,715.00	24,572.00	0.00	0.00
○ ♦	Community Resilience MPCA	47,000.00	27,000.00	10,000.00	0.00	10,000.00
○ ♦	Scenic Heights	260,000.00	50,000.00	0.00	165,000.00	45,000.00
	Total Grants and Other Income	**$ 1,521,687.00**	**$ 787,115.00**	**$ 323,222.00**	**$ 337,150.00**	**$ 74,200.00**

○ Denotes Multi-Year Project - See Table 2 for details

♦ Grants are supplementing the projects - See table 3 for further details

* Denotes the project will be overlapping by one year as it was not fully complete by year end.

‡ Includes the Master Design items - See Table 2 to details

See Accountants Compilation Report

RILEY PURGATORY BLUFF CREEK WATERSHED DISTRICT

Balance Sheet

As of February 28, 2017

ASSETS		
Current Assets		
Checking	$	3,616,934.18
Money Market Savings		75,520.41
Investments		0.00
Total Current Assets	$	3,692,454.59
Other Assets		
Security Deposit		9,744.00
Prepaid Expenses		17,319.17
Delinquent Property Taxes		17,622.16
Total Other Assets	$	44,685.33
Total Assets	$	**3,737,139.92**
LIABILITIES AND NET ASSETS		
Liabilities		
Current Liabilities		
Accounts Payable	$	147,677.17
Payroll Withholding		91.82
Accrued Payroll		10,816.15
PERA Withholding		(0.01)
Total Current Liabilities	$	158,585.13
Other Current Liabilities		
Retainages Payable		23,786.93
Total Other Current Liabilities	$	23,786.93
Long-Term Liabilities		
Deferred Revenues	$	17,622.16
Unearned Revenue		132,396.16
Permit Escrows		627,975.00
Total Long-Term Liabilities	$	777,993.32
Total Liabilities	$	960,365.38
Net Assets		
Cumulative Fund Balance	$	3,068,998.68
Excess (Deficiency) Current		(292,224.14)
Total Net Assets	$	2,776,774.54
Total Liabilities and Net Assets	$	**3,737,139.92**

RILEY PURGATORY BLUFF CREEK WATERSHED DISTRICT
Klein Bank Visa Activity
February 28, 2017

DATE	PURCHASE FROM	AMT	DESCRIPTION	ACCT #	Total
1-Feb	Kowalskis Market	$ 92.45	Manager General Expenses	70402	$ 92.45
17-Feb	HP Patient Accounting	$ 315.62	Employee Benefits	79004	$ 315.62
23-Jan	Office Depot	$ 71.26	Advisory Committee	92002	
22-Jan	Office Depot	$ 165.20	Advisory Committee	92002	
23-Jan	Panera	$ 172.58	Advisory Committee	92002	
23-Jan	Kowalski's Mkt	$ 53.93	Advisory Committee	92002	$ 462.97
16-Feb	Nothing Bundt Cakes	$ 36.00	Education & Outreach	93002	$ 36.00
24-Jan	BP - Apple Valley	$ 50.18	Data Collection	100802	
27-Jan	Hach Company	$ 355.62	Data Collection	100802	
1-Feb	Dans Southside Marine	$ 903.17	Data Collection	100802	
2-Feb	Hatch Company	$ 112.83	Data Collection	100802	
8-Feb	Gander Mountin	$ 10.71	Data Collection	100802	
14-Feb	Walser Chrysler	$ 44.11	Data Collection	100802	$ 1,476.62
15-Feb	Kowalskis Market	$ 24.08	Office Cost	170402	
23-Jan	General Delivery Serv	$ 18.25	Office Cost	170402	
26-Jan	Office Depot	$ 84.88	Office Cost	170402	
1-Feb	Walgreens	$ 2.13	Office Cost	170402	
7-Feb	Fe Security	$ 1,937.38	Office Cost	170402	
8-Feb	Verizon Wireless	$ 20.50	Office Cost	170402	
10-Feb	Kowalskis Market	$ 17.97	Office Cost	170402	
10-Feb	Punch Pizza	$ 35.72	Office Cost	170402	
10-Feb	General Delivery	$ 16.04	Office Cost	170402	
13-Feb	Menards	$ 4.28	Office Cost	170402	
14-Feb	Ikea	$ 1,718.30	Office Cost	170402	
16-Feb	Best Buy	$ 407.11	Office Cost	170402	
15-Feb	Sears.com	$ 602.78	Office Cost	170402	
19-Feb	Microsoft	$ 53.64	Office Cost	170402	
16-Feb	JR Copier	$ 1,750.00	Office Cost	170402	
17-Feb	General Delivery	$ 18.25	Office Cost	170402	
17-Feb	Amazon.com	$ 26.81	Office Cost	170402	$ 6,738.12
TOTAL PURCHASES		**$ 9,121.78**			**$ 9,121.78**
Total Credits		$ (89.95)	Amazon	100802	**(117.65)**
		$ (27.70)	Microsoft	170402	
TOTAL DUE		**$ 9,004.13**			**$ 9,004.13**

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Riley Purgatory Bluff Creek
Watershed District
Eden Prairie, MN

To the Board of Managers:

Accountant's Opinion

The Riley Purgatory Bluff Creek Watershed District is responsible for the accompanying February 28, 2017 Treasurer's Report in the prescribed form. We have performed a compilation engagement in accordance with the Statements on Standards for Accounting and Review promulgated by the Accounting and Review Services Committee of the AICPA. We did not audit or review the Treasurer's Report nor were we required to perform any procedures to verify the accuracy or completeness of the information provided by the Riley Purgatory Bluff Creek Watershed District. Accordingly, we do not express an opinion, a conclusion, nor provide any form of assurance on the Treasurer's Report.

Reporting Process

The Treasurer's Report is presented in a prescribed form mandated by the Board of Managers and is not intended to be a presentation in accordance with accounting principles generally accepted in the United States of America. The reason the Board of Managers mandates a prescribed form instead of GAAP (Generally Accepted Accounting Principles) is this format gives the Board of Managers the financial information they need to make informed decisions as to the finances of the watershed.

GAAP basis reports would require certain reporting formats, adjustments to accrual basis and supplementary schedules to give the Board of Managers information they need, making GAAP reporting on a monthly basis extremely cost prohibitive. An outside independent auditing firm is retained each year to perform a full audit and issue an audited GAAP basis report. This annual report is submitted to the Minnesota State Auditor, as required by Statute, and to the Board of Water and Soil Resources.

The Treasurer's Report is presented on a modified accrual basis of accounting. Expenditures are accounted for when incurred. For example, payments listed on the Cash Disbursements report are included as expenses in the Treasurer's Report even though the actual payment is made subsequently. Revenues are accounted for on a cash basis and only reflected in the month received.

JMSC, PLLC

JMSC, PLLC
St. Louis Park, MN
March 27, 2017

TASK ORDER No. 21b – Bluff Creek Reach BT3A Stabilization Project:
Final Design and Construction Administration Services
Pursuant to Agreement for Engineering Services
Riley Purgatory Bluff Creek Watershed District and BARR Engineering Company.
March 29, 2017

This Task Order is issued pursuant to Section 1 of the above-cited engineering services agreement between the Riley Purgatory Bluff Creek Watershed District (District) and BARR Engineering Company (Engineer) and incorporated as a part thereof.

1. Description of Services:
   Barr will work with District staff to complete the engineering, design and construction services to restore an approximately 2,200-foot reach of an unnamed tributary to Bluff Creek, referred to as Reach BT3A, in Chanhassen, Minnesota. The upper approximately 1,700 feet of the reach are located on property owned by the city of Chanhassen, and the lower approximately 500 feet of the reach are located on Minnesota Department of Transportation (MnDOT) owned land. This tributary to Bluff Creek was inspected in 2015 as part of the District's Creek Restoration Action Strategy (CRAS) project, and again by District and Barr staff in January 2017. Erosion was observed throughout Reach BT3A, and was more severe in the upper half of the reach, with detrimental effects on water quality and stream habitat. This project would provide final design for stabilization of Reach BT3A based on the findings of the January 2017 feasibility study. Project design would be followed by preparation of bid documents and construction support services. Barr would also prepare required permit applications in advance of project construction.

   Barr's scope of work activities are divided into three phases:

   Phase 1: Bluff Creek Stabilization Assessment (Previous Task Order 21a)
   Phase 2: Final Design and Permitting (This Task Order);
   Phase 3: Construction Administration Services (This Task Order).

2. Scope of Services:
   Engineer's services under this task order shall include:

   PHASE 2. FINAL DESIGN AND PERMITTING

   Final design and permitting includes multiple tasks in order to ensure the project is designed properly, and that key stakeholders (District, city of Chanhassen, Minnesota Department of Natural Resources [MNDNR], and U.S. Army Corps of Engineers [USACE]) can provide input and feedback at regular intervals in the design process. These tasks are described below.

   Task 2-1. Kick-off Meeting and Regular Project Meetings

   A kick-off meeting will be held with District and Barr staff to discuss the overall project, intermediate deadlines and deliverables for each deadline. The meeting will also provide an opportunity to define initial roles to be filled by District Staff and Barr Staff. It is assumed that District Staff will provide assistance with stakeholder coordination.

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The project team will meet weekly to review project progress, address questions, and discuss outstanding issues. District Staff will be invited to participate in weekly project meetings at their discretion.

Task 2-2. Site Visits

Barr staff will complete up to three site visits to verify suitability of proposed design elements. It is anticipated that one site visit would be completed prior to 60% design and up to two additional site visits would be completed prior to final design. District staff will be notified of the site visits and invited to participate at their discretion.

Task 2-3. Stakeholder Meeting

District and Barr Staff will coordinate a meeting with key project stakeholders to facilitate early discussion about the project and identify critical stakeholder concerns. This task assumes one stakeholder meeting at approximately 60% design with the city of Chanhassen, MNDNR, USACE and any other public entities with a stake in the project and one public open house for residents in nearby neighborhoods. The kick off meeting in Task 2-1 will help establish a tentative schedule for each meeting and identify key dates to provide notices and/or send information to stakeholders.

Task 2-4. Preliminary (60%) Design and Opinion of Probable

The preliminary design will be advanced based on District and stakeholder input. Hydraulic modeling will be conducted to inform the design. In particular, it will be used to evaluate flow depths and estimate existing and proposed channel velocities. This will help to ensure that the proposed design will withstand anticipated creek flows while not impacting adjacent private properties. A preliminary opinion of probable construction cost will be prepared. The 60% design drawings will be provided electronically in pdf format.

The 60% design will be provided to the District Administrator and city of Chanhassen for additional feedback. It is assumed that comments will be provided within two weeks of providing the drawings.

Task 2-5. QA/QC Review

Barr will utilize other experienced stream restoration staff not directly involved in the design of the project to provide QA/QC review at the 60%, 90% and final design phases.

Task 2-6. Wetland Delineation

Barr staff will complete a field wetland delineation of all areas that could potentially be disturbed by project construction, including but not limited to channel stabilization locations, access routes, and staging areas. The wetland delineation will be completed in accordance with the 1987 USACE Manual and relevant regional supplement.

Barr will draft a wetland delineation report documenting the presence of wetlands and other waters in the survey area. Upon review and approval by the District, Barr will submit the delineation report and a request for delineation concurrence to the Local Government Unit (LGU) responsible for administering the Minnesota Wetland Conservation Act – in this case, the city of

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Chanhassen. If requested by the LGU, Barr will participate in one meeting with the Technical Advisory Panel to review the wetland delineation on-site.

Findings of the wetland delineation will be used to inform project permitting.

Task 2-7. Cultural Resources Desktop Review

Barr staff will complete a desktop review for cultural resources that may be present in areas of project disturbance in support of project permitting. The review will consist of submitting a data request to the State Historic Preservation Office and summarizing and presence and proximity of known cultural resources sites to the project area.

Task 2-8. Permitting Assistance

Barr will complete permit applications for the project, including the development of a stormwater pollution prevention plan (SWPPP). It is assumed that a MNDNR Work in Public Waters Permit and USACE Regional General Permit 3 will be required, as well as local permits such as the RPBCWD permit. It is assumed that the District will provide timely review of permit application materials prior to submittal and that permit fees will be paid by the District directly.

The identified permitting processes typically require eight to twelve weeks, and it is assumed that permitting will begin following completion of 60% design.

Task 2-9. Final Engineering and 90% Design

After gaining additional input from stakeholders regarding the advanced design, Barr will continue to refine the design and prepare the 90% drawings and opinion of cost for review by District staff and delivery to the Board.

Task 2-10. 90% Delivery to RPBCWD Board of Managers

Barr staff will deliver the 90% design to the District Board of Managers at their regularly scheduled meeting and work with District Administrator to determine if a presentation is warranted.

Task 2-11. Final Construction Drawings

Upon review and approval of the 90% design by District staff or the Board of Managers, Barr will complete the final construction drawings (bid-ready).

Task 2-12. Engineer's Opinion of Probable Cost

Upon completion of the final design, Barr will prepare an Engineers Opinion of Probable Cost. This cost estimate will accompany the finished plan set for final approval by the District.

Task 2-13. Technical Specifications and Construction Documents

Barr will provide technical specifications and a project bidding form for the project. Barr will develop technical specification sections using Construction Specifications Institute (CSI) format including all "upfront" sections such as general conditions, supplementary conditions, summary of work and those related to bidding and contracting. The development of the technical specification will be coordinated with the District Administrator and Counsel. Barr assumes specifications will

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be in CSI format with Engineers Joint Contract Documents Committee (EJCDC) general conditions. Barr reserves the right to modify budget if technical specification format is other than stated in this paragraph.

Task 2-14. Final Design Memorandum

Barr will complete a final design memorandum to document the various components and assumptions that influenced the final design.

Task 2-15. Project Management

Project Management is a key component to help meet project milestones. In addition, project management will help make sure the work meets the expectations of District staff and other stakeholders and that work is completed in a satisfactory manner within the project timeline and within the agreed-upon budget.

Barr will continue to provide updates to the project team that document project progress and coordinate tasks. Barr will provide the District with monthly progress reports and budget status updates as part of the monthly invoicing process. Barr will solicit District Staff feedback on an ongoing basis to maintain clear and timely communication.

Task 2-16. City of Chanhassen Agreement

District staff will coordinate with the city of Chanhassen to assist District legal counsel in developing a draft agreement regarding restoration and maintenance of Reach BT3A. This task will be led by District staff and counsel, but Barr providing input on technical components during development of the agreement. The agreement will specify the responsibilities of each organization, as well as the long-term inspection and maintenance of the restoration efforts.

Task 2-17. Phase I Environmental Assessment

Barr often recommends completing a Phase I environmental assessment during the early stages of the project to determine if there is a reasonable probability of encountering contamination issues in the project site. The results of this assessment will help generate more accurate construction cost estimates and evaluate the feasibility of the project. Barr staff will complete this assessment and provide a summary document. It is acknowledged that the risk of contamination being present within the project reach appears to be low, so this task is suggested as an optional task.

PHASE 3. CONSTRUCTION ADMINISTRATION

Phase 3 includes the tasks associated with bidding the project and completing construction. Individual tasks are described below. Work associated with this Phase 3 would only occur if District Managers decide to move the project forward and advertise for construction bids.

Task 3-1. Bidding Assistance

Barr will conduct: a mandatory pre-bid meeting and site visit (if warranted); prequalification of bidders, if appropriate; review of bids; and follow-up inquiries with bidders. Advertising and bidding dates will be coordinated with District Administrator. It is assumed that advertising for bids would occur in the District's official newspapers.

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Barr will prepare recommendations on contractor selection, if requested.

Task 3-2. Pre-Construction Meeting

Barr will conduct a preconstruction meeting with the selected contractor to discuss critical aspects of the restoration project. Safety and erosion control are always key components of the preconstruction meeting. Additional items on the agenda will likely include site access, construction limits, hours of operation, and utilities in the area.

Task 3-3. Construction Administration and Observation

Barr will provide construction planning and coordination with District and contractor(s), as well as to develop final construction sequencing and schedule. Barr will review construction access and equipment/material staging areas with contractor(s) and District staff.

Barr will act as general liaison between contractor(s) and District during the construction process, providing construction oversight as necessary to confirm that all work adheres to the approved plan. Barr will schedule site visits by design team members, review work progress, and document quality and compliance through ground photos and field notes during construction. Barr will review pay requests and change orders as needed. It is assumed that the total construction time will be approximately three weeks, and Barr staff will be on site to provide oversight and guidance for a portion of every day work is occurring. The construction observation budget assumes a total of 62 hours of time to complete the various aspects of this task.

Task 3-4. Post-Construction Memorandum

Barr will complete a memorandum to document key aspects of the construction process, including design changes, any unanticipated obstacles or hindrances to construction, key field notes, and final construction costs. It is assumed that a post-construction survey will not be completed.

Task 3-5. Project Management

Barr will provide updates to the project team to document project progress and coordinate tasks. Barr will provide monthly progress reports and budget status updates as part of the monthly invoicing process. Barr will solicit District feedback on an ongoing basis to ensure clear and timely communication.

Assumptions

Barr has made several assumptions scope of work items in this agreement. Assumptions relating to individual work tasks are listed above in the task detailed descriptions. However, additional assumptions that do not correspond with a single work task are listed below:

- Other than possible hand augers, no soil borings will be conducted.
- Post-construction survey and record drawings are excluded from this scope of work
- Barr will prepare one presentation for the District Board prior to final design approval, before bidding the project.
- Meetings with the MNDNR and other stakeholders will last approximately 1 hour and will be held at District's office.

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- The project site is free from contamination.
- Total time required to complete construction administration and documentation will not exceed 62 hours, based on an assumed total construction timeframe of three weeks.
- No property acquisition will be needed for the project. If property acquisition is needed, those services will be coordinated with the District Administrator on a time and expense basis.
- The proposed budget includes costs for mileage reimbursement for site visits and site observation.
- The District will provide all available and applicable GIS and CAD files to Barr in an electronic format.
- Deliverables will be provided to the District in an electronic format.
- Permit fees will be paid directly by the District. If needed to expedite the application process, Barr will pay the permit fees, if directed by District Administrator, and charge that expense to the District as needed. This effort will be coordinated with the District Administrator on a time and expense basis.
- Preparation of a phase 1 environmental assessment will not be needed
- Preparation of an Environmental Assessment Worksheet (EAW) or Environmental Impact Statement will not be required.

3. Deliverables:
   The following deliverables will be prepared and provided to the District:

   Phase 2: Final Design and Permitting

   - Copies of permit applications
   - 60% plan drawings
   - Stakeholder Meeting agendas, meeting minutes and a summary of the discussion (up to 2 meetings)
   - 90% plan drawings
   - Final construction drawings
   - Final Engineer's Opinion of Probable Cost to accompany final plans.
   - Technical specifications and provisions
   - Contract documents for the bid process

   Phase 3: Construction Administration

   - Advertisement for Bid
   - Pre-bid meeting agenda (if necessary)
   - Bid tab following bid submittals
   - Meeting agenda
   - Meeting minutes
   - Regular updates to District staff about construction progress
   - Construction photos and field notes
   - Pay applications from contractor(s)
   - Change orders (if necessary)
   - Post-construction memorandum

4. Budget:

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Services under this Task Order will be compensated for in accordance with the engineering services agreement and will not exceed $62,700, or $65,700 if Task 2-17 is included, without written authorization by the Administrator or Board of Managers. The following table provides a breakdown of the anticipated cost for major tasks associated with scope of services describe above.

Task	Task Description	Anticipated Budget	Anticipated Completion Date
Phase 2: Final Design, EAW Preparation and Permitting			
2-1	Kick-off Meeting and Project Meetings	$2,500	Ongoing
2-2	Site Visits	$1,300	Ongoing
2-3	Stakeholder Meeting	$1,250	May 2017
2-4	60% Design and Cost Estimate	$8,900	May 2017
2-5	QA/QC Review	$1,400	Ongoing
2-6	Wetland Delineation	$4,400	April 2017
2-7	Cultural Resources Desktop Review	$500	April 2017
2-8	Permitting Assistance	$6,000	June 2017
2-9	90% Design and Cost Estimate	$4,800	July 2017
2-10	90% Delivery to Board of Managers	$1,200	August 2017
2-11	Final Construction Drawings	$2,400	August 2017
2-12	Engineer's Cost Estimate	$1,250	August 2017
2-13	Technical Specifications	$5,200	August 2017
2-14	Final Design Memo	$3,500	August 2017
2-15	Project Management	$3,000	Ongoing
2-16	Chanhassen Agreement Assistance	$2,700	August 2017
Phase 2 Subtotal		**$50,300**	
2-17	Phase I Environmental Assessment (Optional)	$3,000	May 2017
Phase 2 Subtotal with optional Task 2-17		**$53,300**	
Phase 3: Construction Administration			
3-1	Bidding Assistance	$1,700	September 2017
3-2	Pre-Construction Meeting	$800	October 2017
3-3	Construction Administration and Observation	$7,200	May 2018
3-4	Post-Construction Memorandum	$1,700	June 2018
3-5	Project Management	$1,000	Ongoing
Phase 3 Subtotal		**$12,400**	
Task Order 14b Total		**$62,700**	
Task Order 14b Total with optional Task 2-17		**$65,700**	

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5. Schedule and Assumptions Upon Which Schedule is Based
   The proposed schedule (above) is based on the substantial construction occurring during the fall of 2017, with final site restoration being completed in spring 2018. The schedule outlined above assumes project initiation will occur in April 2017. The schedule may be modified depending on actual initiation of project work, permit approvals, and stakeholder coordination efforts.

IN WITNESS WHEREOF, intending to be legally bound, the parties hereto execute and deliver Phases 2 & 3 of this Agreement.

CONSULTANT	**RILEY PURGATORY BLUFF CREEK WATERSHED DISTRICT**
By_____	By_____
Its Vice President	Its_____
Date:	Date:
	APPROVED AS TO FORM & EXECUTION
	_____

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RILEY-PURGATORY-BLUFF CREEK WATERSHED DISTRICT

2016 ANNUAL REPORT

Prepared and submitted by:

Riley-Purgatory-Bluff Creek Watershed District

18681 Lake Drive East

Chanhassen, MN 55317

(952) 607-6512

Table of Contents

CONTACTS

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Name	Residence	Mailing address
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Jim Boettcher	Chanhassen	7476 Crocus Court Chanhassen, MN 55317
Sharon McCotter	Chanhassen	7000 Utica Lane Chanhassen, MN 55317
Laurie Susla	Chanhassen	7008 Dakota Avenue, Chanhassen, MN 55317
Larry Koch	Chanhassen	471 Bighorn Drive Chanhassen, MN 55317
David Ziegler	Eden Prairie	16729 Baywood Terrace Eden Prairie, MN 55346
Peter Iversen	Eden Prairie	8002 Island Rd Eden Prairie, MN 55347
Matt Lindon	Eden Prairie	9026 Belvedere Drive Eden Prairie, MN 55347
Laurie Hable	Eden Prairie	9501 Highview Drive Eden Prairie, MN 55347
Paul Bulger	Eden Prairie	15807 South Lund Rd Eden Prairie, MN 55346
Dennis Yockers	Minnetonka	3648 Hazelmoor Place Minnetonka, MN 55345
Dorothy Pedersen	Shorewood	6155 Ridge Rd Shorewood, MN 55331
Bob Adomaitis	Eden Prairie	9503 Highview Drive Eden Prairie, MN 55347

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Name and Office	Organization	Mailing address
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Leslie Stovring Water Resources Coordinator	City of Eden Prairie	8080 Mitchell Road Eden Prairie, MN 55344 (952) 949-8327
Shelly Pederson City Engineer	City of Bloomington	1700 West 98th Street Bloomington, MN 55431 (952) 563-4870
Steve Segar Water Resources Engineer	City of Bloomington	1700 West 98th Street Bloomington, MN 55431 (952) 563-4867
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Tom Dietrich Water Resources Engineer	City of Minnetonka	14600 Minnetonka Boulevard Minnetonka, MN 55343 (952) 939-8233
Robert Bean Jr. Water Resources Engineer	City of Deephaven (Bolton & Menk, Inc.)	2638 Shadow Lane, Suite 200 Chaska, MN 55318 (952) 448-8838 x2607
Paul Hornby City Engineer	City of Shorewood	5755 Country Club Road Shorewood, MN 55331 (952) 474-3236
Bill Joynes City Administrator	City of Shorewood	5755 Country Club Road Shorewood, MN 55331
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Terry Jeffery Water Resource Coordinator	City of Chanhassen	7700 Market Boulevard P.O. Box 147 Chanhassen, MN 55317 (952) 227-1168
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Steve Christopher Board Conservationist	Minnesota Board of Water and Soil Resources	(651) 296-2633

EMPLOYEES AND CONSULTANTS

The Riley-Purgatory-Bluff Creek Watershed District (District) employs three full-time employees. The administrator oversees daily operations of the District and represents the District on numerous state-wide committees. A Community Outreach Coordinator, and a District Technician & Compliance Officer were hired in spring of 2014. The District retains the services of an engineering consultant, a legal advisor and an accountant to assist with District activities. The District contracts with another accounting firm to perform its annual financial audit.

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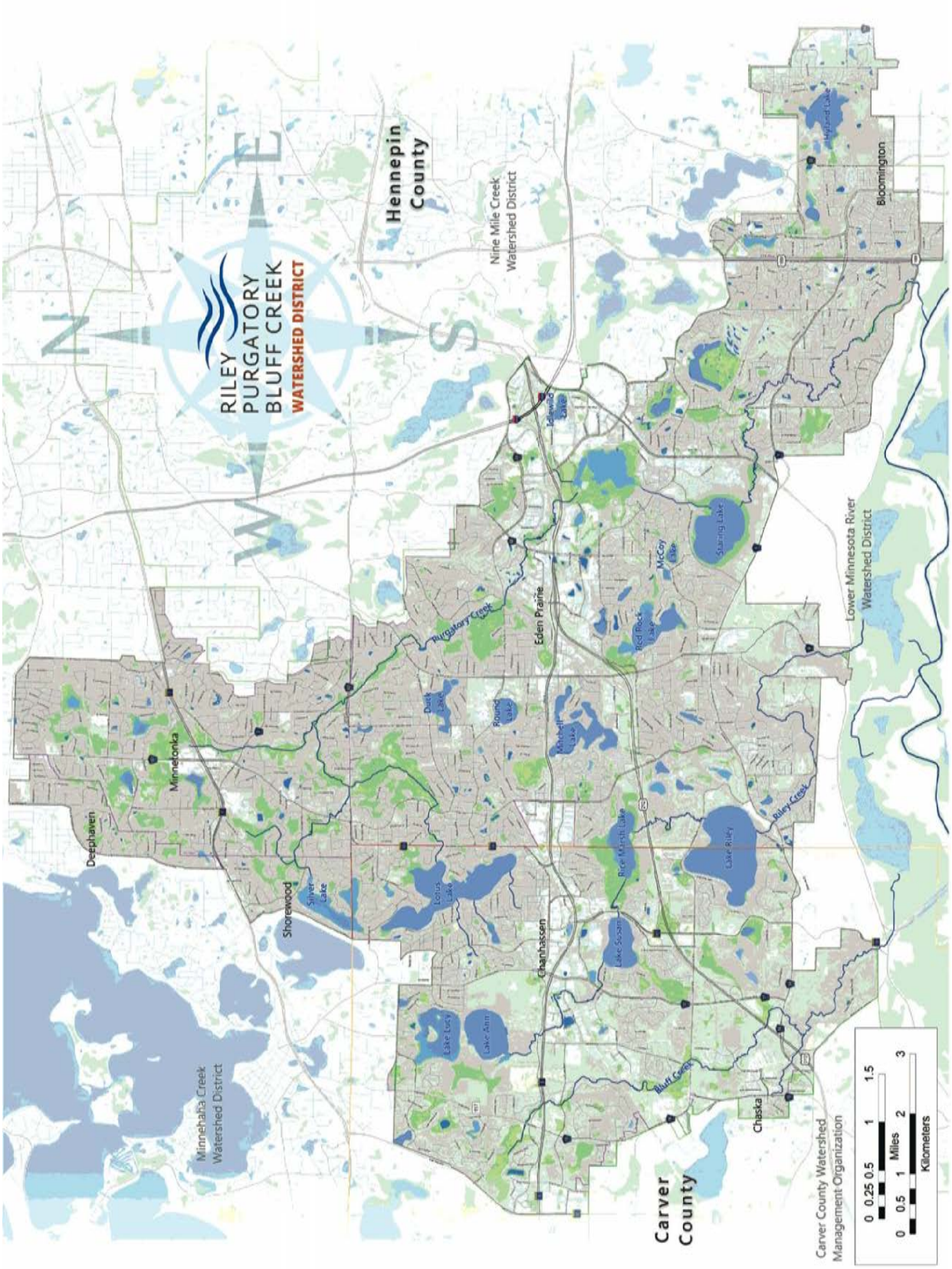
INTRODUCTION

The Riley-Purgatory-Bluff Creek Watershed District was established on July 31, 1969, by the Minnesota Water Resources Board acting under the authority of the Watershed Law. The District is located in the southwestern portion of the Twin Cities metropolitan area consisting of a largely developed urban landscape. It encompasses portions of Bloomington, Chanhassen, Chaska, Deephaven, Eden Prairie, Minnetonka and Shorewood (Figure 1). It is an area close to 50 square miles and includes three watersheds: Riley Creek, Purgatory Creek and Bluff Creek. Approximately 32.8 square miles of the District lies within Hennepin County and 14.5 square miles lies within Carver County. Four Managers are appointed by the Hennepin County Commissioners and one Manager is appointed by the Carver County Commissioners. Each of the District's five Managers serves a three-year term.

Pursuant to Minnesota Statutes Section §103D.351 and Minnesota Rules §8410.0150, the Board of Managers has prepared this Annual Report of the Riley-Purgatory-Bluff Creek Watershed District's financial status, its yearly activities, its 2016 permitting and enforcement, and its 2016 goal and objectives. The Managers invite comments and suggestions concerning this report. The 2016 Annual Report is available on the Riley-Purgatory-Bluff Creek Watershed District website – www.rpbcwd.org. Copies are also available by contacting Claire Bleser, District Administrator, Riley-Purgatory-Bluff Creek Watershed District, 18681 Lake Drive East, Chanhassen, MN 55317, (952) 607-6512.

Figure 1. Map of the Riley-Purgatory-Bluff Creek Watershed District



2016 HIGHLIGHTS

What an exciting year this has been! With three creeks, over a dozen lakes and seven cities in our district, there are many things to do and places to visit. This year alone, the district completed 10 projects, engaged residents in developing our next 10-Year Management Plan, received over $300,000 in grants, and was recognized as the "District of the Year" by the Minnesota Department of Natural Resources. Projects included combating aquatic invasive species with herbicide treatments, reducing phosphorus pollution, and implementing our first creek restoration.

2016 Projects

Herbicide treatments are part of a strategy to restore the health of local water bodies. These treatments target aquatic invasive plants that have either recently established, or are so abundant that they cause concern. Herbicide treatments were performed in five lakes: Mitchell, Red Rock, Riley, Susan and Staring.

A second approach to protecting clean water was implemented at Lake Susan this year. A spent-lime filtration system was built at a culvert where stormwater flows into the lake. This system uses recycled lime to filter out phosphorus, a nutrient that can cause algae blooms and poor water quality. It is designed to remove about 45 pounds of phosphorus annually from stormwater entering the lake. That's enough phosphorous to produce about 22,500 pounds of algae!

Phosphorous was also the target of a project on Lake Riley. In May, Riley was treated with a compound called aluminum sulfate (alum). Alum binds with phosphorus and traps it on the lake bottom, preventing algae from using it to grow. Summer water sampling detected improvements in water quality. Continued monitoring will track the long-term performance of the alum treatment.

Photo: Lake Riley, after treatment with aluminum sulfate. The light blue line shows where the alum was placed.

2016 marked a major stepping-stone for the District: our first creek restoration project! In partnership with the city of Minnetonka, the District stabilized close to 2000 feet of eroding banks along Purgatory Creek. The goals of the restoration are to improve creek health, including water and habitat quality. We look forward to monitoring the results and seeing a healthier Purgatory Creek!

Photo: Purgatory Creek restoration at 101, after creek banks have been stabilized.

2017 upcoming projects

2017 is going to be another busy year. The District will again evaluate the need for herbicides to combat aquatic invasive species. We will also begin creek restoration on Riley Creek, implement two water conservation projects, and continue to engage with our community. To learn more, visit our website and join our email list at rpbcwd.org

How does this work get done?

The Riley Purgatory Bluff Creek Watershed District is a local unit of government tasked with protecting, managing, and restoring the water resources within its boundaries. It is funded through property tax levies. The 2017 levy is $2,859,000. This money will go to projects like

those highlighted above, planning & administration (this includes a permit program and developing the 10-Year Management Plan), research & studies, water quality monitoring, education and outreach (E&O), and reserve funds in the event of an emergency.

Chart: 2017 levy break-down.

Planning for the future

Caring for local waters is a big task, and we can't do it alone. It is only through partnerships with the community that together we can protect clean water. In 2016, the District embarked on a special outreach campaign to engage the community in updating our 10-Year Management Plan. This included public meetings, a survey, and tabling at local events. Over 500 residents shared their concerns about local waters. We gained insight into how residents use and value water resources. This input helped frame the creation of the new plan's goals and strategies. The District will continue to engage with the community through 2017, with the hope of completing the process by the end of 2017. Are you interested in being a part of this process? There are many opportunities to get involved and volunteer. Learn more by visiting our website, or contacting us! Together we can protect clean water for now and future generations.

Photo: Riley-Purgatory-Bluff Creek Watershed District receiving District of the Year Award from the Minnesota Department Natural Resources

2016 Work Plan with Goals and Objectives

In 2016, the District continued its efforts to improve water quality through pollution reduction and restoration of aquatic health, and also began engaging the public and local government units in the development of the District's new 10-year management plan. The following is a summary of the 2016 work plan.

District-wide

Implement Watershed District Rules and Regulatory Program

2016 marked the second year since the District reinstated its permitting authority. It continued working with agencies and other local government units to help applicants go through the permitting process. More on the permitting program can be found under the permitting activities section.

Aquatic Invasive Species

Inspections

The District continued to support the city of Eden Prairie and the city of Chanhassen via Carver County Parks in their efforts to inspect boats to prevent the spread of aquatic invasive species (AIS).

In Chanhassen, 4,489 watercrafts were inspected over 3,333 service hours at lakes Ann, Lotus and Susan. 3,443 inspections were conducted on Lotus, 451 on Lake Susan, and 595 inspections on Lake Ann. One hundred nineteen (or 3.6%) watercrafts inspected at Chanhassen lakes were NON-COMPLIANT with MN AIS laws and were potentially contaminated with an aquatic invasive species. 46 of the 119 were found to have aquatic plants removable by hand, 1 aquatic plant was stuck and required further decontamination, 36 with water, 4 with mud, and 2 confirmed zebra mussels. Twenty four watercrafts entered the access with the drain plug in.

In Eden Prairie, six seasonal staff worked on the watercraft inspection program providing 2,412.5 of service hours. Throughout the summer, city of Eden Prairie inspectors educated boaters, family and friends about invasive species and their threat to our waters. There were no sightings of zebra mussel on boat trailers entering Lake Riley.

Early Detection and Rapid Response

Adopt A Dock

Adopt A Dock is a volunteer lake monitoring program, developed in response to growing concern about the potential spread of invasive mussels, and a call from the community to be part of the solution. The Riley-Purgatory-Bluff Creek Watershed District includes many lakes with public and private accesses. Monitoring all of these locations to detect the presence of invasive mussels is a big task, and through the Adopt A Dock program community members can help

expand the monitoring capacity of the District. Volunteers receive a kit that includes monitoring plates and instructions. They hang the plates from the end of their dock, and check them for the presence of mussels. If a suspicious mussel is found, a District staff member makes a site visit to confirm. If it is an invasive, it is reported to the Department of Natural Resources. Participants receive monthly "team emails", that remind them to check their plates, and also include interesting information about District resources and events, and any reports made by other participants. At the end of the season, plates are returned to the District, cleaned and stored for next year. Observational data from the field notebooks are entered into a database and summarized for an article. [Monitoring plate design came from the Wisconsin Department of Natural Resources].

Year two updates:

In year two, there were eleven volunteers, covering six lakes: Duck, Lucy, Mitchell, Red Rock, Riley, and Silver. There were no invasive mussels detected. The change-over to an online reporting form was greeted with appreciation from the volunteers. It also made year-end reporting easier for staff, as there was no need to transcribe written notes. Observations from the Lake Riley volunteer included remarks about how clear the water was. This coincides with the district observations of an increase in water clarity after the spring alum treatment. In 2017, staff will be reaching out to residents from Lotus Lake and Lake Susan to recruit volunteers. We will also be soliciting photos throughout the summer to highlight and recognize the good work of these volunteers

Staring Lake

The District has continued its work combatting the new arrival of Eurasian Watermilfoil (EWM) in Staring Lake, which was first detected in 2015. The combined mechanical (hand-pulling) and chemical treatment (herbicide) that occured in 2015 as part of the District's rapid response plan, was successful as no plants were found within the treatment area. However, plants were located in other areas of the lake in 2016. The District and Freshwater Scientific delineated the extent of milfoil present on multiple dates and continued with the dual treatment method. This treatment method has kept the EWM at bay within the lake, but as of the last survey conducted by the District in late fall, additional plants were found. Staff removed these plants and will continue with chemical and mechanical removal moving into 2017. More information can be found in the Lakes and Creeks Report.

Monitoring

The District continues to inspect boat landings and has incorporated juvenile mussel monitoring within its monitoring program. The District also uses a portable decontamination unit to decontaminate equipment between each lake visit.

Citizen Advisory Committee

The Citizens Advisory Committee (CAC) of the Riley Purgatory Bluff Creek Watershed District is a volunteer advisory board that supports the district's board of managers in their mission to protect, manage, and restore water resources. As representatives of citizen interests, committee members advise the board on decision making, communicate concerns from the public, and help educate the community on clean water action. Some of the 2016 CAC highlights and accomplishments included participating in educational events, taking on action projects, and participating in the Watershed Management Plan update process. In June, the CAC participated in a community creek walk along Riley Creek. The walk highlighted an eroded section of the creek in need of restoration, and touched on how the district decides where to do restoration projects. The idea for the walk came out of CAC interest in gaining firsthand knowledge about erosion and restoration.

The CAC also took on an action project in 2016. Members noted that it seemed people often did not know what a watershed district was, or what actions were harmful for water resources. They suggested a "watershed awareness" sheet that could be handed out to new homeowners. The CAC formed a sub-committee and developed the idea further. With some help from staff, the handout was finalized and has already been put to good use. The district began updating its 10-Year Plan in 2016. An important component is gathering community input on water resources values and concerns. The CAC participated in a facilitated workshop to provide this input, and also helped generate the idea for a forum to better understand education and outreach needs in our community.

Photo: CAC and other community members touring the site of a future creek restoration.

Creek Restoration Action Strategies

In 2015, the District developed the Creek Restoration Action Strategy (CRAS) to prioritize creek reaches, sub-reaches, or sites, in need of stabilization and/or restoration. RPBCWD identified eight categories of importance for project prioritization including: infrastructure risk, erosion and channel stability, public education, ecological benefits, water quality, project cost, partnerships, and watershed benefits. These categories were scored using methods developed for each category based on a combination of published studies and reports, erosion inventories, field visits, and scoring sheets from specific methodologies. Final tallies of scores for each category using a two-tiered ranking system was used to prioritize sites for restoration/remediation.

In 2016 staff re-assessed lower Bluff Creek (B1A, B1B, B1C) and upper Riley Creek (R4A, R4B, R4C, R4D, R4E), and conducted a new assessment on subreach R4F from Lake Susan to Rice Marsh Lake which had never been surveyed before. The re-assessments are part of the CRAS rotational structure which allows for streams to be be surveyed regularly to allow for updates as temporal changes occur within the stream. Additionally, the original CRAS scores from these subreaches were originally based on past picture assessments and studies, and had not gone through a full CRAS assessment. The CRAS report can be found on our website www.rpbcwd.org and a more in depth summary of the updated scores can be found in the Lakes and Creeks Report which is included in this document.

Photo: An eroded culvert discovered by staff during a creek walk.

Cost-Share Program

This year saw the greatest interest in the cost-share program since its creation. In total, 15 grants were awarded: 11 residential (including 2 Master Water Steward capstone projects), 3 local government, and 1 homeowner's association. There was greater diversity in project types this year compared to last year: 6 raingardens, 5 lake buffers, 1 wetland buffer, 1 water conservation planting, 1 sediment trap & swale, and 1 iron-enhanced sand filter. Grants were well distributed geographically, with the exception of the Bluff Creek watershed. A more targeted outreach campaign in this area may be a consideration for next year's grant cycle.

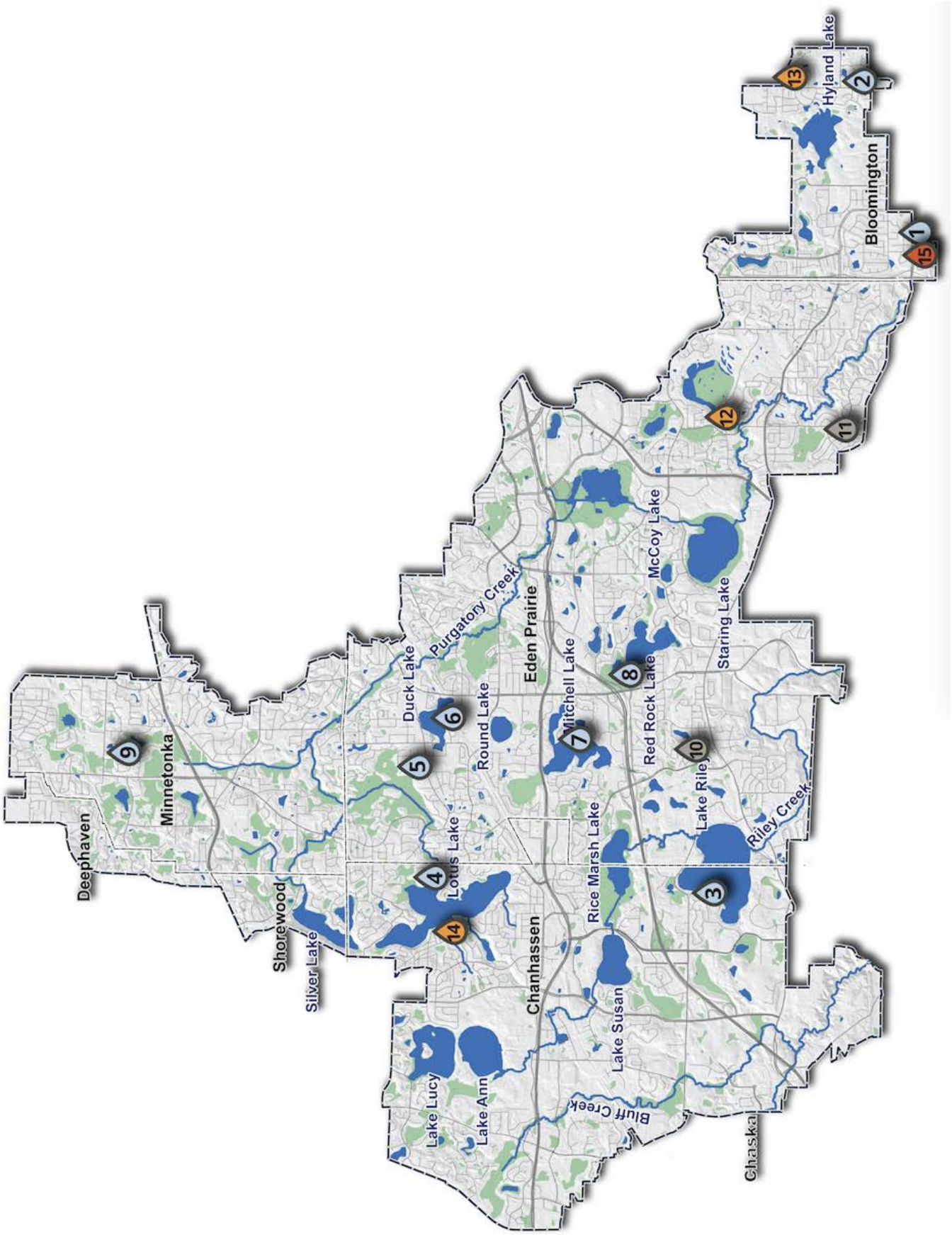
The program is proving to be beneficial not just from a water quality standpoint, but as an education and community capacity tool. Cost share grant recipients continue to engage with the district in volunteer and public input capacities. For example, at the recent Watershed Outreach Workshop, seven of the attendees were past grant recipients. Participants are also helping to increase knowledge and acceptance of best management practices: one of the lake buffer projects this year was initiated because the homeowners watched their neighbor go through the grant process and became interested.

The map and table below show the locations and details of the 2016 projects. They are coded by category: blue = residential, grey = Master Water Steward, gold = city, red = HOA.

Table: 2016 Cost-Share Project Summary

Map key	Category	Applicant	City	Project Description	Water treated in a 1.1" rain event (gal)	Phosphorus removed annually (lbs)	Sediment removed annually (lbs)	Buffer restored (square ft)	Project cost	Award
1	Residential	Blake & Danielle Guither	Bloomington	Raingarden & swale	3000	ND	ND	NA	$7,500	$3,000
2	Residential	Iris Karow	Bloomington	Raingarden & swale	598	0.05	16	NA	$10,207	$3,000
3	Residential	Carter Reese	Chanhassen	Lake buffer	NA	NA	NA	4200	$6,468	$3,000
4	Residential	Rodney Williams	Chanhassen	Sediment trap & swale	3472	0.11	50.04	NA	$8,467	$3,000
5	Residential	Randall & Lynn Berntson	Eden Prairie	Raingarden	1212	0.25	11.92	NA	$4,654	$3,000
6	Residential	Jay & Maryanne McNab	Eden Prairie	Lake buffer	NA	NA	NA	930	$6,403	$3,000
7	Residential	Shari Lackey	Eden Prairie	Lake buffer	NA	NA	NA	2,500	$5,605	$3,000
8	Residential	Tom & Stephanie Baker	Eden Prairie	Lake buffer	NA	NA	NA	280	$3,975	$2,981
9	Residential	David Haeg	Minnetonka	Wetland buffer	NA	NA	NA	1200	$2,468	$1,851
10	Water Steward	Matt Lindon	Eden Prairie	Raingardens	276	0.93	3	NA	$325	$125
11	Water Steward	Lori Tritz	Eden Prairie	Raingardens	260	ND	ND	NA	$646	$326
12	City	City of Eden Prairie	Eden Prairie	Conservation planting	NA	NA	NA	NA	$19,500	$9,750
13	City	City of Bloomington	Bloomington	Iron-enhanced sand filter	11370	8	6000	NA	$90,000	$20,000
14	City	City of Chanhassen	Chanhassen	Lake buffer	NA	NA	NA	6500	$25,334	$9,667
15	Home Owner Assoc	Cavell HOA	Bloomington	Raingarden	2000	0.3	36.44	NA	$11,000	$8,250
				Totals	22188	9.64	6117.4	15610	$202,551	$73,951

Map: 2016 Cost-Share Project Locations



GRANTS UPDATE AND AWARDS

Past Grant Updates

In 2013, The District applied for Clean Water Legacy Funds to fund for a restorative project on Bluff Creek near 101. After multiple efforts by the District, the city of Chanhassen and Carver County, we were not able to successfully work with the homeowner to gain access to restore the restoration site. The District did asked for an extension and modification on the grant so that the District could use grant dollars to do some restoration but in a different area in the watershed. The extension and modification was not approved as the Board of Water and Soil Resources.

The District applied for two grants in 2014 from Clean Water Legacy Funds and was awarded both grants in 2015. The downtown Chanhassen stormwater best management retrofit (BMP) assessment project is identifying BMPs to reduce phosphorus loads to Rice Marsh Lake and improve water quality in downstream Lake Riley, impaired for excess nutrients. This project identifies innovative BMP retrofit opportunities that target soluble phosphorus and promote infiltration and groundwater recharge within this highly developed area. This project is performed in partnership with the city of Chanhassen and will be completed in 2017. The Grant is for $48,000 with an additional District match of $12,000.

The second grant was a joint grant application from the District and the city of Chanhassen. In 2010, the Minnesota Pollution Control Agency listed Lake Susan as a shallow lake impaired for excess nutrients. TMDL-equivalent allocations were developed and published in an update to the Lake Susan Use Attainability Analysis report in 2013. In this report, Project #2 located at the park pond immediately northwest of Lake Susan was recommended as the most cost-effective watershed implementation project. The project calls for an outlet control structure at a higher elevation that will provide increased dead pool storage and the installation of a filter to treat dissolved phosphorus. It also represents a high priority site because it has the long-term potential to treat nutrient loading entering the lake from the channel that drains the north and west watershed areas and its proximity to the athletic facility and irrigated parkland will allow for stormwater reuse. Stormwater that is not used for irrigation will receive final polishing with a woodchip bioreactor. This grant project, alone, would allow the city of Chanhassen and the District to achieve more than half of the watershed load reduction goal for Lake Susan. The District was awarded a grant of $233,400. In 2016, the District it's work on the grant on gaining more understanding on the Lake Susan Park Pond and developing some feasibilities. This project is a multi-year project expected to be completed in 2017.

New Grants

Minnesota Pollution Control Agency Community Resiliency

The District, along with Nine Mile Creek Watershed District applied in 2016 for a grant from the Minnesota Pollution Control Agency titled Building Community Resilience to Climate Change through a Public Planning Process. Both Watershed Districts proposed to demonstrate a public planning process that educates and engages communities on the importance of climate change, current and anticipated impacts, and the need to build community resilience through planning. The work consists of facilitating a series of workshops designed to identify local impacts, vulnerability and strategies to increase resilience, with the goal of developing local and specific climate change action plans for participating communities. The outcomes can be incorporated into municipal comprehensive plans, and the process can be a model for future work in

communities around Minnesota. The District was awarded the grant. The Grant is for $27,000 with an additional District match of $19,000 shared with Nine Mile Creek Watershed District.

Metropolitan Council Stormwater Grants

The District also applied for two grants with the Metropolitan Council: Chanhassen High School Water Reuse System and the Fire Station 2 rainwater harvesting system in Eden Prairie. Both Grants were awarded to the District.

Fire Station 2 water reuse system

The Riley Purgatory Bluff Creek Watershed District (RPBCWD), in partnership with the city of Eden Prairie (hereinafter referred to as City), proposed to retrofit Fire Station #2 with a rainwater collection system that will be used for irrigation, fire truck washing, and fire truck tanker filling. This project will include the following components:

- Rainwater collection system including gutters, downspouts, pre-filter, and pipes to convey rainwater to a storage tank
- Above ground UV resistant 7,500 plastic storage tank
- Pump to provide pressure to distribution points
- Filtration and UV disinfection system designed to meet Minnesota Plumbing Code for internal use
- Distribution plumbing and connections to planting bed irrigation system
- Distribution plumbing and faucets inside the fire station building for truck washing and tanker filling
- Controls and human interface that provides real time water usage information
- External and internal educational signage and displays, and numerous public and professional demonstration opportunities

The District was awarded the grant. The Grant is for $99,287 with an additional District match of $38,413 shared with the city at 50%. Completion of this grant is anticipated to be in 2017.

Chanhassen High School stormwater reuse

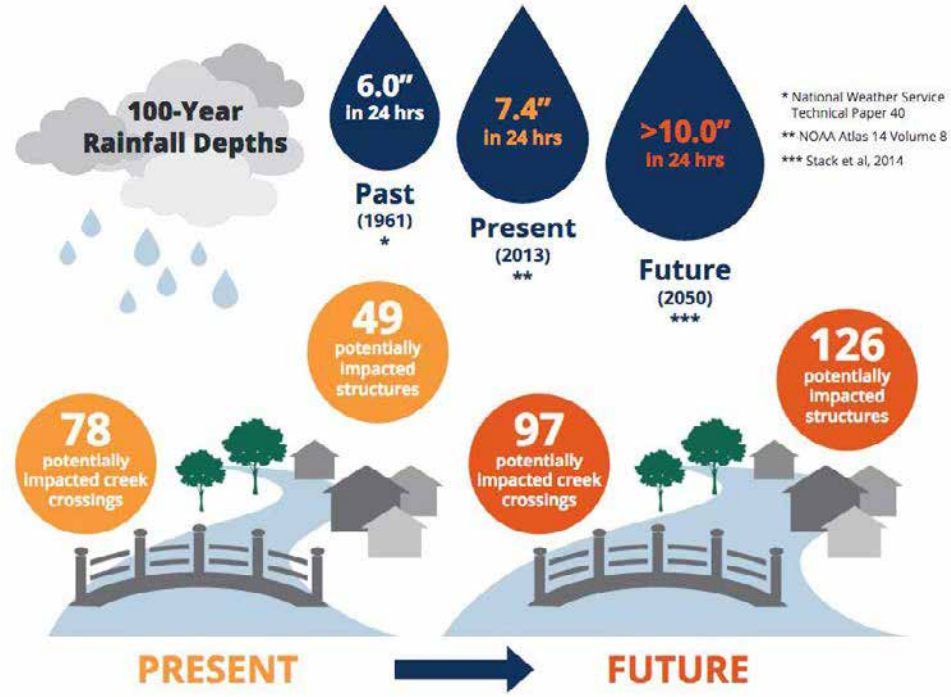
Riley-Purgatory-Bluff Creek Watershed District (RPBCWD) in partnership with the city of Chanhassen conducted a feasibility study of stormwater reuse for irrigation at Chanhassen High School with the goal of implementing a project to reduce groundwater consumption, reduce discharge rates, volumes and pollutants to Bluff Creek (an MPCA impaired water), and increase the public awareness of stormwater reuse and groundwater conservation. According to irrigation meter records, the school campus purchases an average of 3.8 million gallons (MG) of groundwater annually from the city of Chanhassen's domestic water supply to irrigate about 11 acres of green space (athletic fields and areas around the school building). This is equivalent to six Olympic-size swimming pools annually or an average weekly irrigation rate at Chanhassen High School is 0.57 inches per week between May through September.

Through a partnership between the RPBCWD, city of Chanhassen and Independent School District 112, a stormwater reuse system could effectively irrigate nearly 75% of the green space on the high school campus by using 16% of the annual watershed runoff. The proposed reuse system would meet 51% of the total school campus annual irrigation demand by using stormwater from a stormwater pond on the school campus to irrigate the north side of the high school campus (8.2 acres) through the irrigation system. The proposed stormwater irrigation

system will decrease the demand for groundwater at the high school athletic fields and grounds, with the potential for improvements and expansion in the future to meet additional demands. The probable cost to design, construct, and permit the proposed stormwater irrigation system is estimated at $384,000. The Metropolitan Council awarded the District $200,000. The District will be putting $50,000 to this project and the city of Chanhassen $134,000.

Hydraulics and Hydrology Model

In 2015, the District updated the Bluff Creek and Riley Creek Hydraulics and Hydrology Models using Atlas 14 – the most recent hydrometeorological study for Midwestern States. The models provided valuable information in regards to floodplains, flood control and water quality to name a few. All floodplain profiles were updated in 2016. Furthermore, the District in partnership with all our cities (financial partners included the city of Chanhassen, city of Eden Prairie, city of Minnetonka) used the H&H models to estimate the amount of runoff generated during future rainfall depths rain event and calculated water surface elevations along the creeks and lakes within the watershed. This helped the district evaluate areas of resiliency within the watershed (i.e., flood-risk to structures and creek crossings is not sensitive to change in rainfall depths).



Plan Updates

In 2015, the District put forward one major plan amendment for two projects. The amendments were for the Lake Riley Alum Treatment as well as for the Riley Creek Water Quality Improvement project. After the public process, the District modified the scope of the Riley Creek Water Improvement Project to refine the scope of the work to two severe sections located in Lower Riley Creek. The amendment was sent for second round of comments at the end of 2015. The Board of Water and Soil Resources approved the amendment in early 2016.

In 2016, the District processed three plan amendments. The first amendment was to provide a

structure for each watershed city to adopt updates to its ordinance to maintain conformity to the RPBCWD rules or defer exercise of regulatory authority to RPBCWD. RPBCWD is undertaking this step independent of its concurrent ongoing comprehensive update of its water management plan to provide early notice to watershed cities of the critical need to incorporate a commitment consistent with the amendment [Minn Stat. 103B.211, subs 1 (a)(3)(iii)]. The other amendments were for three capital improvement projects: The Chanhassen High School Reuse System, Fire Station 2 Water Reuse Project (please see earlier section for further details on these projects) and lastly the Scenic Heights. The Scenic Heights Plan amendment is specifically to restore the School Forest, improve water quality in the Purgatory Creek subwatershed, and to restore an ecologically diverse and safe outdoor learning environment that promotes sound forest and watershed stewardship for future generations. This project will remove invasive species in the School Forest, improve the pond and wetland through the construction of a vegetated swale and other measures to prevent erosion and improve local water quality, and introduce and establish native plant communities.

TECHNICAL ADVISORY COMMITTEE

The District continued to work with its Technical Advisory Committee in 2016. It held several meetings throughout the year to discuss the 10 year plan as well as floodplain profile updates.

EDUCATION AND OUTREACH

The 2016 education and outreach programing centered around public engagement with the Watershed Management Plan update process. At the same time, we continued to develop and grow our other suite of programs to raise awareness about clean water action, grow stewardship, and increase capacity. Events and programs from 2016 are highlighted below.

Watershed Management Plan Public Engagement

Engaging the public in the process of updating the 10-Year Water Management Plan was a priority in 2016. Strategies to connect with the community included news releases, advertisements, tabling at events, a survey, and community meetings. The efforts paid off, and we gathered important data to help inform the plan. The details of the engagement strategy can be found in the attached summary. In 2017, the district will continue to engage with the public as the plan is completed.

Aquatic Invasive Species

AIS Jr Inspector

The AIS Jr Inspector program teaches children why and how to inspect a boat for invasive species. It utilizes either a toy boat, or a full-size boat. The activity was utilized in and around the district once again this year, with over 400 children engaged. Events included the Eden Prairie City-Wide Open House, the Minnetonka Native Plant Fair, the Eden Prairie Arbor Day Walk and Eco Fair, and the Metro Children's Water Festival. Carver County Water Management Organization also borrowed the kit, and the activity was used in partnership with the Staring Lake Outdoor Center camps. A popular program, the AIS Jr Inspector will be utilized again throughout 2017.

Adopt A Dock

(See: District-Wide; Aquatic Invasive Species; Early Detection & Rapid Response)

AIS Chamois

The District developed a give-away to be used at boat launches. Chamois cloths were imprinted with the District's AIS icon, and the slogan "Pull the Plug, and Wipe it Clean". The cloths encourage boaters to pull their boat plug, and wipe their boat clean when leaving a lake. These were given to inspectors at lakes in the watershed so they could hand them out to recreators.

Communications

Annual Communication

This year's annual communication included two pieces: an 11" by 17" folded brochure, and a Parks & Trails Map. Both were mailed to the District's official contact list, including local and state leaders. They were also distributed to local gathering places like libraries and community centers. The trail map will be used for the next several years, at events and programs.

Newsletter

The District continued to grow its email subscribers list in 2016. Many of the residents who engaged with the District during the 10-Year Plan update process opted to continue to stay in contact through the listserve. In addition to quarterly newsletters, the District also sent notices when board packets were posted for board meetings, and updates about interesting events and opportunities.

Print media

The District submitted frequent news releases to local papers with continued success. This included a year-in-review from the District Administrator. Advertisements were also used for promoting community engagement with the 10-Year Plan updated process.

Social media

In 2016, the District continued to utilize social media to connect with the community. It has been active on Twitter, Instagram, and Facebook.

Website

The website has become an important repository of reports, studies, and other data of interest to the public. It has been noted that certain aspects could use updating and reorganization. Needed improvements will be made in 2017, to help the site remain a valuable community resource.

Community Outreach

Lake and Neighborhood Association

District staff presented to several lake and neighborhood associations. Staff provided updates on their neighboring water resources and on current and upcoming water resources management.

Community events

The District participated in several community events like the Minnetonka Native Plant Fair. The District educated community members on topics like native plants, invasive species, keeping stormdrains clean and other best practices to increase water stewardship. These events were also used to promote community participation in the 10-Year Management Plan update process.

Urban Waters Forum

The Urban Waters Forum was a continuation of the successful two-year Shallow Lakes Forum. It was a partnership of the Riley Purgatory Bluff Creek Watershed District, the Nine Mile Creek Watershed District, Minnehaha Creek Watershed District, Carver County Water Management Organization, the city of Eden Prairie, the city of Minnetonka, the Freshwater Society, and the Minnesota Landscape Arboretum. The focus was broadened from previous years to include all

urban waters, with an emphasis on specific actions that community members can take. The audience for the event was the general resident community. The forum began with an overview of how the landscape impacts water. It then moved into actions residents can take on the water, followed by actions they can take on the land. The forum ended with tips for involving community, and building a volunteer base. Approximately 50 residents attended the forum.

Educational tours

Cycle the Creek Tour

The second annual Cycle the Creek tour explored Purgatory Creek. The event highlighted the Purgatory Recreation Area, carp management in the Purgatory Creek Chain of Lakes, the Staring Lake Outdoor Center, and the challenges of road salt pollution. Next year, the ride will take place in the Riley Creek Watershed, highlighting the creek and several of the lakes.

Riley Creek Walk

Citizens Advisory Committee members, Board Members, and the community participated in an interpretive walk along Riley Creek. The walk highlighted the unique big woods habitat of the Riley Creek Conservation Area, and the location of a future District creek restoration.

Annual Summer Tour

The theme of this year's tour was groundwater. Rather than a bus tour of the District, participants toured the Eden Prairie water treatment facility. Prior to the tour, there was a presentation on groundwater throughout the watershed. The 2017 tour will alternate back to a bus tour.

K-12 Outreach

Scenic Heights School Forest

The Scenic Heights Elementary School is the site of a Department of Natural Resources School Forest. School Forests are outdoor classrooms where students learn and apply math, art, science, language arts, and social studies while gaining an appreciation and awareness of natural resources (source: DNR School Forest Website). In 2015, the District was approached by a teacher at Scenic Heights asking for help in managing the forest. The forest includes pond and wetland habitat, and is tributary to Purgatory Creek. It is overrun with invasive species and the habitat is degraded. In 2016 the District investigated potential grant opportunities to fund a project and developed the plans required to submit for funding. Through a combination of grant, school district, Hennepin County, and watershed district contributions, the restoration was funded. The project will get underway in 2017.

Earth Day Mini Grants

As a part of its outreach to local schools, the District created an Earth Day Mini Grant program in 2016. These are small ($50-250) grants for teachers, non-formal educators, and students. They support Earth Day/Month projects or activities that have a component related to water resources. This could be planting native plants, or purchasing Project WET materials. The program funded one project in 2016: a native planting activity for students with little access to nature. The program will return in 2017 with additional advertising.

St. Hubert's School

The District's partnership with St. Hubert's School is in its fourth year. Staff continued to facilitate the pond project that was started in 2015, with the last sampling conducted in April.

The six students gave a presentation about their findings at the June board meeting. In October, staff returned to conduct an educational presentation. They educated over 70 students on the concept of a watershed and how water and pollutants move through one. They also conducted a demonstration of testing a stormwater pond for chloride pollution.

Staring Lake Outdoor Center Partnership

In 2016, the District formed a new partnership with the Staring Lake Outdoor Center in Eden Prairie. A part of the Eden Prairie Parks and Recreation Department, the outdoor center hosts classes, camps, and events year-round, for adults, families, and children. The partnership supports the center's 4th grade water programing. Approximately 200 students visit the center three times (fall, winter, spring) to study Staring Lake. Staff participated in the fall program, adding testing for chloride to the existing program. The district will continue to support this program in 2017, and will be hosting a one-week "Water Explorers" camp at the center. The camp, for children 8-12, will teach the basic principles of watershed science and management, while exploring the lake.

Nonpoint Education for Municipal Officials (NEMO)

Nemo 101 Presentations

Staff presented at both a Shorewood City Council meeting and a Chanhassen Planning Commission meeting. The focus of these presentations was on the role and functioning of the watershed district, how the District has been engaging in the community, and the ways the District and cities can, and have been, partnering.

Lower Minnesota River Tour

Together with Nine Mile Creek Watershed District, Lower Minnesota River Watershed District, Carver County Water Management Organization, and the University of Minnesota Extension Services, and SeaGrant, the District put on a tour along the Lower Minnesota River for local elected and appointed officials. Titled "The Dirt on Sediment Pollution", this was an educational program for community leaders from cities in the southwest Twin Cities metro region about the sources and impacts of erosion and sediment in local lakes, streams, and rivers. Thirty-nine people participated in the event, and of the 31 evaluations received, all found the program to have a high educational value.

Professional Outreach

Turfgrass Maintenance Workshop

The District hosted a Turfgrass Maintenance Workshop. This workshop gives professionals tools to manage turfgrass while protecting water quality. The workshops are taught by Fortin

Consulting and developed in conjunction with the Minnesota Pollution Control Agency.

Winter Snow & Ice Management Workshops

The District co-sponsored a Winter Parking Lots & Sidewalks Workshop with Nine Mile Creek Watershed District, and co-promoted a Winter Roads Workshop put on by Minnehaha Creek Watershed District. The District also hosted a Level II Winter Maintenance Workshop. These trainings give professionals tools to manage winter ice and snow while protecting water quality.

Volunteer programs

Master Water Stewards Program

The District graduated its first cohort of master water stewards in November 2016. The cohort included six stewards. They conduct projects in teams of two, and two of the teams completed their projects in 2016. These were both raingardens. The third team will install their project, a shoreline restoration, in spring of 2017. The graduated stewards will each be volunteering 50 hours in the year after graduation, a great help to District programing. The Freshwater Society adjusted the class cycle of the program, and so the second cohort of stewards began classes in the fall of 2016. The District has four additional stewards in this cohort.

Service Learners

Several students from the University of Minnesota engaged in service-learning during 2016. These students volunteered 20-24 hours of work in either water and fisheries monitoring, or education and outreach programing. They gained valuable experience in natural resource management while increasing the District's capacity. Their contributions ranged from helping develop the new Parks & Trails Map to monitoring invasive carp.

BLUFF CREEK ONE WATER

The District continued to work with the city of Chanhassen, Lower Minnesota River Watershed District and the Hennepin County Railroad authority to stabilize streambanks and implement a fish passage at Bluff Creek south of the regional trail and west of County 101. The District was awarded a Clean Water Fund grant in 2014. The District and the city of Chanhassen have been engaged with the private property owner to secure access and easement where the restoration will take place. The District, Carver County and the city of Chanhassen were unfortunately unsuccessful in securing access to the restoration site. The District asked that the grant be extended by 1 year and modified to focus on a different restoration site. Unfortunately, our modification and extension were not granted. Unused funds will be returned to the Board of Water and Soil Resources in 2017.

RILEY CREEK ONE WATER

CHANHASSEN TOWN CENTER

The District was awarded a Clean Water Grant from the Board Water and Soil Resources for the downtown Chanhassen stormwater best management retrofit (BMP) assessment project. The project is identifying BMPs to reduce phosphorus loads to Rice Marsh Lake and improve water quality in downstream Lake Riley, impaired for excess nutrients. The project began in 2015 and will be completed in 2017. This project is performed in partnership with the city of Chanhassen. The report which will be finalized in 2017, identifies areas in downtown Chanhassen where improvements can be made or retrofitted to help reduce pollutants in reaching Rice Marsh Lake.

LAKE LUCY IRON ENHANCE FILTER WATER QUALITY PROJECT

The District in 2016 began contacting the Ashling Meadows Neighborhood Association to work with them to improve filtration of pollutant on their stormwater pond located on one of their outlots. Unfortunately, after multiple attempts to communicate with the president of the association, the association did not show any interest in the project. The project is on hold until the association shows interest.

LAKE LUCY PLANT MANAGEMENT

A slight decrease in the species richness of the aquatic plant community of Lake Lucy appears to have occurred between the 2012 and 2015 gap in sampling period. In 2016, the plant community richness and abundance was closer to 2010 through 2012 levels. Exotic species curlyleaf pondweed and Eurasian watermilfoil are still present at low abundances and the plant community is still relatively healthy. Lakeshore homeowners are currently controlling curlyleaf with local herbicide applications so lakewide treatments are not recommended at this time. If curlyleaf pondweed increases dramatically in the future, Lake Lucy could possibly benefit from a lake-wide early season endothall herbicide treatment. More information on the plant management on Lake Lucy can be found on our website at rpbcwd.org look for the 2016 Annual Plant Report.

LAKE SUSAN SPENT LIME

The Riley Purgatory Bluff Creek Watershed District, together with the city of Chanhassen, finished building a structure to treat stormwater in Lake Susan Hills West Park. The structure cleans stormwater by removing phosphorus. This nutrient is contributing to poor water quality in Lake Susan and can cause cloudy water and algae blooms. The structure is called a “spent-lime treatment system.” It is one of several treatment methods that were considered. A spent-lime system was picked because it would have the smallest impact on the surrounding land and wetlands, and remove a large amount of phosphorous for the cost.

The site for the spent-lime system was identified in 2013 through a UAA study (can be found on our website www.rpbcwd.org) that looked at different actions that could be taken to clean Lake Susan water. It is located near the pedestrian trail off of Lake Susan Hills Drive. The District conducted the feasibility study and ordered the project in 2015. The District completed the project in 2016 and is monitoring it to fine tune the performance of the spent lime and determine removal efficiencies.

LAKE SUSAN WATER QUALITY IMPROVEMENT PHASE 2

In 2016, the District it’s work on the grant on gaining more understanding on the Lake Susan

Park Pond and developing some feasibilities. Feasibility will be completed at the start of 2017. More information on the monitoring can be found in the Lake and Creek report.

Lake Susan Plant Management

Following successful carp removal in 2009, aquatic plant transplanting experiments began in the summer of 2009 and ended in the summer of 2011. Lake Susan was treated with the herbicide endothall to control curlyleaf in May 2013 and 2014. No treatment occurred in 2015.

The increasing lake-wide curlyleaf population is concerning, however continuing the split treatment approach will be beneficical to our understanding of how the treatments effect native plant communities. Multiple years of study will improve the interpretation of results from the surveys on the split treatments. This work is being conducted in conjunction with University of Minnesota researchers.

The expansion of native plants appears to be limited by water clarity. With the limited water clarity Lake Susan will likely benefit from an alum treatment to bolster clarity and reduce internal nutrient loading. If alum treatments are to occur in the future, herbicide applications will likely be needed to control the spread and expansion of exotic species and additional transplanting into deeper water could be considered.

Lake Susan Alum

Lake Susan is a shallow eutrophic lake, located in Chanhassen, MN. In 2009 the Minnesota Pollution Control Agency (MPCA) listed Lake Susan as impaired for excess nutrients. In 2013, Riley Purgatory Bluff Creek Watershed District (RPBCWD) and Wenck Associates completed the Lake Susan Use Attainability Assessment Update that outlined nutrient loading and reduction strategies. This study estimated that internal phosphorus loading accounts for 40% (281 lbs/yr) of the total annual phosphorus budget in Lake Susan (Wenck 2013). The District conducted a study to determine feasibility and cost estimate for an aluminum sulfate (alum) treatment on Lake Susan to reduce internal phosphorus loading. The study is anticipated to be finalized at the start of 2017.

Lake Riley Plant Management

Native plants have appeared to positively respond to the combined control of curlyleaf pondweed and Eurasian watermilfoil in addition to the improved water clarity due to the alum treatment. Significant increases in both frequency of occurrence and biomass of natives was observed in 2016. Improved water clarity appeared to enhance the recovery of the native plant community and expansion of native plants in water deeper than 2.5m.

Eurasian watermilfoil has been present at nuisance levels and the 2016 herbicide treatment to control it appeared to reduce the August occurrence and biomass. However, the milfoil biomass is generally reduced by August in most years so it is unknown the extent to which the population was controlled. Continued spring and summer monitoring in 2017 will provide greater understanding of the extent to which the treatment was effective at reducing the population of Eurasian watermilfoil. The recommended strategy is to again implement selective control of Eurasian watermilfoil with an auxin mimic on 35 acres.

Curlyleaf pondweed appears reduced from the four consecutive years of treatment based on frequency of occurrence, biomass, as well as turion densities. The 2016 increase in frequency of occurrence and biomass may warrant a treatment in 2017. Curlyleaf should be assessed after

iceout in 2017 and if growth apprears dense an early season endothall treatment should be planned. However, any treatment should be within areas planned for milfoil treatment so as not to reduce the area allowed for 2,4-D treatment of 45 Eurasian watermilfoil (35 acres) later in June. If growth is not dense then no treatment of curlyleaf is advised and the focus shoud be on Eurasian watermilfoil.

If the invasives remain in check, and good clarity persists, the native plants should have more space and light, and less competition from the invasives and ideally be able to establish and expand in 2017 with the continued improved clarity from the alum treatment. If recovery of the native plant community does not progress in 2017, planting or transplanting should be conducted to jump-start the recovery, along with targeted and selective herbicidal control, in the next year. The study of Lake Riley's plant population is being conducted in conjunction with University of Minnesota researchers.

Lake Riley Alum

An alum treatment was conducted on Lake Riley the week of May 9 - 13, 2016. This was the first dose in a two-dose treatment Alum reduces the growth of algae by trapping the nutrient phosphorus - algae's food source - in sediments. Like most other plants, algae require phosphorus to grow and reproduce, and so less phosphorus means less algae. Alum is a common lake restoration treatment, and is safe. It does not pose any known risk to humans, pets, or wildlife. In anticipation of the public interest that the extra activity at Riley Lake Park would cause, the District created an info sheet and made it available through information boxes at the park. More information on the treatment results can be found in the Lakes & Creeks Report.

Rice Marsh Lake Alum

Rice Marsh Lake is a eutrophic, shallow lake, located on the border of Chanhassen and Eden Prairie, MN. No assessment has been conducted on Rice Marsh Lake to determine impairment status, however, it's total phosphorus concentrations are well above shallow lake standards. Rice Marsh Lake is considered polymictic, which means it experiences intermittent thermal stratification and anoxic periods throughout the growing season. The most recent Rice Marsh Lake Use Attainability Assessment UAA estimated that internal phosphorus loading accounts for 34% (539 lbs/yr) of the total annual phosphorus budget (Barr, 2016). The District conducted a study to determine feasibility and cost estimate for an aluminum sulfate (alum) treatment on Rice Marsh Lake to reduce internal phosphorus loading. The study is anticipated to be finalized at the start of 2017.

Rice Marsh Lake Aeration

The District manages an aeration system during winter months on Rice Marsh Lake. The system sends compressed air through tubing into the lake, much like a fish tank, and keeps dissolved oxygen at a healthy level for native fishes. These fish eat the eggs of non-native carp, which use the lake as a spawning ground, and help control their populations. The district has been operating the aeration unit since 2010. The agitation of the water by the aeration unit causes thin, weak ice, and even open water. To help keep recreators safe, the District posts "thin ice" signs around the lake.

Lower Riley Creek Stabilization

In 2016, the District developed a feasibility to restore an approximately 5,100 foot reach of Lower Riley Creek and 580 foot contributing ravine. The project is located within the Riley Creek Conservation Area (RCCA), in Eden Prairie, Minnesota. The creek was inspected in 2007 and 2016 by District staff and engineers. Erosion was documented on much of the reach, with detrimental effects on water quality and stream habitat. Final design for stabilization and restoration of this reach is anticipated in 2017 with implementation to begin at the end of 2017.

PURGATORY CREEK ONE WATER

PURGATORY CREEK LAKES USE ATTAINABILITY ANALYSIS

A Use Attainability Analysis (UAA) is a scientific assessment that uses an outcome-based evaluation and planning process to obtain or maintain water quality conditions and achieve beneficial uses in a water body, such as swimming, fishing, or wildlife habitat. The District originally developed UAAs for the waterbodies in the Purgatory Creek Watershed in the early 2000s. The UAAs include a water quality analysis and prescription of protective measures for the lakes and their respective watersheds, based on historical water quality data, the results of intensive lake water quality monitoring, and computer simulations of land use impacts on water quality.

The goal of this study is to provide updated and consistent information about the water quality and biological integrity of the receiving waters in the Purgatory Creek watershed with a focus on the lower valley of Purgatory Creek and major lakes in the watershed. The assessment of the lower valley of Purgatory Creek incorporates the extensive efforts previously conducted to establish planning level streambank stabilization strategies. This study includes trend analyses and comparisons of water quality monitoring with state standards and District goals, water quality modeling calibrated for critical conditions and used to evaluate and recommend restoration measures based on the potential water quality benefits and estimated life-cycle costs, all while aligning with the District's "One Waters" strategy of resource management. The study which was completed in 2016, can be found on our website www.rpbcwd.org.

PURGATORY CREEK RESTORATION AT 101

The city of Minnetonka petitioned the District to undertake this restoration of Purgatory Creek east of County Road 101 and north of 62. The District began restoration of the Creek in the fall of 2016 and will be completing the restoration the Spring of 2017. This is the first creek restoration for the district. This restoration project will reduces streambank erosion and it will help improve and protect the water quality of downstream resources, such as Purgatory Creek and Staring Lake, without causing adverse impacts on natural resources of the area.

Red Rock Lake Plant Management

Red Rock Lake is classified as a shallow lake by the Minnesota Pollution Control Agency. In 2015, the District along with the city of Eden Prairie completed a public engagement process to develop a plant management plan for Red Rock Lake. Part of the plan identified the need for managing curlyleaf pondweed and as such the District has taken leadership in managing for this invasive plant. Thirteen acres were treated in May for curlyleaf pondweed. The District will be surveying the aquatic plant community to determine if there is a need to treat in 2017.

Mitchell Lake Plant Management

The native plant community in Mitchell Lake should continue to be monitored in case of further declines. Another year of early season curlyleaf treatment will be useful to manage the population. However, due to the complex shoreline and limits to application areas, whole-lake reductions in curlyleaf may not be as apparent as in other treated lakes. Although Mitchell Lake is a "Natural Environment Lake", the Minnesota DNR may grant another variance if early season endothall treatments were likely to maintain or enhance the native plant community. Because Eurasian watermilfoil is relatively low in abundance, Mitchell may benefit from another early season endothall treatment similar to 2016. In 2017, sampling efforts should continue to be coordinated with harvesting done by the city of Eden Prairie, so as to allow us to better assess the overall response of plants in the lake. More information on the plant management on Mitchell Lake can be found on our website at rpbcwd.org. Look for the 2016 Annual Plant Report.

Red Rock Delisting

The Minnesota Pollution Control Agency removed Red Rock Lake from the impaired waters list.

Staring Lake Plant Management

By 2015 carp were lowered to a density that allowed for the establishment of macrophytes. Exotic species should continue to be monitored as curlyleaf pondweed continues to be problematic early in the summer and Eurasian watermilfoil has recurred in 2016 after a 2015 rapid response to control it. However, brittle naiad (Najas minor) was not observed in 2016 despite occurring at several points in 2015. Curlyleaf pondweed frequency of occurrence doubled from June 2014 to June 2015 and doubled again from June 2015 to June 2016 warranting consideration of an early season herbicide treatment in 2017. The District is looking at focusing control on one large plot on the northwestern side of the lake as that is the side with the densest growth and contains the fishing pier and boat launch. Conducting the treatment on one side of the lake will allow us to evaluate the effect of the herbicide on native plant communities by comparing the treated side to the untreated side. Spot treatment or focused pulling of Eurasian watermilfoil will be considered again for 2017. Continued surveys will allow for consistent monitoring of the plant community and to track exotic species expansion. Lastly,

the District will continue to control the carp population as necessary to maintain the clear water state. The control efforts for curlyleaf pondweed and Eurasian watermilfoil will be futile if carp populations reach high abundances again within the coming years as the lake will likely return to the turbid, low macrophyte abundance state.

ANNUAL COMMUNICATION TO THE PUBLIC

As required by Minnesota Rule §8410.0100, subp4, the District prepared and disseminated its annual communication. This year's Annual Communication was a 11x17 folded handout. Copies of the written communication are included in Appendix A.

EVALUATION OF CAPITAL IMPROVEMENT PROGRAM

The District began working on the District's 4th generation 10-year Plan. As part of the process, the District identified the clear need to develop a prioritization tool that would help prioritize capital improvement projects throughout the District for various types of water resources. Additionally, the District engaged with Local Government Units to identify additional projects that were not identified through District study so that they could be evaluated as part of our prioritization process. The prioritization tool will help in the identification of projects to be implemented for the next 10 years.

PERMITTING ACTIVITIES

The District received 43 permit applications in 2016. Thirty-nine permits were approved in 2016 and none were denied. It is estimated that over 48,000 lbs of Total Suspended Solids (TSS) and close to 130 lbs of Total Phosphorus were prevented from entering our stormwater sewers and ultimately our water resources. In addition, close to 260,000 cubic feet of water was retained either through infiltration or retention ponds and 20 projects included buffers.

Summary		Estimated		
Permit Type	Number	Total TSS (lbs)	Total TP (lbs)	Volume (cft)
Governmental	22	25,718	70.3	162,524
Private Property	11	22,622	59.7	97,178
Ex. Single Family	10	Not Computed		
Withdrawn/ Review in Progress	4	Not Computed		
TOTAL	47	48,340	130	259,702

There were a total of 12 variances on 8 projects. 2 for Rule B - Floodplain, 3 for Rule D -

Buffers, 1 for Rule E – Sediment Removal, 2 for Rule F – Shoreline/Streambank, 3 for Rule G – Waterbody Crossings, and 1 for Rule J - Stormwater.

SUMMARY OF WATER QUALITY MONITORING DATA

The District continues to monitor the lakes and creeks in the Riley, Purgatory and Bluff Creek watersheds. Please read appendix B for the District's 2016 Lakes and Creeks Data Report. As part of the report, the Lake & Creek Water Quality Fact Sheets were updated to help residents understand the health of our water bodies, the actions the District has taken to improve these, and how they can help protect our resources.

STATUS OF LOCAL PLAN ADOPTION AND IMPLEMENTATION

The District did not receive Local Surface Water Management Plans to review.

FINANCIAL STATUS

The District's fund balances and financial status are included in the District's Annual Audit. The Annual Audit is included as Appendix D to this report. The District's audited financial report was prepared by Redpath and Company, a certified public accounting firm. As required by Minnesota Rules §8410.0150, subp. 2, the Audited Financial Report includes classification and reporting of revenues and expenditures, a balance sheet, an analysis of changes in final balances, and all additional statements necessary for full financial disclosures. The 2016 Audited Financial Report may be found on our website at http://www.rpbcwd.org/library/annual-reports-and-communications/.

BIENNIAL SOLICITATION OF INTEREST PROPOSALS

Under Minnesota Statutes §103B.227, subd 5, the District must issue a biennial solicitation for legal, technical, and other professional services. The District issued a formal solicitation for accounting, engineering, and legal service in 2015. The District retained JMSC Futurity as its accountant and Smith Partners, PLLP as its legal counsel. BARR Engineering was selected as District Engineer in June 2015. Next solicitation will be issued in 2017. Redpath and Company conducted the District's annual financial audit.

2016 ANNUAL BUDGET

The District adopted its 2016 Annual Budget in September 2015. The 2016 Budget can be found in Appendix C of this Annual Report.

2016 ANNUAL AUDIT

The District's annual audit can be found at the following website:
http://rpbcwd.org/library/annual-reports-and-communications/

2017 WORK PLAN

The 2017 overall goal for the District is to implement projects that will improve water resources consistent with its current 10-year plan and look ahead to the next 10 years. The District will also run a dynamic monitoring program that will help guide managers in their decision-making.

District-Wide	
Regulatory Program	Manage the regulatory program Continue the district permit program Inspect active permit sites for compliance Inspect completed permit projects for compliance and maintenance Work with Local Government Units to streamline permitting process
Aquatic Invasive Species	Implement AIS monitoring plan Develop Rapid Response Plan as appropriate Engage audiences on best stewardship practices
Citizen Advisory Committee	Continue developing the communication process between the CAC and the Board of Managers Engage the CAC on the Cost-share Program Engage the CAC with the 10-Year Plan and other key issues that might arise
Cost-Share	Administer, promote and grow Cost-share Program Provide technical assistance for potential cost-share applicants Analyze and Report on the Cost-share Program
Creek Restoration Action Strategy	Update creek assessment based on survey rotations Investigate upland solutions to identified creek

	vulnerabilities
Data Collection	Monitor Creeks and Lakes as per monitoring plan Monitor Carp populations as identified in the Riley Chain of Lakes and Purgatory Creek Carp Management Plans Monitor Spent Lime Treatment on Lake Susan Monitor potential project sites Analyze and report on the data collected
District Hydrology and Hydraulics Model	Maintain Hydrology and Hydraulics Model Calibrate/update model as needed
Minnesota Pollution Control Agency Community Resiliency	Engage communities into a planning process on the importance of climate change, current and anticipated impacts, and the need to build community resilience through planning. Report the outcomes to communities that can be incorporated into municipal comprehensive plans Report on the process as a model for future work in communities around Minnesota.
Education and Outreach	Develop, coordinate and/or provide: ● training and support for traditional and non-traditional educators ● training for turf and winter maintenance professionals to implement best practices ● educational opportunities for local decision makers ● educational opportunities for the general community ● materials in support of projects and programs Support and manage Master Water Steward Candidates Engage volunteers to grow stewardship and capacity Increase social media presence Revise website to improve user experience Work with cities and regional partners to increase

	capacity
District Groundwater Assessment	Identify how groundwater and surface water interact across the district Use that data to identify: ● Surface waters and wetlands in the district that may be particularly sensitive to groundwater pumping or climate change ● Specific opportunities for enhanced groundwater recharge to achieve dual goals of replenishing stressed aquifers while also achieving stream-flow volume reductions and water quality improvements ● Areas where infiltration may cause increased risk for slope failure
Total Maximum Daily Load	Work with Minnesota Pollution Control Agency on the Watershed Restoration And Protection Strategies Engage the Technical Advisory Committee
Watershed Plan	Begin the 10-year plan refresh Engage CAC and TAC Engage the public via a survey and public meetings Complete and finalize 10-year plan
Repair and Maintenance Fund	Develop grant program Allocate as directed by managers
Bluff Creek One Water	
Bluff Creek Tributary Restoration	Work with partners and implement project Report Clean Water Grants Expenditures to BWSR
Chanhassen High School Reuse Project	Finalize Design Implement Project
Riley Creek One Water	

Chanhassen Town Center	Complete study identifying potential sites that could be retrofitted with Best Management Practices to reduce the phosphorus loads to Rice Marsh Lake Report Clean Water Grants Expenditures to BWSR
Lake Susan Improvement Phase 2	Complete evaluation of Lake Susan Park Pond Design and construct pond retrofit Work in partnership with the city of Chanhassen
Lake Riley Curlyleaf Pondweed	Work with the University of Minnesota, Cities of Chanhassen and Eden Prairie, lake association, and residents as well the Minnesota Department of Natural Resources on potential treatment Implement herbicide treatment as needed
Lake Riley Eurasian Watermilfoil	Work with the University of Minnesota, Cities of Chanhassen and Eden Prairie, lake association, and residents, as well the Minnesota Department of Natural Resources on potential treatment Implement herbicide treatment as needed
Lake Riley Alum Treatment	Monitor efficiencies of the Lake Riley Alum treatment.
Lake Susan Curlyleaf Pondweed	Work with the University of Minnesota, Cities of Chanhassen and Eden Prairie, and residents, as well the Minnesota Department of Natural Resources on potential treatment Implement herbicide treatment as needed
Rice Marsh Lake Aeration	Manage and maintain the aeration system as per the Riley Chain of Lakes Carp Management Plan
Lower Riley Creek Stabilization	Conduct Design study for Lower Riley Creek reach D3 and E Begin stabilization project
Purgatory Creek One Water	
Fire Station 2 Water Reuse	Work with the city of Eden Prairie in the design and implementation Report to Metropolitan Council

Hyland Lake Use Attainability Analysis	Conduct Use Attainbaility Analysis for Hyland Lake Report to the board findings Incorporate findings into the 10-year plan
Lotus Lake - Phase 1	Work with the city of Chanhassen to identify project as identified in the Purgatory Creek UAA for feasibility analysis Perform feasibility analysis
Purgatory Creek Rec Area	Work with the city of Eden Prairie to identify a solution to repair and maintain the berm
Purgatory Creek Restoration	Finish restoration project on Purgatory Creek near 101
Mitchell Lake Plant Management	Work with the University of Minnesota, city of Eden Prairie, lake association, and residents as well the Minnesota Department of Natural Resources on potential treatment Implement herbicide treatment as needed
Red Rock Lake Plant Management	Work with the city of Eden Prairie, lake association, residents and the Minnesota Department of Natural Resources on potential treatment Implement herbicide treatment as needed
Scenic Heights	Work with the city of Minnetonka and Minnetonka School District on design revisions Work with the city of Minnetonka, Minnetonka School District, Minnesota Department of Natural Resources and Hennepin County on educational components Implement restoration
Silver Lake - Phase 1	Work with the city of Chanhassen to identify project as identified in the Purgatory Creek UAA for feasibility analysis Perform feasibility analysis
Staring Lake Plant Management	Work with the University of Minnesota, city of Eden Prairie, lake association, and residents as well the Minnesota Department of Natural Resources on potential treatment. Implement herbicide as needed.

APPENDIX

A - Annual Written Communication to the Public
B - Lakes and Creeks Report
C - 2016 Annual Budget

2016

RILEY PURGATORY BLUFF CREEK
WATERSHED DISTRICT

Yearly update

The Riley Purgatory Bluff Creek Watershed District is a local unit of government tasked with **protecting**, **managing**, and **restoring** the **water resources** within its boundaries. It is funded through property tax levies.

The district is led by a five-member board of managers. The managers meet the first Wednesday of the month, 7 p.m., at the district office. Changes to the schedule are posted to the district website: rpbcwd.org.

FROM THE ADMINISTRATOR

What an exciting year this has been! The district implemented 10 projects, engaged residents in developing our next 10-year management plan, and received over $300,000 in grants. Projects ranged from combating aquatic invasive species with herbicide treatments to implementing our first creek restoration. Other water quality improvement projects included the Lake Susan Spent Lime Filter and the Lake Riley Alum Project. Read more on page 4!

Every year the district undertakes studies to assess the health of our water bodies, and identify projects to protect and restore them. This year the District conducted one of its largest studies, an assessment of the entire Purgatory Creek Watershed. We look forward to using all of these data in working with our partners and residents to improve our waters in 2017!

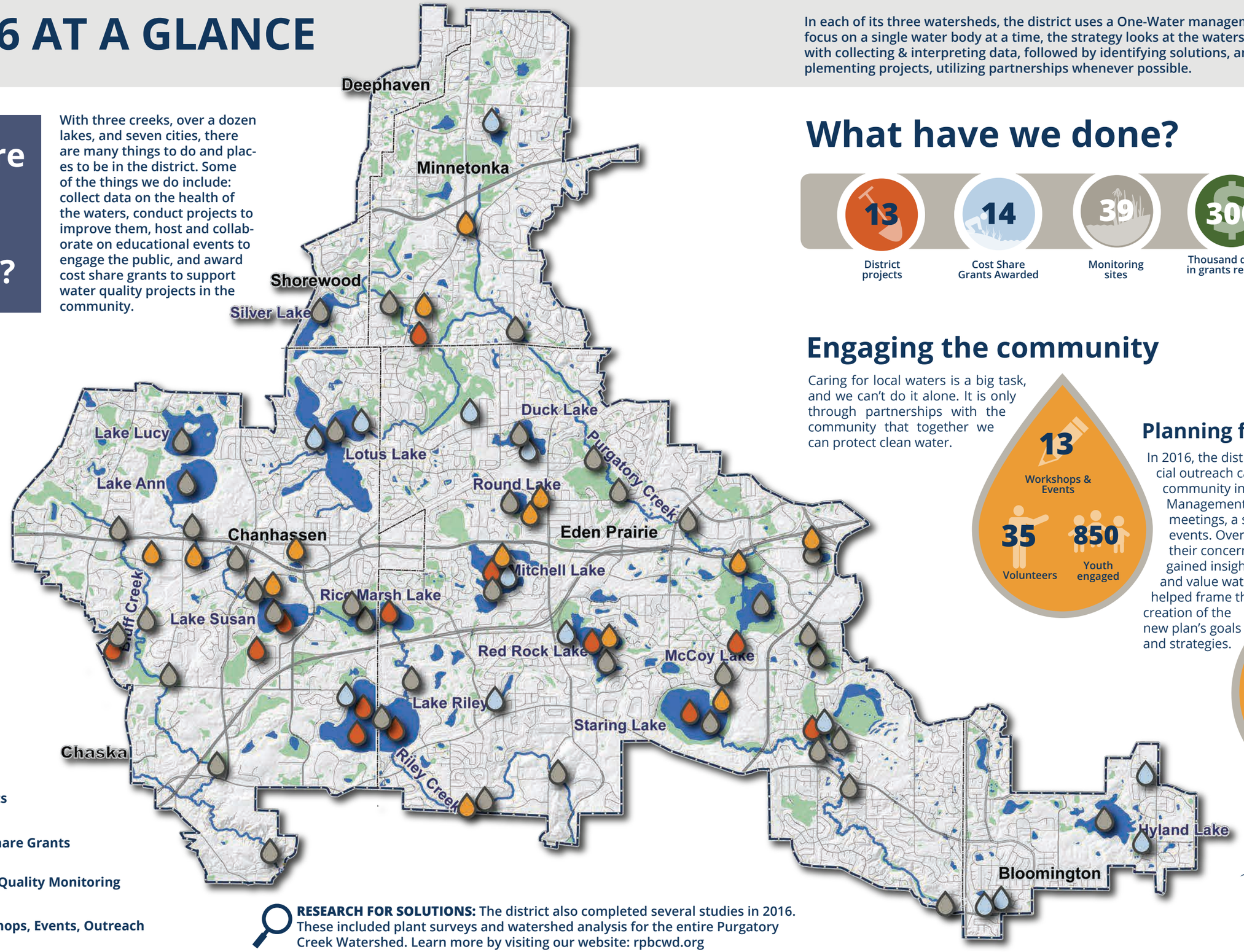
Claire Bleser
952-607-6512
cbleser@rpbcwd.org

2016 AT A GLANCE

In each of its three watersheds, the district uses a One-Water management strategy. Rather than focus on a single water body at a time, the strategy looks at the watershed as a whole. It begins with collecting & interpreting data, followed by identifying solutions, and finally prioritizing & implementing projects, utilizing partnerships whenever possible.

Where have we been?

With three creeks, over a dozen lakes, and seven cities, there are many things to do and places to be in the district. Some of the things we do include: collect data on the health of the waters, conduct projects to improve them, host and collaborate on educational events to engage the public, and award cost share grants to support water quality projects in the community.



What have we done?

- **13** District projects
- **14** Cost Share Grants Awarded
- **39** Monitoring sites
- **300** Thousand dollars in grants received
- **19** Partner organizations

Engaging the community

Caring for local waters is a big task, and we can't do it alone. It is only through partnerships with the community that together we can protect clean water.

- **13** Workshops & Events
- **35** Volunteers
- **850** Youth engaged

Planning for tomorrow

In 2016, the district embarked on a special outreach campaign to engage the community in updating the 10-Year Management Plan. This included public meetings, a survey, and tabling at local events. Over 500 residents shared their concerns about local waters. We gained insight into how residents use, and value water resources. This input helped frame the creation of the new plan's goals and strategies.

80% value wildlife watching & recreation near waterbodies (ex. trails). Full survey results: rpbcwd.org

RESEARCH FOR SOLUTIONS: The district also completed several studies in 2016. These included plant surveys and watershed analysis for the entire Purgatory Creek Watershed. Learn more by visiting our website: rpbcwd.org

rpbcwd.org

SPOTLIGHT PROJECTS

2016 projects included invasive plant management, water quality improvement, and creek restoration.

ALUM TREATMENT SHOWS RESULTS IN RILEY

In May, Lake Riley was treated with a compound called aluminum sulfate (alum). Alum binds with phosphorus, preventing algae from using it to grow. Sampling over the summer detected improvements in water quality. Continued monitoring will track long-term performance of the alum.

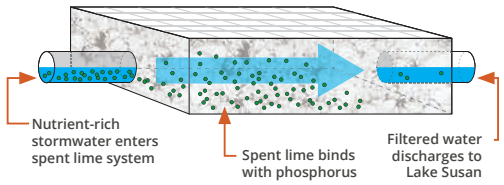
PURGATORY CREEK REACH RESTORED

In partnership with the City of Minnetonka, the district stabilized eroding banks along close to 2000 ft of Purgatory Creek. The goal of the restoration is to improve water and habitat quality, and overall creek health. It is the first creek restoration in district history, and we are excited by its success.

SPENT LIME FILTER COMPLETED AT LAKE SUSAN

A spent-lime filtration system was built at a culvert where stormwater flows into Lake Susan. Its purpose is to filter out phosphorus, a nutrient that can cause algae blooms and poor water quality. The system is designed to remove about 45 lbs of phosphorus annually from stormwater entering the lake. That's about 22,500 pounds of algae!

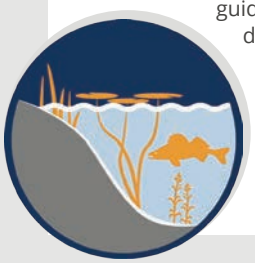
How it works



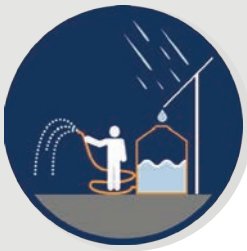
What it looks like

LOOKING AHEAD

CRAFTING A NEW 10-YEAR MANAGEMENT PLAN



The 10-Year Management Plan is a document that guides district actions over a decade. The district began the process of updating its plan in 2016. It will continue in 2017, with the hope of completing it by the end of the year. The plan includes goals for local water resources and strategies to attain them. Stay updated by joining our email list at rpbcwd.org.



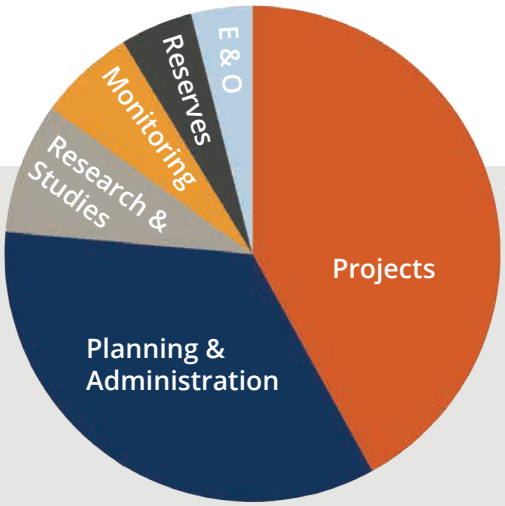
PARTNERING FOR STORMWATER REUSE AT CHANHASSEN HIGH SCHOOL

In partnership with the City of Chanhassen the district will be implementing a project to capture and reuse stormwater at Chanhassen High School for irrigation. The school uses about 3.8 million gallons of groundwater each year (~6 Olympic-sized swimming pools) to irrigate, This project will help reduce consumption. It will also reduce stormwater pollution to Bluff Creek, and increase the public awareness of stormwater reuse and groundwater conservation.

WHERE ARE YOUR TAXES GOING? 2017 LEVY

The watershed district is funded through property tax levies. That means, if you live within the district you are helping make the work of protecting clean water possible.

The 2017 levy is $2,859,000. Where will those dollars go? To projects, like those highlighted above, planning & administration (includes the permit program, and developing the 10-Year Management Plan), research & studies, water quality monitoring, and education and outreach (E&O). The district also keeps reserve funds in the event of an emergency.



RILEY PURGATORY BLUFF CREEK WATERSHED DISTRICT

Lakes and Creeks Report

2016 ANNUAL REPORT

RILEY PURGATORY BLUFF CREEK WATERSHED DISTRICT

protect. manage. restore.

Executive Summary

The Riley-Purgatory-Bluff Creek Watershed District (RPBCWD) had a successful water quality sampling season in 2016, completing a full year of sample collection and data analysis. This effort was made possible through multiple partnerships with municipalities and organizations based within the watershed. The results from the 2016 sampling effort are presented in this report.

Lake Monitoring

During the 2016 monitoring season, 13 lakes were monitored across the District. In addition to the lakes sampled, Lake Idlewild was monitored by the city of Eden Prairie and was included in this analysis, even though it was classified in 2015 as a high value wetland. As part of the sampling protocol, a multi-probe sonde was used to measure water chemistry and a secchi disk to measure clarity. Water samples were also collected for nutrient and chloride analysis (regular lake sampling). Chlorophyll-a (Chl-a) and Total Phosphorus (TP) concentrations, along with Secchi Disk depths, were compared to standards set by the Minnesota Pollution Control Agency (MPCA). Regular lake sampling was conducted on each lake approximately every two weeks throughout the growing season (June-September). Monthly samples were also taken from the Riley Chain of Lakes and stormwater ponds draining into Purgatory Creek during winter/early spring months (January-April) to monitor chloride (Cl) levels. In addition to regular lake sampling, the District monitored water levels of 14 waterbodies, assessed carp populations within the Riley and Purgatory Chain of Lakes, and assessed zooplankton populations in three lakes. The District also monitored public access points and analyzed water samples for the presence of zebra mussels in these 14 waterbodies. Additionally, herbicide treatments were conducted on Lake Susan, Red Rock Lake, Staring Lake, and Lake Riley.

Figure displays lakes sampled in 2016 that met or exceeded the MPCA lake water quality standards for Chl-a, TP, and Secchi Disk depth during the growing season (June-September). The MPCA has specific standards for both ‘deep’ lakes (Lake Ann, Lotus Lake, Lake Riley, and Round Lake) and ‘shallow’ lakes (Duck Lake, Hyland Lake, Lake Idlewild, Lake Lucy, Mitchell Lake, Red Rock Lake, Rice Marsh Lake, Staring Lake, Lake Susan, and Silver Lake, MPCA 2016). For specific information regarding MPCA lake standards see section 3. Lake Ann, Duck Lake, Lake Idlewild, and Round Lake met all three MPCA standards in 2016. Lotus Lake, Lake Lucy, and Lake Susan all exceeded both the Chl-a and TP standards in 2016. These lakes did not meet these two standards in 2015 as well, but Chl-a levels did drop across all three lakes in 2016. Rice Marsh Lake slightly exceeded the TP standard in 2016, but is down from levels in 2015 and improved to meet the MPCA standard for Chl-a in 2016. Red Rock Lake and Lake Riley both barely exceeded the Chl-a standard in 2016. Hyland Lake, Mitchell Lake, Silver Lake, and Staring Lake failed to meet any of the three

MPCA standards in 2016. These four lakes were the only lakes to not meet the Secchi Disk standard for their lake classification, although both Hyland Lake and Mitchell Lake were within 0.1m of meeting this standard. More specific information regarding each lake can be found in section 4.1 and in the Lake Fact Sheets in Exhibit E.

All lakes within the Riley Chain of Lakes met the MPCA's chloride chronic standard (the highest water concentration of chloride to which aquatic life, humans, or wildlife can be exposed to indefinitely without causing chronic toxicity) for class 2B water bodies in 2016, falling below 230mg/L. No zebra mussel (adults or juveniles) or invasive zooplankton were found in any District lake. More information on chloride monitoring can be found in section 4.4 and more information on AIS can be found in section 5.

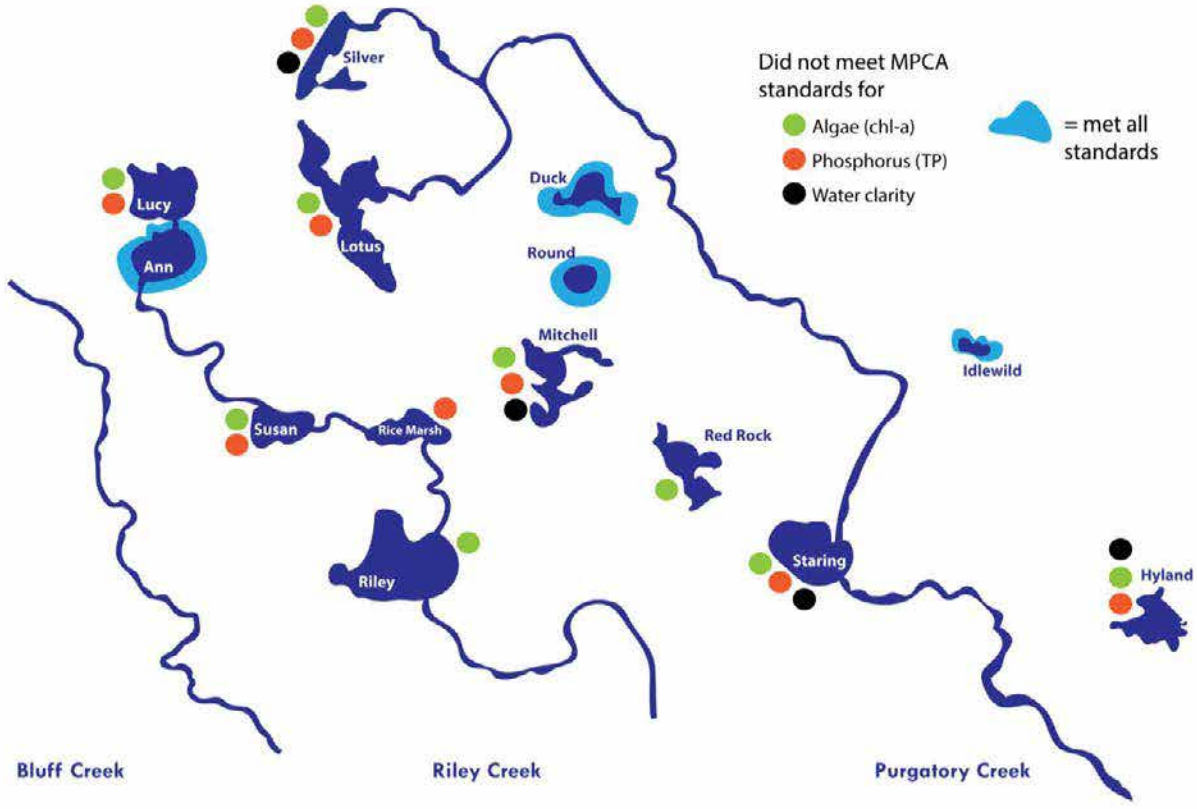


Figure 1 : 2016 Lake Water Quality

Summary of the lake water quality data collected in 2016 by the Riley-Purgatory-Bluff Creek Watershed District as compared to the Minnesota Pollution Control Agency Water Quality Standards. Chlorophyll-a (green), Total Phosphorus (orange), and Secchi Disk depth (black) were assessed during the growing season (June-September) for both 'deep' lakes or lakes >15 ft deep and < 80% littoral area (Lake Ann, Lotus Lake, Lake Riley, and Round Lake) and 'shallow' lakes or lakes <15 ft deep and >80% littoral area (Duck Lake, Hyland Lake, Lake Idlewild, Lake Lucy, Mitchell Lake, Red Rock Lake, Rice Marsh Lake, Staring Lake, Lake Susan, and Silver Lake). The corresponding dots next to each lake indicate which water quality standard was violated and the lakes surrounded by blue met all water quality standards.

Creek Monitoring

In 2016, the District collected water quality samples and performed data analysis on 18 different sampling sites along Riley Creek (five sites), Bluff Creek (five sites), and Purgatory Creek (eight sites). For the 2016 creek monitoring season (April through September) a multi-probe sonde was used to measure water chemistry, and a transparency tube and turbidity meter were used to measure clarity. Water samples were collected to assess nutrient (TP and Chl-a) and total suspended sediment (TSS) concentrations. In 2015, the District began monitoring Chl-a concentrations at sampling locations to compare results with the new MPCA water quality standards adopted in 2014. Creek flow was calculated from velocity measurements taken at consistent cross sections at each water quality monitoring location. Sections of lower Bluff Creek and Upper Riley Creek were also walked and assessed using the District's Creek Restoration Action Strategy (CRAS) evaluation, which identifies stream reaches in the most need of restoration. More information on the results of the CRAS update can be found in section. In addition, the District completed its first creek restoration project on Purgatory Creek from Highway 101 to a stormwater pond. This project stabilized nearly 1300ft of stream bank, will reduce nutrient and total suspended solid concentrations downstream, and provide aquatic and terrestrial habitat.

The summary for all three creeks is based on new water quality parameters developed by the MPCA in 2014 for Eutrophication and TSS. The new standards include some parameters the District has not yet incorporated into monitoring procedures. Therefore, this is the evaluation of the stream reaches that did not meet MPCA water quality standards using the current parameters measured by the District. The parameters measured during the summer growing season (April-September) and the associated MPCA water quality limits for streams located in the Central River Region include: Dissolved Oxygen (DO) daily minimum > 4mg/L, summer season average TP < 0.1mg/L, TSS < 10% exceedance of 30mg/L limit during the summer season, summer season average Chl-a <18ug/L, and summer season average pH < 9su and >6su (MPCA, 2016).

There were three stream water quality sites, R5, R3 and P3, that met all MPCA water quality standards in 2016 (Figure 2). Only one site exhibited no water quality violations in 2015, R2, which exceeded the TSS standard in 2016. Each stream varied in the number of violations it exhibited overall; Bluff had seven, Riley had four, and Purgatory had 11. Riley Creek is the only creek to show an improvement in number of violations (six violations in 2015). Bluff Creek remained at seven violations from 2015, although site B5 had an increase in TSS which added an additional violation, and site B2 improved in DO which reduced a violation. In 2015, lower Bluff Creek (B2 and B1) and lower Riley Creek were identified as being excellent candidates for stream restoration projects, having increased violations due to steep ravines and fine soil types located in these reaches, and because of their position at the bottom of the watershed. Despite this, both sites B2 and R1 each improved in water quality by one standard in 2016. Due to similar reasoning described above, P1 had the most water quality violations in 2016 which has degraded from 2015. Exceedance of the

MPCA TP standard (summer average <0.1 mg/L) was the water quality parameter most violated in 2016 with 11 out of the 18 sites failing to meet the standard, down from 15 TP violations in 2015. TSS violations rose from three in 2015 to seven in 2016. More information pertaining to each individual creek can be found in the Creek Fact Sheets located in Exhibit D.

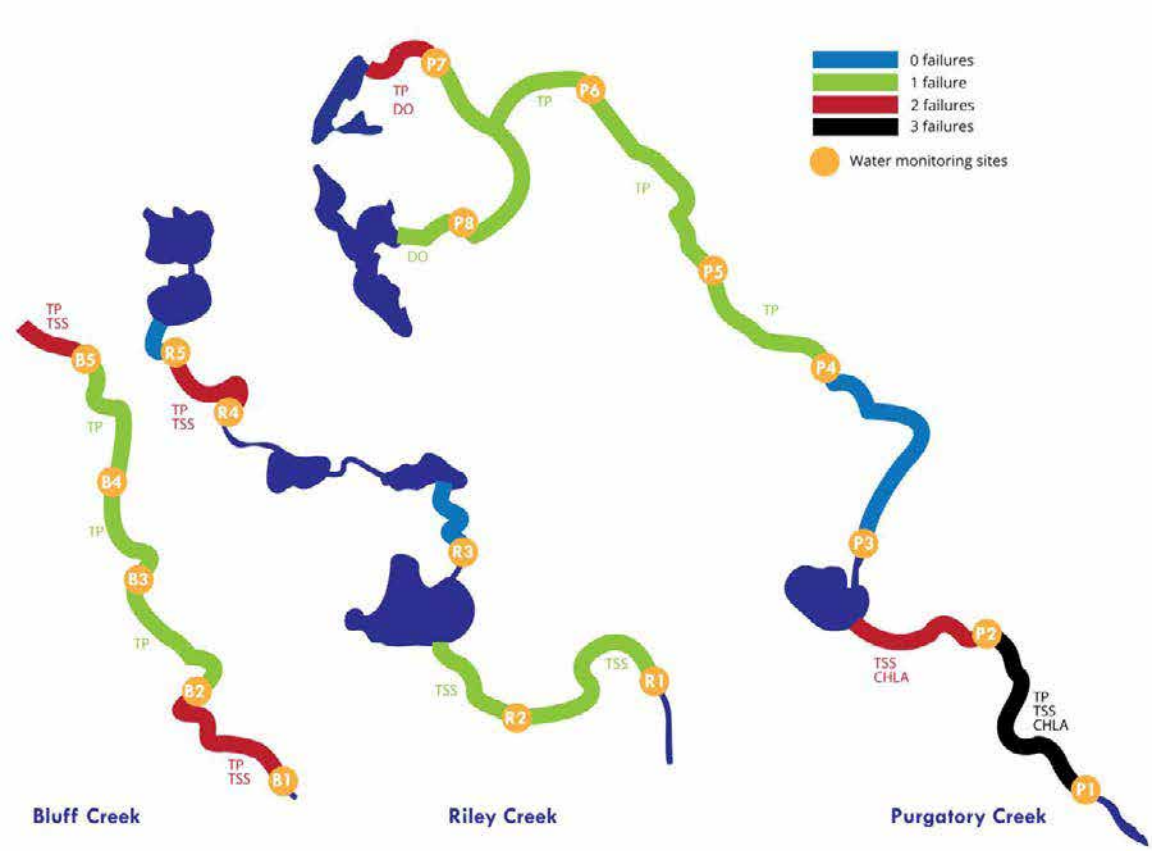


Figure 2 : 2016 Stream Water Quality

Summary of the stream water quality data collected on Bluff Creek, Riley Creek, and Purgatory Creek in 2016 by the Riley-Purgatory-Bluff Creek Watershed District as compared to the Minnesota Pollution Control Agency (MPCA) Water Quality Standards. A total of 18 water monitoring locations (orange circles) were sampled and information gathered from the individual sites were applied upstream to the next monitoring location. The summer season (April-September) eutrophication and total suspended solids water quality standards used in this assessment included: Dissolved Oxygen (DO) daily minimum > 4mg/L, average (April to September) Total Phosphorous (TP) < 0.1mg/L, Total Suspended Solids (TSS) < 10% exceedance of 30mg/L limit, average Chlorophyll-a <18ug/L, average pH < 9su and > 6su. The corresponding labels next to each stream section indicate which water quality standard is being violated.

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Acronyms & Abbreviations

ac	Acre
BMP	Best Management Practice
cBOD	5-day Carbonaceous Biochemical Oxygen Demand
cf	Cubic feet
cfs	Cubic feet per second
Chl-a	Chlorophyll-a
Cl	Chloride
CRAS	Creek Restoration Action Strategy
CS	Chronic Standard
DO	Dissolved Oxygen
E. coli	*Escherichia coli*
EPA	Environmental Protection Agency
EWM	Eurasian Water Milfoil
ft	Foot/Feet
FWSS	Freshwater Scientific Services
GPS	Global Positioning System
ha	Hectare
IBI	Index of Biological Integrity
in	Inch
kg	Kilogram
L	Liter
lb	Pound
m	Meter
MCWD	Minnehaha Creek Watershed District
METC	Metropolitan Council
mg	Milligram
mL	Milliliter
MNDNR	Minnesota Department of Natural Resources
MnDOT	Minnesota Department of Transportation
MPCA	Minnesota Pollution Control Agency
MS	Maximum Standard
MS4	Municipal Separate Storm Sewer System
NA	Not Available
NCHF	North Central Hardwood Forest
NH_3	Ammonia
NO_2	Nitrite
NO_3	Nitrate
NOAA	National Oceanic and Atmospheric Administration
NWS	National Weather Service
OHWL	Ordinary High Water Level
Ortho-P	Ortho-Phosphate
PCL	Purgatory Chain of Lakes
RCL	Riley Chain of Lakes
sec	Second
SRP	Soluble Reactive Phosphorus
TDP	Total Dissolved Phosphorous
TKN	Total Kjeldahl Nitrogen
TN	Total Nitrogen
TMDL	Total Maximum Daily Load
TP	Total Phosphorous
TSS	Total Suspended Solids
UMN	University of Minnesota-St. Paul Campus
WD	Watershed District
WIDNR	Wisconsin DNR

WMO	Watershed Management Organization
YOY	Young of Year

1 Introduction and Overview

The Riley-Purgatory-Bluff Creek Watershed District was established on July 31st, 1969, by the Minnesota Water Resources Board acting under the authority of the watershed law. The District is located in the southwestern portion of the Twin Cities Metropolitan Area consisting of a largely developed urban landscape and encompassing portions of Bloomington, Chanhassen, Chaska, Deephaven, Eden Prairie, Minnetonka, and Shorewood (Figure 2.1-1). This total area for the watershed is close to 50 square miles in both Hennepin and Carver Counties and includes three smaller subwatersheds: Riley Creek Watershed, Purgatory Creek Watershed, and Bluff Creek Watershed.

The data collection and reporting is the foundation for the RPBCWD's work. Regular, detailed water quality monitoring provides the District with scientifically reliable information that is needed to decide if water improvement projects are needed and how effective they are in the watershed. Data collection remains a key component of the District's work as we strive to de-list, protect, and improve the water bodies within the watershed. The purpose of this report is to summarize the water quality and quantity results collected over the past year, which can be used to direct the District in managing our water resources.

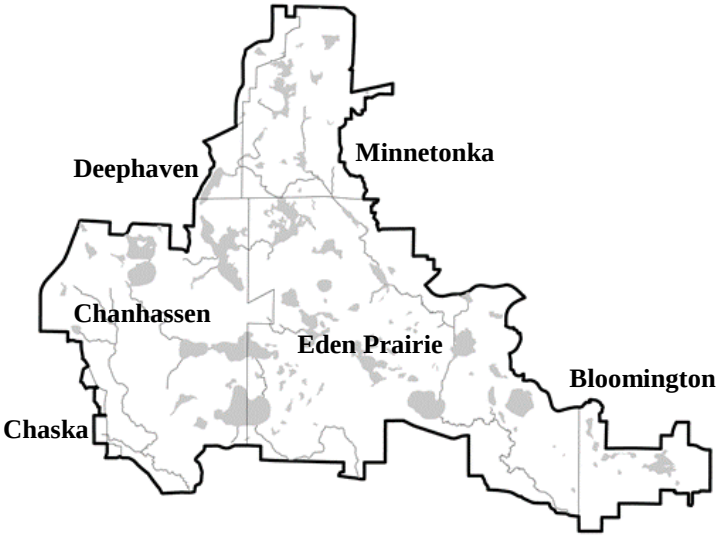

Figure 2.1-1 Riley-Purgatory-Bluff Creek Watershed District Boundary

Table 2.1-1 District Water Resource Sampling Partnerships

Water Resource	RPBCWD	Three Rivers Park District	EP	UMN	METC
Duck Lake	■				
Hyland Lake	■	■			
Lake Ann	■				
Lake Idlewild	■		■		
Lake Lucy	■			■	
Lake Riley	■			■	
Lake Susan	■			■	
Lotus Lake	■				
Mitchell Lake	■		■	■	
Red Rock Lake	■		■		
Rice Marsh Lake	■				
Round Lake	■		■		
Silver Lake	■				
Staring Lake	■			■	
Bluff Creek	■				■
Purgatory Creek	■				■
Riley Creek	■		■		■

Through partnerships with the city of Chanhassen and Eden Prairie (EP), Three Rivers Park District, the University of Minnesota (UMN), and the Metropolitan Council (METC), water quality data was collected on 13 lakes, one high value wetland (Lake Idlewild), and 18 creek sites in the District. The 18 creek sites include five on Bluff Creek, five on Riley Creek, and eight on Purgatory Creek. Lake McCoy, which is within the watershed boundaries, has not been part of the District's sampling regime. Each partner was responsible for monitoring certain parameters of their respective lakes/streams and reporting their findings, allowing for more time and attention to be given to each individual water resource (Table 2.1-1).

Most of the sampling carried out by various partners and the District is included below. Water quality and water quantity was monitored at each stream site during the field season (April through September) approximately twice a month. The METC also has continuous monitoring stations near the bottom of each creek as part of its long-term monitoring program which identifies pollutant

loads entering the Minnesota River. Lakes are also monitored bi-weekly during the summer growing season (June through September) for water quality. On top of this, lake levels are continuously recorded from ice out to ice in. Lake water samples were also collected and analyzed in early summer for the presence of zebra mussel veligers. Additionally, during every sampling event, boat launch areas and zebra mussel monitoring plates were scanned for adult zebra mussels. Zooplankton samples are also collected on lakes to assess the overall health of the population as it applies to the fishery and water quality. Plant surveys are also conducted to assess overall health of the plant community and to search for invasive plants. Common Carp have also been identified as being detrimental to lake health and are being continually monitored by the District moving forward. In addition to water quality monitoring, creek walks are also conducted to gather more information about the current stream conditions in the District. This information is to be included in the Creek Restoration Action Strategy (CRAS), which was developed by the District to identify and prioritize future stream restoration sites. Bank pin data was also collected near each of the water quality monitoring sites to measure generalized sedimentation and erosion rates across all three streams. Winter monitoring occurred on the Riley Chain of Lakes (Lucy, Ann, Susan, Rice Marsh, and Riley), as well as four separate storm water ponds in 2016. Extending the monitoring activities into the winter months can provide key insights into ways to improve water quality during the summer months. Winter monitoring also allows us to evaluate the influence of chloride levels in our lakes. The data collection and reporting events are tracked throughout the year and can be seen in Table 2.1-2. Data was not collected in March and December due to unsafe ice conditions. In addition to lakes and streams, multiple stormwater ponds and other specialty projects are monitored to increase the overall health of the waterbodies within the District.

Table 2.1-2 2016 RPBCWD Monthly Field Data Collection Locations

Water Resource	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lake Ann	■	■		■	■	■	■	■	■	■	■	
Duck Lake				■	■	■	■	■	■	■	■	
Hyland Lake												
Lake Idlewild				■	■	■	■	■	■	■	■	
Lotus Lake				■	■	■	■	■	■	■	■	
Lake Lucy	■	■		■	■	■	■	■	■	■	■	
Mitchell Lake				■	■	■	■	■	■	■	■	
Red Rock Lake				■	■	■	■	■	■	■	■	
Rice Marsh Lake	■	■		■	■	■	■	■	■	■	■	
Round Lake												
Lake Riley	■	■		■	■	■	■	■	■	■	■	
Staring Lake				■	■	■	■	■	■	■	■	
Lake Susan	■	■		■	■	■	■	■	■	■	■	
Silver Lake				■	■	■	■	■	■	■	■	
Bluff Creek (5 sites)				■	■	■	■	■	■	■		
Purgatory Creek (8 sites)				■	■	■	■	■	■	■		
Riley Creek (5 sites)				■	■	■	■	■	■	■		

*Water Level Sensors were placed on all lakes.

2 Methods

Water quality and quantity monitoring entails the collection of multi-probe sonde data readings, water samples, zooplankton samples, zebra mussel veliger samples, and physical readings, as well as recording the general site and climactic conditions at the time of sampling. Listed in the following sections are the methods and materials, for both lake and stream monitoring, used to gather the water quality and quantity data during the 2016 field-monitoring season. Table 2.1-1 identifies many of the different chemical, physical, and biological variables analyzed to assess overall water quality.

Table 2.1-1 Sampling Parameters

Parameter	Sonde or Wet Chemistry	Summer Lakes	Winter Lakes	Streams	Reason for Monitoring
Total Phosphorus (TP)	Wet	■	■	■	Nutrient, phosphorus (P) controls algae growth
Orthophosphate	Wet	■	■		Nutrient, form of P available to algae
Chlorophyll-a, pheophytin	Wet	Surface	Surface	■	Measure of algae concentration
Ammonia as N	Wet	■	■		Nutrient, form of nitrogen (N) available to algae
Nitrate + Nitrite as N	Wet	■	■		Nutrient, also oxygen substitute for bacteria
Total Alkalinity, adjusted	Wet	Surface	Surface		Measure of ability to resist drop in pH
Total Suspended Solids	Wet			■	Measure of the solids in water (block light)
Chloride	Wet		■		Measure of chloride ions, salts in water
Temperature	Sonde	■	■	■	Impacts biological and chemical activity in water
pH	Sonde	■	■	■	Impact chemical reactions (acidic or basic)
Conductivity	Sonde	■	■	■	Ability to carry an electrical current (TSS & Cl)
Dissolved Oxygen	Sonde	■	■	■	Oxygen for aquatic organisms to live
Oxidation Reduction Potential (ORP)	Sonde	■	■	■	Tracks chemistry in low or no oxygen conditions
Phycocyanin	Sonde	■	■		Pigment, measures cyanobacteria concentration
Photosynthetic Active Radiation (PAR)	Sonde	■			Measure of light available for photosynthesis
Turbidity	Sonde			■	Measure of light penetration in shallow water
Secchi disk depth	Observation	■	■		Measure of light penetration in deeper water
Transparency Tube	Observation			■	Measure of light penetration into shallow water
Zooplankton	Wet Analysis	■			Organisms fluctuate due to environmental variables
Zebra Mussel Veligers	Wet/Observation	■			Larval form of zebra mussels/plate checks (AIS)

2.1 Water Quality Sampling

The monitoring program supports the District's 10-year water management plan to delist waters from the MPCA's 303d Impaired Waters list. The parameters monitored during the field season help determine the sources of water quality impairments and provide supporting data that is necessary to design and install water quality improvement projects.

Multi-probe sondes (Lakes DS-5/ Streams MS-5) were used for collecting water quality measurements across both streams and lakes. Sonde readings measured include: temperature, pH, dissolved oxygen, conductivity, and other technical parameters. Secchi disk depth readings were recorded at the same time as sonde readings were collected at all

lake sampling locations. When monitoring stream locations, transparency, turbidity, and flow measurements were collected as well. General site conditions related to weather and other observations were recorded as well. A list of the variety of parameters monitored during each sampling event can be seen in Table 2.1-1.

At each lake monitoring location, multiple water samples were collected using a Van Dorn, or depth integration sampler, for analytical laboratory analysis. For Duck, Idlewild, Rice Marsh, Silver, and Staring Lakes, water samples were collected at the surface and bottom due to shallow depths (2-3m). For all other lakes within the District, water samples were collected at the surface, middle, and bottom of the lake. Lakes are monitored at the same location on each sampling trip, typically at the deepest part of the lake. All samples are collected from whole meter depths except for the bottom sample, which is collected 0.5 meters from the lake bottom to prevent disrupting the sediment. The surface sample is a composite sample of the top two meters of the water column. The middle sample is collected from the approximate midpoint of the temperature/dissolved oxygen change or thermocline. Pictures and climatic data are collected at each monitoring site. Water quality information collected in the winter is collected using the same procedures as in the summer. Zooplankton samples were collected using a 63 micrometer Wisconsin style zooplankton net on Lake Mitchell, Lake Riley, and Red Rock Lake. The net was lowered to a depth of 0.5 meters from the bottom at the deepest point in the lake and raised slowly. Zebra mussel veliger samples were collected on all lakes using the same procedures, but collected at three sites and consolidated before being sent to a lab for analysis. A Zeiss Primo Star microscope with a Zeiss Axiocam 100 digital camera was used to monitor zooplankton populations, scan for invasive zooplankton, and to calculate Cladoceran-grazing rates on algae.

Water quality samples collected during stream monitoring events were collected from the approximate middle (width and depth) of the stream flow in ideal conditions or from along the bank when necessary. Both water quality samples and flow monitoring activities were performed in the same reach section of the creek during each sampling event. Stream velocity was calculated at 0.3 to 1 foot increments across the width of the stream using the FloTracker Velocity Meter at each sampling location. If no water or flow was recorded, only pictures and climatic data were collected. The activities associated with the monitoring program are described in Table 2.1-1.

Table 2.1-1 District Water Quality Monitoring Activities

Pre-Field Work Activities	Calibrate Water Quality Sensors (sonde) Obtain Water Sample Bottles and Labels from Analytical Lab Laboratories Prepare Other Equipment and Perform Safety Checks Coordinate Events with Other Projects and Other Entities
Summer Lake – Physical and Chemical	Navigate to Monitoring Location Read Secchi Disk Depth and Record Climatic Data Record Water Quality Sonde Readings at one Meter Intervals Collect Water Samples from top, thermocline, and bottom
Summer Lake – Biological	Collect Zooplankton Tow (pulling a net) from Lake Bottom to Top Collect Zebra Mussel Veliger Tow (pulling a net) from Lake Bottom to Top at Multiple Sites
Winter Lakes	Navigate to Monitoring Location Record Ice Thickness Read Secchi Disk Depth and Record Climatic Data Record Water Quality Sonde Readings at one Meter Intervals Collect Water Samples from top, middle, and bottom
Streams – Physical and Chemical	Navigate to Monitoring Location Measure Total Flow by Measuring Velocity at 0.3 to 1 Foot Increments across Stream Record Water Quality Sonde Measurements Upstream of Flow Measurement in Middle of Stream Read Transparency Tube and Perform Turbidity Test Collect Water Samples from Middle of Stream Collect Climatic Data and Take Photos
Post-Field Work Activities	Ship Water Samples to Analytical Lab Enter Data, Perform Quality Control Checks, and Format Data for Database Clean and Repair Equipment Reporting and Summarizing Data for Managers, Citizens, Cities, and Others

2.2 Analytical Laboratory Methods

RMB Environmental Labs, located in Detroit Lakes, MN, is the third-party company that is responsible for conducting the analytical tests on the water samples that were collected by the District's Water Quality Specialists. The methods used by the laboratory to analyze the water samples for the specified parameters are noted in Table 2.2-1. Zebra mussel veliger samples are also sent to RMB Labs for analysis.

Table 2.2-1 RMB Environmental Laboratories Parameters and Methods Used for Analyses

Parameter	Standard Method
Alkalinity	EPA 310.2
Ammonia	EPA 350.1 Rev 2.0
Nitrogen, Nitrate & Nitrite	EPA 353.2 Rev 2.0
Chlorophyll a.	SM 10200H
Total Phosphorus	EPA 365.3
Orthophosphate	EPA 365.3
Chloride	SM 10200H

2.3 Lake Water Levels

In-Situ Level Troll 500, 15-psig water level sensors have been placed on most lakes throughout the watershed district to monitor water quantity and assess yearly and historical water level fluctuations. These sensors are mounted inside a protective PVC pipe that are attached to a vertical post and placed in the water. A staff gauge or measuring device is also mounted to the vertical post and surveyed by District staff to determine the elevation for each level sensor. Once the water elevation is established, the sensor records continuous water level monitoring data every 15 minutes from ice out until late fall.

Lake level data is used for developing and updating the District's models, which are used for stormwater and floodplain analysis. Monitoring the lake water levels can also help to determine the impact that climate change may have on lakes and land interactions in the watershed. Lake level data is also used to determine epilimnetic zooplankton grazing rates (located in section 4.6). Lake level data is submitted to the Minnesota Department of Natural Resources (MNDNR) at the end of each monitoring season and historical data specific to each lake can be found on MNDNR website using the Lakefinder database. See Exhibit A for 2016 level sensor results. Lake Levels for 2015 are also provided for a year-to-year comparison. In both the Lakefinder database and in Exhibit A, the Ordinary High Water Level (OHWL) is displayed so water levels can be compared to what is considered the "normal" water level for each lake. The OHWL is used by governing bodies like the RPBCWD for regulating activities that occur above and below this zone. National Oceanic and Atmospheric Administration (NOAA) precipitation data collected from the Flying Cloud Drive Airport, Eden Prairie, MN was also included in Exhibit A to evaluate how rain events influenced lake levels.

In 2016, lake level measurements were collected on 13 lakes in the District and one high value wetland, Lake Idlewild (Table 2.3-1). Round Lake experienced the greatest fluctuation over the 2016 season, increasing 2.21 ft. Round Lake also had the largest single event maximum fluctuation in which it increased by 3.22 ft. On average lake levels increased by 0.44ft over the 2016 season with all lakes increasing except for Lake Lucy (no seasonal change) and Lake Ann (decreased by 0.14ft). The average maximum fluctuation in 2016 across all District lakes was 1.4ft.

Table 2.3-1 Lake Water Levels Summary

The 2016 (March-December) and historical recorded lake water levels (ft) for all lakes within the Riley-Purgatory-Bluff Creek Watershed District. The 2016 data includes the overall change in water level, the maximum fluctuation, and the highest and lowest recorded levels (elevation). Historical data includes the highest and lowest historical recorded levels and the date they were taken.

	2016 Lake Water Level Data				Historical Lake Water Levels			
Lake	Seasonal Flux	Max Flux	Highest Lake Level	Lowest Lake Level	Highest Lake Level	Date	Lowest Lake Level	Date
Ann	-0.14	0.88	956.83	955.95	957.93	2/18/98	952.8	9/28/70
Duck	0.22	0.63	914.69	914.05	916.12	6/20/14	911.26	11/10/88
Hyland	1.86	2.14	816.42	814.28	818.68	8/11/87	811.66	12/2/77
Lotus	0.27	0.83	895.98	895.16	897.08	7/2/92	893.18	12/29/76
Lucy	0.00	0.78	956.89	956.11	957.67	6/20/14	953.29	11/10/88
Mitchell	0.19	0.99	872.18	871.19	874.21	6/25/14	865.87	7/25/77
Red Rock	0.38	1.80	841.76	839.97	842.69	7/13/14	835.69	9/28/70
Rice Marsh	0.54	1.52	876.65	875.13	877.25	5/28/12	872.04	8/27/76
Riley	0.19	0.94	865.63	864.69	866.74	7/6/93	862	2/1/90
Round	2.21	3.22	880.37	877.15	884.26	8/17/87	875.29	7/25/77
Silver	0.04	1.38	900.58	899.20	901.03	6/20/12	894.78	6/6/72
Staring	0.18	2.05	816.05	813.99	820	7/24/87	812.84	2/12/77
Susan	0.04	1.30	882.12	880.81	883.77	6/21/14	879.42	12/29/76
Idlewild	0.17	1.11	854.39	853.28	860.78	3/29/76	853.1	1/7/85
Average	0.44	1.40	880.75	879.35				

3 Water Quality Standards

In 1974, the Federal Clean Water Act set forth the requirements for states to develop water quality standards for surface waters. In 2014, specific standards were developed for eutrophication and TSS for rivers and streams. In Minnesota, the agency in charge of regulating water quality is the MPCA. Water quality monitoring and reporting is a priority for the District to determine the overall health of the water bodies within the watershed boundaries. The District's main objectives are to prevent a decline in the overall water quality within lakes and streams and to prevent water bodies from being added to the 303d Impaired Water Bodies list (MPCA). The District is also charged with the responsibility to take appropriate actions to improve the water quality in water bodies that are currently listed for impairments.

There are seven ecoregions within Minnesota; the RPBCWD is within the Northern Central Hardwood Forest (NCHF) ecoregion. Rural areas in the NCHF are dominated by agricultural land as the ecoregion is characterized by fertile soils. For most water resources in the region, phosphorous is the limiting (least available) nutrient within lakes and streams, meaning that the extent of algal growth is often controlled by the available concentration of phosphorous. The accumulation of excess nutrients (i.e. TP and Chl-a) in a waterbody is called eutrophication. This relationship has a direct impact on the clarity and recreational potential of our lakes and streams. Water bodies with high phosphorus concentrations and increased levels of algal production have reduced water clarity and limited recreational potential.

All lakes sampled in the district are considered Class 2B surface waters. The MPCA states that this class of surface waters should support the propagation and maintenance of a healthy community of cool or warm water sport or commercial fish and associated aquatic life, and their habitats. They should also be suitable for aquatic recreation of all kinds, including bathing. This class of surface water is not protected as a source of drinking water. For more detailed information regarding water quality standards in Minnesota, please see the MPCA's Guidance Manual for Assessing the Quality of Minnesota Surface Waters for the Determination of Impairment, 305(b) Report, and 303 (d) List of Impaired Waters. These resources provide information to better understand the water quality assessment process and the reasoning behind their implementation.

3.1 Lakes

The MPCA has specific standards for both 'deep' lakes or lakes >15ft deep and < 80% of the total lake surface area able to support aquatic plants (littoral area), and 'shallow' lakes or lakes <15ft deep and >80% littoral area. Except for chlorides, summer growing season (June-September) averages of the parameters listed in Table 3.1-1 for each lake are compared to the MPCA standards to determine the overall state of the lake. The standards are set in place to address issues of eutrophication or excess nutrients in local water bodies. Water samples are collected and sent away for analytical testing for TP, Chl-a, and chlorides. If result values are greater than the standards listed in Table 3.1-1, the lake is considered impaired. Secchi disk readings are collected to measure the transparency, or visibility, in each lake. A higher individual reading corresponds to increased clarity within the lake as the Secchi Disk was visible at a deeper depth in the water column.

Table 3.1-1 MPCA Water Quality Standards for Shallow and Deep Lakes

Parameter	Shallow Lakes Criteria	Deep Lakes Criteria
Total Phosphorus (mg/L)	≤ 0.060	≤ 0.040
Chlorophyll a (ug/L)	≤ 20	≤ 14
Secchi Disc (m)	≥ 1	≥ 1.4
Chloride Chronic Standard (mg/L)	230	230
Chloride Maximum Standard (mg/L)	860	860

Chlorides (Cl) are a concern during the winter when road salt is being used heavily. It is often sampled over the winter and during early spring melting periods when salts are being flushed through our waterbodies. The Cl standard is the same for both deep lakes and shallow lakes. The table includes both the Cl chronic standard (CS) and a maximum

standard (MS). The CS is the highest water concentration of Cl to which aquatic life, humans, or wildlife can be exposed to indefinitely without causing chronic toxicity. The MS is the highest concentration of Cl in water to which aquatic organisms can be exposed for a brief time with zero to slight mortality.

3.2 Streams

Table 3.2-1 displays the new water quality parameters developed by the MPCA in 2014 for eutrophication and TSS. The new standards include some parameters the District has not yet incorporated into their monitoring procedures that may eventually be added in the future. All streams sampled in the district are considered Class 2B surface waters. The MPCA states that this class of surface waters should support the propagation and maintenance of a healthy community of cool or warm water sport or commercial fish and associated aquatic life, and their habitats. They should also be suitable for aquatic recreation of all kinds, including bathing. This class of surface water is not protected as a source of drinking water. For more detailed information regarding water quality standards in Minnesota, please see the MPCA's Guidance Manual for Assessing the Quality of Minnesota Surface Waters for the Determination of Impairment, 305(b) Report, and 303 (d) List of Impaired Waters. These resources provide information to better understand the water quality assessment process and the reasoning behind their implementation.

Eutrophication pollution is measured based upon the exceedance of the summer growing season average (May-September) of TP levels and Chl-a (seston), five-day biochemical oxygen demand (cBOD, amount of DO needed by organisms to breakdown organic material present in a given water sample at a certain temperature over a five-day period), diel DO flux (difference between the maximum DO concentration and the minimum daily DO concentration), or summer average pH levels. Streams that exceed phosphorus levels but do not exceed the Chl-a (seston), cBOD, diel DO flux, or pH levels meet the eutrophication standard. The District added Chl-a to its sampling regime in 2015 to account for the polluted condition when Chl-a (periphyton) concentration exceeds 150mg/m² more than once in ten years. The daily minimum DO concentration for all Class 2B Waters cannot dip below 4mg/L to achieve the MPCA standard, which was used in the analysis for the Annual Report.

TSS is a measure of the amount of particulate (soil particles, algae, etc.) in the water. Increased levels of TSS can be associated with many negative effects including: nutrient transport, reduced aesthetic value, reduced aquatic biota, and decreased water clarity. For the MPCA standard, TSS concentrations are assessed from April through September and can be exceeded no more than 10 percent of the time during that period.

Table 3.2-1 MPCA Water Quality Standards for Streams

Standard	Parameter	Exceedance Criteria
Eutrophication	Phosphorus	≤ 100ug/L
	Chlorophyll-a (seston)	≤ 18ug/L
	Diel Dissolved Oxygen	≤ 3.5mg/L
	Biochemical Oxygen Demand	≥ 2mg/L
	pH Max	≤ 9su
	pH Min	≥ 6.5su
Total Suspended Solids	TSS	≤ 30mg/L

4 Water Quality Projects/Monitoring

To improve water quality within the watershed, the District conducts studies to root out key sources of pollution or other negative variables that impact our lakes and streams. Once identified, the District will often monitor these locations and eventually act to improve the water resource if the data confirms the suspicion. Below is a summary list of special projects/monitoring the District has worked on in 2016.

4.1 2016 Lakes Water Quality Summary

The 2016 growing season Chl-a mean concentrations for all lakes sampled within the District are shown in Figure 4.1-1. Four lakes sampled in 2016 within the District are categorized as 'deep' by the MPCA (>15ft deep, < 80% littoral area): Lake Ann, Lotus Lake, Lake Riley, and Round Lake. The MPCA standard for Chl-a in deep lakes (< 14ug/L) was met by Lake Ann and Round Lake, but levels were over twice the standard in Lotus Lake and just above the standard for Lake Riley. The remainder of the lakes sampled in 2016 are categorized as 'shallow' by the MPCA (<15ft deep, >80% littoral area): Duck Lake, Hyland Lake, Lake Lucy, Mitchell Lake, Red Rock Lake, Rice Marsh Lake, Staring Lake, Lake Susan, and Silver Lake. Water quality metrics on Lake Idlewild, classified as a high-value wetland, were compared to MPCA shallow lake standards. The water quality standard for shallow lakes (< 20ug/L) was met by Duck Lake, Lake Idlewild, and Rice Marsh Lake in 2016. Lake Lucy, Mitchell Lake, Red Rock Lake, and Silver exceeded the standard, while Hyland Lake, Staring Lake, and Lake Susan more than doubled the MPCA standard. Hyland Lake did however experience a large decrease in Chlorophyll in 2016 (57.4ug/L) from 2015 (86ug/L). Overall, five of the 14 lakes were sampled in 2016 met all the MPCA standards for their lake classification: Lake Ann, Duck Lake, Lake Idlewild, Rice Marsh Lake, and Round Lake. Red Rock Lake was the only lake that changed from meeting the standard in 2015 to slightly exceeding (25.9ug/L) the standard in 2016.

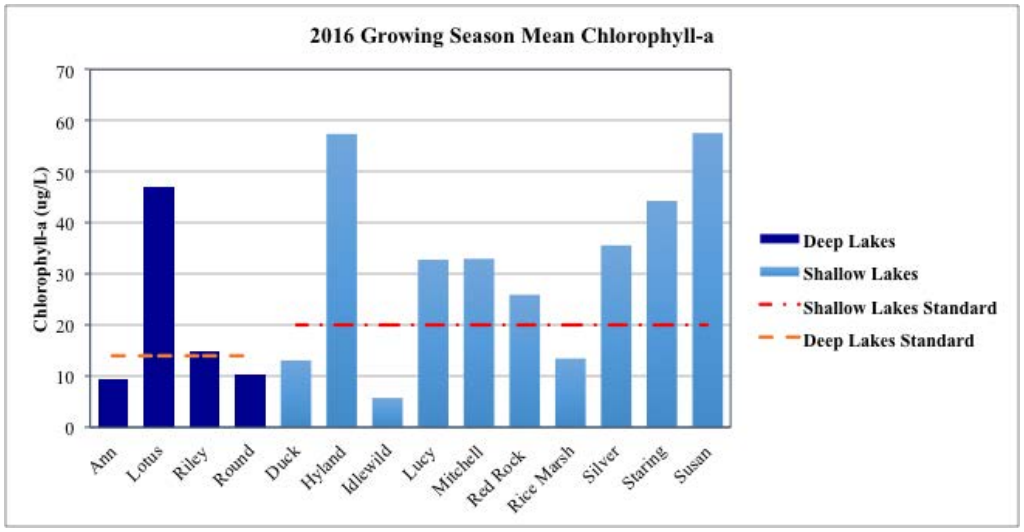

Figure 4.1-1 2016 Lake Growing Season Mean Chlorophyll-a

Lakes growing season (June-September) mean chlorophyll-a concentrations (ug/L) for shallow (lakes <15ft. deep, >80% littoral area-light blue bars) and deep lakes (lakes >15 ft. deep, <80% littoral area-dark blue bars) in the Riley-Purgatory-Bluff Creek Watershed District during 2016. The dashed lines represent the Minnesota Pollution Control Agency water quality standards for Chlorophyll-a for shallow (<20ug/L-orange dashed line) and deep lakes (<14ug/L-red dashed line).

The total phosphorous growing season averages for all lakes sampled within the District in 2016 is shown in Figure 4.1-2. The MPCA standard for total phosphorus in deep lakes (<0.040mg/L) was met by Lake Ann, Lake Riley, and Round Lake, but the levels were above the standard in Lotus. Lake Riley was previously above the standard in 2015, but the aluminum sulfate treatment in early 2016 is most likely attributable to it meeting the standard. For shallow lakes, the MPCA TP standard (<0.060mg/L) was met by Duck Lake, Lake Idlewild, and Red Rock Lake. Silver Lake had the highest total phosphorous concentrations with 0.102mg/L, while Hyland, Mitchell, Rice Marsh, Staring, Susan, and Lake Lucy all exceeded the standard. Overall, six of the 14 lakes sampled met the MPCA total phosphorus standard for their lake classification in 2016: Lake Ann, Duck Lake, Lake Idlewild, Red Rock Lake, Lake Riley and Round Lake. That is two more lakes meeting MPCA TP standards than in 2015.

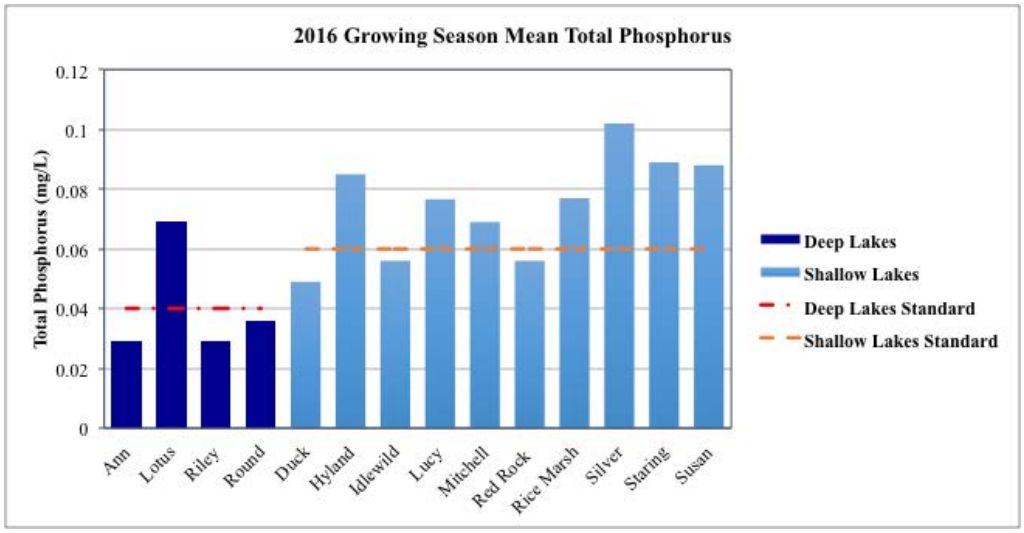

Figure 4.1-2 2016 Lakes Growing Season Mean Total Phosphorus

Lakes growing season (June-September) mean total phosphorous concentrations (mg/L) for shallow (lakes <15ft. deep, >80% littoral area-light blue bars) and deep lakes (lakes >15ft. deep, <80% littoral area-dark blue bars) in the Riley Purgatory Bluff Creek Watershed District during 2016. The dashed lines represent the Minnesota Pollution Control Agency water quality standards for Total Phosphorus for shallow (<0.060ug/L-orange dashed line) and deep lakes (<0.040ug/L-red dashed line).

The 2016 secchi disk growing season mean for all District lakes sampled is shown in Figure 4.1-3. The MPCA standard for secchi disk depth for deep lakes (> 1.4m) was met by all deep lakes in the District (Ann, Lotus, Riley, and Round). Lake Ann and Lake Riley had the largest changes occur across all deep lakes, with a reduction in water clarity by about 0.5m in Ann and an increase by 1.2m in Riley. The change in Lake Riley can most likely be attributed to the aluminum sulfate treatment that occurred in the spring of 2016 (more information about the treatment can be found in section 4.2). All other deep lakes had clarity readings similar to numbers from 2015. For shallow lakes (>1m), six of 10 lakes monitored achieved the secchi depth water quality standard. Duck Lake, Lake Idlewild, Lake Lucy, Red Rock Lake, Rice Marsh Lake, and Lake Susan met the standard. Hyland and Mitchell Lake were extremely close to meeting the MPCA with a summer averages of 0.99m and 0.95m respectively. Except for Ann, Staring, Susan, and Silver Lake, water clarity improved across all lakes. Lake Riley had the highest average secchi readings at 2.9m, while Silver Lake recorded the worst.

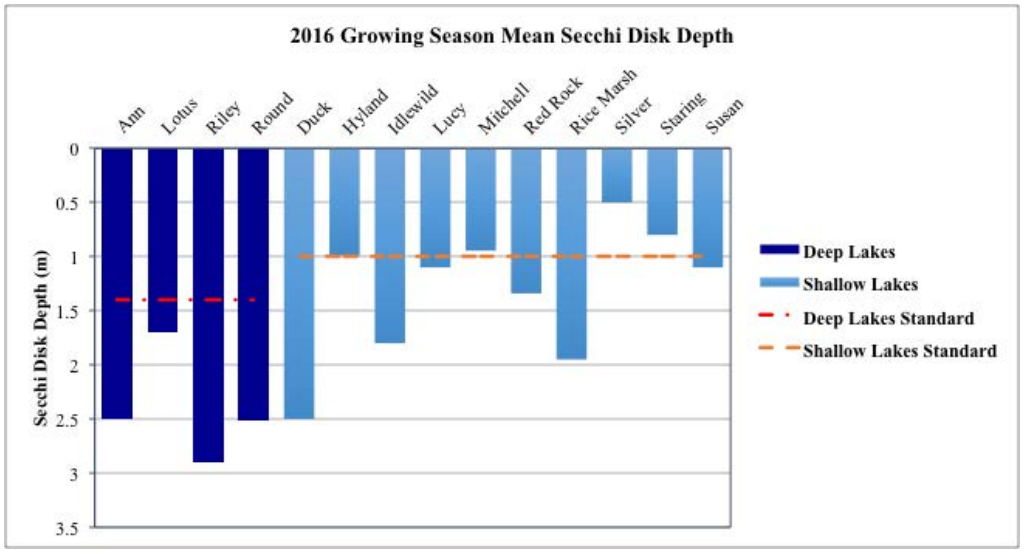

Figure 4.1-3 2016 Lakes Growing Season Mean Secchi Disk Depth

Lakes growing season (June-September) mean secchi disk depths(m) for shallow (lakes <15ft. deep, >80% littoral area-light blue bars) and deep lakes (lakes >15ft. deep, <80% littoral area-dark blue bars) in the Riley Purgatory Bluff Creek Watershed District during 2016. The dashed lines represent the Minnesota Pollution Control Agency water quality standards for secchi disk depths for shallow (>1m-orange dashed line) and deep lakes (>1.4m-red dashed line).

4.2 Alum Treatment on Lake Riley

In May of 2016, the District treated Lake Riley with the first dose of aluminum sulfate (Alum). Alum is a compound which works to reduce the growth of algae by trapping the nutrient phosphorus (the food source of algae) in the lake sediments. The treatment was applied by injecting the alum into water several feet below the surface of the lake. Upon contact with water, alum becomes aluminum hydroxide (also called floc), a fluffy precipitate. As floc settles to the bottom of the lake it interacts with phosphorus, binding it, making it unusable by algae. This process also collects other particles suspended in the water column, helping to improve water clarity.

Figure 4.2-1 illustrates the change in TP levels after the alum treatment was applied in Lake Riley in May. TP data was included from January 2015 to October 2016 to highlight the abrupt changes in TP concentrations over a short period. There was a large reduction in TP at the surface after the treatment in May which led to Lake Riley achieving the MPCA standard over the summer growing season (June-September) of 2016. TP levels sampled in the hypolimnion (the bottom layer of water in a thermally-stratified lake, below the thermocline) rose almost 0.6mg/L from May through September in 2015. In 2016, TP levels in the hypolimnion were drastically reduced after treatment and only rose about 0.06mg/L through September. A decrease in TP also led to reductions in summer averages of Chl-a (algae) concentrations from 27.4ug/L to 14.9ug/L. RPBCWD staff also saw a noticeable, positive change in water clarity after the application of the alum. Water clarity summer averages increased from 1.7m in 2015 to 2.9m (2016). The District will continue to monitor water clarity and nutrient levels in 2017, as it is a part of regular monitoring, but also to track the initial effectiveness of the alum treatment. Future monitoring will also indicate when a second dose of alum should be applied. More information about Lake Riley nutrient and water clarity data can be seen in the Fact Sheet located in Exhibit E.

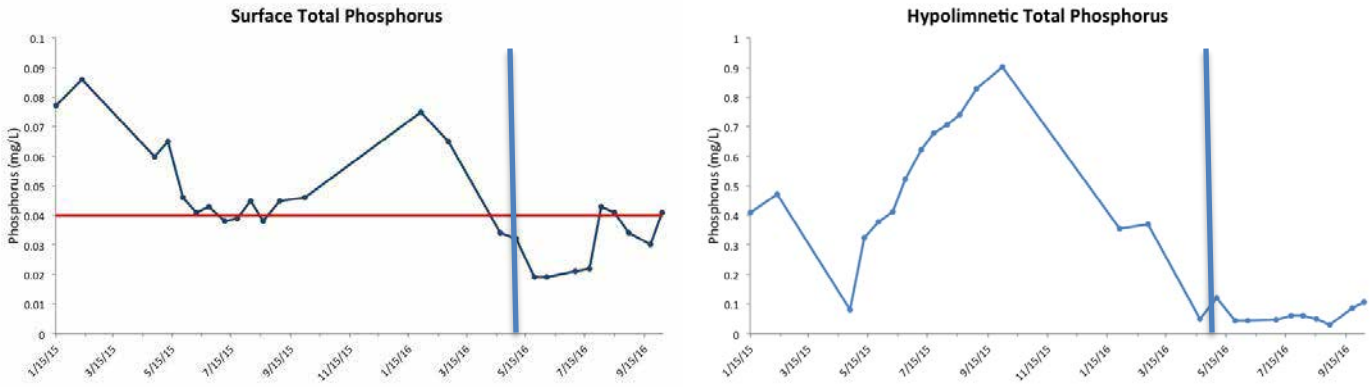

Figure 4.2-1. Total phosphorus levels in Lake Riley pre-and post-alum treatment, 2015-2016.

Total phosphorous levels (TP) in Lake Riley between January 15, 2015 and October 3, 2016. The graphs reflect levels before and after the aluminum sulfate (Alum) treatment carried out in May of 2016. The left graph displays TP levels (mg/L) measured from 2m composite samples taken at the surface of the lake. The MPCA water quality standard for TP is represented by the horizontal red line and the vertical blue line indicates when Alum was applied. The right graph displays the TP levels (mg/L) measured from samples taken at the hypolimnion of the lake.

4.3 Lake Susan Park Pond

In 2013, a Use and Attainability Analysis (UAA) identified Lake Susan Park Pond as a significant contributing source of nutrient pollution to Lake Susan. In 2015, staff conducted sampling on Lake Susan Park Pond (North and West inlet, and East side) and at the Lake Susan Park Pond Outlet located on the south end of the pond. Grab samples were collected after rain events to assess the amount of nutrient pollution being contributed to Lake Susan. In addition to sampling efforts in 2015, staff placed an automated water-sampling unit at the outlet structure of the pond in 2016 to better capture and understand rain event nutrient loading. Analyzing the “first flush” of a storm event is important because these events are when water pollution entering storm drains in areas with high proportions of impervious surfaces is typically more concentrated compared to the remainder of the storm. Water samples were analyzed for total dissolved phosphorous (TDP), TP, TSS, and Chl-a.

Across both years, the relative amount of dissolved phosphorous vs TP was extremely low as seen in Figure 4.3-1. In 2015, the highest TP reading was 0.081mg/L. In 2016, TP concentrations only exceeded the floor of the standard as set by the MPCA (0.1-0.25mg/L) three times while never exceeding the ceiling of the standard (Figure 4.3-1). Additionally, samples taken at the north inlet of the pond, which was hypothesized as the main source of nutrients, also yielded low concentrations. TSS concentrations were also considered low for water leaving a stormwater pond. In 2015 the highest TSS reading was 42mg/L and in 2016 it was 65mg/L (Table 4.3-1). The 2015 readings are somewhat lower overall because staff went out after storm events to collect samples which often was well after the "first flush" event. The 2016 samples were collected automatically and fully captured all the "first flush" events which is more representative of initial pollutants moving downstream from the pond. There is no MPCA water quality standard for water leaving a stormwater pond, however the pond drains directly into Riley Creek, which has a set water quality standard of <10% exceedance of 30mg/L of TSS. Using the stream standard, with the understanding that after mixing with the water of Riley Creek, which may yield a different outcome, Lake Susan Park Pond did not violate the TSS standard in 2015 as it only exceeded the limit during one event. In 2016, the average TSS concentration was 34.5mg/L (Table 4.3-1) and exceeded the stream standard across seven of the 12 sampling events. Even though the pond did exceed the stream standard, many stormwater ponds have TSS values well over 100 mg/L, suggesting that the pond is performing well. The Chl-a average across all the pond samples within each year was 31ug/L in 2015 and 35ug/L in 2016 (Table 4.3-1), which is relatively low for a stormwater pond. The Lake Susan summer growing season (June-September) average for Chl-a in 2015 was 59.8ug/L and 57.6ug/L in 2016, which is more than double the MPCA shallow lake standard of 20ug/L. The Chl-a concentrations observed in Lake Susan Park Pond may be partially contributing to the high values seen in Lake Susan. This information will be used in the Lake Susan Park Pond project feasibility study to assess water quality projects that would be beneficial at this location.

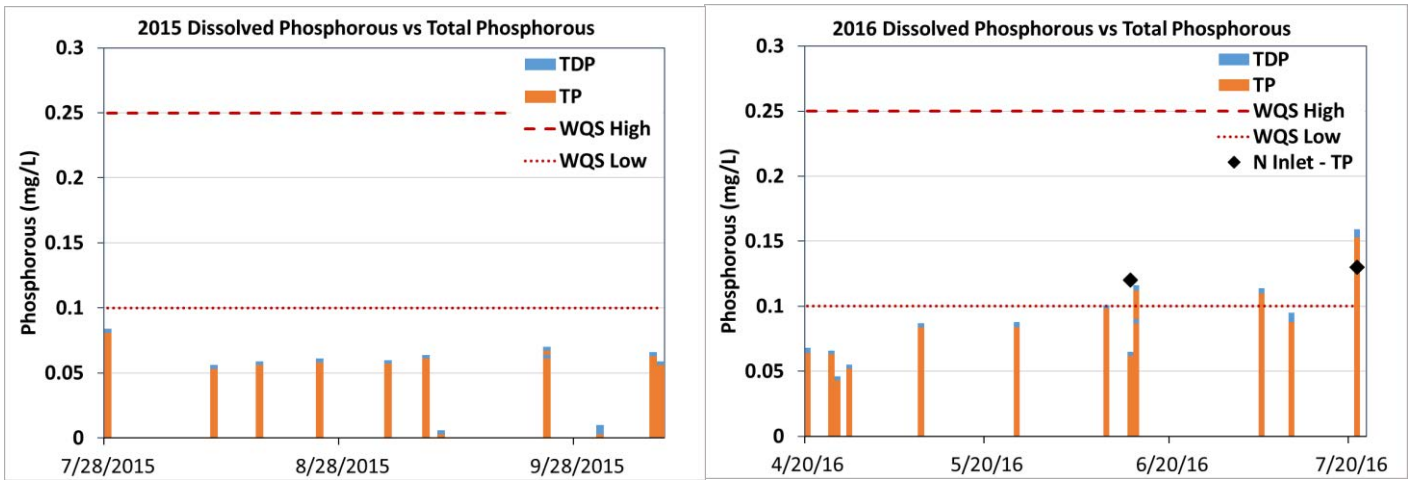

Figure 4.3-1 2015 and 2016 Lake Susan Park Pond Dissolved Phosphorous vs Total Phosphorous

Total Dissolved Phosphorous (TDP) and Total Phosphorus (TP) concentrations (mg/L) from Lake Susan Park from 2015 grab samples and 2016 automated flow-paced samples. Dashed lines represent Minnesota Pollution Control Agency Standards for stormwater ponds (0.1mg/L-0.25mg/L). In 2016 the black diamonds represent total phosphorous readings from the north inlet on the pond.

Table 4.3-1 2015 and 2016 Lake Susan Park Pond Summary

Lake Susan Park Pond Total Dissolved Phosphorous (mg/L), Total Phosphorus (mg/L), Chlorophyll-a (ug/L), and Total Suspended Solid (mg/L) concentrations (max, min, and average) from 2015 grab samples and 2016 automated flow-paced samples.

	2015				2016			
Parameter	# of Samples	Minimum	Maximum	Average	# of Samples	Minimum	Maximum	Average
TP (mg/L)	12	0.003	0.081	0.052	13	0.43	0.153	0.085
TDP (mg/L)	12	0.003	0.007	0.003	13	0.003	0.007	0.004
Chl-a (ug/L)	12	20	45	31	12	6	59	32
TSS (mg/L)	12	8	42	17	12	11	63	35

4.4 Creek Restoration Action Strategy

The RPBCWD developed the Creek Restoration Action Strategy (CRAS) to prioritize creek reaches, sub-reaches, or sites, in need of stabilization and/or restoration. The District has identified eight categories of importance for project prioritization including: infrastructure risk, erosion and channel stability, public education, ecological benefits, water quality, project cost, partnerships, and watershed benefits. These categories were scored using methods developed for each category based on a combination of published studies and reports, erosion inventories, field visits, and scoring sheets from specific methodologies. Final tallies of scores for each category, using a two-tiered ranking system, were used to prioritize sites for restoration/remediation. More information on the CRAS can be found on the District's website: www.rpbcwd.org. The CRAS was finalized/adopted in 2015 and a severe site list was developed which includes subreaches from all three creeks (Table 4.4-1). The 2016 updates did not affect this list.

Table 4.4-1 Severe Reaches Identified by the Creek Restoration Action Strategy

Stream	Rank Tier II	Rank Tier I	Reach	Subreach	Location
Purgatory	1	7	P7	P7E	Covington Road to Covington Pond
Riley	2	1	R2	R2E	Mid 1/3 between Dell Road and Eden Prairie Road
Bluff	3	9	BST	BT3A	Audubon Road to Pioneer Trail
Purgatory	4	8	P1	P1E	1,350ft DS of Pioneer Trail to Burr Ridge Lane
Bluff	5	2	B1	B1D	475ft US of Great Plains Blvd to Great Plains Blvd
Bluff	6	4	B3	B3A	750ft DS of RR Bridge to 860ft DS
Bluff	7	3	B5	B5C	Galpin Blvd to West 78th Street
Bluff	8	5	B3	B3C	1,675ft US of Audubon Road to Lyman Blvd
Bluff	9	6	B5	B5B	985ft US of Galpin Blvd to Galpin Blvd

As part of CRAS, stream reaches are walked on a rotational basis after the initial assessment was completed. This will allow staff to evaluate changes in the streams and update the CRAS accordingly. In 2016 staff walked all of Reach 4 of Riley Creek and all but the bottom subreach of Reach 1 of Bluff Creek. These sites were especially in need of a full assessment as previous scores were calculated based upon pictures and past studies. Staff conducted Modified Pfankuch Stream Stability Assessments, MPCA Stream Habitat Assessments (MSHA), took photos, and recorded notes of each subreach to assess overall stream conditions. In addition to creek walks, staff also checked bank pins which were installed in 2015 near all the regular water quality sites. The bank pins were installed in "representative" erosion sites to evaluate erosion rates for each reach. Changes to the CRAS based upon 2016 creek walks can be seen in Table 4.4-2.

Figure 4.4-1 Mass Erosion Site in B1B.

Bluff Creek-Reach 1 subreaches did not change CRAS categories (severe/poor/moderate/good) based on updates from 2016. Overall, both Pfankuch scores and MSHA scores increased across all the subreaches. B1A shifted by 10 points using the Pfankuch assessment, which was related mainly to the three major erosion sites within the subreach and the downstream degradation caused by them. All MSHA scores increased by more than 14 points, B1C having the largest adjustment (19.3 points). Scores were generated based upon pictures for the first version of the CRAS and shifted upward in large part because of the amount of exposed cobble/gravel riffles and large amounts of instream woody debris. Infrastructure risk was considered low across all subreaches and a review of the water quality data from the past five years did not change the overall water quality scores. B1B was considered the worst out of the three subreaches with six mass wasting erosion sites were identified (Figure 4.4-1). B1C changed its total score by -2 which caused it to fall slightly on the CRAS final table. More information about each

subreach can be seen in Appendix D and the updated information is incorporated within our Creek Fact Sheets in Exhibit E.

In Riley Creek, Reach 4, only one subreach changed CRAS categories (severe/poor/moderate/good) based on updates from 2016. Subreach R4B from Park Drive to Park Road had a reduced Pfankuch score, which led to a change from a moderate to a good overall CRAS score. This was graded largely based upon the very stable clay soils that were present in the subreach. Additionally, staff added subreach R4F from Lake Susan to Rice Marsh Lake. Previously no assessment had been conducted on this subreach, which was found to be in good condition overall from the assessment. Pfankuch scores did not change dramatically based upon the updated scores. MSHA scores also did not vary dramatically from the previous assessments, except for R4E Powers Boulevard to Lake Susan. Severe incising and sedimentation caused the MSHA score to decrease from 42.4 to 28.5. However, this shift did not change the subreach from the fair MSHA rating. Infrastructure risk was considered low with only minor long-term threats to culverts and stormwater culverts for R4A, R4B, and R4E. R4C and R4D had some issues with stormwater culvert degradation, however they scored higher due to the degraded stormwater culverts under Park Road and the railroad bridge. Both culverts were considerably degraded, with exposed rebar and cement breakdown. A review of the water quality data from the past five years did not change the overall water quality scores. More information about each subreach can be seen in Exhibit D and the updated information is incorporated within our Creek Fact Sheets in Exhibit E.

Table 4.4-2 Creek Restoration Action Strategy Changes in 2016

CRAS updates from 2015 to 2016 for all subreaches within Reach 4 of Riley Creek and the top three subreaches within Reach 1 of Bluff Creek. Infrastructure risk score of 1=no threat, score of 3=long–term threat, and a score of 5=shorter-term threat. The Modified Pfankuch Stream Stability Rating scores were based on the Rosgen Stream Classification with a higher number representing less stability. Stream habitat conditions were rated using the MSHA; 1-25 indicate poor habitat quality, 26-50 indicate fair quality, and 51-75 indicate good quality. The Water Quality (WQ) summary used water quality data from the past five years to assess water quality with each subreach. A WQ score of 3 indicates WQ parameters consistently near the maximum allowed, where a score of 7 indicates the WQ parameter consistently exceeding MPCA standards. Tier I scores add all assessment scores and divides the subreaches into final categories based upon the need for restoration; 12 or lower=lowest priority for restoration; 13-17=low priority reach; 18-21=high priority and restoration is needed; 22 or greater=highest priority and immediate restoration and/or stabilization is needed.

Reach	Subreach	Location	Infrastructure Risk	2015 Pfankuch	2016 Pfankuch	Pfankuch Summary	2015 MSHA	2016 MSHA	MSHA Summary	WQ Summary	Tier I Scores
R4	R4A	Highway 5 to Park Drive	3	90	86	5	39.7	49.1	5	3	16
R4	R4B	Park Drive to Park Road	3	83	48	1	33.5	40	5	3	12
R4	R4C	Park Road to Railroad Bridge	5	91	87	5	41.2	38.7	5	3	18
R4	R4D	Railroad Bridge to Powers Blvd	5	91	95	7	45.7	42.5	5	3	20
R4	R4E	Powers Blvd to Lake Susan	3	93	100	7	42.4	28.5	5	3	18
R4	R4F	Lakes Susan to Rice Marsh Lake	1	-	73	5	-	58.5	3	3	12
B1	B1A	Pioneer Trail to 2,150 ft DS	1	90	100	5	34	52.2	3	7	16
B1	B1B	2,150ft DS 300ft US of Bluff Creek Park	1	111	115	7	34	48.9	5	7	20
B1	B1C	300ft US to 475ft US of Great Plains Blvd	1	111	112	7	34	53.3	3	7	18

4.5 Chloride Monitoring

Chloride (Cl) levels in our water bodies are becoming a greater concern within the state of Minnesota. It takes only one teaspoon of road salt to permanently pollute five gallons of water, as chlorides do not break down over time. At high concentrations, Cl can also be harmful to fish, aquatic plants, and other aquatic organisms. The MPCA Cl Chronic Standard (CS, the highest water concentration of Cl to which aquatic life, humans, or wildlife can be exposed to indefinitely without causing chronic toxicity) is 230mg/L for class 2B surface waters (all waters sampled within the district, excluding stormwater holding ponds). The MPCA Cl Maximum Standard (MS, the highest concentration of Cl in water to which aquatic organisms can be exposed for a brief time with zero to slight mortality) is 860mg/L for class 2B surface waters.

The District has been monitoring salt concentrations in our lakes and ponds since 2013 and plans to continue monitoring efforts to identify high salt concentration areas and to assess temporal changes in salt concentrations. Currently the District is monitoring the Riley Chain of Lakes (Lake Ann, Lake Lucy, Lake Susan, Rice Marsh Lake, and Lake Riley) and a chain of ponds that drains the city of Eden Prairie Center to Purgatory Creek. During sampling, staff collects a surface 2m composite and a bottom water sample to be analyzed for Cl. The RCL has exhibited healthy Cl levels since sampling began in 2013. Every sample taken from the RCL since then has fallen below the MPCA CS of 230mg/L (Figure 4.5-1). Except for Rice Marsh Lake, which has shown a decrease in Cl levels since 2013, Cl levels have stayed consistent within the lakes year-to-year.

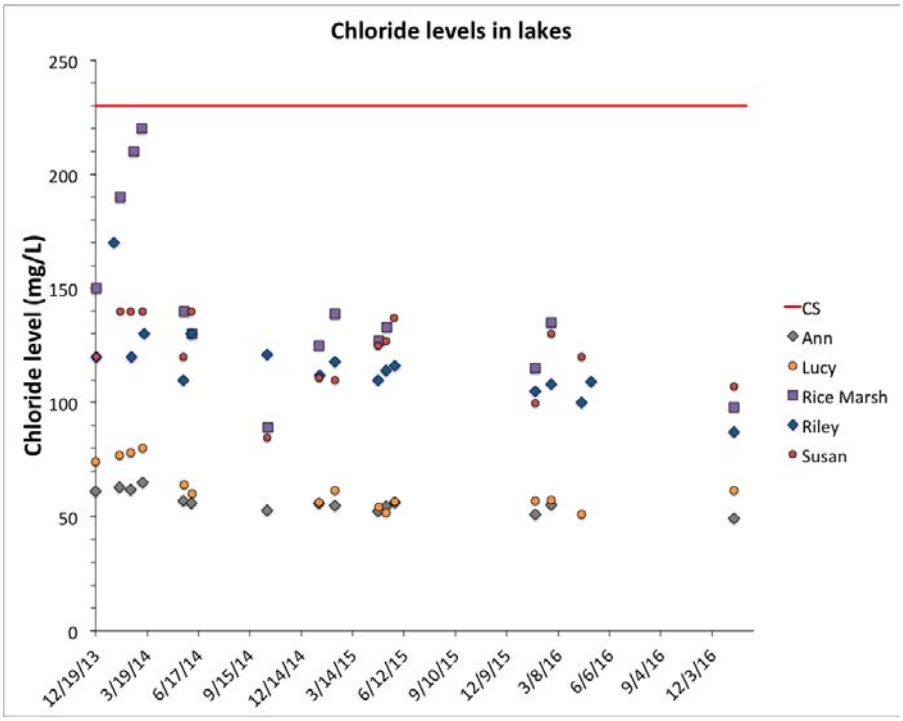

Figure 4.5-1 Chloride levels within the Riley Chain of Lakes 2013-2016

All chloride sampling results (mg/L) on the Riley Chain of Lakes from 2013-2017. The MPCA chloride chronic standard for class 2B waters (230mg/L) is included, represented by the solid orange line.

Figure 4.5-2 shows Cl levels within the four stormwater ponds, which includes all sampling events since 2013. In the spring of 2015, staff was no longer able to take accurate water samples on Pond B due to low water levels, so, sampling began on Pond A, directly upstream. As the figure illustrates, most samples taken from Eden Pond greatly exceed the class 2B CS, some exceeding the class 2B MS. Except for one sampling event, all samples taken from Pond K exceed the class 2B MS, although, there has been a noticeable drop in levels each year since sampling began. It is important to note that these stormwater ponds are not classified as class 2B surface waters by the MPCA; the CS is given in the figure to demonstrate how much higher Cl levels accumulating within these ponds are before water moves into adjacent lakes and streams. In 2017 through 2020 staff will continue to monitor the stormwater ponds, but will switch to monitoring the Purgatory Chain of Lakes which will include: Lotus, Silver, Duck, Round, Mitchell, Red Rock, Staring, and Hyland Lake.

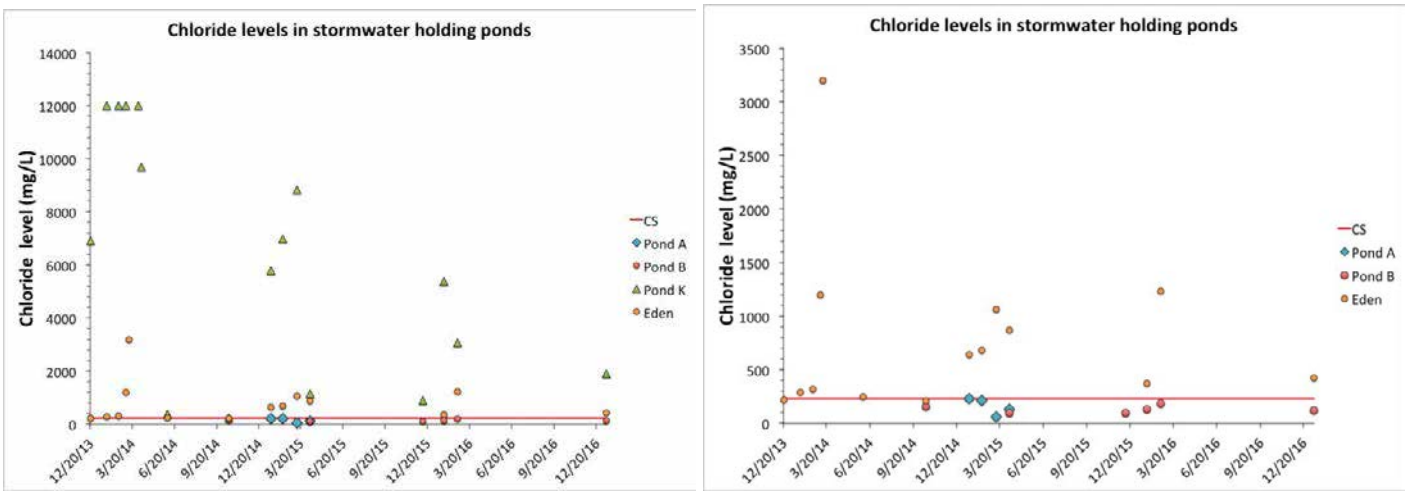

Figure 4.5-2 Chloride levels within stormwater ponds 2013-2016

All chloride results (mg/L) on stromwater ponds draining the city of Eden Prairie Center to Purgatory Creek from 2013-2016. The left graphic includes samples taken from Pond K, where the right graphic does not. The MPCA chloride chronic standard (230mg/L) for class 2B waters are included, represented by the solid red line.

4.6 Zooplankton

In 2016, three lakes were sampled for zooplankton; Mitchell Lake, Red Rock Lake, and Lake Riley. Zooplankton play an important role in a lake's ecosystem, specifically for the fishery and bio control of algae. Healthy zooplankton populations are characterized by having balanced densities (number per m^2) of three main groups of zooplankton: Rotifers, Cladocerans, and Copepods. The District analyzed zooplankton populations for the following reasons:

1. Epilimnetic Grazing Rates: The epilimnion is the uppermost portion of the lake during stratification where zooplankton feed. Zooplankton can be a form of bio control for algae that may otherwise grow to an out-of-control state and therefore influence water clarity.
2. Population Monitoring: Zooplankton are a valuable food source for planktivorous fish and other organisms. The presence or absence of healthy zooplankton populations can determine the quality of fish in a lake. Major changes in a lake (removal of common carp, winter kill, etc.) can change zooplankton populations drastically. By insuring that the lower parts of the food chain are healthy, we can protect the higher ordered organisms.
3. Aquatic Invasive Species Monitoring: Early detection of water fleas is important to ensure these organisms are not spread throughout the District. These invasive species outcompete native zooplankton for food and grow large spines which make them difficult for fish to eat.

Lake Riley

In 2016, all three groups of zooplankton were captured in Lake Riley (Exhibit C), however only 3.2% of the population was comprised of Cladocerans. As expected, rotifers were the most abundant zooplankton sampled across all sampling dates (Figure 4.6-1). The number of rotifers and copepods were at their highest point during the first spring sampling event, declining to the lowest point in May before leveling off for the remainder of the year. Copepod and rotifer numbers were similar to numbers found in 2015 except for the massive spring spike of over six million rotifers seen in April. Cladoceran numbers remained low across all sampling dates; the highest number was recorded in July and the lowest in April. These counts were slightly lower than Cladoceran numbers seen in 2015. Between April-July the Cladoceran community was dominated by large-bodied zooplankton, the most common being Daphnia pulex. After July, Daphnia retrocurva and Diaphanosoma leuchtenbergianum were the most abundant.

Cladocera consume algae and have the potential to improve water quality if they are abundant. The estimated epilimnetic grazing rates of Cladocera observed in 2016 were down from rates observed in 2015. In 2016 the estimated epilimnetic grazing rates ranged from 1% to 21% (Figure 4.6-2), down from 1% to 38% in 2015. April grazing rates were very low before peaking at 21% in June and returning to low levels in August and September. The highest June grazing rates were linked with the high number of Daphnia pulex present, which declined after the June sample date and were replaced with small bodied Cladocera. The reduction in large bodied zooplankton during the early summer months is often seen in zooplankton communities because of the hatching of young of the year (YOY) fish (fish born in the spring) which consume large/high energy zooplankton. Reductions can also occur because of an increase in cyanobacteria in the phytoplankton community which are inedible to Cladocera.

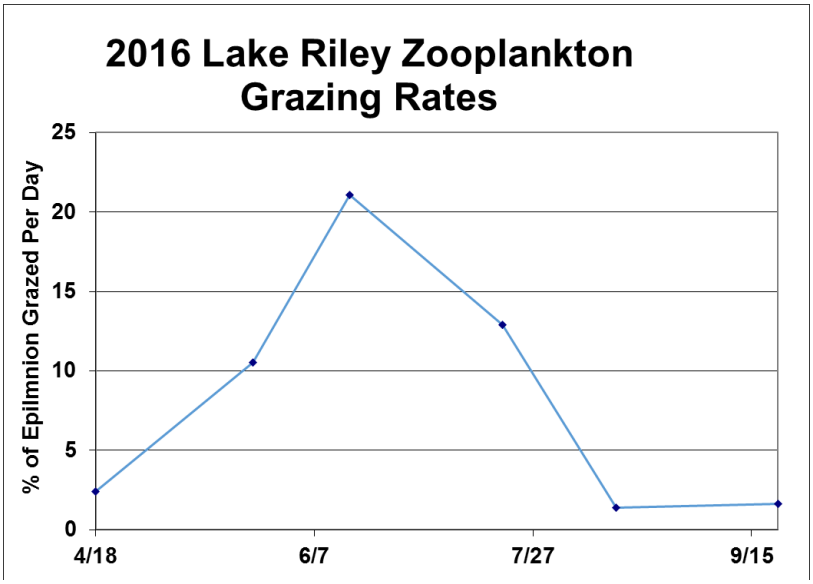

Figure 4.6-1 Lake Riley Zooplankton Counts (#/m²)

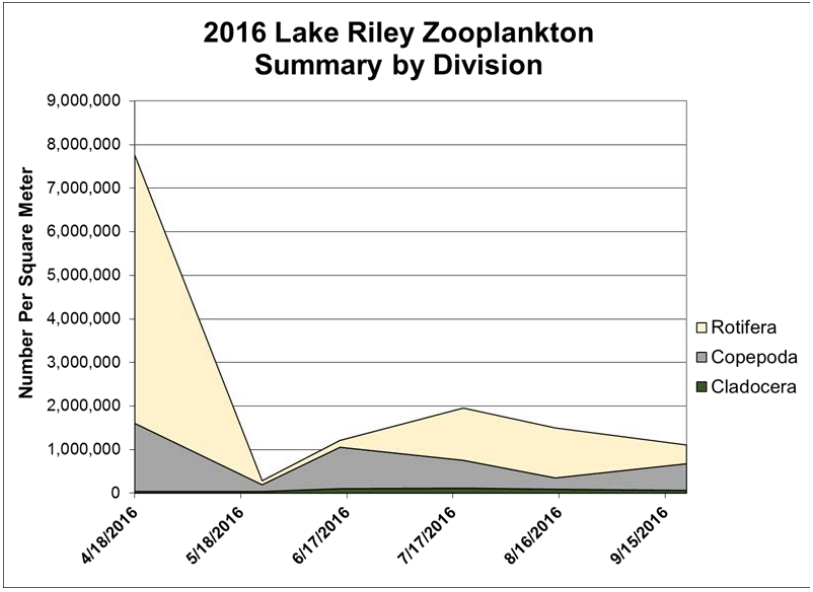

Figure 4.6-2 Lake Riley Epilimnetic Grazing Rates

Red Rock Lake

In 2016, all three groups of zooplankton were present in Red Rock Lake (Exhibit C). Rotifers were the most abundant zooplankton sampled in the 2016 across all sampling dates (Figure 4.6-3). Similar to what was seen in Lake Riley, April rotifer numbers were very high (over 7.5 million) before oscillating around one million for the remainder of the year. Copepod numbers spiked in May, around 1.3 million, which also occurred in 2015. Less copepods were found overall in 2016. Cladoceran numbers increased from mid-April to its peak of over 1.2 million in May. Cladocera then decreased in June and stayed fairly consistent at around 200 thousand through mid-August. These reductions may be due to an increase in the number of YOY fish or the increase in cyanobacteria as discussed in the Lake Riley summary. After August, the number of small Cladocera, which dominated the overall population, recovered to levels previously seen in the spring. The most abundant Cladocera were *Bosmina longirostris* which are common in lakes and ponds across the continent.

Large Cladocera consume algae and, if enough are present in a lake, they have the potential to improve water quality. The estimated epilimnetic grazing rates observed in 2016 experienced a range from 5% to 36% (Figure 4.6-4). The April eplimnetic grazing rate was the lowest of the season, however it spiked in May and stabilized for the rest of year.

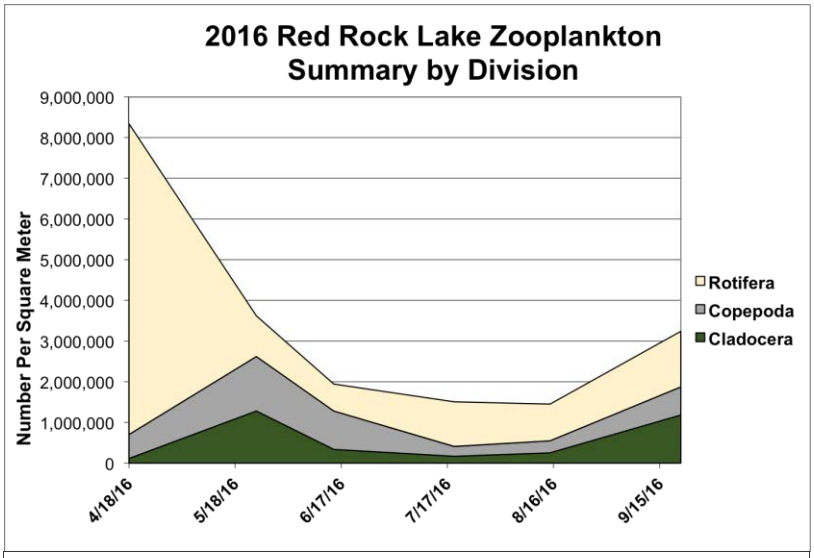

Figure 4.6-3 Red Rock Lake Zooplankton Counts (#/m²)

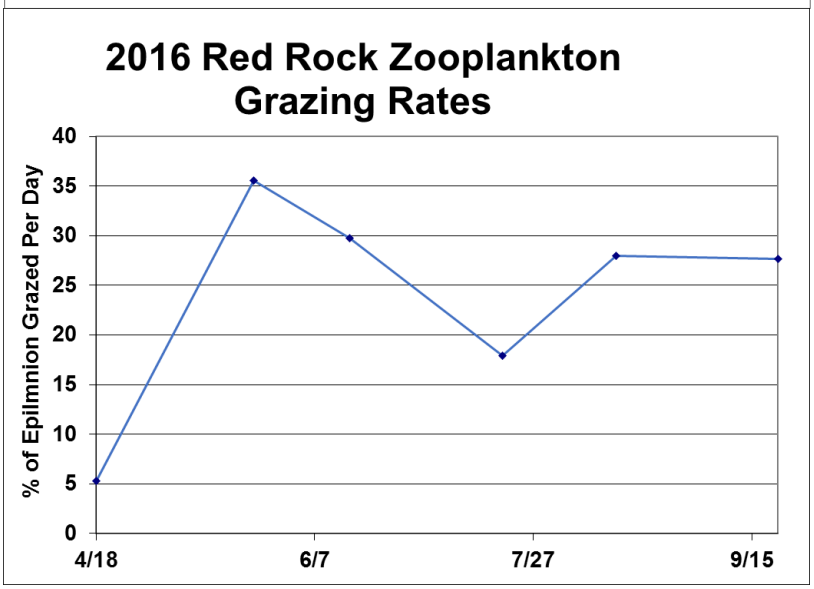

Figure 4.6-4 Red Rock Lake Epilimnetic Grazing Rates

Mitchell Lake

Rotifers were the most abundant type of zooplankton captured in 2016 on Mitchell Lake (Exhibit C). The rotifer population began over 1.3 million in April before spiking to over 8.8 million in May. Copepod numbers remained consistent across the year averaging around 585 thousand (Figure 4.6-5). The Cladocera community was comprised mainly of smaller bodied organisms with fewer large bodied Cladocera in 2016 than in 2015. The population trend followed the same pattern as rotifers did; it started low in April and spiked in May before leveling out. The lowest Cladocera population was recorded in July. Similar to what was found in Red Rock Lake, the most abundant Cladocera in Mitchell Lake was *Bosmina longirostris*.

The estimated epilimnetic grazing rate upon algae observed in 2016 ranged from 2% to 39% (Figure 4.6-6). This rate is down from 2015 which ranged from 10% to 41%. Across the entirety of the sampling season, grazing rates were erratic. The highest recorded grazing rate was observed in August when *Chydorus sphaericus* and *Diaphanosoma leuchtenbergianum* were more numerous in the zooplankton community. During the last sampling period in earlier September, *Leptodora kindtii* were captured, which has been uncommon. Leptodora, the largest planktonic Cladoceran, occurs in a wide range of conditions, including clear, oligotrophic lakes, as well as eutrophic lakes.

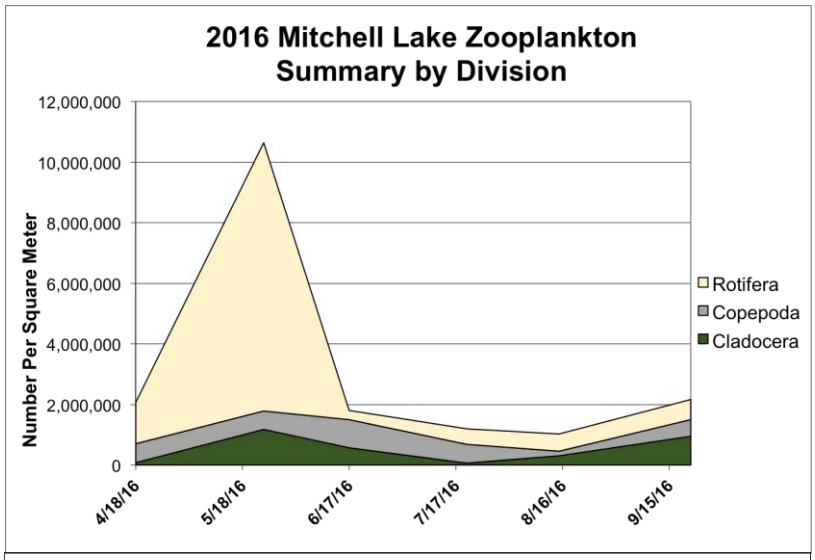

Figure 4.6-5 Mitchell Lake Zooplankton Counts (#/m²)

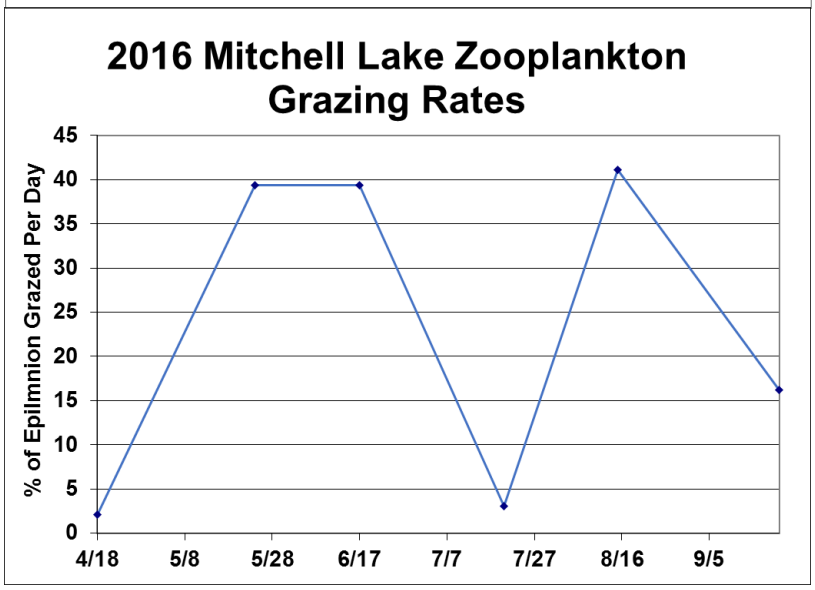

Figure 4.6-6 Mitchell Lake Epilimnetic Grazing Rates

4.7 Chanhassen High School Reuse

In 2016, the District conducted a feasibility study in partnership with Chanhassen High School, to implement a stormwater reuse project. The project would reduce groundwater consumption and maintain adequate hydrology to the six on-site wetland mitigation areas. The would also reduce discharge rates, volumes, and pollutants entering Bluff Creek. The District determined that it would advance its water conservation goals to pursue a cooperative project with the city of Chanhassen and Independent School District 112 to irrigate nearly 75% of the green space on the high school campus by reusing 16% of the annual watershed runoff, with the potential to expand in the future to meet additional demands.

The project will consist of a new irrigation system installed alongside the existing potable irrigation system, an ultraviolet disinfection treatment system and a hydropneumatic tank, with the ability to use the existing irrigation system for backup. The project will meet 51% of the total school campus annual irrigation demand, reduce groundwater use by 1.93 million gallons per year, reduce annual stormwater runoff reaching Bluff Creek by 9.1 acre-feet, reduce annual total phosphorus entering Bluff Creek by 7.4lbs, and reduce average total suspended solids entering Bluff Creek by 1,345lbs. The Chanhassen High school pond which is the source for the reuse system is approximately 10ft deep from the normal water level to the bottom. The intent is to draw down the pond by two feet (from the normal water level). In 2016, staff went out and collected water quality samples on four dates and tested for various parameters. Some variables were irrigation specific (these can impact vegetation growth, turf, etc.) including; total dissolved solids, sodium, boron, calcium, magnesium, and specific conductivity. Other variables were tested to help design the UV treatment system including iron and total alkalinity. All 2016 results collected from the four sampling events can be seen in Table 4.7-1.

Table 4.7-1

Chanhassen High School Pond Sampling 2016 Results

	Date				
Parameter	**8/3/2016**	**8/18/2016**	**8/30/2016**	**9/20/2016**	**Limits**
Alkalinity, total, as CaCO3 (mg/L)	46.5	41.6	50.9	59.2	<120
Bacteria, *E. coli* (n/100ml)	22.6	3.1	40.4	30.7	2.2*
Biochemical Oxygen Demand (5-day, mg/L)	2.34	5.3	2.94	1.61	-
Boron (ug/L)	100	100	100	100	<2000
Calcium (mg/L)	20	18	19.6	23.1	<80
Chloride (mg/L)	71.3	40.7	31.6	29.5	<100
Chlorophyll -a, pheophytin-adjusted (ug/L)	4.45	37.4	6.23	4	-
Iron (ug/L)	139	118	119	132	<5000
Magnesium (mg/L)	6.7	5.4	6.2	7.1	<35
Nitrogen, ammonia, as N (mg/L)	0.04	0.04	0.04	0.04	<10
Nitrogen, Nitrate + Nitrite, as N (mg/L)	0.03	0.03	0.03	0.03	<10
Nitrogen, Nitrate, as N (mg/L)	0.03	0.03	0.03	0.03	<10
Nitrogen, total kjeldahl (TKN, (mg/L))	0.368	0.653	0.3	0.3	<22.6
Orthophosphate, as P (mg/L)	0.003	0.003	0.007	0.003	-
pH		9.35	9.48	8.71	6-7
Phosphorus, total, as P (mg/L)	0.028	0.04	0.023	0.018	<0.8
Sodium (mg/L)	38.2	21.2	16.2	13.7	<70
Solids, total dissolved (mg/L)	204	138	122	146	<500
Solids, total suspended (mg/L)	4	8	2	2	-
Specific Conductance @ 25 ºC (mmhos/cm)		0.2324	0.21	0.2176	0.78
Temperature (degrees C)		26.45	25.37	21.26	-
Turbidity (NTU)	1.86	11.4	3.87	2.26	<1*

*MPC –2015 Minnesota Plumbing Code
All other guidelines from Duncan et al., 2000

Most of the irrigation guidelines were met by the Chanhassen High School stormwater pond. Water quality limits/guidelines were taken from the 2015 Minnesota Plumbing Code (IAPMO, 2017) and from Duncan et al. (2000). *E. coli* concentrations were above the MN plumbing water quality limits, but was still below the MPCA water quality standards for Class 2a waters (MPCA, 2014) (126 organisms/100 mL monthly average). Chlorophyll-a and Ortho-P concentrations did not have any standards for reuse systems, however both concentration levels were low, specifically with Ortho-P which registered values at or near the minimum detectable limit. Similarly, Total suspended solid concentrations generally do not affect turf grass accept at extremely high levels. TSS can clog irrigation equipment, however the 2016 results were very low (2-8 mg/L). Turbidity numbers were slightly above Minnesota Plumbing Code (IAPMO, 2017), but overall values were still low. Recommended values for pH were exceeded as pond values were more basic ranging from 8.5-9.5.

4.8 Lotus Lake and Lake Susan Fish Kill

RPBCWD staff went out on Lotus Lake on 6/14/2016 and 6/15/2016 to follow up with the concerns raised by a Lotus Lake resident and Terry Jeffery (city of Chanhassen) about the possibility of a fish kill and poor water quality overall. After a review of the 2016 chemical data (TP, CHLA, Alkalinity, Ortho-p, Nitrogen) and the 1m lake profile data for Lotus Lake, staff determined that there were no major "red flags" with water quality (values were very similar to previous years). Staff did notice some scattered dense patches or curly-leaf pondweed and large blooms of spirogyra, which was most likely the reason for the water quality concerns raised by the resident. Staff did notice some dead bluegills and crappies near the boat ramp the week before (6/8/2016) when conducting regular lake monitoring (enough that it was noted it during observations, estimation 5-10 fish), however the fish were all of catchable size and it seemed like an angler possibly dumped them there. A scan of Lotus was conducted the week of the 14th to assess if a fish kill occurred. Staff counted a total of 40 bluegills, two crappies, and one green sunfish that had perished, confirming that a minor fish killed had occurred. The fish found had been dead for at least a few days and a majority were whole. Most of the fish were of catchable size with very few small fish visible, however smaller fish are scavenged more easily and could have been removed. Additionally, conducting routine sampling on Lake Susan on 7/19/2016, staff noticed that a fish kill occurred. A total of 19 black crappies that had perished were located just around the boat ramp area. Fish specimens were intact and fresh. Water temperatures were very warm (27.05 degrees Celsius) with water quality data similar to what has been seen in the past.

Staff contacted Daryl Ellison, the Fisheries Supervisor for the area, about the fish kill, specifically whether it had something to do with bluegill spawning which had just finished, or with residents treating aquatic vegetation and applying herbicide directly to spawning beds. Daryl explained that fish kills occur in different area lakes when water temperatures warm in May and June following spawning activity. Pathology investigations have identified a bacterial infection (*Flexibacter columnaris*) as a reason for fish kills in the past. The University of Minnesota had previously collected fish samples from Lotus Lake in 2016 to determine if the bacterial infection is a secondary cause or a primary cause. Wet mounts of gills, tail fin, and skin scrap were created, but there were no significant findings to report (due to desiccation). No samples were taken for further study. See information below about colmnaris provided by the MNDNR.

A common fish disease caused by the bacterium *Flexibacter columnaris* can occur in local lakes. This pathogen can cause large kills of fish, particularly crappies, sunfish, and bullheads. Often only one fish species is affected (if more than one species are affected, the fish are the same size); frequently smaller, less hardy fish make up the majority of mortalities observed. Die-offs happen for a short period (typically 1-7 days) in spring and early summer. Effects of the bacterium are non-existent at other times of the year. Temperature conditions determine the timing and severity of infections and die-off. Fish disease caused by other bacteria species can happen under similar water conditions.

The *columnaris* bacterium exists naturally in lakes and can cause disease during conditions stressful to fish. The primary fish stresses triggering *columnaris* infection are rapid springtime increases in water temperature, coupled with spawning activity and low energy reserves from the previous winter. Fish infected with or killed by *Flexibacter columnaris* show signs of eroded fin edges, skin lesions, eroded gill tissue, and a grey-white to yellow skin slime. External symptoms might not be obvious. Fish succumbing to the disease or secondary infections often results in a noticeable fish kill. *Columnaris* disease-caused kills occur in many Minneapolis-St. Paul area lakes, and can occasionally affect several thousand fish. On some lakes, kills occur every year. Almost always, fish losses are small relative to numbers of the lake's total population. In observing and investigating many fish kills, MNDNR Fisheries has seen little, if any, noticeable changes in angler success attributable to *columnaris*-related die-offs. No practical

antibiotic treatment exists for treating lake areas affected by this naturally occurring, common bacterium. Live fish infected with *Flexibacter columnaris* are edible. Fish caught having *columnaris* should be skinned and prepared as desired, make sure the fish is cooked to a temperature of at least 140 degrees F for at least five minutes.

4.9 Lake Susan Spent Lime Treatment System

Lake Susan is an 88-acre lake next to Lake Susan Park. It is an important resource in the city of Chanhassen and the Riley Purgatory Bluff Creek Watershed District. The lake is a popular recreational water body used for boating and fishing. Lake Susan is connected to four other lakes by Riley Creek. It receives stormwater runoff from 66 acres of land around it, and from two upstream lakes. The stormwater entering the lake carries debris and pollutants, including the nutrient phosphorus. Phosphorus is a nutrient that comes from sources such as fertilizers and decaying leaves and grass clippings. Excess phosphorus can cause cloudy water and algal blooms in lakes. Removing phosphorus from stormwater is a proven way to improve the water quality of lakes and streams.

A spent-lime filtration system was constructed at a culvert of a tributary stream draining a wetland on the south-west corner of Lake Susan. The system is designed to remove approximately 45 pounds of phosphorus annually from water entering the lake, which equals about 22,500 pounds of algae. This would result in improved water quality and recreational opportunities. Spent-lime is calcium carbonate that comes from drinking-water treatment plants as a byproduct of treating water. Instead of disposing of it, spent-lime can be used to treat stormwater runoff. When nutrient-rich water flows through the spent-lime system, the phosphorus binds to the calcium. The water flows out of the spent-lime system, leaving the phosphorus behind.

In 2016, staff collected water samples at the spent lime treatment system to assess the treatment effectiveness of the unit. Water samples were analyzed for 23 different parameters, however phosphorous and suspended solids are the main pollutants targeted by the spent lime system. The results of the change between samples collected at the inflow and outflow can be seen in Table 4.9-1. Overall, results varied considerably across all sampling dates. With this type of treatment system as seen in other locations, we would expect to see reductions across the gambit of phosphorous and suspended solids, however this was not the case. TDP had a large reduction in August and early September with values reduced by 0.472mg/L and 0.216mg/l. However, TDP values did increase at the outlet across four of the sampling periods. TP values were split with early samples showing reductions and later samples showing increases. The average TP value did show an increase overall (-0.058mg/L). TSS values also fluctuate across the sampling periods with the September sample having the highest reduction (36mg/L), but having a relatively low average reduction overall (7mg/L). Ortho-P had increases at the outlet of the system across nearly all sampling periods. One explanation for the lack of desired treatment may be due to contact time with the spent lime. Staff will continue to monitor the system and will increase the contact time in 2017 to improve system efficiencies.

	DATE							
CHEMICAL	**7/28/2016**	**8/11/2016**	**8/18/2016**	**8/30/2016**	**9/20/2016**	**10/6/2016**	**10/26/2016**	**Average Change**
TDP (mg/l)	-0.006	0.003	-0.032	-0.002	0.472	0.216	-0.029	0.089
TP (mg/l)	0.068	0.05	0.003	0.024	-0.481	-0.049	-0.019	-0.058
TSS (mg/l)	13	0	1	1	0	36	0	7
OP (mg/l)	-0.01	-0.014	-0.029	0.019	-0.025	-0.033	-0.023	-0.016

Table 4.9-1 Spent Lime Phosphorus and Total Suspended Solids Removal Results

Spent Lime System results across all seven sampling periods for removal of total dissolved phosphorous (TDP), total phosphorous (TP), total suspended solids (TSS), and ortho-phosphate (OP) from 2016 (Change=Inflow-Outflow). Negative numbers are associated with an increase and positive numbers with a decrease.

5 Aquatic Invasive Species

5.1 AIS Management

Due to the increase in spread of Aquatic Invasive Species (AIS) throughout the state of Minnesota, staff completed an AIS early detection and management plan in 2015. As part of the plan, an AIS inventory for all waterbodies within the District was completed and a foundation was set up to monitor invasive species that are currently established within District waters (Table 5.1-1). Early detection is critical to reduce the negative impacts of AIS and to potentially eliminate and invasive species before it becomes fully established within a waterbody. Effective AIS management of established AIS populations will also reduce negative impacts and control their further spread. The RPBCWD AIS plan is adapted from the Wisconsin Department of Natural Resources (WIDNR), Minnehaha Creek Watershed District (MCWD), and the Minnesota Department of Natural Resources (MNDNR) Aquatic Invasive Species (AIS) Early Detection Monitoring Strategy. The goal is to not only assess AIS that currently exist in RPBCWD waterbodies, but to be an early detection tool for new infestations of AIS. Figure 5.1-1 identifies what AIS monitoring/management occurred in 2016 excluding common carp management.

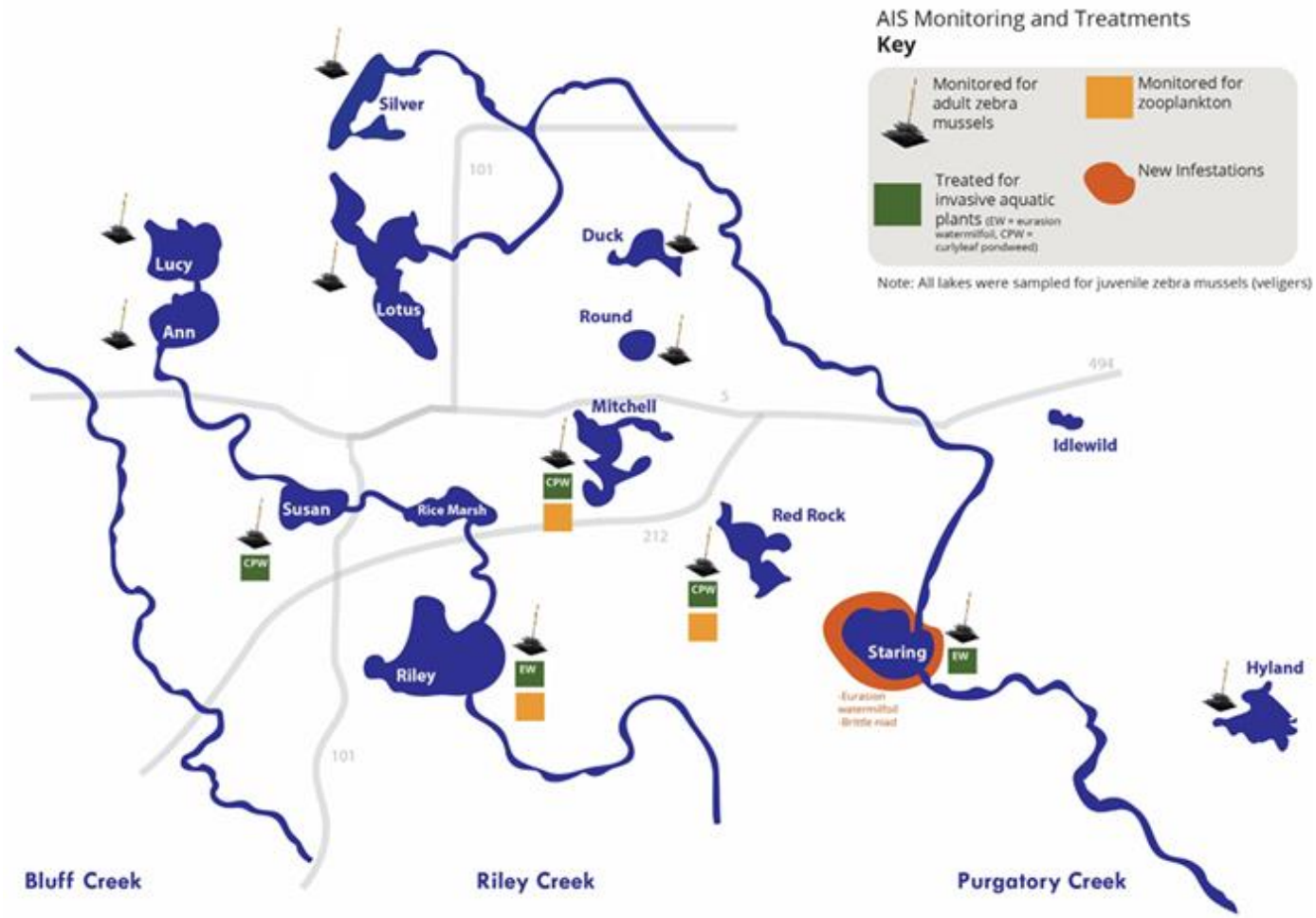

Figure 5.1-1 General AIS Figure

Aquatic Invasive Species work conducted in 2016 within the Riley-Purgatory-Bluff Creek Watershed District. Zebra mussel plate symbol indicates some combination of the installation of plates at public boat accesses and bi-weekly public boat launch scans. Lakes that received zooplankton sampling are identified by orange squares and lakes that received herbicide treatments are identified by green squares (CPW=curly-leaf pondweed treatment; EW=Eurasian watermilfoil treatment). The orange blob around Staring Lake indicates that Brittle Naiad and Eurasian water milfoil were discovered there in 2015. All lakes received juvenile mussel sampling. This map excludes carp management.

Table 5.1-1 Aquatic Invasive Species Infested Lakes

Lake Names	Infested Waters	Brittle Naiad	Eurasian Water Milfoil	Curlyleaf Pondweed	Purple Loosestrife	Common Carp
Ann	x		x	x	x	x
Lotus	x		x	x		x
Lucy	x		x	x	x	x
Red Rock	x			x	x	
Rice Marsh	x			x	x	x
Riley	x		x	x	x	x
Silver	x			x	x	
Staring	x	x	x	x		x
Susan	x		x	x	x	x
Duck	x			x	x	
Mitchell	x		x	x	x	
Round	x	x	x	x		
Hyland	x			x		

5.2 Aquatic Plant Management

Aquatic plant surveys are important because they allow the District to map out invasive plant species for treatment, locate rare plants for possible protection, create plant community/density maps which evaluate temporal changes in vegetation community, and they can assess the effectiveness of herbicide treatments. Aquatic plant surveys have been conducted on a rotational basis within RPBCWD to ensure all lakes have received adequate assessments. Additionally, as projects arise or issues occur, additional plant surveys were conducted to aid in the decision-making process. Herbicide treatments have been shown to reduce and control aquatic invasive plants at a manageable level which may in turn allow for native plants to increase in abundance. The District will continue to monitor the aquatic plant communities within our lakes and use herbicide treatments to manage aquatic invasive plants to sustain healthy aquatic communities into the future. In 2016, Mitchell Lake, Lake Susan, Lake Riley, Red Rock Lake, and Staring Lake received plant surveys. Herbicide treatments were carried out on Mitchell Lake, Red Rock Lake, and Lake Susan for curly leaf pondweed and Staring and Lake Riley for Eurasian watermilfoil. In addition, Silver Lake's wild rice beds were assessed.

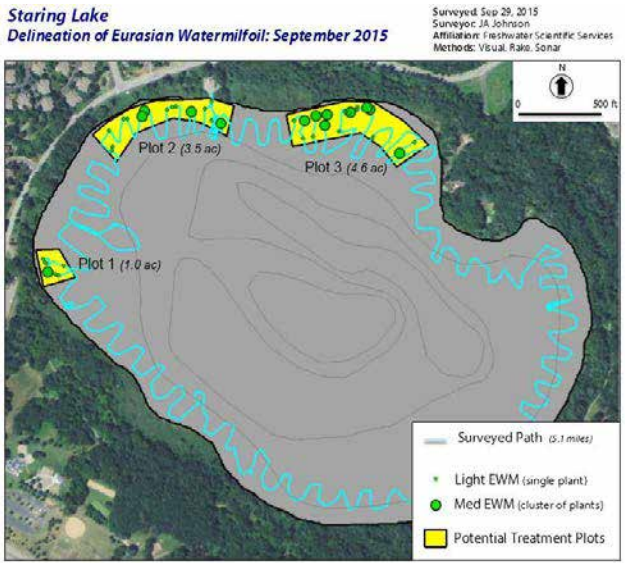

Figure 5.2-1 2015 Eurasian Watermilfoil Infestation and Treatment Areas

Eurasian watermilfoil (EWM) is a species native to Europe and Asia that has been introduced to the United States. The concern with this species is that it can form dense mats that outcompete native species and interfere with recreational activities such as boating, swimming, and fishing. Since the infestation of EWM in Staring Lake in 2015, the District has been working with James Johnson from the Freshwater Scientific Services (FWSS) and has developed a mechanical and chemical rapid response strategy to potentially eliminate the plant from the lake. The strategy of hand-pulling followed by a fall herbicide treatment has been successfully used to control new infestations of EWM

on Weaver Lake (Hennepin Co.) and Lake Charlotte (Wright Co.). After a plant survey of EWM on Staring (Figure 5.2-2), staff from FWSS, RPBCWD, and the University of MN hand-pulled the majority of EWM plants located during the survey on October 2nd, 2015. To ensure the success of the mechanical removal, a herbicide treatment was applied in three small blocks totaling 9.1ac. The herbicide was applied to treat plants that were too deep to hand pull and to eliminate EWM fragments. A granular 3,5,6-trichloro-2-pyridinyloxyacetic acid herbicide was applied up to the maximum rate of 67.5 pounds per acre foot.

The herbicide treatment in 2015 was successful as no EWM was discovered in the treatment areas in 2016. That said, during the first scan by Johnson in mid-summer, 20 plants were discovered across the lake (Figure 5.2-2– Panel A). RPBCWD staff then went out and conducted an additional scan and found an additional 10 plants. After conducting this scan, RPBCWD staff hand pulled these plants (Figure 5.2-2 – Panel B). The same herbicide was then applied to Staring Lake, treating 6.5ac (one site at the northwest end, and another at the east end of the Lake). This treatment targeted deep plants and plants that were not pulled (Figure 5.2-2 – Panel C). Johnson and RPBCWD staff each performed one last scan in the fall and identified an additional 20 plants (Figure 5.2-2 – Panel D). RPBCWD staff once again mechanically removed all plants except two deep plants that were topped and marked for removal/treatment in 2017. In 2017, aquatic plant surveys will evaluate the success of the combined mechanical and chemical treatment. A combination of mechanical and chemical removal of EWM will continue through 2017.

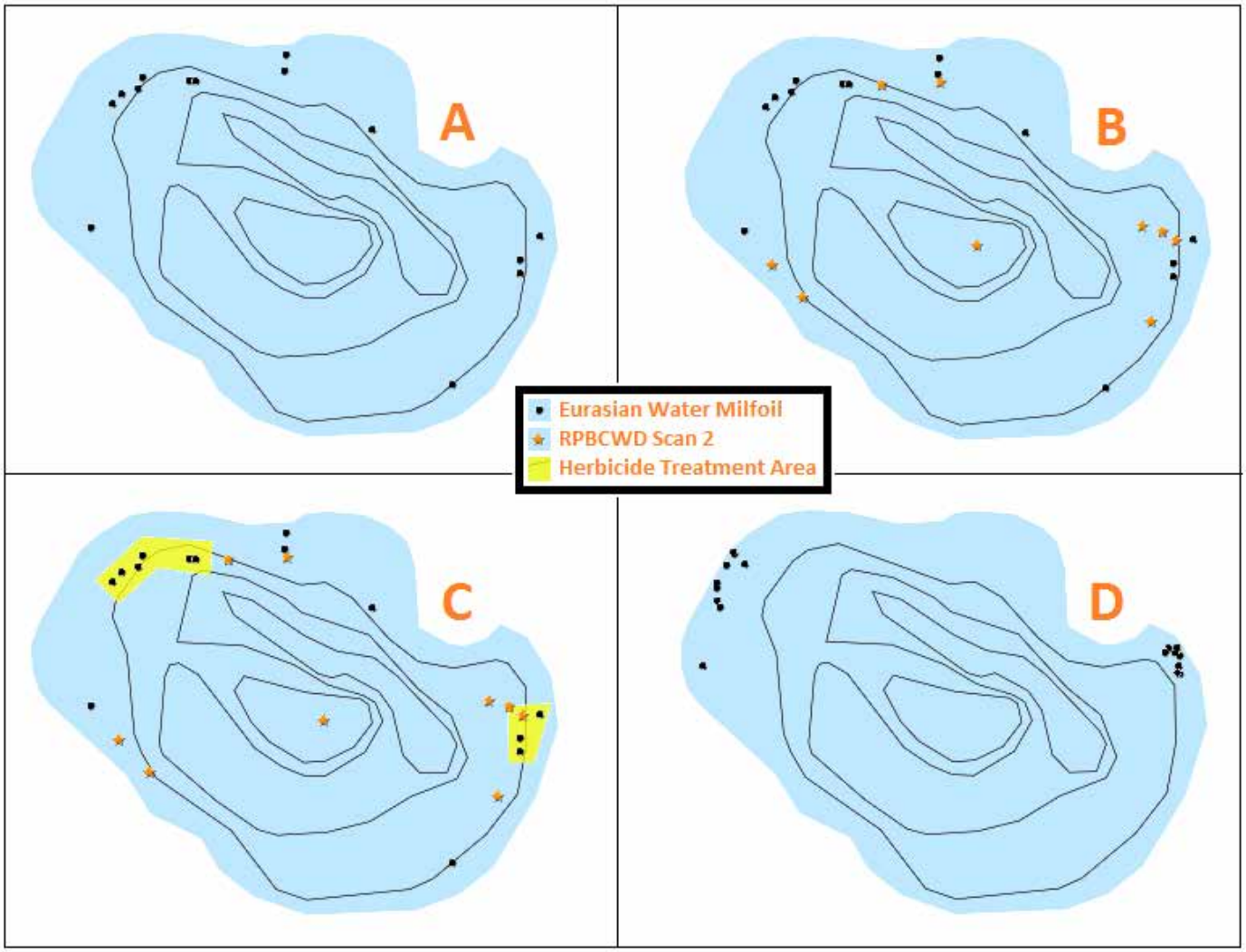

Figure 5.2-2 2016 Staring Lake Eurasian Watermilfoil Scans and Treatment

Eurasian watermilfoil scans/mechanical removals and mid-July herbicide treatment (yellow polygons-C) on Staring Lake in 2016. Scan A was conducted by James Johnson Freshwater Scientific Services on July 1st, 2016. Scan and mechanical removal B was RPBCWD staff on July 18th, 2016. Scan and mechanical removal D was conducted by FWSS on September 19th, 2016 and RPBCWD on October 1st, 2016.

5.3 Common Carp Management

The RPBCWD, in cooperation with the University of Minnesota (UMN), has been a key leader in the development of successful carp management strategy for lakes within the state of Minnesota. Following the completion of the Riley Chain of Lakes (RCL) Carp Management Plan drafted by the UMN in 2014 and the Purgatory Creek Carp Management Plan drafted in 2015, the District took over monitoring duties from the University in 2015. Adult carp are monitored by conducting three, 20-minute electrofishing transects per lake between Late July and October. If the total biomass estimate of carp reached over 100kg/h the District would need to consider hiring commercial fisherman to conduct winter seining. Young of the year (YOY) carp are monitored by conducting five, 24-hour small mesh fyke net sets between August and September. If YOY carp were captured during this event, it meant successful recruitment occurred and monitoring efforts should be increased with the additional option of conducting winter seining.

Figure 5.3-1 Staring Lake Common

District staff completed fyke net surveys on all lakes within the RCL, as well as lakes within the Purgatory Chain of Lakes (PCL), including Lotus Lake, Staring Lake, and the Lower Purgatory Recreation Area. As is true with many lakes during late summer located within the twin cities metro area, the RCL and PCL inshore fish community was dominated by bluegill sunfish and bullhead species. Overall, Staring Lake had the highest number of bluegills captured averaging 2,142 per net, while an average of only 340 bluegills was captured on Lake Ann. Many other Centrarchid species, including pumpkinseed sunfish and black crappie, were also very common across all lakes. A full summary table of the fish captured for each lake can be found in Exhibit B. In 2016 no YOY carp were captured in any of the lakes during fyke net surveys. One YOY carp was captured during an electrofishing survey on the Lower Purgatory Recreation Area. The lack of young individuals captured indicates that 2016 was a very poor recruitment year for common carp overall.

Adult electrofishing surveys are normally scheduled to be conducted on a bi-annual basis, however due to the capture of five YOY carp in Lake Susan and the higher number of adults captured on Lake Lucy in 2015 (109kg/h), these lakes were sampled during the 2016 field season. In the 2016 assessment Lake Lucy was found to be over the carp threshold (100kg/h) with a similar estimate of 113kg/h (Table 5.3-1). This is of limited concern as many carp within the RCL migrate to Lucy throughout the year as it is the top of the watershed and because of the small sample size. Additionally, no YOY carp were captured in Lake Lucy and all carp captured electrofishing were very large adults suggesting that no/very little recruitment is occurring. Lake Susan electrofishing surveys yielded a very low adult carp population at 31kg/h which was a reduction from 2015 (51kg/h). With the low adult abundance and no YOY fish captured, it can be assumed that the very limited recruitment event seen in 2015 did not cause much of a change in the overall carp population.

PCL lakes (Lotus and Staring) and the Purgatory Recreation Area were also surveyed in 2016. Electrofishing surveys were completed between late July and early October. Both Lotus and Staring have carp biomass estimates above the set threshold developed by the UMN (Table 5.3-1). Lotus had a calculated biomass of 107kg/h, which is just over the recommended level (100kg/h). Similar to what was seen in Lake Lucy of the RCL, this was of limited concern because of the small sample size, and because no YOY fish were captured. Staring's estimated carp biomass was 141kg/h which is of concern moving into 2017. Most of these fish were from the 2013/2015 year class with very few large adults captured. The Lower Purgatory Recreational Area was electrofished one time for five hours, which yielded a biomass estimate of 35kg/h. These fish consisted entirely of individuals from the 2013/2015 year class, as seen in Staring Lake. Additionally, one YOY carp was captured via electrofishing. The Upper Purgatory Recreation Area also exceeded recommended biomass levels based on a single hour survey, reaching an estimate of 287kg/h. This population was comprised of very large adults. Normally the upper rec area is disconnected by the berm that splits the upper and lower rec area. However, there was a breach in the berm allowing for the system to be connected for most of the year with the consistent rainfall received in 2016. Since the upper rec area is basically the top of the system (fish cannot get to Silver Lake and Lotus) and has a deeper water refuge, fish moved to this location. A total of 524 common

carp were removed via electrofishing and fyke netting from the PCL system in 2016, 333 from Staring, 165 from LPRA, and 26 from UPRA.

Since Staring Lake was above the threshold, commercial fisherman should be hired to conduct winter seining to reduce the carp biomass in the lake. Overall, 15 carp were tagged with implant-style VHF transmitters, nine fish in Staring and six in the Purgatory Recreation Area. This will allow staff to locate where in the lake the carp are schooling to conduct effective seining efforts. In addition to commercial seining, staff will be placing a large floating trap net below the barrier in Purgatory Creek during peak spawning events to capture carp in 2017. Placing the net below, the barrier should reduce fowling of the net by debris. This net will be checked daily and fish will be sorted and carp removed. In 2017, the barrier will be pulled immediately at ice out to allow northern pike to move up to spawn and back down before being closed for the remainder of the year. This is a different procedure from the 2015 strategy, as carp were also allowed to move into the rec area to spawn before the barrier would be closed. This was done to trap fish in the rec area in the winter in hopes that a winter kill would eliminate all the fish. Due to the light winters and increased abundance of bluegills in Staring Lake (to consume carp eggs), the barrier will be closed to force carp to spawn in Staring. The large number and size variety of bluegills (Exhibit B) may serve as an effective biocontrol for carp.

Table 5.3-1 Common Carp Catch Rates & Biomass Estimates for the Riley and Purgatory Chains of Lakes

	Lake	Fish per Hour	Density per Hectare	Average Weight (kg)	Carp Biomass (kg/h)
Riley Chain	**Lucy**	5.00	26.59	4.28	113.75
	Susan	2.33	14.03	2.21	31.05
	Lake Susan Park Pond	9.00	45.43	1.99	90.50
Purgatory Chain	**Lotus**	5.33	28.16	3.81	107.43
	Staring	40.52	193.91	0.73	141.43
	Lower Purgatory	12.6	62.39	0.56	35.10
	Upper Purgatory	31.00	149.05	1.92	286.50

Lake Susan Park Pond Fish Assessment

On October 23rd, 2016 at 12:45 PM, Riley-Purgatory-Bluff Creek Watershed District Staff conducted an electrofishing transect on Lake Susan Park Pond to assess the abundance of common carp within the pond and the overall fish community in general. It was thought that Lake Susan Park Pond might be acting as a carp nursery, contributing to the carp population within Lake Susan. Adult carp had been visually observed within the pond and were attempting to access the pond from Lake Susan at the pond outlet during high flow events. All fish were collected in a 30 minute transect, which covered the entire pond. An additional 10 minute transect was conducted offshore in which only carp were netted and added to the overall total. In total, nine species of fish were captured, all of which are species found within Lake Susan (Table 5.3-2). The most abundant fish sampled was the bluntnose minnow which is a very common minnow species across the eastern United States. A number of largemouth bass were present (16) that ranged across multiple year classes, suggesting that winter survival is occurring. Movement of fish in and out of the pond does occur in the southeast outlet to Riley Creek, however it is very limited due to the culvert size, undercutting occurring below the culvert, and because of the high velocities during flow regimes high enough for fish to pass the culvert.

Common carp (six) were captured in the pond, most of which were large adults. Calculating a carp biomass estimate for the pond using methods developed by the UMN yielded a biomass estimate of 90.5 kg/h (Table 5.3-1). The method was developed for lakes within the watershed using a sample size of three, 20 minute transects across three separate sampling events. Since only one, 30 minute transect was conducted on this pond (vs lake), biomass estimates should be used with caution. The biomass threshold for a lake is 100 kg/h, meaning fish densities below this level would not impact the lake. Lake Susan Park Pond is a small pond that could be affected by a smaller number of carp. None-the-less, the pond did register below the 100 kg/h threshold and the overall water quality of the pond has proven to be surprisingly good. The number of bluegill captured (87) indicate a modest bluegill population that, within such a small area, may be enough to control the carp populations via predation on eggs. With the limited information collected and small sample size, it would suggest the Lake Susan Park Pond is not a significant source for the carp population in Lake Susan. More information is needed to fully rule out the pond being a source, including a more electrofishing transects to increase the sample size and the deployment of small mesh fyke nets to assess recruitment.

Table 5.3-2 Lake Susan Park Pond Electrofishing Results

Species	Number of fish caught in each category (inches)									
	0-5	6-8	9-11	12-14	15-19	20-24	25-29	30+	Total	Fish/Hour
bluntnose minnow	106								106	212
bluegill	76	11							87	174
common carp				1	3	1		1	6	9
green sunfish	15								15	30
hybrid sunfish	1								1	2
largemouth bass	4	3	8	1					16	32
pumpkinseed	3	1							4	8
yellow bullhead		1							1	2
yellow perch	3								3	6

5.4 Zebra Mussel Monitoring

The District continued to monitor for adult and veliger zebra mussels in 2016. This year the District conducted veliger sampling from June to July on 14 lakes to detect the presence of zebra mussels. Each lake was sampled once except for Lake Riley and Lotus Lake, each of which were sampled twice due to the amount of summer traffic on these lakes. RMB processed the samples and found no zebra mussel veligers across all lakes.

Adult zebra mussel presence was assessed using monitoring plates that were hung from all public access docks and private residents participating in the Adopt-a-Dock program. Monitoring plates were checked monthly and no mussels were found across all lakes during the 2016 open water season. Additionally, public accesses were scanned for approximately ten minutes during each regular water quality sampling period (bi-weekly). Staff would visually search rock, docks, sticks, and vegetation for adult zebra mussels. No adult zebra mussels were found using this technique in 2016.

6 Lake and Creek Fact Sheets

The Riley-Purgatory-Bluff Creek Watershed District has included in this report informational fact sheets for the lakes and creeks that were monitored during the 2016 sampling season (See Exhibit E). The lake fact sheets include: Lake Ann, Duck Lake, Hyland Lake, Lake Idlewild (high value wetland), Lotus Lake, Lake Lucy, Mitchell Lake, Red Rock Lake, Rice Marsh Lake, Lake Riley, Round Lake, Silver Lake, Staring Lake, and Lake Susan. The creek fact sheets include: Bluff Creek, Purgatory Creek, and Riley Creek.

Each lake fact sheet includes a summary of the historical water quality data collected as related to the MPCA water quality parameters: Secchi Disk depth, Total Phosphorus, and Chlorophyll-a. Each creek fact sheet includes a summary of the most current Creek Restoration Acton Strategy which includes the analysis of infrastructure risk, water quality, stream stability/erosion, and habitat. Lake or creek characteristics, stewardship opportunities, and information about what the District is doing in and around local water bodies are also described in each fact sheet.

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8 Exhibits

Exhibit A	2015 & 2016 Lake Level Sensor Graphs
Exhibit B	2016 Fyke Net Summary Data
Exhibit C	2016 Zooplankton Summary Data
Exhibit D	2016 Creek Assessments
Exhibit E	2016 Lake and Creek Fact Sheets

Exhibit A

2015 & 2016 Lake Level Sensor Graphs

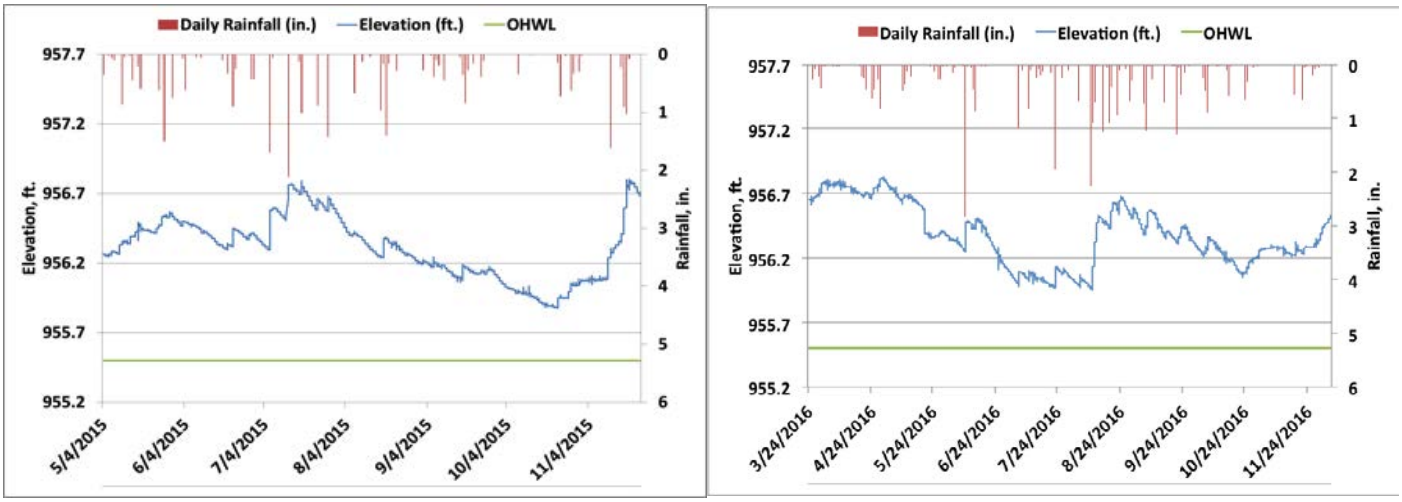


Figure A-1. **Lake Ann** level elevation data (ft.) for 2015 and 2016 along with the lake's ordinary high water level (OHWL). Daily rainfall (in.) is displayed along the top of the graph (NOAA).

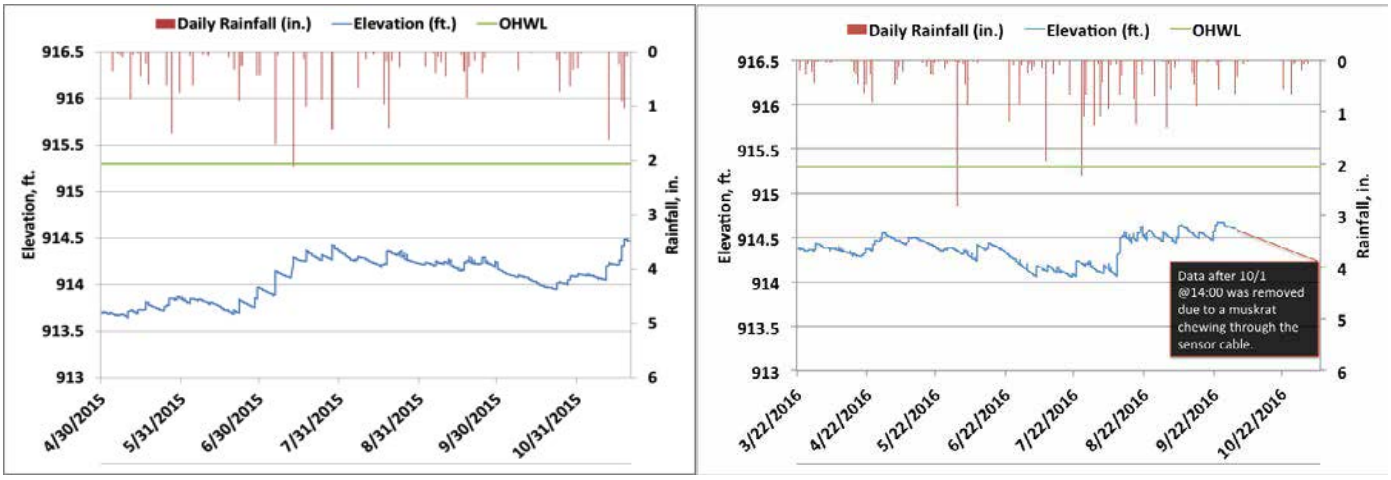


Figure A-2**. Duck Lake** level elevation data (ft.) for 2015 and 2016 along with the lake's ordinary high water level (OHWL). Daily rainfall (in.) is displayed along the top of the graph (NOAA).

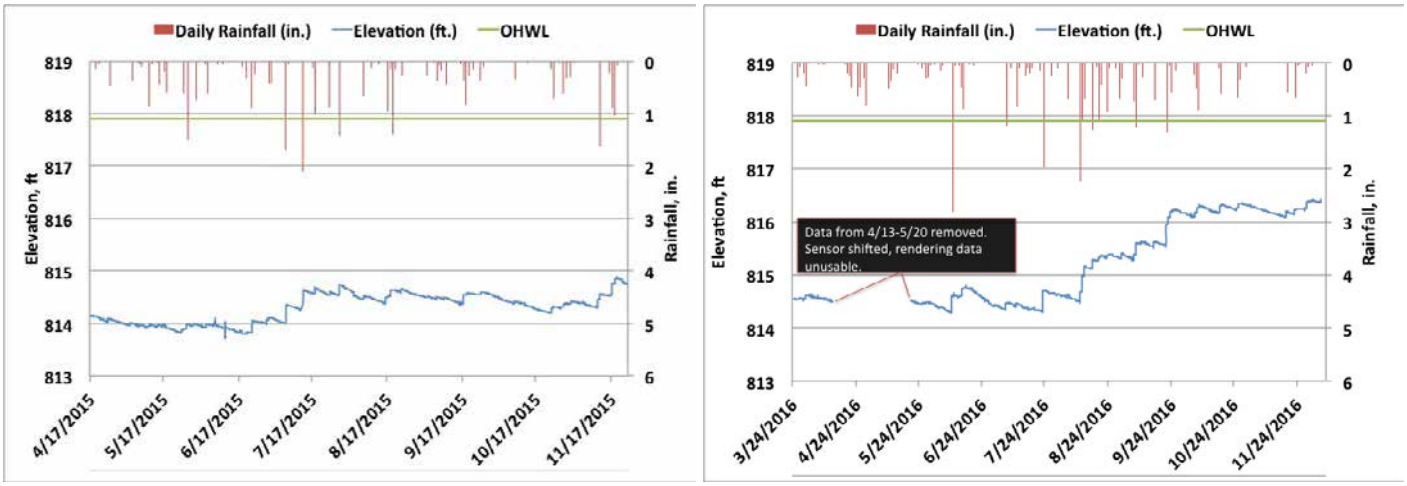


Figure A-3. **Hyland Lake** level elevation data (ft.) for 2015 and 2016 along with the lake's ordinary high water level (OHWL). Daily rainfall (in.) is displayed along the top of the graph (NOAA).

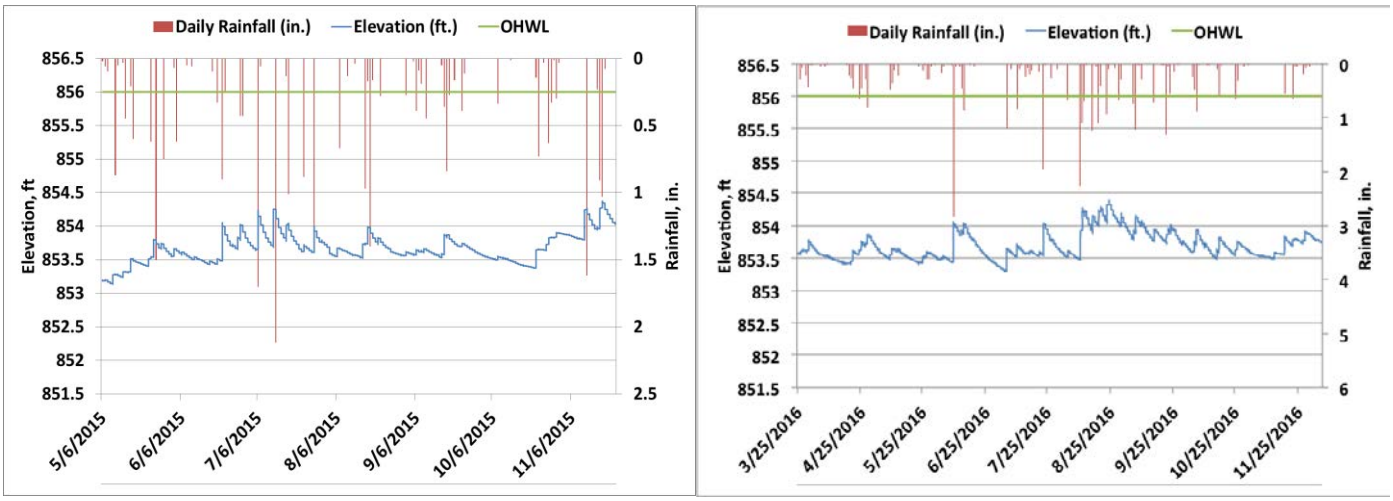


Figure A-4. **Lake Idlewild** level elevation data (ft.) for 2015 and 2016 along with the lake's ordinary high water level (OHWL). Daily rainfall (in.) is displayed along the top of the graph (NOAA) .

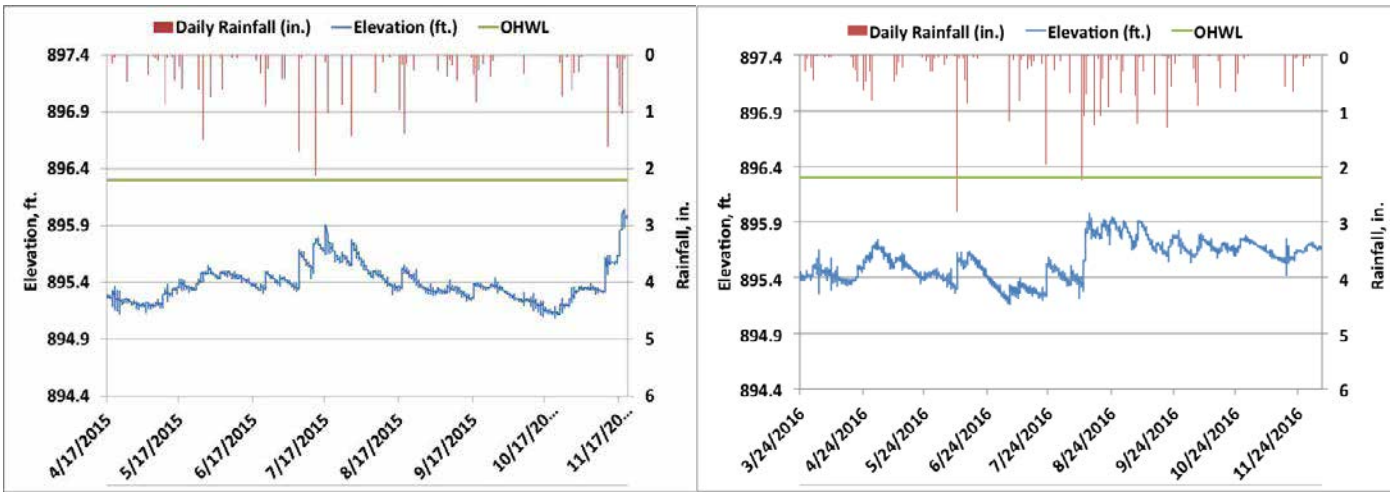


Figure A-5. **Lotus Lake** level elevation data (ft.) for 2015 and 2016 along with the lake's ordinary high water level (OHWL). Daily rainfall (in.) is displayed along the top of the graph (NOAA) .

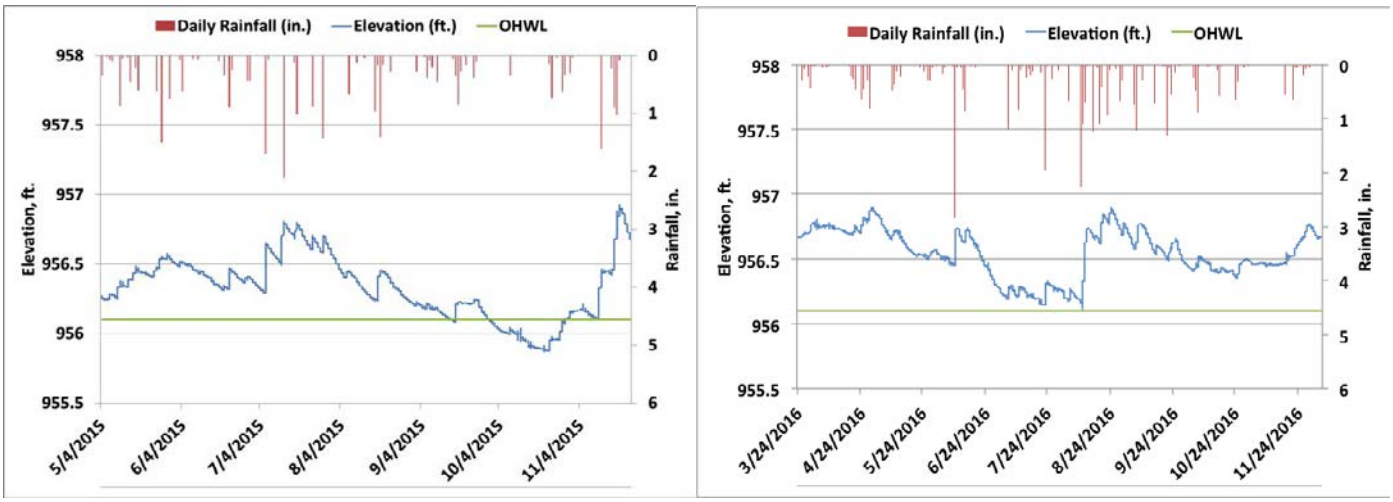


Figure A-6. **Lake Lucy** level elevation data (ft.) for 2015 and 2016 along with the lake's ordinary high water level (OHWL). Daily rainfall (in.) is displayed along the top of the graph (NOAA).

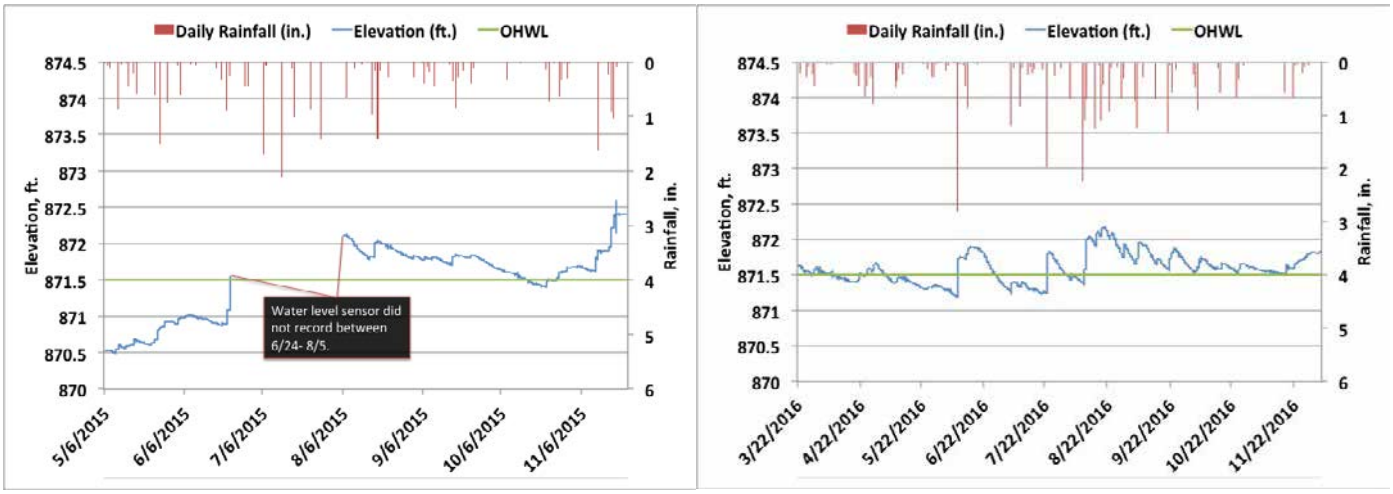


Figure A-7. **Mitchell Lake** level elevation data (ft.) for 2015 and 2016 along with the lake's ordinary high water level (OHWL). Daily rainfall (in.) is displayed along the top of the graph (NOAA).

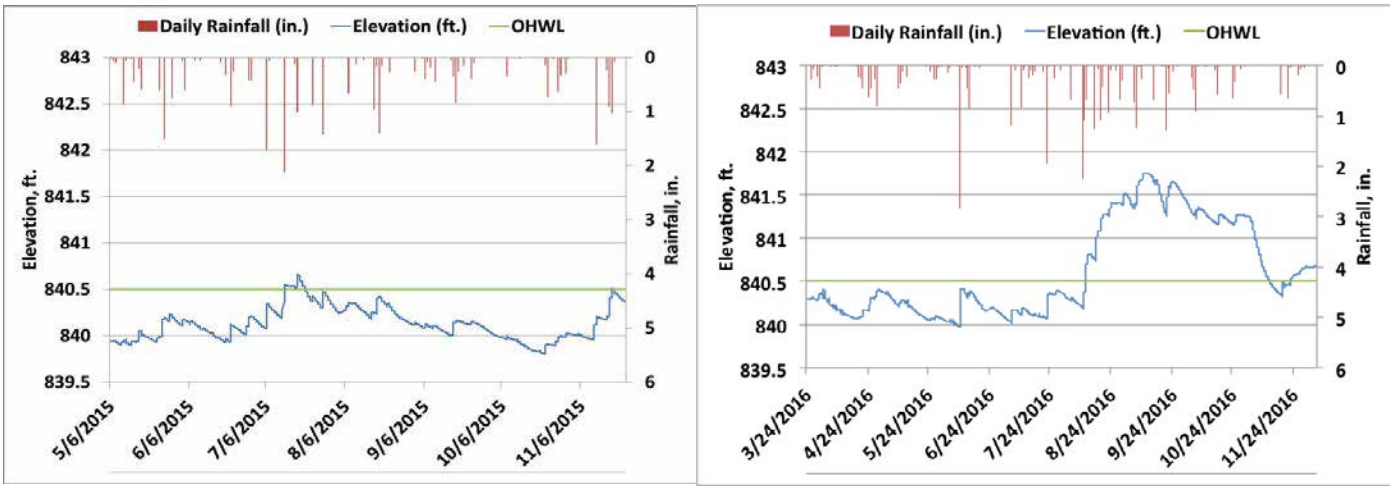


Figure A-8. **Red Rock Lake** level elevation data (ft.) for 2015 and 2016 along with the lake's ordinary high water level (OHWL). Daily rainfall (in.) is displayed along the top of the graph (NOAA).

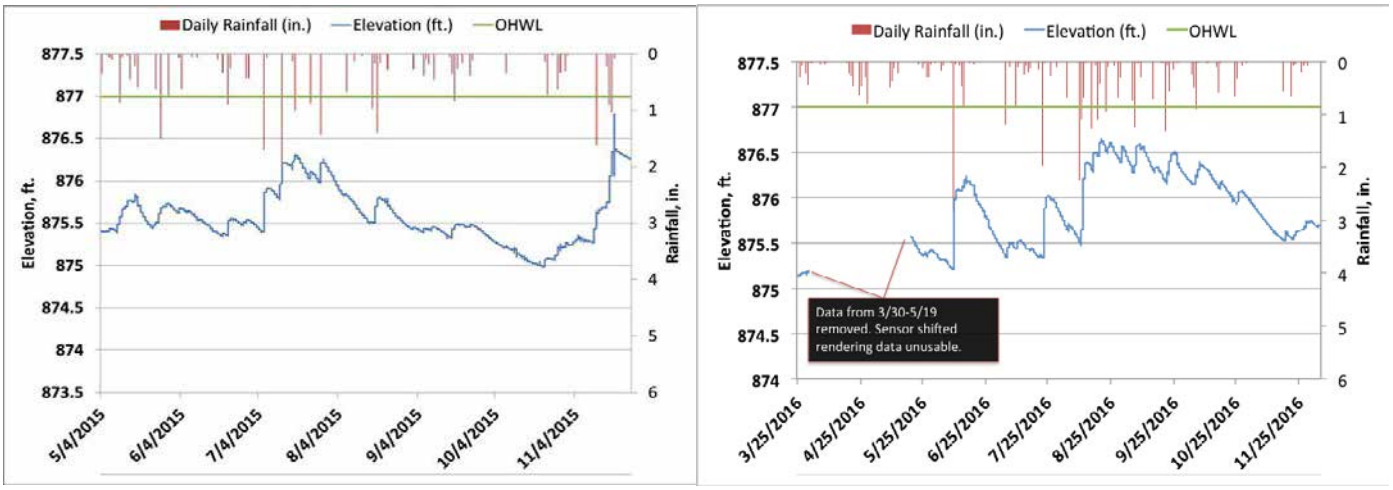


Figure A-9. **Rice Marsh Lake** level elevation data (ft.) for 2015 and 2016 along with the lake's ordinary high water level (OHWL). Daily rainfall (in.) is displayed along the top of the graph (NOAA).

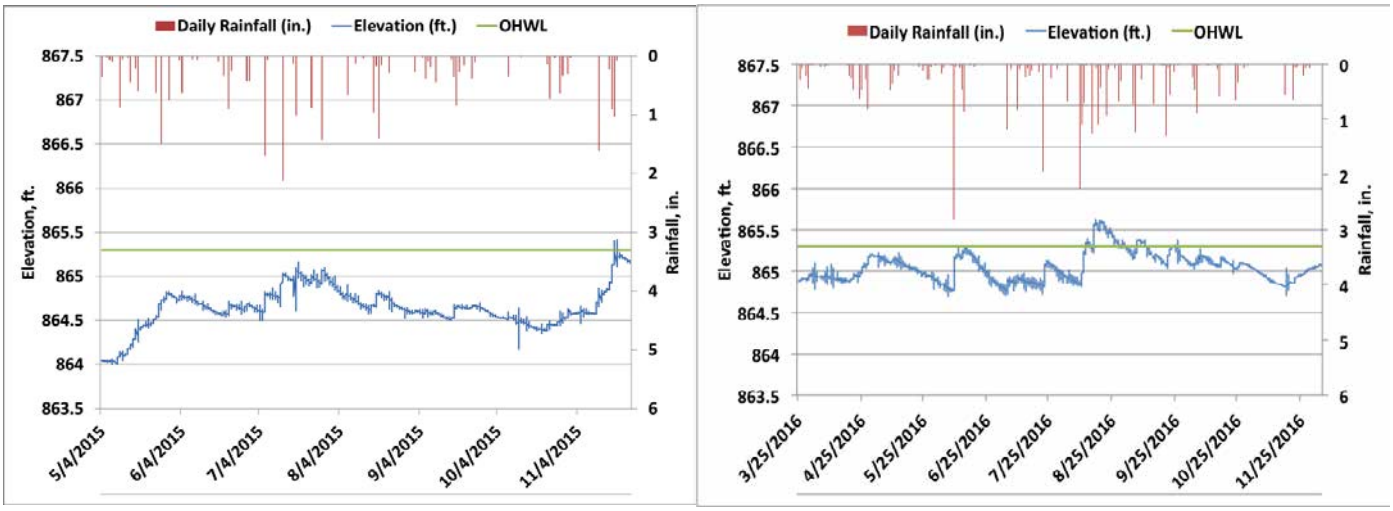


Figure A-10. **Lake Riley** level elevation data (ft.) for 2015 and 2016 along with the lake's ordinary high water level (OHWL). Daily rainfall (in.) is displayed along the top of the graph (NOAA).

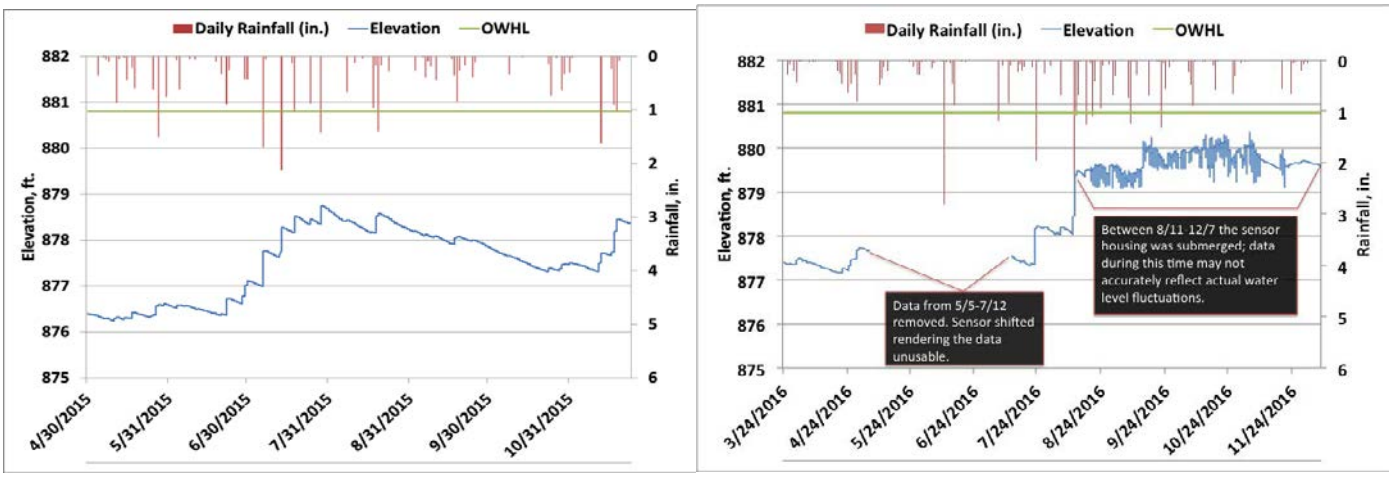


Figure A-11. **Round Lake** level elevation data (ft.) for 2015 and 2016 along with the lake's ordinary high water level (OHWL). Daily rainfall (in.) is displayed along the top of the graph (NOAA).

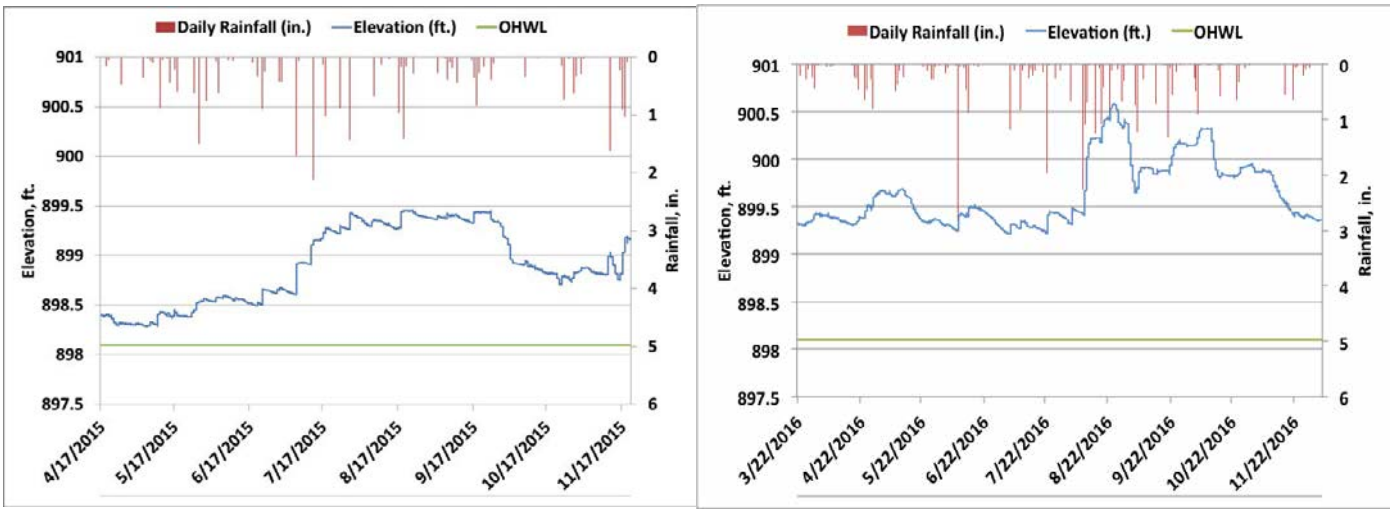


Figure A-12. **Silver Lake** level elevation data (ft.) for 2015 and 2016 along with the lake's ordinary high water level (OHWL). Daily rainfall (in.) is displayed along the top of the graph (NOAA).

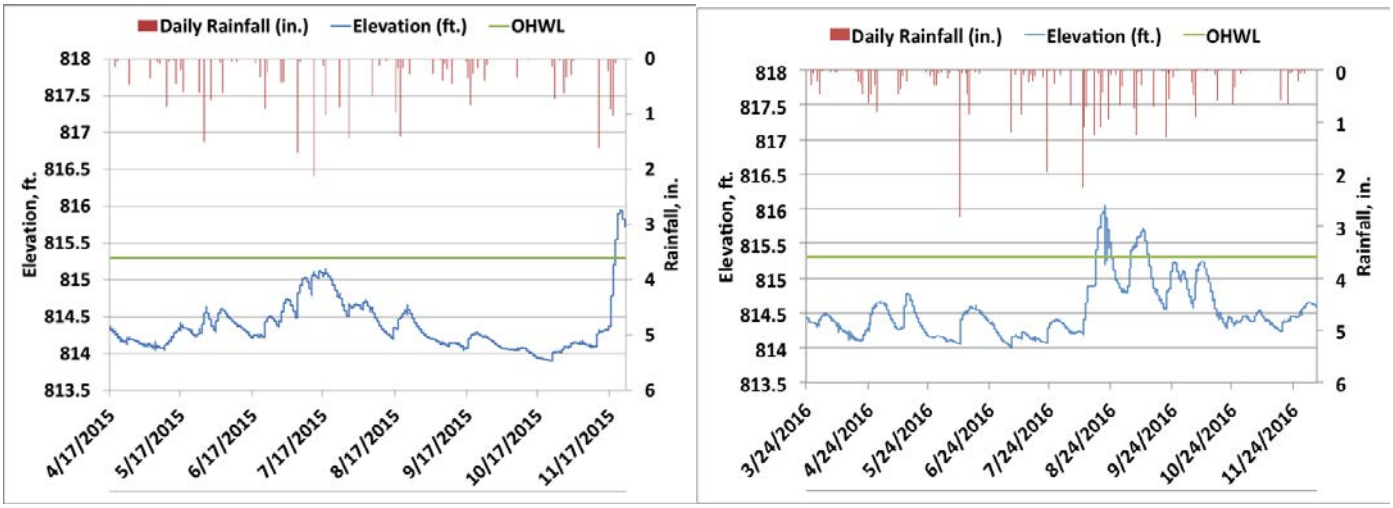


Figure A-13. **Staring Lake** level elevation data (ft.) for 2015 and 2016 along with the lake's ordinary high water level (OHWL). Daily rainfall (in.) is displayed along the top of the graph (NOAA).

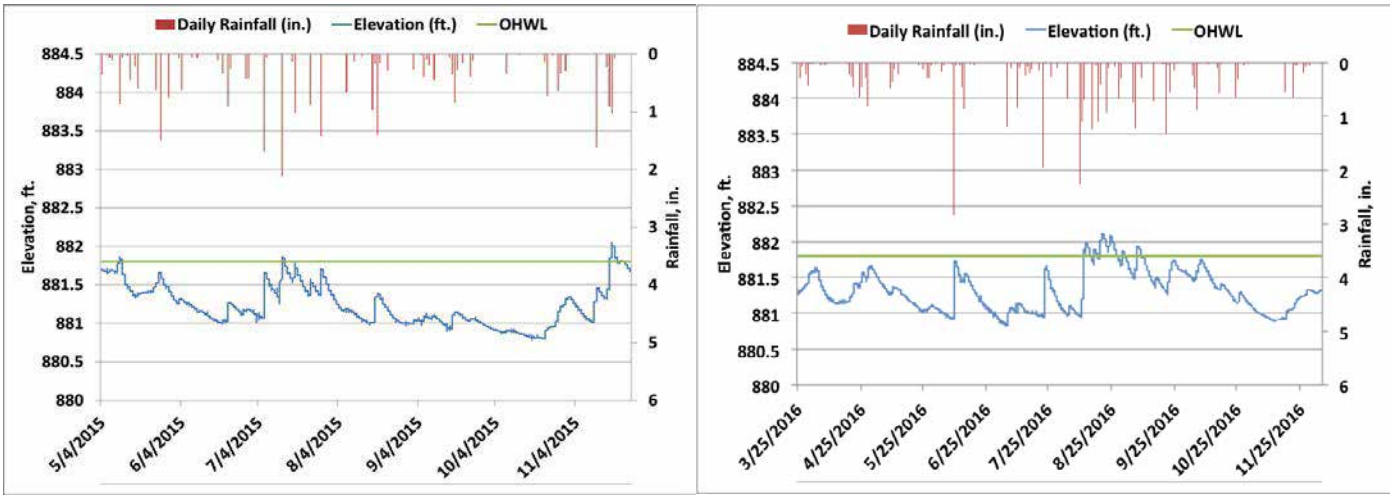


Figure A-14**. Lake Susan** level elevation data (ft.) for 2015 and 2016 along with the lake's ordinary high water level (OHWL). Daily rainfall (in.) is displayed along the top of the graph (NOAA).

Exhibit B

2016 Fyke Net Summary Data

Table B1: 2016 Lake Ann fyke net data

Species	Number of fish caught in each category (inches)									
	0-5	6-8	9-11	12-14	15-19	20-24	25-29	30+	Total	Fish/Net
black bullhead			2	1					3	0.6
black crappie	2	7	1						10	2
bluegill	168	60							340	68
common carp									0	0
golden shiner									0	0
green sunfish									0	0
hybrid sunfish	1	1							2	0.4
largemouth bass	2								2	0.4
northern pike							3	1	4	0.8
pumpkinseed	30	1							31	6.2
walleye									0	0
white sucker									0	0
yellow bullhead			8						8	1.6
yellow perch	1								1	0.2

Table B2: 2016 Lake Lotus fyke net data

Species	Number of fish caught in each category (inches)									
	0-5	6-8	9-11	12-14	15-19	20-24	25-29	30+	Total	Fish/Net
black bullhead				1					1	0.2
black crappie		26	1						27	5.4
bluegill	450	350	3						803	160.6
common carp									0	0
golden shiner	1								1	0.2
green sunfish	1								1	0.2
hybrid sunfish		1							1	0.2
largemouth bass	5								5	1
northern pike						1		1	2	0.4
pumpkinseed	9	2							11	2.2
walleye			6	5	9	1			21	4.2
white sucker									0	0
yellow bullhead		2	5	16					23	4.6
yellow perch									0	0

Table B3: Lake Lucy fyke net data

Species	Number of fish caught in each category (inches)									
	0-5	6-8	9-11	12-14	15-19	20-24	25-29	30+	Total	Fish/Net
black bullhead									0	0
black crappie	3	29	2						34	6.8
bluegill	615	346							961	192.2
common carp									0	0
golden shiner									0	0
green sunfish	15								15	3
hybrid sunfish	2								2	0.4
largemouth bass	4								4	0.8
northern pike					1				1	0.2
pumpkinseed	152	11							163	32.6
walleye									0	0
white sucker									0	0
yellow bullhead		6	74	4					84	16.8
yellow perch									0	0

Table B4: 2016 Lower Purgatory Creek Recreational Area fyke net data

Species	Number of fish caught in each category (inches)									
	0-5	6-8	9-11	12-14	15-19	20-24	25-29	30+	Total	Fish/Net
black bullhead	156	30	1						187	37.4
black crappie	71	30							101	20.2
bluegill	925	3							928	185.6
common carp		2	15	52	8				77	15.4
golden shiner	1								1	0.2
green sunfish	39	2							41	8.2
hybrid sunfish									0	0
largemouth bass	1	3	1	1					6	1.2
northern pike									0	0
pumpkinseed	101								101	20.2
walleye									0	0
white sucker			2	2					4	0.8
yellow bullhead		2	2						4	0.8
yellow perch	56	84	2						142	28.4

Table B5: 2016 Rice Marsh Lake fyke net data

Species	Number of fish caught in each category (inches)									
	0-5	6-8	9-11	12-14	15-19	20-24	25-29	30+	Total	Fish/Net
black bullhead	1	3							4	0.8
black crappie	1	78	1						80	16
bluegill	1062	238							1300	260
common carp					1				1	0.2
golden shiner									0	0
green sunfish	1	1							2	0.4
hybrid sunfish	1	1							2	0.4
largemouth bass	2	3							5	1
northern pike					1				1	0.2
pumpkinseed	61	16							77	15.4
walleye									0	0
white sucker									0	0
yellow bullhead	8	35	27	1					71	14.2
yellow perch									0	0

Table B6: 2016 Lake Riley fyke net data

Species	Number of fish caught in each category (inches)									
	0-5	6-8	9-11	12-14	15-19	20-24	25-29	30+	Total	Fish/Net
black bullhead			2	1					3	0.6
black crappie	5	162							167	33.4
bluegill	784	745							1529	305.8
common carp									0	0
golden shiner									0	0
green sunfish	1								1	0.2
hybrid sunfish									0	0
largemouth bass	4				1				5	1
northern pike				1		2			3	0.6
pumpkinseed	20	1							21	4.2
walleye		1		1		1			3	0.6
white sucker					1				1	0.2
yellow bullhead	3	20	35	15					73	14.6
yellow perch	3	9	9	1					22	4.4

Table B7: 2016 Staring Lake fyke net data

Species	Number of fish caught in each category (inches)									
	0-5	6-8	9-11	12-14	15-19	20-24	25-29	30+	Total	Fish/Net
black bullhead	15	140	54	7					216	43.2
black crappie	8	73	16	1					98	19.6
bluegill	1867	270	5						2142	428.4
common carp			1	22	6	1			30	6
golden shiner	1								1	0.2
green sunfish	12	2							14	2.8
hybrid sunfish	1								1	0.2
largemouth bass	11	6	1						18	3.6
northern pike						1	1		2	0.4
pumpkinseed	92	1							93	18.6
white crappie		1	1						2	0.4
walleye									0	0
white sucker				1	2				3	0.6
yellow bullhead		9	14	1					24	4.8
yellow perch	86	84							170	34

Table B8: 2016 Lake Susan fyke net data

Species	Number of fish caught in each category (inches)									
	0-5	6-8	9-11	12-14	15-19	20-24	25-29	30+	Total	Fish/Net
black bullhead			1	7					8	1.6
black crappie		72	3						75	15
bluegill	360	251							611	122.2
common carp				1	6				7	1.4
golden shiner									0	0
green sunfish									0	0
hybrid sunfish	2								2	0.4
largemouth bass					1				1	0.2
northern pike					2			2	4	0.8
pumpkinseed	3	3							6	1.2
walleye									0	0
white sucker						1			1	0.2
yellow bullhead	3	16	106	24					149	29.8
yellow perch	1								1	0.2

Exhibit C

2016 Zooplankton Summary Data

Table C1: 2016 Mitchell Lake Zooplankton Counts (#/m²)

Lake: Mitchell

		Sample Date					
DIVISION	**TAXON**	**4/18/16**	**5/24/16**	**6/17/16**	**7/20/16**	**8/15/16**	**9/21/16**
CLADOCERA	*Bosmina longirostris*	34,970	1,093,660	100,002	14,501	6,543	683,173
	Ceriodaphnia sp.	0	0	192,312	0	0	0
	Chydorus sphaericus	29,974	20,160	53,847	36,252	111,232	87,933
	Daphnia galeata mendotae	4,996	50,399	192,312	7,250	0	0
	Daphnia retrocurva	0	5,040	15,385	0	39,258	162,338
	Diaphanosoma leuchtenbergianum	0	5,040	15,385	7,250	143,947	6,764
	Leptodora Kindtti	0	0	0	0	0	6,764
	CLADOCERA TOTAL	69,940	1,174,298	569,244	65,254	300,980	946,972
COPEPODA	*Cyclops sp./Mesocyclops sp.*	194,832	100,798	161,542	145,008	91,603	87,933
	Diaptomus sp.	29,974	35,279	38,462	21,751	13,086	6,764
	Nauplii	409,647	483,831	723,094	159,509	52,344	466,722
	Copepodid	0	0	0	290,016	0	0
	COPEPODA TOTAL	634,453	619,909	923,099	616,283	157,033	561,419
ROTIFERA	*Asplanchna priodonta*	4,996	35,279	269,237	29,002	26,172	13,528
	Monostyla sp.	0	0	0	36,252	0	0
	Keratella cochlearis	809,303	3,623,693	0	449,524	549,615	487,014
	Keratella quadrata	134,884	20,160	0	0	0	0
	Kellicottia sp.	224,806	4,929,029	23,077	0	0	101,461
	Polyarthra vulgaris	184,841	35,279	23,077	7,250	0	47,349
	Conochilus sp.	0	206,636	0	0	0	0
	ROTIFERA TOTAL	1,358,830	8,850,076	315,392	522,028	575,787	649,352
	TOTALS	2,063,223	10,644,283	1,807,735	1,203,565	1,033,800	2,157,743

Table C2: 2016 Red Rock Lake Zooplankton Counts (#/m²)

Lake: Red Rock

		Sample Date					
DIVISION	**TAXON**	**4/18/16**	**5/24/16**	**6/15/16**	**7/19/16**	**8/15/16**	**9/21/16**
CLADOCERA	*Bosmina longirostris*	70,028	1,145,031	79,577	23,873	68,437	814,608
	Ceriodaphnia sp.	0	13,263	132,629	7,958	7,604	0
	Chydorus sphaericus	43,768	4,421	19,894	31,831	38,020	36,694
	Daphnia ambigua/parvula	4,377	110,524	72,946	0	0	22,016
	Daphnia galeata mendotae	0	0	39,789	23,873	0	0
	Daphnia retrocurva	0	0	0	0	22,812	315,569
	Diaphanosoma leuchtenbergianum	0	4,421	6,631	63,662	114,061	0
	Immature Cladocera	0	0	0	15,915	0	0
	CLADOCERA TOTAL	118,173	1,277,661	351,467	167,113	250,934	1,188,887
COPEPODA	*Cyclops sp./Mesocyclop sp.*	140,056	296,205	179,049	95,493	38,020	242,181
	Diaptomus sp.	446,430	22,105	26,526	7,958	15,208	80,727
	Nauplii	0	1,025,665	736,092	143,239	250,934	366,941
	COPEPODA TOTAL	586,486	1,343,975	941,667	246,690	304,163	689,848
ROTIFERA	*Asplanchna priodonta*	26,261	256,416	26,526	47,746	0	0
	Brachionus sp.	0	0	0	0	7,604	0
	Filinia longiseta	170,694	0	0	0	0	0
	Monostyla sp.	0	8,842	0	0	98,853	587,105
	Keratella cochlearis	3,133,761	48,631	470,833	994,718	707,178	506,378
	Keratella quadrata	83,158	0	0	0	0	0
	Kellicottia sp.	4,026,620	389,045	19,894	7,958	83,645	146,776
	Polyarthra vulgaris	192,577	296,205	145,892	47,746	0	124,760
	Conochilus sp.	0	2,789,632	0	0	0	0
	ROTIFERA TOTAL	7,633,071	999,139	663,146	1,098,169	897,280	1,365,019
	TOTALS	8,337,730	3,620,775	1,956,280	1,511,972	1,452,377	3,243,755

Table C3: 2016 Lake Riley Zooplankton Counts (#/m²)

Lake: Riley

Division	Taxon	Sample Date 4/18/16	5/24/16	6/15/16	7/20/16	8/15/16	9/21/16
	Ceriodaphnia sp.	0	0	0	0	7,427	0
	Chydorus sphaericus	0	0	8,842	7,427	0	0
	Daphnia galeata mendotae	14,589	0	0	22,282	0	16,888
	Daphnia pulex	19,452	35,191	101,682	59,418	0	0
	Daphnia retrocurva	0	0	0	0	29,709	25,332
	Diaphanosoma leuchtenbergianum	0	0	0	29,709	51,991	16,888
	Immature Cladocera	0	0	0	0	0	0
	CLADOCERA TOTAL	34,041	35,191	110,524	118,836	89,127	59,108
COPEPODA	*Cyclops sp.*	301,510	52,786	39,789	59,418	7,427	67,552
	Diaptomus sp.	38,905	8,798	274,100	133,690	44,563	92,885
	Nauplii	1,225,493	96,775	627,778	438,207	215,390	464,423
	Copepodid	0	0	0	0	0	0
	COPEPODA TOTAL	1,565,908	158,359	941,667	631,315	267,380	624,860
ROTIFERA	*Asplanchna priodonta*	364,730	0	0	103,981	0	0
	Brachionus sp.	53,494	0	0	0	0	0
	Monostyla sp.	0	0	4,421	0	0	0
	Keratella cochlearis	1,663,169	61,584	88,419	155,972	958,113	211,101
	Keratella quadrata	2,874,073	17,595	35,368	0	0	0
	Kellicottia sp.	267,469	8,798	0	0	0	84,441
	Polyarthra vulgaris	904,531	0	26,526	155,972	7,427	126,661
	Conochilus sp.	0	0	0	794,714	178,254	0
	Nolthaca	24,315	0	4,421	0	0	0
	ROTIFERA TOTAL	6,151,781	87,977	159,155	1,210,639	1,143,794	422,203
	TOTALS	7,751,730	281,527	1,211,346	1,960,789	1,500,301	1,106,171

Exhibit D

2016 Creek Assessments

Bluff Creek Assessment: Reach 1

Pioneer Trail to Great Plains Blvd

Conducted by: RPBCWD staff [Josh Maxwell; Zach Dickhausen]
Conducted on: 11 April 2016

Summary

Site/Scope

On the 11th of April at 09:45, 2016, Riley Purgatory Bluff Creek Watershed District (RPBCWD) staff conducted a stream corridor assessment of subreaches B1A, B1B, and B1C of Bluff Creek. Staff started at Pioneer Trail east of highway 212 and walked downstream to just north of Flying Cloud Drive (approximately 2.06 stream miles). Staff walked both sides of the creek to assess overall stream conditions and to discover and prioritize possible restoration locations. Staff conducted a Modified Pfankuch Channel Stability Assessment and a Minnesota Pollution Control Agency (MPCA) Stream Habitat Assessment (MSHA) on each subreach to better characterize the stream. A GPS, and a GPS-enabled camera were used to mark points and take photos.

- All pictures were taken Facing Downstream unless noted otherwise.
- Right and Left bank are defined by looking downstream.
- Erosion was defined as Slight, Moderate, or Severe.
- Stream bank Erosion was measured from the streambed to the top of the eroding bank.
- Vegetation was defined as Sparse, Patchy, or Dense.
- All measurements were recorded in Meters.
- All major erosion sites were labeled on the GPS by the erosion site number and reach (A#B1).

Weather Conditions

Wind: 10mph
Temp: 1.4° C
Cloud Cover: 70%

Stream Features

The surrounding vegetation for this stream section included deciduous forests and residential areas. The substrate in this section consisted mostly of sand and silt; there were many sand/silt depositional areas along this reach as well. Many stretches within B1B and B1C contained gravel deposits, and several areas where cobble and small boulders were present in large amounts. Slope gradients within this section were predominantly high, reaching 60% to 70% in some areas. There were, however, multiple short stretches in which the slope of the upper banks decreased to below 30%. The stream was rather sinuous with only a handful of long, straight stretches. There was a fair amount of stream development (riffle, run, pool). The extensive woody debris throughout this stream section was attributed to the upper eroding banks.

Areas of Concern

There were multiple areas exhibiting severe mass wasting that presented quite a bit of concern; 12 total mass wasting sites were photographed and recorded via GPS points. Several other less severe instances of bank

erosion were photographed as well. Many of these mass wasting sites were actively eroding, with fully exposed banks reaching heights of 15m to 20m and lengths of 30m. Within subreach B1A, 50% of the banks were incised 0.5m to one meter. B1B and B1C both had stretches of creek with banks incised anywhere from 0.5m to over a meter. Below all mass wasting sites, fine sediments and woody debris was deposited in mass quantities. Overall, subreach B1B was the most degraded subreach.

Subreach B1A– Pioneer Trail to Tributary (BT-3C)

MSHA: 52.2 (Good); Pfankuch: 100 (Unstable)

Staff began the creek walk at the 10ft by 10ft box culvert underneath Pioneer Trail at the summer sampling site B2 (IMG-6246). During the creek walk the stream was shallow and had relatively low flows. Riprap had been placed below the culvert upon its construction to stabilize the surrounding banks. Directly downstream of the culvert the stream formed a horseshoe bend to the right (IMG-6249). The immediate vegetation below Pioneer Trail was patchy, woody vegetation, shrubs and trees, with some graminoids/grasses. The immediate banks were steep, but upper bank gradientss were rather low, less than 10%. On the outside bend of the horseshoe curve was an erosion site which measured 4m high by 10m long on the left bank (IMG-6249 & IMG-6250). Downstream, staff encountered a small cobble/gravel riffle followed by a deep pool (IMG-6252). Behind the riffle there was some minor incising along the right bank as seen in IMG-6252. The stream was sinuous and woody debris was common within the subreach. In IMG-6253, a large woody debris dam was causing significant ponding behind it. The sediment in riffles consisted of gravel, sometimes containing cobble and a few small boulders (IMG-6254). A gravel deposition over two meters long can also be seen on the right bank in IMG-6254. However, the predominant substrate within the creek consisted of sand and silt (IMG-6256).

The landscape and bank angles became steeper downstream, sometimes reaching gradients up to 70%. More severe erosion and mass wasting sites were encountered moving downstream. The very large mass wasting site in IMG-6257 was partially healed over with vegetation growing over it. Staff encountered an extremely large mass wasting site measuring 10m high by 20m long, with heavy woody debris and downed trees below it (E1B1, IMG-6258-6262). Parts of the site were healed over while other parts exhibited active erosion. At this point, the surrounding vegetation consisted of patchy trees with little-to-no herbaceous ground cover. Sediment and debris from E1B1 was settling downstream in the channel; the sediment was soft and staff sank in it when walking within the channel. Downstream, incising was occurring along the right bank and measured 3m high by 9m long (IMG-6263). Staff soon encountered another severe erosion site on the right bank (4m high by 15m long) which wrapped around the bend to the right (IMG-6264-6266). This site also had a large tree that was holding part of the bank together which was otherwise entirely sloughing into the creek (IMG-6266). Immediately following this site was another mass wasting site on the left bank measuring 12m high by 15m long, with heavy woody debris below it (E2B1, IMG-6267 & IMG-6268). The sediment exposed from the mass wasting site was very sandy/sandstone-like and easily erodible (IMG-6269). All of the mass wasting sites after this contained similar sediment types. At this point, about 50% of the banks were incised between 0.5m and 1m. An additional mass wasting site measuring 6m high by 15m long was located just downstream on the right bank (E3B1, IMG-6270).

Continuing downstream, a short stream section had bank slopes that flattened and the canopy opened, allowing horsetail reed to grow on the immediate banks (IMG-6271). This section contained a stretch of stream that was very straight compared to other stretches (IMG-6273). The channel width and depth ranged from 2m-4m wide by 0.2m-1m deep. Staff then encountered more severe erosion on the left bank (IMG-6274) and the slopes increased again. Soon after, there were two natural dams formed by sediment deposits and woody debris with pooling behind them (IMG-6275 & IMG-6277). There was patchy moss growing along the bank and rocks through this section of the reach (IMG-6275-6285). Continuing downstream more large erosion sites were present, the first measuring 4m by 10m (IMG-6278), followed by a larger one measuring 5m by 15m (IMG-6281 & IMG-6282). Before the second erosion site, the stream made a severe meander and was attempting to cut

through a narrow strip of land on the left bank. If that happens, it may reduce the erosion on the opposite bank (IMG-6279). The subreach ended just downstream where a tributary enters the creek (IMG-6285).

	**IMG-6246** Box culvert under Pioneer Trail, photo taken facing upstream		**IMG-6249** Severe erosion, LB; boulders,RB
	**IMG-6250** Severe erosion LB, 4m x 10m long		**IMG-6252** Small boulder/ gravel riffle; slight incising on RB
	**IMG-6253** Woody debris, ponding behind it and to the left of it		**IMG-6254** Riffle with gravel substrate, gravel deposition on RB over 2m long

	**IMG-6256** Sand/silt substrate		**IMG-6257** Partially healed mass wasting, RB
	**IMG-6258** Downed tree, heavy woody debris; mass wasting, RB (E1B1)		**IMG-6259** Several downed trees; mass wasting, LB (E1B1)
	**IMG-6261** Mass wasting site, LB (E1B1)		**IMG-6262** Edge of Mas wasting site, LB (E1B1); downed trees
	**IMG-6263** Woody debris and sediment deposition; incising on RB		**IMG-6264** Severe erosion on right bank, wrapping around bend

	**IMG-6265** Continued erosion wrapping around bend		**IMG-6266** Photo taken facing upstream; tree holding bank together
	**IMG-6267** Mass wasting site, on left bank (E1B2)		**IMG-6268** Heavy woody debris underneath mass wasting site, on left bank (E2B1)
	**IMG-6269** Left bank exposed sediment within mass wasting site, sandstone		**IMG-6270** Mass wasting site, on right bank (E3B1)
	**IMG-6271** Horsetail reeds growing on right bank		**IMG-6272** General stream photo; woody debris

	**IMG-6273** General stream photo; straight section of creek		**IMG-6274** Severe erosion on left bank
	**IMG-6275** Sediment and woody debris dam from deposition of upstream mass wasting sites		**IMG-6276** General stream photo; stream has good sinuosity
	**IMG-6277** Natural dam formed by moss		**IMG-6278** Cutting on right bank outside bend
	**IMG-6279** Stream attempting to cut off large meader		**IMG-6281** Mass wasting on right bank; downed trees

	**IMG-6282** Mass wasting site continued on right bank; continued heavy woody debris		**IMG-6284** General stream photo; more horsetail growing on RB
	**IMG-6285** Tributary BT3C entering on right bank		

Subreach B1B– Tributary (BT-3C) to North of Hesse Farm Rd MSHA: 48.9 (Good); Pfankuch: 115 (Unstable)

In this subreach, staff encountered several mass wasting sites, all of which were larger than those previously observed. The first mass wasting site was very severe, ranging between 5m and 10m high by 30m long (E4B1, IMG-6286-6290). The site wrapped along left bank as the creek turned to the right. There was heavy woody debris in the creek at this site that had been deposited from the upper banks (IMG-6290). There was a large amount of sediment deposition just downstream of this site, consisting of a very soft sand/silt mixture (IMG-6291). Downstream, staff encountered several more patches of moderate woody debris and depositional bars within the stream that were likely from the upstream mass wasting site (IMG-6292 & IMG-6293). The next mass wasting site was the largest and most severe site encountered within this reach, measuring 16m high by 20m long (E5B1, IMG-6294-6306). The sediment within the mass wasting was sandy with some gravel and was actively eroding at the time of the walk via wind erosion (IMG-6304-6306). A house at the top of the bluff above the stream, was set back less than 50m from the edge of the mass wasting site E5B1 (IMG-6294) and was considered a long-term infrastructure risk.

Further downstream, the surrounding slopes varied, ranging between 5-60 degrees. There was a long sand deposition bar on the right bank with scattered boulders along it (IMG_6309). Staff then encountered three large, disassembled cement culvert pipes sitting on the left bank and in the channel (IMG_6310). Sediment consisting of mainly sand/silt had filled in behind the pipes and heavy woody debris can be seen in IMG_6310 just downstream. Further downstream a riffle with boulders was present before the stream shifted back south (IMG_6311). Overall this subreach was sinuous, however as the stream shifted south, there was a long, straight stretch of stream that had some entrenchment and incising mainly along the right bank (IMG_6312). As the stream became sinuous again, there were areas with scattered boulders and sediment deposition bars composed of sand/silt (IMG_6313, IMG_6314, IMG_6317).

The next severe mass wasting site occurred along the left bank and measured 15m high by 30m long. Lower parts the site looked to be healed over with vegetation growing on previously eroded parts (E6B1, IMG_6316 and IMG_6318). Areas of accumulation of heavy woody debris and sediment occurred directly below the exposed slopes (IMG-6317, IMG-6319, IMG-6321). Downstream, another mass wasting site occurred on the right bank and measured 18m high by 10m long (E7B1, IMG-6321). There was a great deal of downed trees and woody debris at this site also. Next, staff observed a large erosion site along the left bank which measured 4m high by 8m long (IMG-6324); there was a stretch of creek after this containing many small boulders (IMG-6325). The next major mass wasting site occurred on the right bank, measuring 20m high by 20m long (E8B1, IMG-6331). A long stretch of the left bank after site E8B1 was eroded quite severely, 2m high, continuing for 10m (IMG-6332). Immediately after this, a 10m length of the right bank was severely eroded measuring 3m high (IMG-6334).

The stream then became entrenched by 1m to 2m; however, the banks were again moderately stable due to the surrounding vegetation and less severely angled banks. Staff then passed through several straight stretches which were stabilized by multiple small boulders, woody debris, and horsetail on the banks (IMG-6333, IMG-6336-6338). Moving downstream, a natural dam formed by sedimentation and small boulders, narrowed the stream and created a moderate size pool below (IMG-6339). Water from the dam fell about 0.6m into the large pool. The final mass wasting site of this subreach occurred on the right bank and was actively eroding (E9B1, IMG-6340).

	**IMG-6285** Tributary stream entering Bluff Creek on right bank		**IMG-6286** Beginning photo of mass wasting site on left bank (E4B1)
	**IMG-6287** Continued severe mass wasting site on left bank (E4B1)		**IMG-6289** Continued severe mass wasting site on left bank (E4B1)

	**IMG-6290** Continued severe mass wasting site on left bank (E4B1); heavy woody debris accumulation		**IMG-6291** Soft sand/silt sediment deposition downstream of mass wasting
	**IMG-6292** Moderate woody debris		**IMG-6293** General stream photo
	**IMG-6294** Severe mass wasting site on right bank; house at top of bluff		**IMG-6296** Severe mass wasting site on right bank (E5B1); downed trees and woody debris
	**IMG-6304** Severe mass wasting site on right bank (E5B1);actively eroding; staff saw sediment moving		**IMG-6306** Severe mass wasting site on right bank (E5B1);sandy sediment

	**IMG-6308** General stream photo		**IMG-6309** Sandy sediment deposition on right bank
	**IMG-6310** Large cement culvert pieces on left bank		**IMG-6311** Boulder riffle
	**IMG-6312** General stream photo; entrenched banks		**IMG-6313** General stream photo
	**IMG-6314** Large sediment depositional bar		**IMG-6316** Photo facing upstream; severe mass wasting site on RB (E6B1)

	**IMG-6317** Heavy woody debris and sediment deposition		**IMG-6318** Severe mass wasting site on left bank, partially healed (E6B1)
	**IMG-6319** Heavy woody debris		**IMG-6320** General stream photo; silt deposition on left bank
	**IMG-6321** Severe mass wasting site on right bank (E7B1); downed trees and heavy woody debris below slope		**IMG-6323** General stream photo; multiple downed trees
	**IMG-6324** Severe erosion on left bank; vertical exposed bank		**IMG-6325** General stream photo; lots of small boulders; stream in incised

	**IMG-6331** Severe mass wasting site on right bank (E8B1); substancial woody debris below slope		**IMG-6332** Eroding left bank
	**IMG-6333** General stream photo		**IMG-6334** Severe cutting along outside bend of right bank
	**IMG-6335** General stream photo		**IMG-6336** General stream photo
	**IMG-6337** General stream photo		**IMG-6338** General stream photo

	**IMG-6339** Natural dam with pool underneath it		**IMG-6340** Severe mass wasting site on right bank (E9B1)

Subreach B1C– North of Hesse Farm Rd to Great Plains Blvd MSHA: 53.3 (Good); Pfankuch: 111 (Unstable)

Within this subreach, the stream was very shallow and narrow, however the channel remained wide throughout (IMG_6341, IMG_6342, IMG_6345, IMG_6347, IMG_6348, IMG_6352). The creek bed contained mostly sand, gravel, and cobble with a few scattered boulders present within the channel (IMG_6341, IMG_6342, IMG_6345, IMG_6347, IMG_6348, IMG_6352). The stream was nearly continuously incised, although the banks were angled gradually and root systems, moss, and rocks helped to stabilize the banks. The first mass wasting site in this subreach was caused by upper bank drainage creating a large eroding ravine down to the stream on the left bank (E10B1, IMG_6343). Just downstream, another mass wasting site was present on the right bank, measuring 15m high by 9m long. Cobble and large gravel had been deposited in front of the site (E11B1, IMG_6345). IMG_6347 and IMG_6348 shows the stream becoming straight for large stretches with moderately stable, incised banks measuring 1.7m. Continuing downstream, a large woody debris pile accumulated from the upstream mass wasting site, slowing water movement (IMG_6349). The final mass wasting site occurred on the right bank and measured approximately 9m high by 10m long. Again, heavy woody debris from the upper banks accumulated at the bottom of the slope (E12B1, IMG_6350). Site E12B1 was followed by erosion on the right bank measuring 3m high by 8m long with a large amount of woody debris deposited from the upstream mass wasting sites (IMG_6353). The stream then meandered past the regular water quality monitoring site B1 and ended at the railroad bridge that crosses great plains boulevard.

	**IMG-6341** General stream photo		**IMG-6342** Large boulder island/bar in stream

	**IMG-6343** Mass wasting site on left bank (E10B1)		**IMG-6345** Severe mass wasting site and a cobble/ gravel deposit on right bank (E11B1)
	**IMG-6347** General stream photo; straight channel; Incised channel		**IMG-6348** General stream photo; straight channel; Incised channel
	**IMG-6349** Woody debris from upstream mass wasting sites		**IMG-6350** Severe mass wasting site on right bank (E12B1); heavy woody debris below
	**IMG-6352** General stream photo		**IMG-6353** Erosion site on right bank; heavy woody debris

	**IMG-6354** Woody debris dam		

Riley Creek Assessment: Reach R4

Highway 5 to Railroad Bridge South of Park Road

Conducted by: RPBCWD staff [Josh Maxwell; Zach Dickhausen]
Conducted on: 9 November

Summary

Site/Scope

On the 9th of November at 1135, Riley Purgatory Bluff Creek Watershed District (RPBCWD) staff conducted a stream corridor assessment of subreaches R4A/R4B/R4C within Reach 4 of Riley Creek. Staff started at Highway 5 and walked downstream to the Railroad Bridge south of Park Road (approximately 0.65 stream miles). Staff walked both sides of the creek to assess overall stream conditions, and to identify and prioritize possible restoration locations. Staff conducted a Modified Pfankuch Channel Stability Assessment and a Minnesota Pollution Control Agency (MPCA) Stream Habitat Assessment (MSHA) on the subreaches to better characterize the stream. A GPS, and a GPS-enabled camera were used to mark points and take photos.

- All pictures were taken Facing Downstream unless noted otherwise.
- Right and Left bank are defined by looking downstream.
- Erosion was defined as Slight, Moderate, or Severe.
- Stream bank Erosion was measured from the streambed to the top of the eroding bank.
- Vegetation was defined as Sparse, Patchy, or Dense.
- All measurements were recorded in Meters.
- All major erosion sites were labeled on the GPS by the erosion site number and reach (E#R4).

Weather Conditions

Wind: 5.8 mph
Temp: 14.3°C
Cloud Cover: 50%

Stream Features

This section of the stream passes through deciduous forests (R4A/R4C) and grass prairies/wetlands (R4B) with small business and industry set back about 20-50m. All subreaches had similar substrates overall (sand/silt), however, the upper most section of R4A had more exposed gravel and a large portion of the center section of R4B was mainly clay. Slope gradients within the subreaches were relatively low starting around 40% in R4A and decreasing to 10%. The stream was fairly sinuous in R4A and R4C but was mostly straight in R4B. There was moderate stream development (riffle, run, pool) in subreach R4A and R4C, while relatively little was observed in R4B. Habitat availability in R4A was diverse, lacking in R4B, and poor in R4C. R4A and R4C were nearly continuously eroded at levels ranging from 0.2-0.5m with some more major sites located on outside bends. R4B was relatively stable with very low levels of erosion and bank sloughing.

Areas of Concern

Within subreach R4A and R4C there was a nearly continuously incised channel ranging from 0.2-0.5m, R4C being the worse of the two. Additionally, multiple larger erosion sites measuring up to 2.7m tall of exposed banks, occurred most often on the outside bends of the left bank in both reaches. In R4C, the two largest erosion areas were a groundwater seepage area and a drainage ravine, each located near the end of the subreach. The area of most concern across all subreaches was a large ravine formed from the drainage of a small business located at the top of the left bank in R4A (E1R4). The drainage had caused severe erosion by carving a ravine

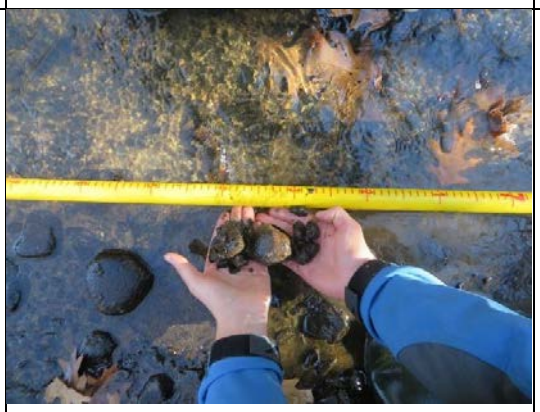
down to the stream channel. R4B was a relatively stable subreach with dense surrounding grasses and graminoids, and clay substrates. Overall R4C was the most degraded subreach, both for stability and habitat.

Subreach R4A–Highway 5 to Park Drive

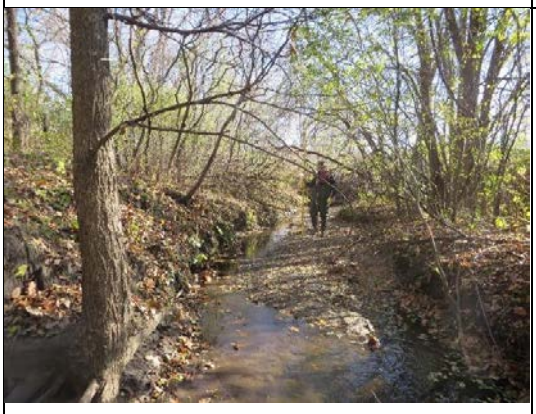
MSHA: 49.1 (Good); **Pfankuch:** 86 (Moderately Unstable)

Staff began the creek walk downstream of the culvert under Highway 5 below Lake Ann Park (IMG_0183). Riprap had been placed to stabilize the area around the culvert, however, on the right side of the culvert the drainage runoff from the road had caused some erosion by carving a small ravine to the stream (IMG_0185). Additionally, the culvert was undercut by 0.9m and a degraded stormwater culvert entered on the left side of the culvert, draining into the center of the stream (IMG_0183). Directly downstream of the culvert, the right bank was eroded, measuring 2m by 5m (IMG_0184). Continuing downstream, the channel curved to the right causing erosion on the outside bend of the left bank, which measured 2.2m tall by 8m long (IMG_0186). The surrounding vegetation within the subreach was low-density, deciduous forest, consisting of mainly smaller buckthorn, oaks, and other hardwoods. The leaf litter and small woody debris generated by the wooded area covered the mostly bare ground and accumulated in slow stream sections. Small business/industry was set back from the stream edge about 15m from the right bank and 45m from the left bank. In IMG_0187 it is apparent that water levels during the creek walk were very low. On average stream depth was about 0.2m and the width was 2.5m. Scattered boulders, which most likely migrated from the upstream culvert, were also present in the upper portion of the subreach (IMG_187). This subreach had good channel development (riffle/run/pool) and sinuosity, both of which were reduced near the end of the subreach. The substrate within the riffles was approximately 70% sand, 20% gravel, and 10% cobble as seen in IMG_0188. The substrate composition switched to 80% sand, 20% gravel near the end of the subreach. Within the pools, the predominate substrates were sand and silt (IMG_0189). Moving downstream, the channel shifted to the right again, causing more erosion on the outside bend (measuring about 2.3m tall by 10m long) and exposing tree roots (IMG_0190). In IMG_0191 the stream is incised along the right bank by about 0.5m which was fairly continuous throughout the subreach. Soon after, the creek shifted right, with the left bank/outside bend eroding, measuring 1.6m by 4m (IMG_192). Near the next left curve, woody debris had concentrated to the point where it blocked flow (IMG_193). Continuing downstream, drainage from a business near the top of the slope had formed a large eroding ravine along the left bank (IMG_0195). At the top of ravine, the erosion was more severe as seen in IMG_0196 (E1R4).

Nearing the City of Chanhassen Public Works, more herbaceous plants were present. The surrounding slopes flattened out (10-15% slope gradient) and the density of the groundcover increased moderately. Some erosion occurred along the right bank, exposing a landscape tarp (IMG_0197). After the left turn, a large deposition zone of fine sediments was present (IMG_0198). As the stream paralleled public works property along the right bank, it seemed confined and straightened, causing more erosive forces. Evidence of this is visible in IMG_0199 with erosion measuring 1.7m tall by 6m long. After public works, the stream became even straighter; only minor riffles and runs present (IMG_0200). Additionally, there was an increase in groundcover which consisted of terrestrial grasses. This was coupled with an overall decrease in the deciduous over story (IMG_0201). Near Park Drive, a large metal cattle tub was found along the right bank as seen in IMG_0202. The subreach ended at the culvert under Park Drive, which appeared to be approximately 40% filled with fine sediments (IMG_0203).

	**IMG-0183** Culvert under under Highway 5, photo taken facing upstream		**IMG-0184** Erosion on right bank, 2m x 5m
	**IMG-0185** Drainage from road causing small eroding ravine		**IMG-0186** Outside bend erosion on left bank, 2.2m by 8m
	**IMG-0187** Genreal stream photo		**IMG-0188** Riffle substrate, predominat-ely gravel

	**IMG-0189** Pool substrate, predomina-ntly sand/silt		**IMG-0190** Outside bend erosion on left bank, 2.3m x 10m
	**IMG-0191** Right bank cutting measuring 0.5m		**IMG-0192** Outsdie bend erosion of left bank, 1.6m x 4m
	**IMG-0193** Debris dam		**IMG-0195** Eroded ravine caused by uphill buisness drainage on left bank

	**IMG-0196** Erosion at top of ravine caused by buisness drainage		**IMG-0197** Landscape fabric and woody debris near public works
	**IMG-0198** Deposition of fine sediment		**IMG-0199** Large eroding bank, 1.7m by 6m
	**IMG-0200** Large sand/gravel deposition zone; increased groundcover and straightened channel		**IMG-0201** Increased herbaceous plants and groundcover

	**IMG-0202** General stream photo, large metal cattle tub		**IMG-0203** Culvert under Park Drive, about 40% filled with sediment

Subreach R4B–Park Drive to Park Road

MSHA: 40 (Fair); **Pfankuch:** 48 (Good)

At the start of Reach 4, subreach B, the culvert under Park Drive was approximately 40% filled with sediment (IMG_0204). Facing downstream from Park Drive, the banks are densely covered with herbaceous vegetation and graminoids with very sparse woody debris present (IMG_0205). Additionally, some of the surrounding vegetation was comprised of cattails and minor ponding was seen within the riparian zone (IMG_0206). The surrounding slopes were very low; small businesses and stormwater ponds were set back from the right bank approximately 20m and 50m from the left bank. No overhead canopy cover was present; however, the overhanging grasses did provide some shade over the stream. Substrate near the beginning of the subreach was comprised mainly of sand/silt, however shortly after it shifted to a clay/marl material. Continuing downstream, a tributary/drainage from the business park about 25m away entered the main stream channel on the left bank (IMG_0207). The banks in this subreach were characteristic of a small prairie stream, having steep banks (vertical in places) with dimensions measuring approximately 0.9m deep by 1m wide. There was evidence of a shifting channel present in the riparian zone and some bank sloughing was occurring, caused by uncut bank failures (IMG_0208, IMG_0209, IMG_0211).

The channel then moved between two stormwater ponds and straightened (perhaps artificially straightened upon the ponds creation). Some stream cutting occurred in this section, measuring up to 0.4m along both banks (IMG_0210). The channel became wider at this point measuring 2.5m wide by 1.3m deep at approximate bank full. The north stormwater pond then emptied into the main channel, causing significant erosion immediately on the side channel that drains to Riley Creek (IMG_0212). The culvert at the outlet of the stormwater pond was undercut by 1.2m. In this stretch the clay sediment formed mainly riffles and pools that were variable in depth and contained random and unusual deep pockets. Near the north tributary entrance (IMG_0214), the channel substrate shifted to sand/silt and the stream became a glide lacking any channel development (IMG_0213). After the tributary, the channel shifted south and widened, measuring 3m wide by 0.6m deep (IMG_0214). The surrounding bank vegetation was comprised of small shrubs, slightly increasing the amount of woody debris present in the channel. The stream eventually flowed past the District's regular water quality monitoring site R4 and through the large cement culvert under Park Road (IMG_0216). The culvert showed signs of wearing, including an apparent drop in the cement when entering the culvert, decaying cement walls, and exposed rebar (IMG_0217 & IMG_0218).

	**IMG-0204** Facing upstream, culvert under Park Drive culvert 40% filled		**IMG-0205** General stream photo, sparse woody debris with grasses and graminnoids
	**IMG-0206** Dense herbacious vegetation and graminoids; some cattails present		**IMG-0207** Tributary from business park within 25m of left bank
	**IMG-0208** Evidence of bank sloughing		**IMG-0209** Bank undercut on both sides by about 0.4m

	**IMG-0210** Widening channel measuring 2.5m by 1.3m with some erosion (0.4 m)		**IMG-0211** Evidence of bank sloughing
	**IMG-0212** Stormwater pond outlet; significant erosion, 1.2m undercut culvert		**IMG-0213** Stream with softer substrates and shifted to a glide
	**IMG-0214** North tributary entering from the left bank		**IMG-0215** Channel widened to 3m and increased in depth by 0.6m

	**IMG-0216** Box culvert under Park Road (R4 water quality sample site)		**IMG-0217** Culvert deterioration, drop off inside culvert
	**IMG-0218** Culvert deterioration and exposed rebar		

Subreach R4C–Park Road to Railroad Bridge

MSHA: 38.7 (Fair); **Pfankuch:** 87 (Moderately Unstable)

Staff began this creek walk at the large cement culvert under Park Road (IMG_0219). The water exited the culvert over a cement step and through an artificial rock riffle as seen in IMG_0219. The immediate groundcover near the culvert consisted of dense woody vegetation, mostly shrubs/buckthorn and small trees, and moderately dense herbaceous cover. Cover type evolved to a more open, wooded habitat towards the end of the subreach, consisting of patchy oak/mixed-hardwood upper canopy with very sparse herbaceous/understory cover (IMG_0232-IMG_0238). Leaf litter covered the ground and stream in slow water areas. Small business development limited the riparian zone along both banks, keeping it quite narrow early on in this subreach (10-15 m). Near the end of the subreach the riparian zone did widen out to approximately 40-60 m and was bordered by the railroad tracks along the left bank. The slope gradient of the upper banks fluctuated throughout this reach, but on average it was less than 30%. The stream had good channel development, consisting of 35%/25%/40% riffle/run/pool. The stream was graded at having fair sinuosity early on, but rather good sinuosity along the last two thirds of creek.

Early on, the riffle substrate consisted of gravel and sand which quickly shifted to sand/silt for most of the subreach (IMG_0220). Staff did encounter multiple points of moderate to moderately severe bank erosion. The first site was along the right bank and measured 1.7m by 8m long (IMG_0221). There was also a large silt deposit at this point as seen in IMG_0221. Downstream was another erosion site on the left bank with a large amount of silt deposited in front of it; the bank erosion measured 1.5m tall by 8m long (IMG_0222). There was a dense patch of woody debris just downstream of this erosion site which can be partially seen in IMG_0222. Before reaching the IWCO walking bridge, which crossed the stream, staff encountered more woody debris and a stormwater culvert on the left bank. Many large boulders had been placed under the IWCO bridge to ensure its stability.(IMG_0223-IMG_0225). There was also slight erosion occurring near the footings of the bridge on both banks which could eventually threaten its integrity in the long-term (IMG_0224 & IMG_0225). During the

previous creek walk in 2014, the erosion around the bridge was observed to be much more severe. After the bridge, staff observed more incising, measuring about 1m-1.5m along both banks (IMG_0227). Another large silt deposit was seen in the middle of the stream in IMG_0227, as well as silt deposition along the left bank and heavy woody debris in the background. At this point the channel widened and formed a glide for a long stretch. The channel bank full dimensions were estimated at 3.6m wide by 1m deep (IMG_0228) and the current stream levels measured 2.7m wide by 0.3m deep. Staff soon encountered more heavy woody debris and small downed trees in front of a stormwater culvert (which was undercut 0.8m) along the left bank (IMG_0229).

After the stormwater culvert, the stream became very sinuous. The substrate shifted to sand and silt and there were many points of deposition. Channel development improved and pools within the channel were on average four times wider than riffles. Both stream banks continued to be incised about by approximately 1m (IMG_0231& IMG_0233). The surrounding vegetative cover thinned-out and shifted from a somewhat dense woody understory to open understory with a patchy deciduous over story (IMG_0232). Continuing downstream, a stormwater culvert along the right bank caused a large woody debris dam which had pooling water behind it (IMG_0231). After the culvert, three sites of major erosion were observed. The first site occurred on the outside bend of the left bank, and measured 2.7m tall by 6m long (IMG_0232). A downed tree seen in IMG_0232, had planks placed on it making a rudimentary walking bridge. The second major bank erosion site occurred on the right bank, measuring 3.8m by 5m long (IMG_0234). The erosion in this site was possibly caused by groundwater seepage. Before the last major erosion site and the end of the subreach, staff encountered a couple more spots with heavy woody debris and some silt/sand deposition (IMG_0235). The last erosion site was on the right bank before the box culvert running under the railroad bridge (IMG_0238). The ravine had junk scattered/dumped throughout it (IMG_0238). The walk ended at the box culvert running under the railroad bridge; cement inside the culvert was very degraded, exposing rebar (IMG_0236 & IMG_0237).

	**IMG-0219** Culvert under Park Road, photo taken facing upstream		**IMG-0220** Coarse gravel substrate
	**IMG-0221** Right bank erosion measuring 1.7m by 8m; silt deposit right bank		**IMG-0222** Erosion on left bank measuring 1.5m by 8m; reduced riparian zone

	**IMG-0223** Woody debris dam and IWOC bridge		**IMG-0224** Boulders under IWOC bridge on left bank
	**IMG-0225** Right bank under IWOC bridge		**IMG-0226** General stream photo
	**IMG-0227** Both banks incised, 1-1.5m; silt deposition bar		**IMG-0228** Channel widens and forms long glide; 2.7m wide x 0.3m deep
	**IMG-0229** Stormwater culvert on left bank, undercut 0.8m		**IMG-0230** General stream photo; silt depositon along channel boundaries

Riley Creek Assessment: Reach 4

Railroad Bridge Upstream of Powers Boulevard to Lake Susan

Conducted by: RPBCWD staff [Josh Maxwell; Zach Dickhausen; Nicole Sullivan]
Conducted on: 21, 28 November 2016

9 Summary

Site/Scope

On the 21st of November at 1407 and on the 28th of November at 1302, 2016, Riley Purgatory Bluff Creek Watershed District (RPBCWD) and a student volunteer from the University of Minnesota conducted a stream corridor assessment of the subreaches R4D and R4E, within Reach 4 of Riley Creek. Staff started at the railroad bridge south of Park Road and north of Lake Drive West and ended at Lake Susan (approximately 0.65 stream miles). Staff walked both sides of the creek to assess overall stream conditions and to discover and prioritize possible restoration locations. Staff conducted a Modified Pfankuch Channel Stability Assessment and a Minnesota Pollution Control Agency (MPCA) Stream Habitat Assessment (MSHA) on the subreach to better characterize the stream. A GPS, and a GPS-enabled camera were used to mark points and take photos.

- All pictures were taken Facing Downstream unless noted otherwise.
- Right and Left bank are defined by looking downstream.
- Erosion was defined as Slight, Moderate, or Severe.
- Stream bank Erosion was measured from the streambed to the top of the eroding bank.
- Vegetation was defined as Sparse, Patchy, or Dense.
- All measurements were recorded in Meters.
- All major erosion sites were labeled on the GPS by the erosion site number and reach (E#R4).

Stream Features

The stream in this section passed through mainly mixed deciduous forests, and the surrounding land-use consisted of small industry/business and residential developments set back about 40m from the stream. Substrates in this section consisted of fine sand and silt, silt being the predominant type. There were many occurrences of gravel/sand/silt deposition occurring on point bars, along channel banks, and near obstructions. Slope gradients started at 40 to 60% during the first quarter of subreach R4D, but decreased to less than 10% for the remainder of the section. The stream showed some sinuosity and channel development during the first half of R4D, but was mainly straight and a glide for much of the section.

Areas of Concern

Subreach R4D had nearly continuous erosion (0.5m) occurring along both banks with multiple larger erosion sites measuring up to 3.3m. Staff observed significant deposition of fine sediments throughout R4D, including one bar measuring almost 6m long. The subreach was not very sinuous throughout its entire length and limited channel development. Subreach R4E was extremely incised with banks continuously eroding measuring up to 2m in height. Evidence of some bank sloughing was found across both reaches, however R4E was considerably worse. The MSHA scores were very poor as the stream had heavy deposits of silt, no channel development, and was very straight. Another area of concern was the metal pipe/cable found midway through the subreach which was about 3 inches in diameter and spanned across the channel. At the end of R4E, there was also evidence of heavy deposition from the creek as seen by the delta extending 30m into Lake Susan.

Subreach R4D–Railroad Bridge to Powers Blvd

MSHA: 42.5 (Fair); Pfankuch: 95 (Unstable)

Staff began this subreach at the box culvert underneath the railroad bridge south of Park Road and north of Lake Drive West (IMG_0240). The slope gradient immediately leaving the culvert was somewhat steep, averaging between 40 and 60% on both banks (IMG_0239). The vegetation consisted mainly of sparse to patchy deciduous forest that, with some very sparse herbaceous ground cover. Small business/industrial development was set back from the creek banks ranging between 20-50m. Channel development (riffle, run, pool) was fair, with only a few riffles and runs. Overall the stream could be considered a glide, caused by a series of woody debris dams that elevated water levels. Around 50-75% of the right bank and 25-50% of the left bank displayed erosion within this subreach.

Immediately following the culvert, the right bank was continuously cutting measuring about 0.5m high (IMG_0239). Moving downstream, staff came upon the first small woody debris/leaf litter dam (IMG_0242). Early on channel development was good because of the increased flow concentrated at the culvert (IMG_0242). Gravel was present in small amounts during this stretch of the subreach, but the substrate consisted mostly of sand and silt, and remained a sand/silt mixture for the rest of the subreach (IMG_0246). Staff then came upon a larger woody debris dam, which had a considerable amount of water pooling behind it (IMG-0249). Along this woody debris dam was some deposition, as well as some erosion measuring about 2.5m tall by 6m long on the right bank (IMG_0250). Staff continued to monitor sediment types along the stream and observed a gravel/sand mixture in one riffle (IMG_0254). Further downstream, a more severe patch of erosion was present on the left bank measuring 3.3m high by 9m long (IMG_0255).

The vegetation along the banks soon shifted from patchy trees to dense herbaceous vegetation and graminoids; here the creek width and depth decreased (IMG_0259). At this point, a grated stormwater culvert was present on the right bank, which was undercut 0.6m and had carved a small channel to the stream (IMG_0257 & IMG_0258). After the stormwater culvert, the right bank was experiencing a significant amount of bank sloughing (IMG_0259). Soon, the vegetation composition on the banks shifted back towards patchy, woody vegetation with patchy herbaceous ground cover. The slope gradient around the stream greatly decreased by this point, to below 10%. Staff began to encounter more woody debris and depositional bars after this vegetation shift took place (IMG_0260 & IMG_0261). As the stream shifted east, the right bank was eroding on the outside bend, measuring 1.4m high by 4m long (IMG_0261). Following the shift, a larger deposition zone occurred along the left bank measuring 3.5m long (IMG_0262) which was followed by another on the right bank measuring 6m (IMG_0264). Slightly downstream, staff also observed a short section of the right bank with undercutting occurring measuring about 0.5m (IMG_0296). In the last quarter of the subreach, woody debris and downed trees continued to be frequently present within the channel (IMG_0300, IMG_0306, IMG_0309). A small debris dam occurred because of the woody debris within the channel; it was holding back approximately 0.3m of water (IMG_0300). After the debris dam, there was a small stretch where the left bank exhibited continuous cutting, measuring about 0.7m high (IMG_0304). Before ending the subreach at Powers Blvd, the stream was attempting to straighten and was cutting through the narrow point on a small horseshoe curve (IMG_0311 & IMG_0312). The subreach ended at the culvert running underneath Powers Blvd which had a considerable amount of woody debris built up on the remaining grate (IMG_0315).

	**IMG-0240** Culvert under the railroad bridge (facing upstream)		**IMG-0239** Cutting along right bank, about 0.5m high
	**IMG-0242** Woody debris and leaf litter		**IMG-0243** Continued cutting along right bank; cutting on left bank
	**IMG-0246** Sediment is 50/50 sand/silt		**IMG-0249** Woody debris dam forming large pool; erosion on right bank
	**IMG-0250** Erosion 2.5m x 6m long on right bank.		**IMG-0253** Deposition and woody debris; erosion left bank

	**IMG-0254** Gravel and sand in a riffle		**IMG-0255** Large erosion patch, 3.3m x 9m on right bank
	**IMG-0257** Stormwater culvert channel enterance along right bank		**IMG-0258** Stormwater culvert along right bank, undercut 0.6m
	**IMG-0259** Decrease in width and depth; increase in grasses; evidence of sloughing, right bank		**IMG-0260** Woody debris and gravel deposition bar
	**IMG-0261** Woody debris dam; erosion 1.4m x 4m long on right bank		**IMG-0262** Large deposition area on left bank, 3.5 m long

	**IMG-0264** Large stretch of deposition along right bank, 6m long		**IMG-0296** Stream is incised 0.5 to 0.6m
	**IMG-0300** Woody debris dam holding back about 0.3m of water		**IMG-0304** Consistent cutting along left bank, about 0.7m high
	**IMG-0306** Downed trees adding to woody debris within stream		**IMG-0309** Dense woody debris and downed trees
	**IMG-0311** Channel trying to cut through horseshoe curve, right bank		**IMG-0312** Channel trying to cut through horseshoe curve, right bank

	**IMG-0315** Culvert under Powers Blvd; debris buildup		

Subreach R4E–Powers Blvd to Lake Susan

MSHA: 28 (Fair); Pfankuch: 100 (Unstable)

Staff began this subreach at the culvert under Powers Blvd. Below the culvert the stream flowed through a large artificial rock riffle (IMG_0316). Residential housing was set back about 10m from the creek along the right bank, and Lake Susan Park Pond was 10-30m back from the left bank. Substrate consisted of a marl/clay-like sediment, which quickly shifted to deposited sand/silt. The surrounding slope gradient was below 10%. Surrounding vegetation was mainly patchy to dense woody vegetation, with sparse herbaceous cover. There stream was severely incised and actively eroding for nearly 100% of its length. The overwhelming majority of the channel was straight with no channel development (considered a glide).

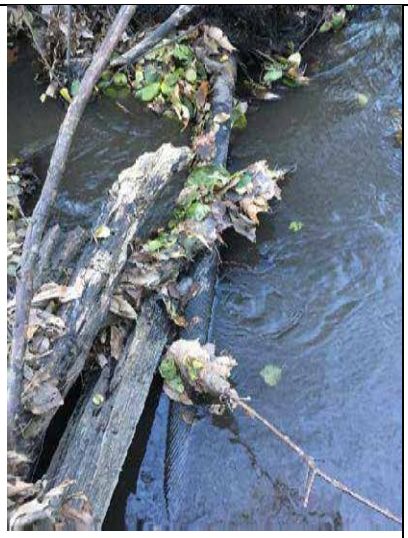
Just downstream from the culvert, the drainage off Powers Blvd and the recreational trail created eroded a channel to the stream (IMG_0317). At the confluence of the runoff channel and the stream, evidence of erosion was visible as the deposition of sand/silt/gravel occurred at the mouth of the outlet. Continuing downstream, the left bank had extensive erosion occurring, starting at about 1.5m and increasing to 1.8m tall further downstream. The bank was experiencing this severe erosion for about 20m downstream (IMG_0319 & IMG_0320). A stormwater culvert then entered on the right bank, draining into the stream over riprap (IMG_0321). Woody debris and deposition bars were common near the beginning of the subreach. A dense patch of woody debris with several small trees downed over the stream and a 2m long sand/silt depositional bar can be seen in IMG_0323. Staff soon observed erosion measuring 1.6m tall by 6m long occurring on the right bank (IMG_0324). There was also more erosion on the left bank measuring 1.5m by 5m long with more silt/sand deposition below (IMG_0325). There continued to be intermittent sediment deposits and woody debris along the stream. At one point, woody debris was dense enough to restrict flow and backup water (IMG_0326).

Further downstream, signs of major sloughing from the past (partially healed over) was present on along both banks (IMG_0328 & IMG-0331). The stream was significantly incised at this point, actively contributing sediment to the channel (IMG_0329). When the stream shifted northeast, staff noticed a metal pipe/cable about three inches in diameter, protruding from the bank over/in the stream (IMG_0330). The stream then shafted east and straightened out with uniform depth and width (IMG_0332-IMG_0334). At this point the creek was about 2.25m wide by 0.4m deep and the approximate bankfull height was 2.5m by 1.6m (IMG_0334). There was a stretch of continuous sandy deposition, and some evidence of bank sloughing along the right bank (IMG_0333). Some gravel was found intermittently throughout the creeks but most was highly imbedded, and the main substrate was deposited silt.

The creek soon came to the Lake Susan Park Pond outlet located on the left bank (IMG_0335). The channel to the stream had significant erosion occurring and the culvert was undercut 0.2m (IMG_0335). From Lake Susan Park Pond the stream remained a glide, widened, deepened, and became more straight. (IMG_0336 & IMG_0338). Herbaceous vegetation increased (patchy-dense) on the left bank; on the right bank, vegetation was a mixture of moderately dense woody and herbaceous vegetation. Staff observed some drainage forming a channel along the left bank, which was most likely stormwater draining from Lake Susan Park. Soon after the drainage channel, the creek ran under a walking bridge, which was part of a path around Lake Susan (IMG_0339). The creek walk ended at Lake Susan (IMG_0341). A large, sand/silt delta had formed from continuous sediment deposition at the outlet of the creek; the delta stretched about 30m into the Lake Susan (IMG_0342).

	**IMG-0316** Culvert under Powers Blvd and artificial riffle (facing upstream)		**IMG-0317** Drainage eroding a channel on right bank
	**IMG-0319** Erosion along the left bank, 1.5m tall by 20m long		**IMG-0320** Continuous erosion along left bank increased to 1.8m tall
	**IMG-0321** Stormwater culvert on right bank; riprap at culvert		**IMG-0323** Heavy woody debris and downed trees; continued erosion along left bank

	**IMG-0324** Erosion on right bank measuring 1.6m by 6m long		**IMG-0325** Erosion on left bank measuring 1.5m tall by 5m long; sand/silt deposition
	**IMG-0326** Woody/leafy debris dam; continued erosion left bank		**IMG-0327** Signs of major bank sloughing, partially healed over; right bank
	**IMG-0328** Signs of major bank sloughing, partially healed over; right bank		**IMG-0329** Severely incised channel; small woody debris

	**IMG-0330** Metal pipe/cable about 3 inches in diameter across channel		**IMG-0331** Major bank sloughing and severely incised channel
	**IMG-0332** Channel straightens; glide		**IMG-0333** Sandy/silt deposition and evidence of bank sloughing along right bank
	**IMG-0334** General stream photo		**IMG-0335** Outlet culvert of Lake Susan Park pond, undercut 0.2m; along left stream bank

	**IMG-0336** General stream photo; channel widens and deepens		**IMG-0338** General stream photo
	**IMG-0339** Walking trail bridge over stream		**IMG-0341** Riley Creek entering Lake Susan
	**IMG-0342** Sand/silt deposition creating delta projecting about 30m into Lake Susan		

Riley Creek Assessment: Reach 4F

Lake Susan to Rice Marsh Lake

Conducted by: RPBCWD staff [Josh Maxwell; Zach Dickhausen; Nicole Sullivan]
Conducted on: 28 November 2016

10 Summary

Site/Scope

On the 28th of November at 1330, 2016, Riley Purgatory Bluff Creek Watershed District (RPBCWD) staff and a student volunteer from the University of Minnesota conducted a stream corridor assessment of the subreach R4F, within Reach 4 of Riley Creek. Staff started at the Lake Susan outlet and walked downstream to the Rice Marsh Lake (approximately 0.4 stream miles). Staff walked both sides of the creek to assess overall stream conditions and to discover and prioritize possible restoration locations. Staff conducted a Modified Pfankuch Channel Stability Assessment and a Minnesota Pollution Control Agency (MPCA) Stream Habitat Assessment (MSHA) on the subreach to better characterize the stream. A GPS, and a GPS-enabled camera were used to mark points and take photos.

- All pictures were taken Facing Downstream unless noted otherwise.
- Right and Left bank are defined by looking downstream.
- Erosion was defined as Slight, Moderate, or Severe.
- Stream bank Erosion was measured from the streambed to the top of the eroding bank.
- Vegetation was defined as Sparse, Patchy, or Dense.
- All measurements were recorded in Meters.
- All major erosion sites were labeled on the GPS by the erosion site number and reach (E#R4).

Weather Conditions

Wind: Unknown
Temp: 7.8° C
Cloud Cover: 100%

Stream Features

This stream subreach passed through mainly grass prairies/wetlands with small business and residential areas set back about 100m from the stream channel along both banks. The channel disappeared in the wetland area about 100m to the west of Rice Marsh Lake. This subreach had substrates consisting of fine sand and silt (mostly sand). Slope gradients within this subreach were below 10%. The stream was sinuous across the subreach with little channel development. The stream was mostly considered a glide with various large pools present within the subreach. Most of the stream had overhanging grassy vegetation with very little shade. Little erosion occurred in this subreach however some major cutting and bank sloughing was evident.

Areas of Concern

There were no major areas of concern within this subreach. Erosion was limited. The remnant fence line across the stream just below Great Plains Boulevard should be removed to reduce scouring.

Subreach R4F– Lake Susan to Rice Marsh Lake **MSHA:** 58.5 (Good); **Pfankuch:** 73 (Moderately Unstable)

Staff began this stream walk at the outlet of Lake Susan located on the East side of the Lake. There were several large trees down across the stream intlet (IMG_0345). The vegetation along the immediate banks near the outlet, consisted of patchy, deciduous forest. The stream was very shallow and wide. The surrounding slope gradient was below 10% (IMG_0346). Across most of the subreach, residential and small buisness development was set back 60m from the stream on the left bank and 100m from the right bank. Sediment in this part of the subreach consisted of mostly sand (about 95%). Just before the culvert under Great Plains Boulevard, a stormwater pond outlet entered the stream on the left bank and the grated overflow pipe for the stream was visible to the left of the main culvert (IMG_0347). There was some sparse woody debris and a overall increase in herbacious and graminoid vegetation leading up to the culvert.

On the downstream side of Great Plains Blvd, there were a number of large boulders near the outflow of the culvert. There was also a dramatic increase of herbaceous and graminoid vegetation as the landscape opened up into a dense prairie/wetland type habitat (IMG_0349 & IMG_0351). Rooted aquatic vegetation was clearly visible in the areas with reduced flow, including curlyleaf pondweed, coontail, and elodea (IMG_0352). The bottom substrate consisted of mainly sand and silt, and there was a large deposit of sand/silt immediately downstream of the culvert. The stream began to narrow and became deeper downstream of the culvert. As staff continued downstream, they encountered a manmade obstruction made of two large metal t-posts which was possibly remnants of an old agricultural fence. Small logs/tree limbs had collected on the upstream side of the obstruction causing scouring just downstream (IMG_0353). Staff did not observe much stream development in this stretch of the subreach, as it was mainly a glide with a few large pools present (IMG_0354 & IMG_0358). The stream was however very sinuous forming five very large and uniform meanders before heading towards Rice Marsh Lake. Although the subreach was fairly stable, there were multiple areas along both banks showing evidence of bank sloughing (IMG_0358 & IMG_0360). The stream started to narrow as it shifted east twards Rice Marsh Lake, flowing through a stretch of wooded habitat. Before entering the wooded area, a large pool of variable depth had formed due to flow being conveyed from the drainage culvert located on the left bank under Great Plains Boulevard (IMG_0364).

After the large pool, the vegetation changed rather abruptly from dense herbaceous vegetation and graminoids to dense woody vegetation (IMG_0366). There were a few, smaller depositional areas of small gravel and fine sands present in this stretch. Most of the bottom substrate still consisted of sand and silt. The presence of woody debris within the channel increased and became rather dense in some areas (IMG_0367). Staff observed minor cutting along both banks, of which there was little to none observed before this point (IMG_0366 & IMG_0370). Staff then came to a recreational trail bridge that allows the trail to completely circle Rice Marsh Lake (IMG_0370). The stream left the wooded area and the vegetation once again shifted abruptly to dense herbaceous and graminoid vegetation (IMG_0371). At this point, the stream split into several arms and began pooling in areas. The stream then began to dissipate into inundated, wetland/marsh area located on the west end of Rice Marsh Lake (IMG_0373-IMG_0375). The creek walk ended when the stream channel was no longer recognizable which was about 100m from the west side of Rice Marsh Lake (IMG_0375).

	**IMG-0345** Lake Susan outlet large; downed trees across channel		**IMG-0346** General stream photo; low slopes and patchy woody vegetation
	**IMG-0347** Stormwater culvert left bank; Great Plains Blvd culvert		**IMG-0349** Downstream view of culvert under Great Plains Blvd (facing upstream)
	**IMG-0351** Large grassy island below culvert		**IMG-0352** Aquatic vegetation including curlyleaf, coontail, and elodea

	**IMG-0353** Fencing causing debris dam and scouring		**IMG-0354** General stream photo
	**IMG-0356** General stream photo; horseshoe stream bend		**IMG-0358** Some bank sloughing (left bank)
	**IMG-0360** Evidence of bank sloughing		**IMG-0362** General stream photo; some sparse woody vegetation
	**IMG-0364** Drainage culvert under Great Plains Blvd		**IMG-0366** Increased woody vegetation; some minor bank cutting present

	**IMG-0367** Areas with moderate-dense woody debris		**IMG-0370** Walking bridge over stream
	**IMG-0371** Stream leaves wooded area and enters open, grassy wetland area		**IMG-0373** Stream splits and dissipates into wetland west of Rice Marsh Lake
	**IMG-0375** Stream pools and dissipates into wetland west of Rice Marsh Lake		

Exhibit E

2016 Lake and Creek Fact Sheets

What's happening

UPDATING THE WATERSHED MANAGEMENT PLAN

The plan guides district actions for a decade, and is currently being updated.

In 2016, the district embarked on a special outreach campaign to engage the community in updating the 10-Year Management Plan. This included public meetings, a survey, and tabling at local events. Over 500 residents shared their concerns about local waters. We gained insight into how residents use, and value water resources. This input helped frame the creation of the new plan's goals and strategies. Once completed, the plan will guide district actions over the next decade. The community can continue to engage with the district in this process in 2017. Join our email newsletter list to stay up to date! Subscribe at: rpbcwd.org

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Dive deeper

Interested in learning more? Explore the following reports on our website.

Aquatic plants
JaKa, J. and Newman, R. 2014. Aquatic Plant Community of Lakes Ann, Lotus, Lucy, Mitchell, Susan, Riley and Staring within the Riley Purgatory Bluff Creek Watershed: Final Report 2009 – 2014. University of Minnesota.

Watershed study
BARR Engineering. 2013. Lake Lucy and Lake Ann: Use Attainability Analysis.

Stormwater ponds
RPBCWD. 2013. Stormwater pond project.

Carp management
Bajer P.G., Headrick,M., Miller B. D. and Sorensen P. W. 2014. Development and implementation of a sustainable strategy to control common carp in Riley Creek Chain of Lakes. University of Minnesota.

Contact us

and find out how you can get involved

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55317

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rpbcwd.org

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Lake Ann

2016

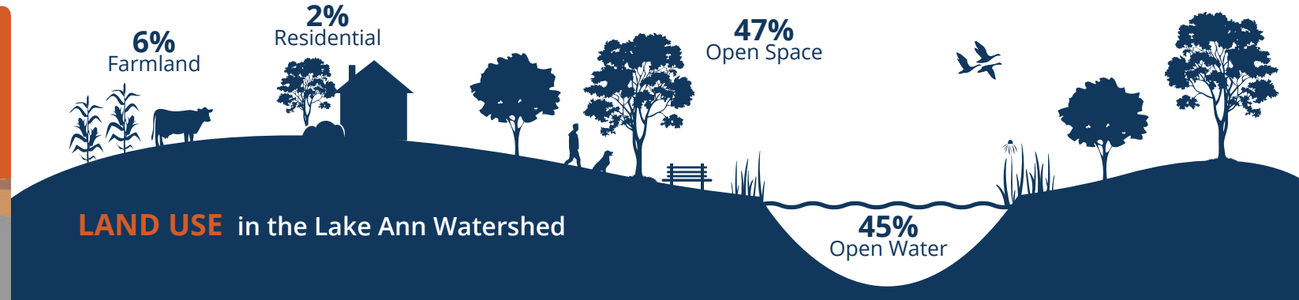
RILEY PURGATORY BLUFF CREEK WATERSHED DISTRICT

Located in Chanhassen, Lake Ann is at the headwaters of Riley Creek. Over the past 40 years, Lake Ann has consistently met Minnesota Pollution Control Agency clean water standards.

CHARACTERISTICS

Size	119 acres
Volume	2005 acre-ft
Average depth	16.8 ft
Max depth	40 ft
Watershed size	250 acres
Land draining directly into	105 acres
MPCA lake classification	Deep
Impairment listing	Mercury
Trophic status	Mesotrophic
Common fish	Bluegill, White Sucker, Black Crappie, Yellow Perch
Invasive species	Curlyleaf Pondweed, Eurasian Watermilfoil, Common Carp

WATERSHED BOUNDARIES



LAND USE in the Lake Ann Watershed

How healthy is Lake Ann?

For the past 40 years, Lake Ann has consistently met the clean water standards set by the Minnesota Pollution Control Agency (MPCA). The graphs on the next page show the trends over time. The red line on each graph marks the MPCA standard. The goal is for the average values (the dots) to be below the red line.

During the growing season (June - September), district staff visit Lake Ann every other week to collect water samples and take measurements. The water samples are sent to a lab where they are tested for several compounds including total phosphorous (TP) and chlorophyll a (Chl-a). Staff also measure how clear the water is using a disk that is lowered into the water until it can no longer be seen. All three of these parameters help indicate whether the water is clean. Find out more about each on the next page.

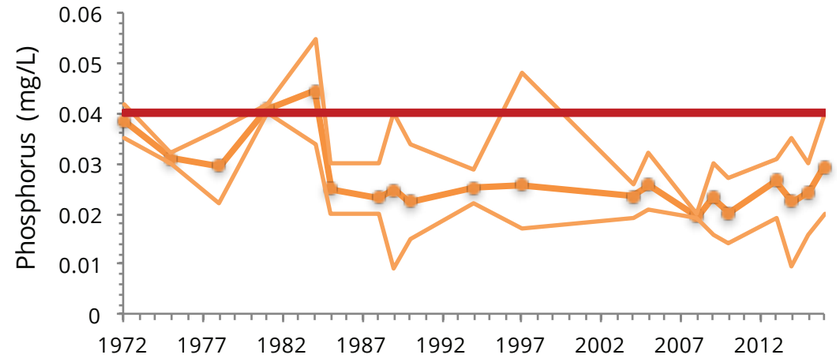
Ann is classified as a "Deep Lake", which means that it is over 15 feet deep and light can not reach the bottom in most of the lake. To be considered healthy by the MPCA, deep lakes need to be clear enough to see 1.4 meters down, and have very low TP and Chl-a levels. Water quality descreased slightly from 2015 to 2016, but remained well below the MPCA standards.

A young angler enjoys some winter fishing. An ice fishing contest is held on Ann most years.

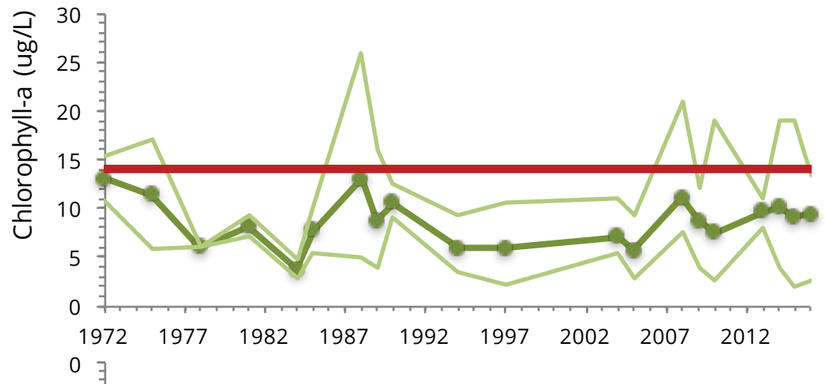
A common loon, the Minnesota state bird, enjoys a dip in Lake Ann.

Water quality graphs 1972 - 2016

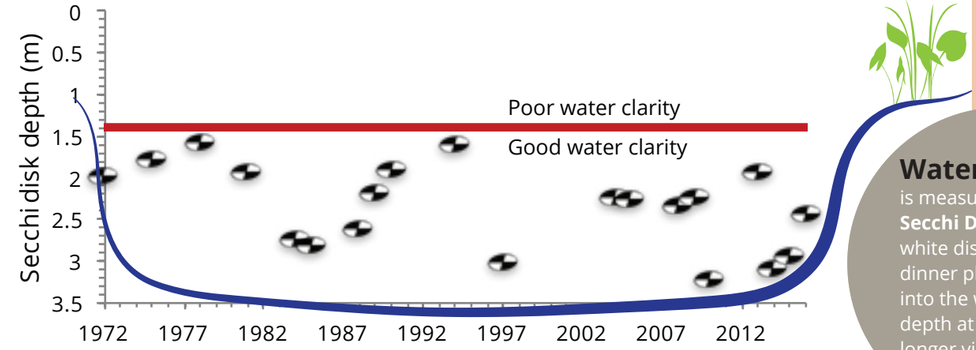
Points are growing season (Jun-Sep) averages. Thin lines are the min and max values for each year.



Phosphorus is a nutrient that plants and algae need to grow. It is often measured as total phosphorus (TP). Too much phosphorous can cause algae blooms.



Chlorophyll-a is the main pigment in algae, so measuring chl-a can tell us how much algae there is. Too much chl-a means that there are too many nutrients in the water.



Water clarity is measured using a **Secchi Disk**, a black and white disk the size of a dinner plate. It is lowered into the water, and the depth at which it is no longer visible is recorded.

Rainwater runoff, the water that flows across yards, parking lots, and streets into stormdrains, is one of the main causes of pollution in urban areas. You can take simple actions to help protect Lake Ann.

Keep the curb clean

Sweep up leaves, grass clippings and fertilizer from driveways and streets.

Water with care

Grass requires 1-inch of water per week: about one hour of sprinkling per week if it has not rained.

Salt smart

The salt we use to melt ice can pollute our lakes and creeks. Use salt sparingly and always shovel first.

Reuse the rain

Collect and reuse rainwater with a rain barrel.

Build a raingarden

Raingardens soak up water and filter out pollution. Visit our website for help.

Summary table

	MPCA standard	Since 1972			2016		
		max	min	average	max	min	average
TP	<0.04 mg/l	0.055	0.009	0.025	0.04	0.02	0.029
Chl-a	<14 ug/l	26	2	8.4	13.4	2.67	9.4
Secchi	>1.4 m	6.8	1	2.5	3.7	1.6	2.5

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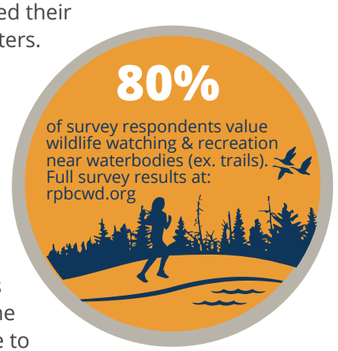

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Aquatic plants
Blue Water Science. 2014. Aquatic plant surveys for Duck Lake, Eden Prairie, MN.

Stormwater ponds
RPBCWD. 2013. Stormwater pond project.

Watershed study
BARR Engineering. 2016. Purgatory Creek Watershed Use Attainability Analysis.

Located in Eden Prairie, Duck is one of the district's shallow lakes. Since 2011, it has seen improvement in water quality, and has met the Minnesota Pollution Control Agency's clean water standards for several years.

CHARACTERISTICS

Size	41 acres
Volume	131 acre-ft
Average depth	3.4 ft
Max depth	8 ft
Watershed size	233 acres
Land draining directly into	174 acres
MPCA lake classification	Shallow
Impairment listing	Not listed
Trophic status	Eutrophic
Common fish	Bluegill, Black Crappie, Bullhead
Invasive species	Curlyleaf Pondweed, Common Carp

WATERSHED BOUNDARIES

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and find out how you can get involved

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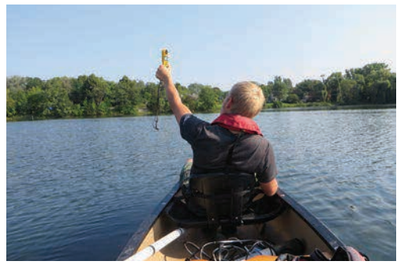
LAND USE in the Duck Lake Watershed

How healthy is Duck Lake?

2016 saw some of the clearest water since records began on Duck Lake in 1975. Until 2011, Duck Lake had failed to meet the clean water standards set by the Minnesota Pollution Control Agency (MPCA). For the past six years however, water quality has improved. Continued monitoring will track whether this continues, and help us understand why.

During the growing season (June - September), district staff visit Duck Lake every other week to collect water samples and take measurements. The water samples are sent to a lab where they are tested for several compounds including total phosphorous (TP) and chlorophyll a (Chl-a). Staff also measure how clear the water is using a disk that is lowered into the water until it can no longer be seen. All three of these parameters help indicate whether the water is clean.

Duck is classified as a “Shallow Lake”, which means that it is generally less than 15 feet deep and light can reach the bottom in most of the lake. This ample light means that shallow lakes often have a lot of aquatic plants, and are habitat to many types of fish and birds.

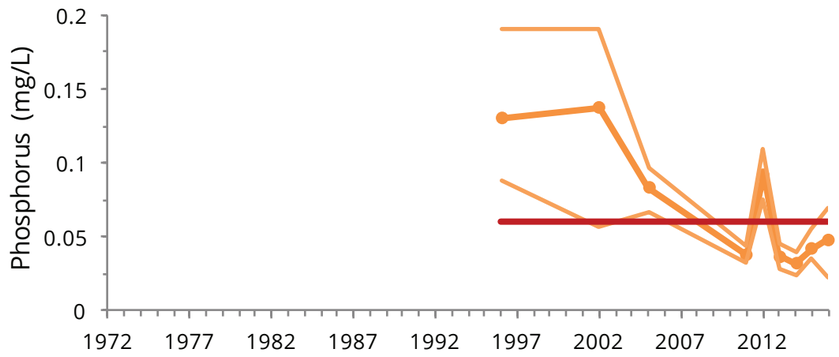


District staff collect environmental and water quality data at Duck Lake.

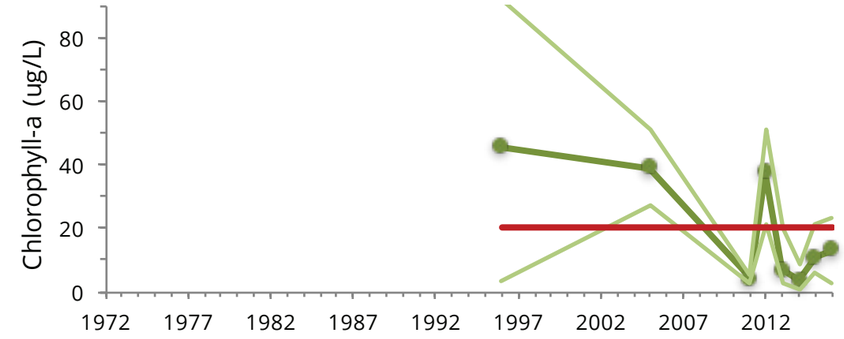
Motorized boats are not allowed on shallow Duck Lake, but it is a popular place to kayak and canoe.

Water quality graphs 1975 - 2016

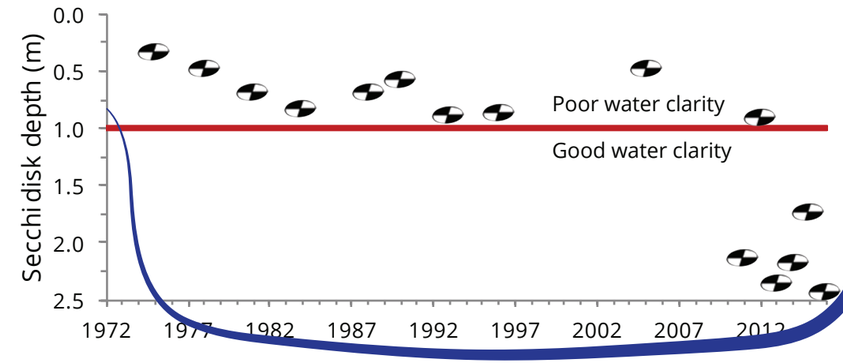
Points are growing season (Jun-Sep) averages. Thin lines are the min and max values for each year.



Phosphorus is a nutrient that plants and algae need for growth. It is often measured as total phosphorus (TP). Too much phosphorous can cause algae blooms.



Chlorophyll a is the main pigment in algae, so measuring chl-a can tell us how much algae there is. Too much chl-a means that there are too many nutrients in the water.



Water clarity is measured using a **Secchi Disk**, a black and white disk the size of a dinner plate. It is lowered into the water, and the depth at which it is no longer visible is recorded.

Summary table

	MPCA standard	Since 1975 or 1996			2016		
		max	min	average	max	min	average
TP	<0.06 mg/l	0.191	0.24	0.067	0.069	0.023	**0.049**
Chl-a	<20 ug/l	92.3	1.0	17.8	23.1	2.67	**13.1**
Secchi	>1 m	2.7	0.2	1.4	2.6	2.3	**2.5**

Rainwater runoff - the water that flows across yards, parking lots, and streets into stormdrains - is one of the main causes of pollution in urban areas. You can take simple actions to help protect Duck Lake.

Keep the curb clean

Sweep up leaves, grass clippings and fertilizer from driveways and streets.

Water with care

Grass requires 1-inch of water per week: about one hour of sprinkling per week if it has not rained.

Salt smart

The salt we use to melt ice can pollute our lakes and creeks. Use salt sparingly and always shovel first.

Reuse the rain

Collect and reuse rainwater with a rain barrel.

Build a raingarden

Raingardens soak up water and filter out pollution. Visit our website for help.

What's happening

UPDATING THE WATERSHED MANAGEMENT PLAN

The plan guides district actions for a decade, and is currently being updated.

In 2016, the district embarked on a special outreach campaign to engage the community in updating the 10-Year Management Plan. This included public meetings, a survey, and tabling at local events. Over 500 residents shared their concerns about local waters. We gained insight into how residents use, and value water resources. This input helped frame the creation of the new plan's goals and strategies. Once completed, the plan will guide district actions over the next decade. The community can continue to engage with the district in this process in 2017. Join our email newsletter list to stay up to date! Subscribe at: rpbcwd.org

GRANTS AVAILABLE FOR PROJECTS THAT HELP PROTECT CLEAN WATER

Decreasing pollution, beautifying your yard, and creating habitat are all possible through a cost-share grant with the watershed district. The district's cost-share grant program was created to help community members implement clean water projects. These could be projects that conserve water, like rainwater reuse systems, or projects that clean water, like raingardens.

Awards: up to $3000
(25% homeowner match)

Technical help available

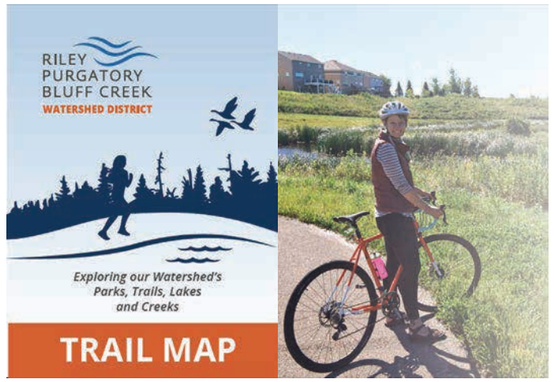
Interested? Contact:
952-607-6481
mjordan@rpbcwd.org

Dive deeper

Interested in learning more? Explore these reports and documents on our website.

Watershed study
BARR Engineering. 2016. Purgatory Creek Watershed Use Attainability Analysis.

Updated Parks & Trails Map
Explore the watershed through our updated parks and trails map. Wnat a printed copy? Stop by our office!



Contact us

and find out how you can get involved

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Chanhasse, MN 55317

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Hyland Lake

2016

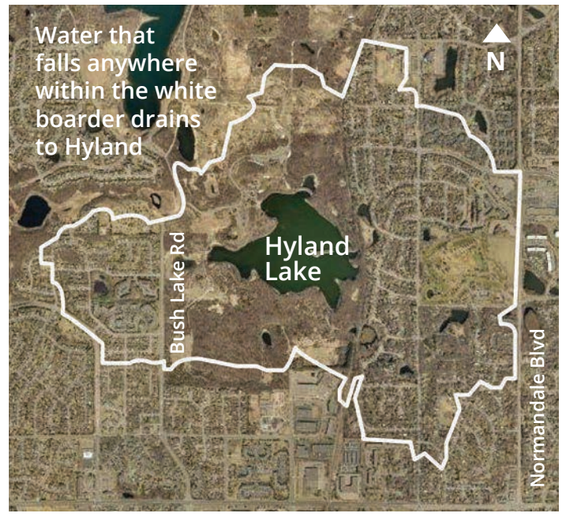
RILEY PURGATORY BLUFF CREEK WATERSHED DISTRICT

Located in Bloomington, Hyland Lake is surrounded by Hyland Lake Park Reserve, a Three Rivers Park District facility. Visitors can paddle the lake in the summer, hike nearby trails, and ski in the winter.

CHARACTERISTICS

Size	83 acres
Volume	725 acre-ft
Average depth	7.5 ft
Max depth	10 ft
Watershed size	1040 acres
MPCA lake classification	Shallow
Impairment listing	Nutrients
Trophic status	Eutrophic
Common fish	Bluegill, Black Crappie, Walleye, Black Bullhead
Invasive species	Curlyleaf Pondweed

WATERSHED BOUNDARIES



LAND USE in the Hyland Lake Watershed

How healthy is Hyland Lake?

After a substantial decrease in 2015, water quality in Hyland Lake improved in 2016. However, it still failed to meet the clean water standards set by the Minnesota Pollution Control Agency (MPCA). The graphs on the next page show the trends over time. The red line on each graph marks the MPCA standard. The goal is for the average values (the dots) to be below the red line.

During the growing season (June - September), Three Rivers Park District staff visit Hyland Lake every other week to collect water samples and take measurements. The samples are tested for several compounds including total phosphorous (TP) and chlorophyll a (Chl-a). Staff also measure how clear the water is using a disk that is lowered into the water until it can no longer be seen. All three of these parameters help indicate whether the water is clean.

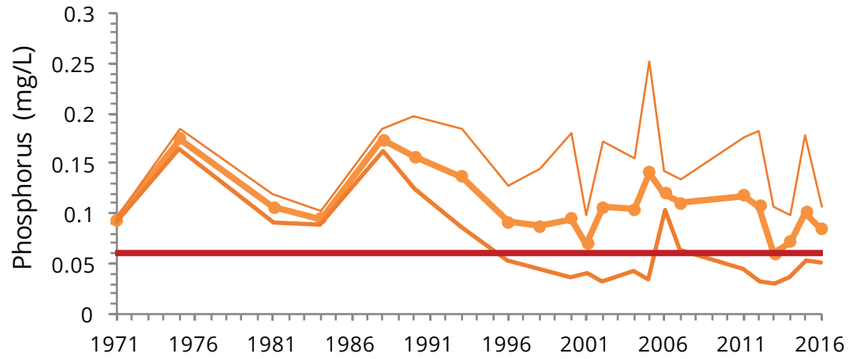
Hyland is classified as a "Shallow Lake", which means that it is generally less than 15 feet deep and light can reach the bottom in most of the lake. This ample light means that shallow lakes often have a lot of aquatic plants, and are habitat to many types of fish and birds. To be considered healthy by the MPCA, shallow lakes need to be clear enough to see one meter down, and have low TP and Chl-a levels.

Staff install a water level sensor on Hyland Lake. The sensor tracks how high the lake gets.

A skiier enjoys a winter outing in Hyland Lake Park.

Water quality graphs 1971 - 2016

Points are growing season (Jun-Sep) averages. Thin lines are the min and max values for each year.



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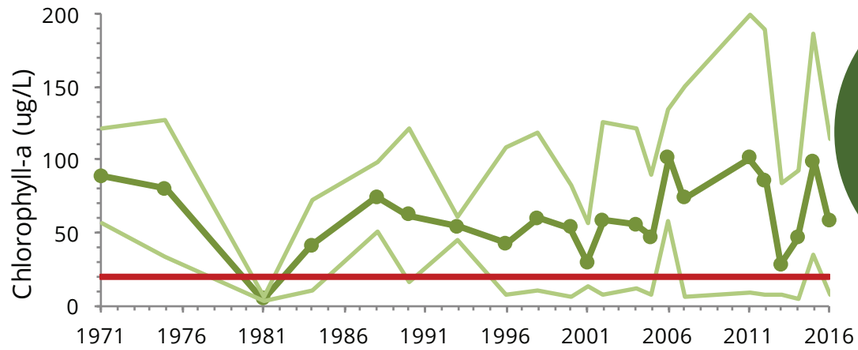
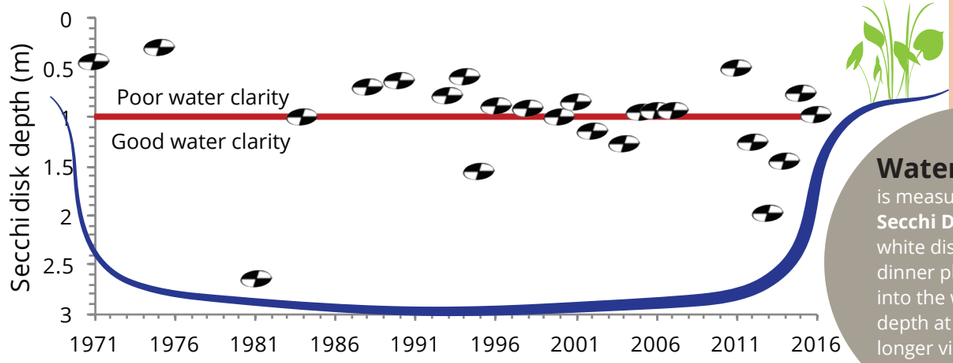


Chlorophyll a is the main pigment in algae, so measuring chl-a can tell us how much algae there is. Too much chl-a means that there are too many nutrients in the water.



Water clarity is measured using a **Secchi Disk**, a black and white disk the size of a dinner plate. It is lowered into the water, and the depth at which it is no longer visible is recorded.

Summary table

	MPCA standard	Since 1971			2016		
		max	min	average	max	min	average
TP	<0.06 mg/l	0.252	0.031	0.105	0.107	0.05	0.085
Chl-a	<20 ug/l	200	3.5	64.5	113.6	7.4	57.4
Secchi	>1 m	3.7	0.2	1.0	1.98	0.44	0.99

Rainwater runoff, the water that flows across yards, parking lots, and streets into stormdrains, is one of the main causes of pollution in urban areas. You can take simple actions to help protect Hyland Lake.

Keep the curb clean

Sweep up leaves, grass clippings and fertilizer from driveways and streets.

Water with care

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Technical help available

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mjordan@rpbcwd.org

Dive deeper

Interested in learning more? Explore the following reports on our website.

Aquatic Plants
Blue Water Science. 2014. Aquatic plant surveys for Idlewild Lake, Eden Prairie, MN.

Stormwater ponds
RPBCWD. 2013. Stormwater pond project.

Watershed study
BARR Engineering. 2016. Purgatory Creek Watershed Use Attainability Analysis.

Contact us

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Lake Idlewild

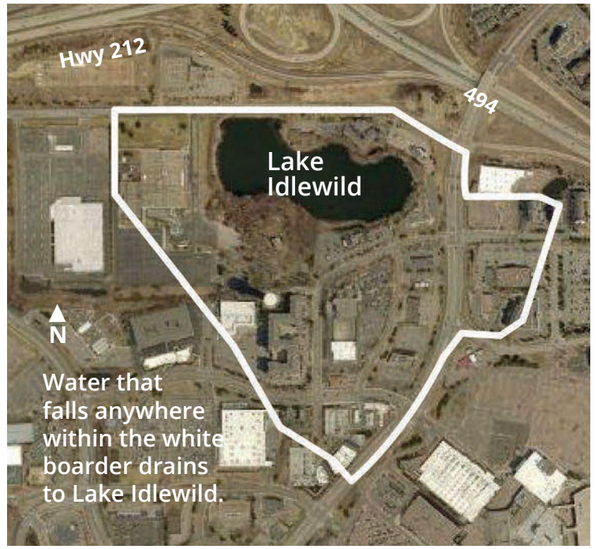
2016

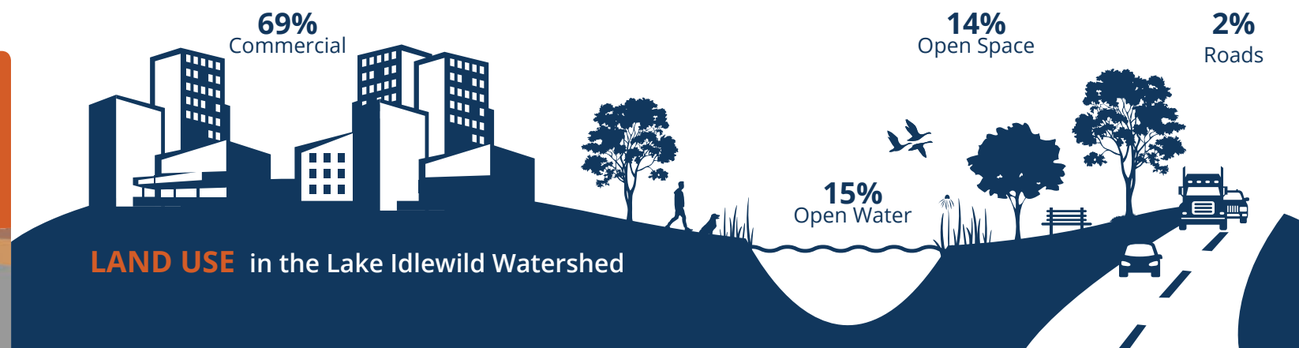
Located in Eden Prairie, Idlewild is a part of the Purgatory Creek Watershed. Painted turtles are a common site in this small basin, which is completely surrounded by commercial development.

CHARACTERISTICS

Size	15 acres
Volume	51 acre-ft
Average depth	4 ft
Max depth	8.2 ft
Watershed size	89 acres
MPCA lake classification	Not classified
Impairment listing	Not listed
Trophic status	Eutrophic
Common fish	Bluegill, Black Crappie, Black Bullhead, Golden Shiner
Invasive species	None Listed

WATERSHED BOUNDARIES





How healthy is Lake Idlewild?

Lake Idlewild was first monitored in 2014. All three years water quality has met, or been near to the clean water standards set by the Minnesota Pollution Control Agency (MPCA). The graphs on the next page show the trends over time. The red line on each graph marks the MPCA standard. The goal is for the average values (dots) to be below that line.

During the growing season (June - September), the city of Eden Prairie or the watershed district visits Lake Idlewild every other week to collect water samples and take measurements. The samples are sent to a lab to be tested for several compounds including total phosphorous (TP) and chlorophyll a (Chl-a). Staff also measures how clear the water is using a disk that is lowered into the water until it can no longer be seen. All three of these parameters help indicate whether the water is clean.

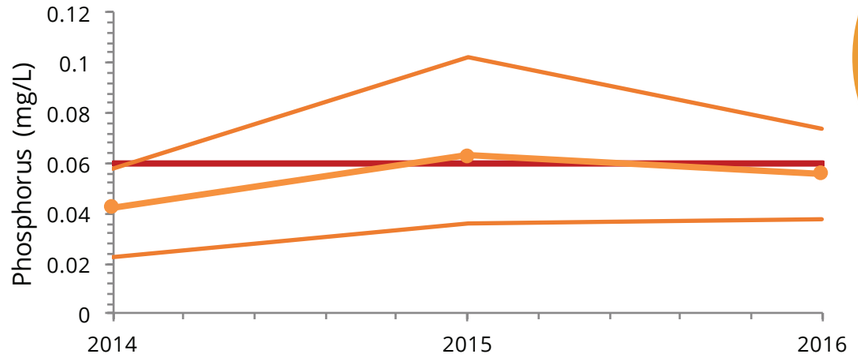
Idlewild was recently reclassified from a “Shallow Lake” to a wetland. However it continues to be monitored for water quality, and using the shallow lake water standards can be a useful bench mark for seeing how the lake health changes over time.

Collecting water samples on Lake Idlewild.

Painted turtles sun themselves on a log.

Water quality graphs 2014 - 2016

Points are growing season (Jun-Sep) averages. Thin lines are the min and max values for each year.



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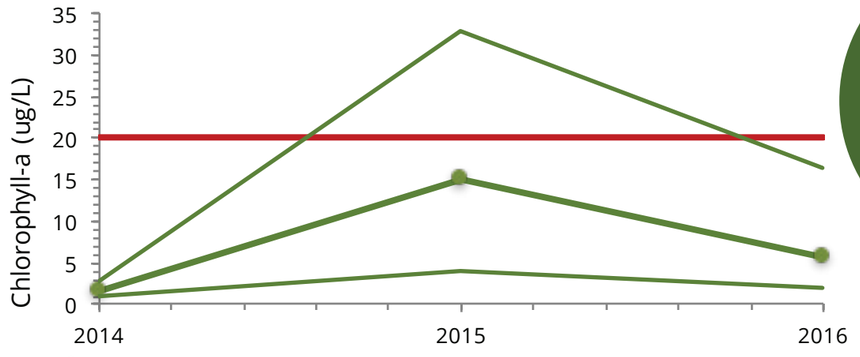

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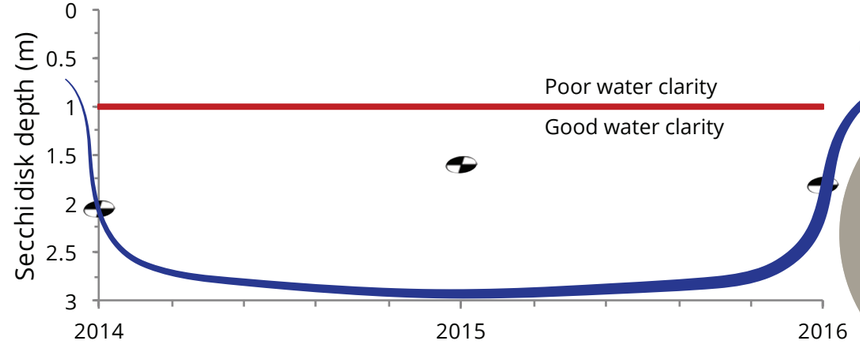

Water clarity is measured using a **Secchi Disk**, a black and white disk the size of a dinner plate. It is lowered into the water, and the depth at which it is no longer visible is recorded.

Rainwater runoff - the water that flows across yards, parking lots, and streets into stormdrains - is one of the main causes of pollution in urban areas. You can take simple actions to help protect Lake Idlewild.

Keep the curb clean

Sweep up leaves, grass clippings and fertilizer from driveways and streets.

Water with care

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Build a raingarden

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Summary table

	MPCA standard	2014-2016 max	2014-2016 min	2014-2016 average	2016 max	2016 min	2016 average
TP	<0.06 mg/l	0.102	0.038	0.056	0.074	0.038	0.056
Chl-a	<20 ug/l	33	1.1	9.1	16.4	2.1	5.75
Secchi	>1 m	2.6	1.1	1.9	2.4	1.5	1.8

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INVASIVE CARP UNDER CONTROL IN LOTUS LAKE

The district has wrapped up this season's carp monitoring on Lotus Lake, and good news, carp numbers are under control! Common carp, an invasive species to Minnesota water bodies, have a detrimental effect on our lakes and streams. They disturb sediment, reducing water quality and the presence of native plants. They also feed on macro invertebrates, which feed on algae. This can lead to excessive algal blooms on the lake which further impacts water quality.

District staff completed two types of carp monitoring in summer and autumn. They conducted surveys to estimate carp numbers, and set out nets to estimate carp reproduction. Electrofishing stuns fish momentarily, but doesn't harm them. Staff can then spot the carp, and capture them for measuring. Staff did not find any young carp in their trap nets. This means carp are spawing very little in Lotus, which is excellent news for the lake.

Dive deeper

Interested in learning more? Explore the following reports on our website.

Aquatic plants
JaKa, J. and Newman, R. 2014. Aquatic Plant Community of Lakes Ann, Lotus, Lucy, Mitchell, Susan, Riley and Staring within the Riley Purgatory Bluff Creek Watershed: Final Report 2009 – 2014. University of Minnesota.

Paleolimnology
Ramstack J. M. and Edlund M. B. 2011. Historical water quality and ecological change of three lakes in the Riley Purgatory Bluff Creek Watershed District, MN.

Carp management
Bajer P.G., Headrick,M., Miller B. D. and Sorensen P. W. 2014. Development and implementation of a sustainable strategy to control common carp in Riley Creek Chain of Lakes. U of M.

Watershed study
BARR Engineering. 2016. Purgatory Creek Watershed Use Attainability Analysis.

Stormwater ponds
RPBCWD. 2013. Stormwater pond project.

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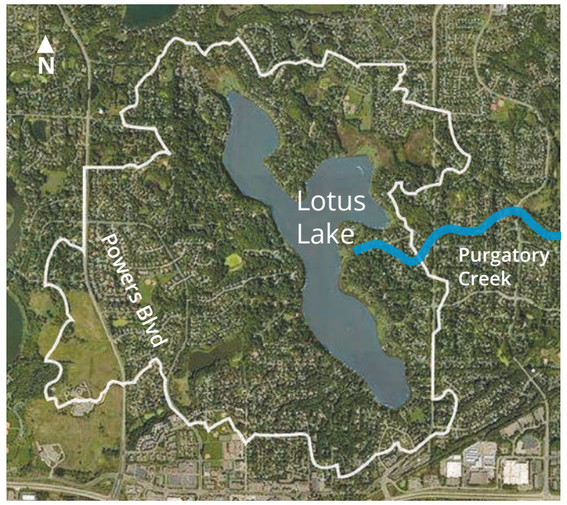
Located in eastern Chanhassen, Lotus Lake is one of three headwaters of Purgatory Creek. Water flows out of Lotus into the south fork of Purgatory Creek which eventually meets up with two other forks.

CHARACTERISTICS

Size	248 acres
Volume	2500 acre-ft
Average depth	16 ft
Max depth	31 ft
Watershed size	1406 acres
Land draining directly into	316 acres
MPCA lake classification	Deep
Impairment listing	Mercury & Nutrients
Trophic status	Hypereutrophic
Common fish	Bluegill, Yellow Perch, Walleye
Invasive species	Eurasian Watermilfoil, Common Carp

WATERSHED BOUNDARIES

Water that falls anywhere within the white boarder drains to Lotus Lake.



LAND USE in the Lotus Lake Watershed

How healthy is Lotus Lake?

Water clarity improved slightly from 2015 to 2016, but Lotus Lake still failed to meet the clean water standards set by the Minnesota Pollution Control Agency (MPCA). The graphs on the next page show the trends over time. The red line on each graph marks the MPCA standard. The goal for each graph is for the average values (the dots) to be below the red line.

During the growing season (June - September), district staff visit Lotus Lake every other week to collect water samples and take measurements. The samples are sent to a lab where they are tested for several compounds including total phosphorous (TP) and chlorophyll a (Chl-a). Staff also measure how clear the water is using a disk that is lowered into the water until it can no longer be seen. All three of these parameters help indicate whether the water is clean.

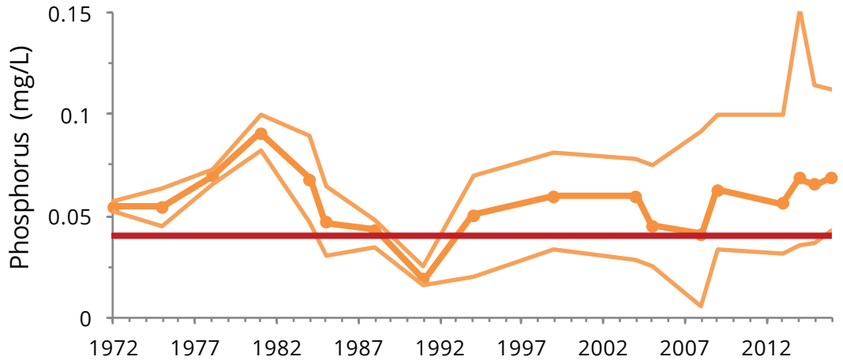
Lotus is classified as a “Deep Lake”, which means that it is over 15 feet deep and light can not reach the bottom in most of the lake. To be considered healthy by the MPCA, deep lakes need to be clear enough to see 1.4 meters down, and have very low TP and Chl-a levels.

Staff collect water samples on Lotus Lake during a beautiful summer day.

A loon enjoys a paddle on Lotus.

Water quality graphs 1972 - 2016

Points are growing season (Jun-Sep) averages. Thin lines are the min and max values for each year.



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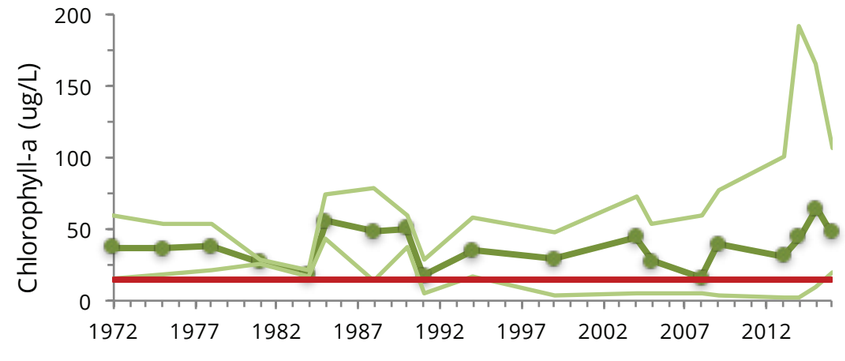

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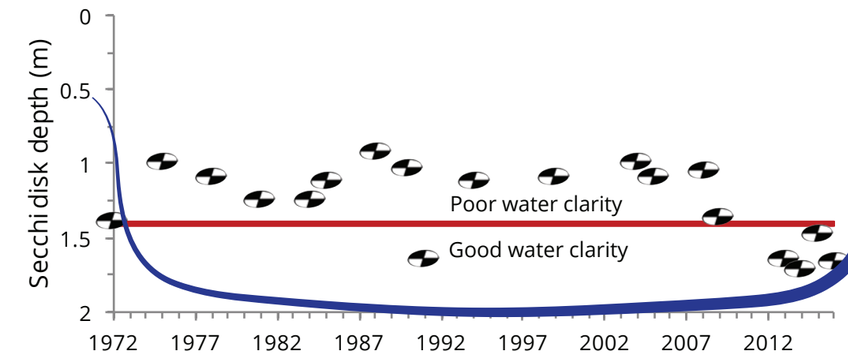

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Summary table

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		max	min	average	max	min	average
TP	<0.04 mg/l	0.15	0.01	0.06	0.11	0.043	0.069
Chl-a	<14 ug/l	192	2.7	35.5	106	20.5	47.1
Secchi	>1.4 m	4.2	0.3	1.3	2.8	0.85	1.7

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JaKa, J. and Newman, R. 2014. Aquatic Plant Community of Lakes Ann, Lotus, Lucy, Mitchell, Susan, Riley and Staring within the Riley Purgatory Bluff Creek Watershed: Final Report 2009 – 2014. University of Minnesota.

Wenck Associates Inc. 2015. Lake Lucy Aquatic Plant Managment Plan.

Watershed study
BARR Engineering. 2013. Lake Lucy and Lake Ann: Use Attainability Analysis.

Carp management
Bajer P.G., Headrick,M., Miller B. D. and Sorensen P. W. 2014. Development and implementation of a sustainable strategy to control common carp in Riley Creek Chain of Lakes. U of M.

Stormwater ponds
RPBCWD. 2013. Stormwater pond project.

Contact us

and find out how you can get involved

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18681 Lake Drive East
Chanhassen, MN
55317

CONTACT INFO
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Lake Lucy is the headwaters to Riley Creek. Water flows out of Lucy to Lake Ann and then Riley Creek. On its way south to the Minnesota River, Riley Creek passes through Lakes Susan, Rice Marsh, and Riley.

CHARACTERISTICS

Size	88 acres
Volume	558 acre-ft
Average depth	6.5 ft
Max depth	20 ft
Watershed size	997 acres
Land draining directly into	111 acres
MPCA lake classification	Shallow
Impairment listing	Mercury
Trophic status	Eutrophic
Common fish	Bluegill, Northern Pike, Yellow Bullhead
Invasive species	Curlyleaf Pondweed, Eurasian Watermilfoil, Common Carp

WATERSHED BOUNDARIES

Water that falls anywhere within the white boarder drains to Lake Lucy.

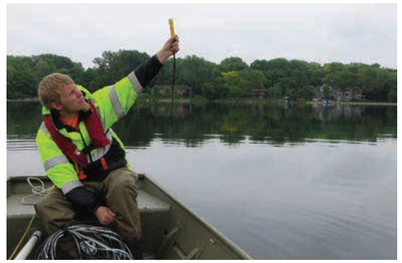
How healthy is Lake Lucy?

Water quality in Lake Lucy increased slightly from 2015 to 2016. However, it only met one of the clean water standards set by the Minnesota Pollution Control Agency (MPCA). The graphs on the next page show the trends over time. The red line on each graph marks the MPCA standard. The goal is for the average values (the dots) to be below the red line.

During the growing season (June - September), district staff visit Lake Lucy every other week to collect water samples and take measurements. The samples are sent to a lab and tested for several compounds including total phosphorous (TP) and chlorophyll a (Chl-a). Staff also measure how clear the water is using a disk that is lowered into the water until it can no longer be seen. These parameters help indicate whether the water is clean.

Lucy is classified as a "Shallow Lake", which means that it is generally less than 15 feet deep and light can reach the bottom in most of the lake. This ample light means that shallow lakes often have a lot of aquatic plants, and are habitat to many types of fish and birds. To be considered healthy by the MPCA, shallow lakes need to be clear enough to see one meter down, and have low TP and Chl-a levels.

Native iris bloom along the edges of Lake Lucy.



Staff collect environmental measurements.

Rainwater runoff, the water that flows across yards, parking lots, and streets into stormdrains, is one of the main causes of pollution in urban areas. You can take simple actions to help protect Lake Lucy.

Keep the curb clean
Sweep up leaves, grass clippings and fertilizer from driveways and streets.

Water with care
Grass requires 1-inch of water per week: about one hour of sprinkling per week if it has not rained.

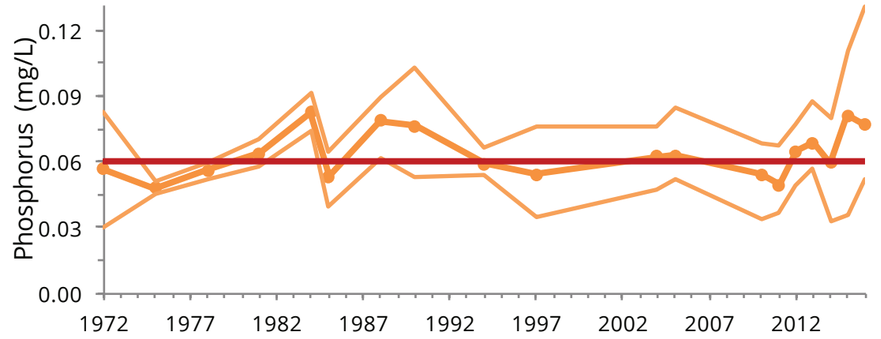
Salt smart
The salt we use to melt ice can pollute our lakes and creeks. Use salt sparingly and always shovel first.

Reuse the rain
Collect and reuse rainwater with a rain barrel.

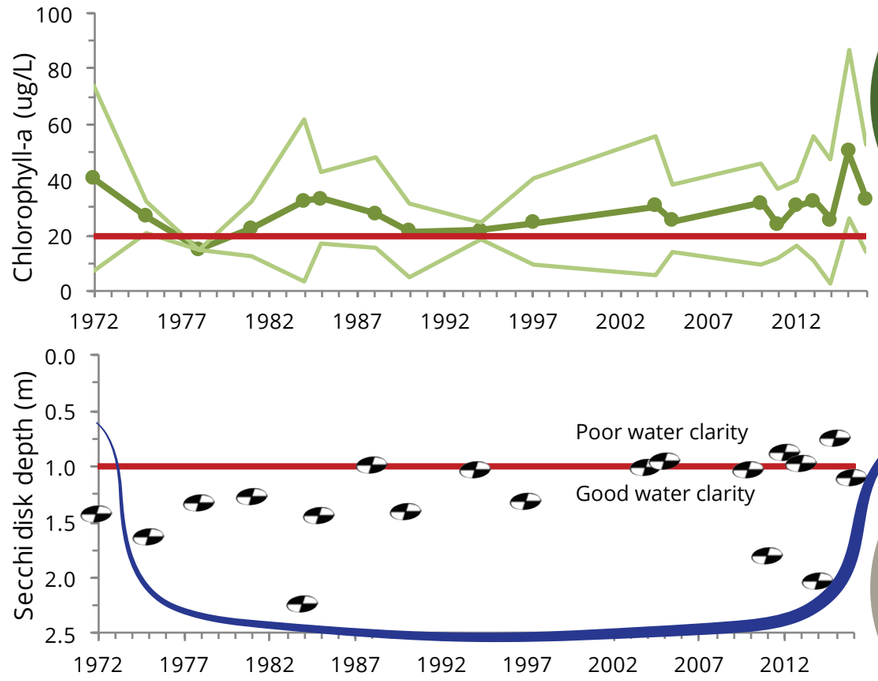
Build a raingarden
Raingardens soak up water and filter out pollution. Visit our website for help.

Water quality graphs 1972 - 2016

Points are growing season (Jun-Sep) averages. Thin lines are the min and max values for each year.



Phosphorus is a nutrient that plants and algae need for growth. It is often measured as total phosphorus (TP). Too much phosphorous can cause algae blooms.



Chlorophyll a is the main pigment in algae, so measuring chl-a can tell us how much algae there is. Too much chl-a means that there are too many nutrients in the water.

Water clarity is measured using a **Secchi Disk**, a black and white disk the size of a dinner plate. It is lowered into the water, and the depth at which it is no longer visible is recorded.

Summary table

	MPCA standard	1972 - 2015			2016		
		max	min	average	max	min	average
TP	<0.06 mg/l	0.11	0.03	0.064	0.131	0.052	0.077
Chl-a	<20 ug/l	87	2.7	29.8	52.5	14.2	**32.8**
Secchi	>1 m	6.9	0.5	1.3	1.95	0.75	**1.1**

What's happening

UPDATING THE WATERSHED MANAGEMENT PLAN

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TIMBER LAKES ASSOCIATION TAKE ON SHORELINE RESTORATION

In 2015, the Timber Lakes Association received a cost-share grant from the watershed district to rejuvenate their shoreline buffer. The buffer had been severly damaged during the period of high water in 2014. In 2016, invasive species were removed, and 140 feet of shoreline were restored with native plantings. Cost-share funding is again available in 2017. Homeowners can receive up to $3,000 for projects that help protect and improve water resources. Associations and nonprofits can receive up to $20,000. Interested? Contact us at: 952-607-6481, or info@rpbcwd.org.

Dive deeper

Interested in learning more? Explore the following reports on our website.

Aquatic plants
Dunne, M. and Newman, R. 2017. Aquatic Plant Community of Lakes Lucy, Mitchell, Susan, Riley and Staring: Annual Report for 2016. University of Minnesota.

JaKa, J. and Newman, R. 2014. Aquatic Plant Community of Lakes Ann, Lotus, Lucy, Mitchell, Susan, Riley and Staring: Final Report 2009 – 2014. University of Minnesota.

Stormwater ponds
RPBCWD. 2013. Stormwater pond project.

Paleolimnology
Ramstack J. M. and Edlund M. B. 2011. Historical water quality and ecological change of three lakes in the Riley Purgatory Bluff Creek Watershed District, MN.

Watershed study
Barr Engineering. 2016. Purgatory Creek Watershed Use Attainability Analysis.

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Mitchell Lake

2016

RILEY PURGATORY BLUFF CREEK WATERSHED DISTRICT

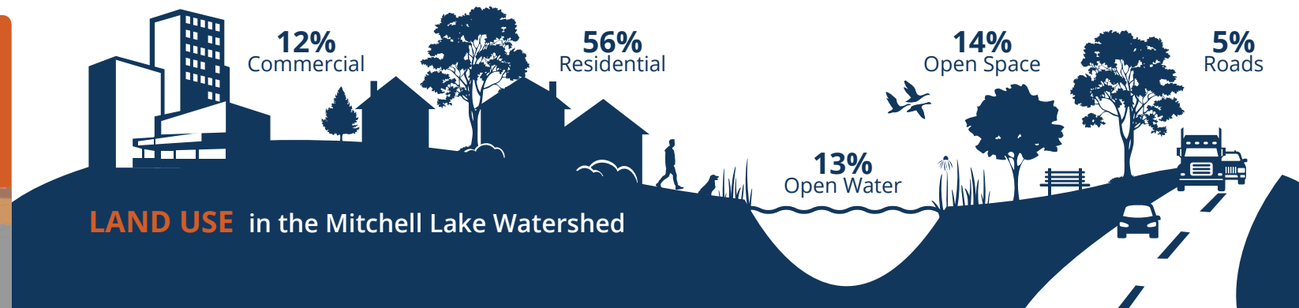
Located in Eden Prairie, Mitchell Lake is a part of the Purgatory Creek chain of lakes. During high water events it outflows through an overflow pipe to Red Rock Lake.

CHARACTERISTICS

Size	124 acres
Volume	729 acre-ft
Average depth	5.3 ft
Max depth	19 ft
Watershed size	937 acres
Land draining directly into	154 acres
MPCA lake classification	Shallow
Impairment listing	Mercury
Trophic status	Hypereutrophic
Common fish	Bluegill, Black Bullhead, Black Crappie, Northern Pike, Pumpkinseed
Invasive species	Curlyleaf Pondweed, Eurasian Watermilfoil, Purple Loosestrife

WATERSHED BOUNDARIES

Water that falls anywhere within the white boarder drains to Mitchell Lake.



LAND USE in the Mitchell Lake Watershed

How healthy is Mitchell Lake?

After decades of failing to meet the clean water standards set by the Minnesota Pollution Control Agency (MPCA), Mitchell Lake has improved and been at or near standards for the last six years. Continued water sampling will help monitor whether the trend persists.

The graphs on the next page show the trends over time. The red line on each graph marks the MPCA standard. The goal is for the average values (the dots) to be below the red line.

During the growing season (Jun - Sept), the city of Eden Praire visits Mitchell Lake to collect water samples and take measurements. The samples are tested for several compounds including total phosphorous (TP) and chlorophyll a (Chl-a). The city also measures how clear the water is using a disk that is lowered into the water until it can not be seen. These tests help indicate if the water is clean.

Mitchell is classified as a “Shallow Lake”, which means that it is generally less than 15 feet deep and light can reach the bottom in most of the lake. This ample light means that shallow lakes often have a lot of aquatic plants, and are habitat to many types of fish and birds. To be considered healthy by the MPCA, shallow lakes need to be clear enough to see 1 meter down, and have low TP and Chl-a levels.

An osprey looks out on Mitchell Lake, scanning the surface for signs of the fish it relies on for food.

Staff head out on a blustery day to take samples to monitor zooplankton, an important food for native fishes.

Rainwater runoff, the water that flows across yards, parking lots, and streets into stormdrains, is one of the main causes of pollution in urban areas. You can take simple actions to help protect Mitchell Lake.

Keep the curb clean

Sweep up leaves, grass clippings and fertilizer from driveways and streets.

Water with care

Grass requires 1-inch of water per week: about one hour of sprinkling per week if it has not rained.

Salt smart

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Water quality graphs 1972 - 2016

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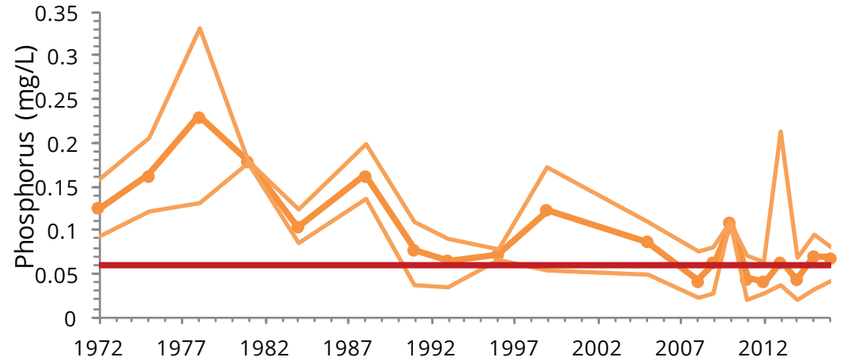
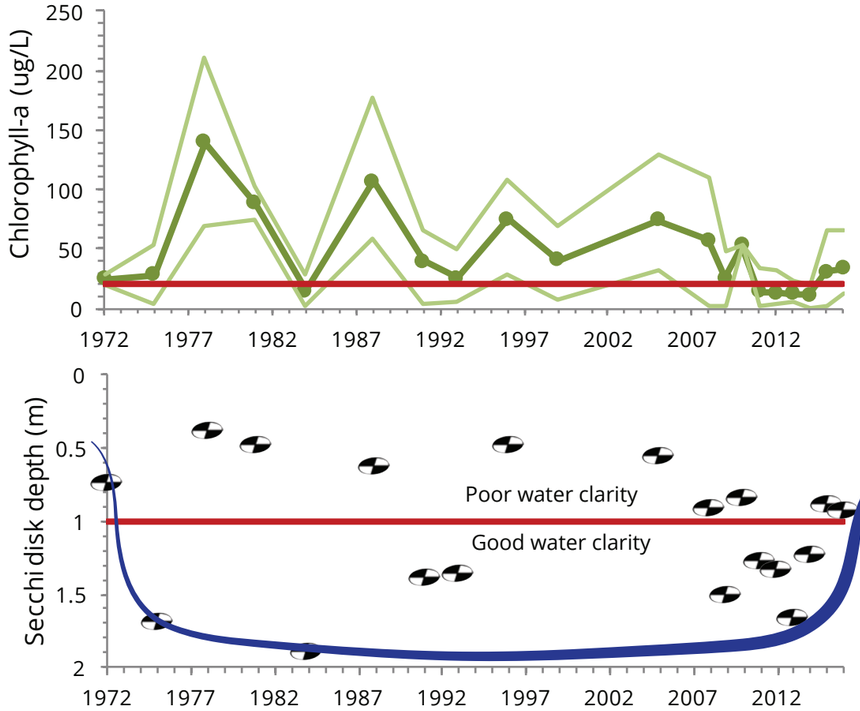


Phosphorus is a nutrient that plants and algae need for growth. It is often measured as total phosphorus (TP). Too much phosphorous can cause algae blooms.



Chlorophyll a is the main pigment in algae, so measuring chl-a can tell us how much algae there is. Too much chl-a means that there are too many nutrients in the water.

Water clarity is measured using a **Secchi Disk**, a black and white disk the size of a dinner plate. It is lowered into the water, and the depth at which it is no longer visible is recorded.

Summary table

	MPCA standard	1972 - 2015			2016		
		max	min	average	max	min	average
TP	<0.06 mg/l	0.33	0.02	0.079	0.08	0.04	0.07
Chl-a	<20 ug/l	211	1	36.8	66.2	12.8	**33.0**
Secchi	>1 m	4.1	0.3	1.2	2.07	0.49	**0.95**

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GRANTS AVAILABLE FOR PROJECTS THAT HELP PROTECT CLEAN WATER

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Awards: up to $3000
(25% homeowner match)

Technical help available

Interested? Contact:
952-607-6481
mjordan@rpbcwd.org

Dive deeper

Interested in learning more? Explore the following reports on our website.

Aquatic plants
Freshwater Scientific Services. 2015. Aquatic Plant Community of Red Rock Lake.

Wenck Associates Inc. 2015. Red Rock Lake Plant Management Plan.

Stormwater ponds
RPBCWD. 2013. Stormwater pond project.

Watershed study
BARR Engineering. 2016. Purgatory Creek Watershed Use Attainability Analysis.

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Red Rock Lake

2016

RILEY PURGATORY BLUFF CREEK WATERSHED DISTRICT

Located in Eden Prairie, Red Rock Lake is a part of the Purgatory Creek chain of lakes. During high water events it outflows through an overflow pipe to Staring Lake.

CHARACTERISTICS

Size	121 acres
Volume	615 acre-ft
Average depth	4.7 ft
Max depth	19 ft
Watershed size	1286 acres
Land draining directly into	332 acres
MPCA lake classification	Shallow
Impairment listing	Mercury
Trophic status	Eutrophic
Common fish	Bluegill, Northern Pike, Pumpkinseed, Yellow Perch
Invasive species	Curlyleaf Pondweed, Eurasian Watermilfoil

WATERSHED BOUNDARIES

Water that falls anywhere within the white boarder drains to Red Rock Lake.

LAND USE in the Red Rock Lake Watershed

How healthy is Red Rock Lake?

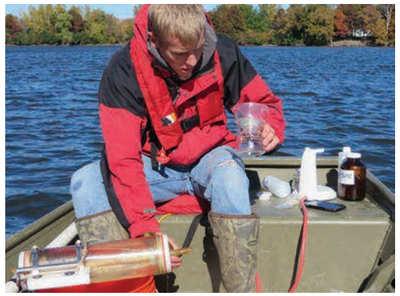
After decades of failing to meet the clean water standards set by the Minnesota Pollution Control Agency (MPCA), Red Rock Lake has improved and been at or near standards for the last six years. Continued water sampling will help monitor whether the trend persists.

The graphs on the next page show the trends over time. The red line on each graph marks the MPCA standard. The goal is for the average values (the dots) to be below the red line.

During the growing season (Jun - Sept), the city of Eden Praire visits Red Rock to collect water samples and take measurements. The samples are tested for several compounds including total phosphorous (TP) and chlorophyll a (Chl-a). The city also measures how clear the water is using a disk that is lowered into the water until it can not be seen. These tests help indicate if the water is clean.

Red Rock is classified as a "Shallow Lake", which means that it is generally less than 15 feet deep and light can reach the bottom in most of the lake. This ample light means that shallow lakes often have a lot of aquatic plants, and are habitat to many types of fish and birds. To be considered healthy by the MPCA, shallow lakes need to be clear enough to see one meter down, and have low TP and Chl-a levels.

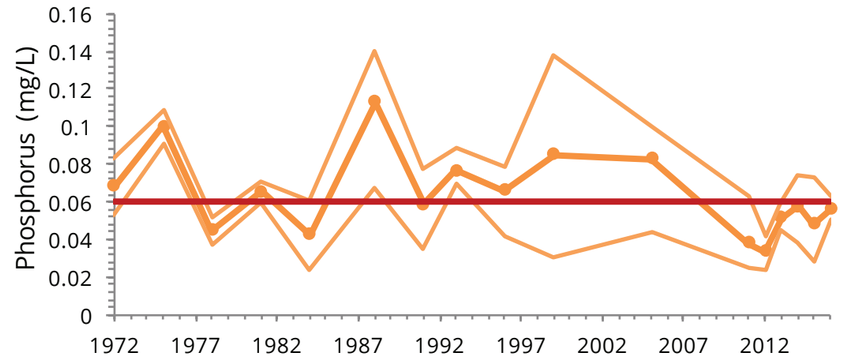
Water lilies are a common site on the lake.



Staff collect water samples on Red Rock Lake.

Water quality graphs 1972 - 2016

Points are growing season (Jun-Sep) averages. Thin lines are the min and max values for each year.



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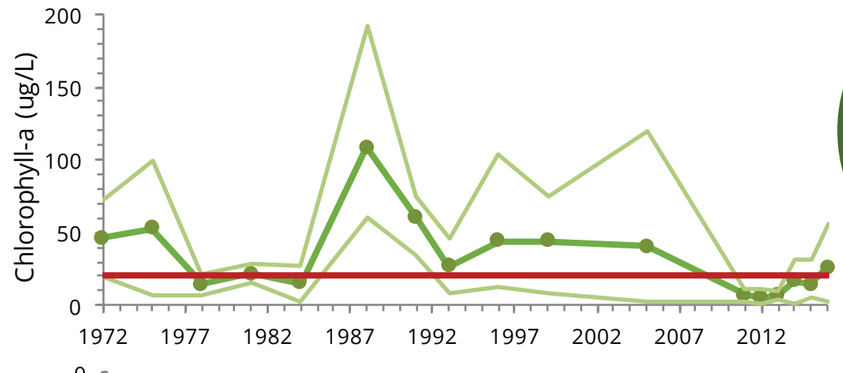

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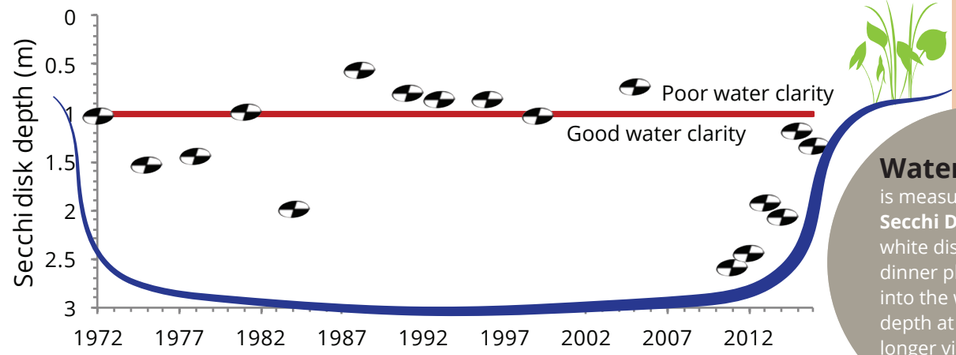

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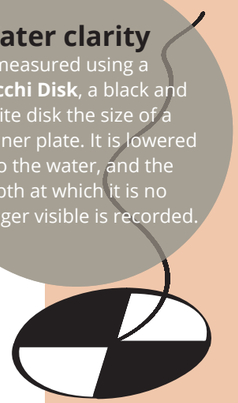

Summary table

	MPCA standard	1972 - 2015 max	1972 - 2015 min	1972 - 2015 average	2016 max	2016 min	2016 average
TP	<0.06 mg/l	0.14	0.024	0.064	0.063	0.051	0.056
Chl-a	<20 ug/l	192	1.3	30.2	56.2	2.8	25.9
Secchi	>1 m	4.9	0.3	1.41	2.63	0.53	1.34

Rainwater runoff, the water that flows across yards, parking lots, and streets into stormdrains, is one of the main causes of pollution in urban areas. You can take simple actions to help protect Red Rock Lake.

Keep the curb clean

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Blue Water Science. 2014. Aquatic plant survey for Rice Marsh Lake, Eden Prairie.

Carp management
Bajer P.G., Headrick,M., Miller B. D. and Sorensen P. W. 2014. Development and implementation of a sustainable strategy to control common carp in Riley Creek Chain of Lakes. University of Minnesota.

Paleolimnology
Ramstack Hobbs J. M. and M.B. Edlund. 2014. Historical water quality and ecological change in Rice Marsh Lake. St. Croix Watershed Rsearch Station.

Stormwater ponds
RPBCWD. 2013. Stormwater pond project.

Watershed study
BARR Engineering. 2016. Rice Marsh Lake and Lake Riley Use Attainability Analysis.

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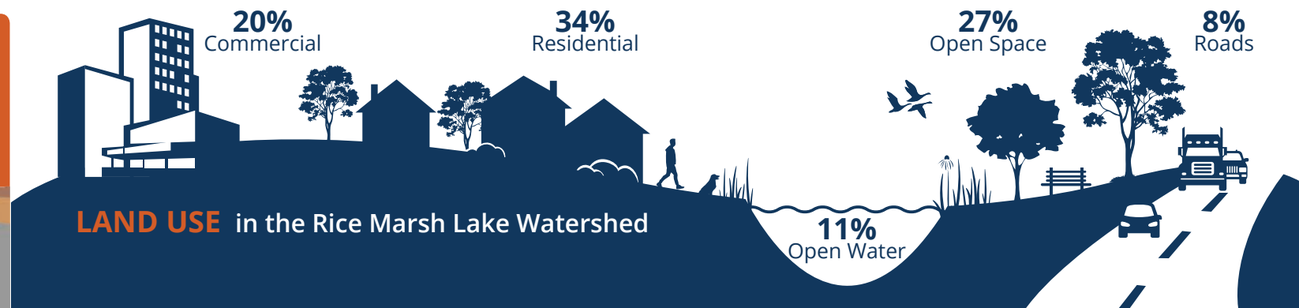
Located in both Eden Prairie and Chanhassen, Rice Marsh Lake is aerated in the winter. This management helps keep bluegill sunfish alive so that they can feed on invasive carp eggs in the spring.

CHARACTERISTICS

Size	81 acres
Volume	350 acre-ft
Average depth	5 ft
Max depth	10 ft
Watershed size	853 acres
Land draining directly into	280 acres
MPCA lake classification	Shallow
Impairment listing	Not listed
Trophic status	Eutrophic
Common fish	Bluegill, White Sucker, Northern Pike
Invasive species	Curlyleaf Pondweed, Purple Loosestrife

WATERSHED BOUNDARIES

Water that falls anywhere within the white boarder drains to Rice Marsh Lake.



LAND USE in the Rice Marsh Lake Watershed

How healthy is Rice Marsh Lake?

Water quality in Rice Marsh Lake improved from 2015 to 2016. Two of the three parameters tested met the clean water standards set by the Minnesota Pollution Control Agency (MPCA). The graphs on the next page show the trends over time. The red line on each graph marks the MPCA standard. The goal is for the average values (the dots) to be below the red line.

During the growing season (June - September), district staff visit Rice Marsh Lake every other week to collect water samples and take measurements. The water samples are sent to a lab where they are tested for several compounds including total phosphorous (TP) and chlorophyll a (Chl-a). Staff also measure how clear the water is using a disk that is lowered into the water until it can no longer be seen. All three of these parameters help indicate whether the water is clean.

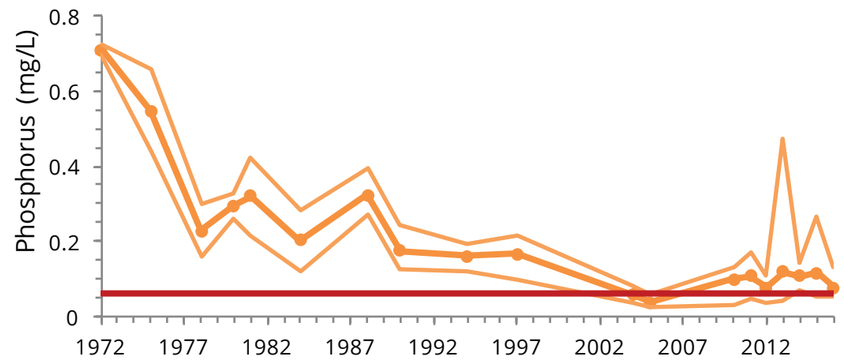
Rice Marsh is classified as a "Shallow Lake", which means that it is generally less than 15 feet deep and light can reach the bottom in most of the lake. This ample light means that shallow lakes often have a lot of aquatic plants, and are habitat to many types of fish and birds. To be considered healthy by the MPCA, shallow lakes need to be clear enough to see one meter down, and have low TP and Chl-a levels.

Motorized craft are not allowed on Rice Marsh Lake, so staff use a canoe to take water samples.

Blooms of thick, stringy algae are common on Rice Marsh Lake in the spring. These harmless green growths usually disappear in a few weeks.

Water quality graphs 1972 - 2016

Points are growing season (Jun-Sep) averages. Thin lines are the min and max values for each year.



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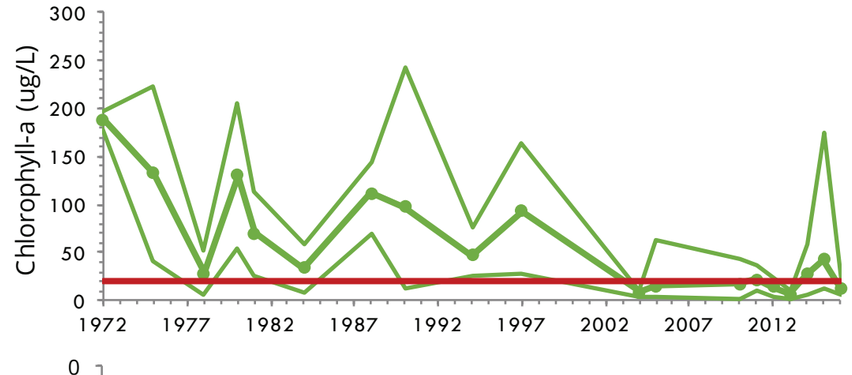

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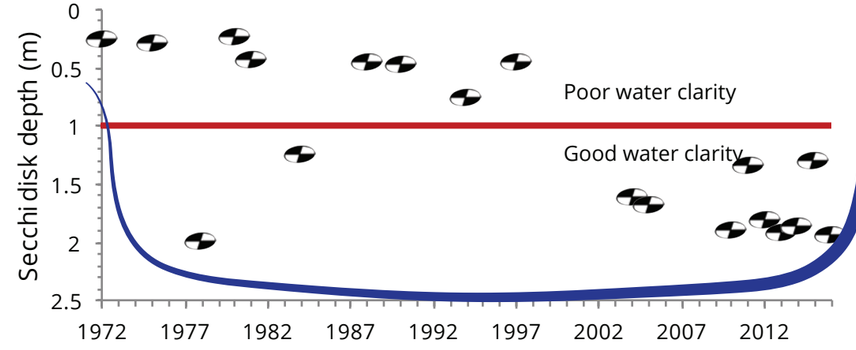

Water clarity is measured using a **Secchi Disk**, a black and white disk the size of a dinner plate. It is lowered into the water, and the depth at which it is no longer visible is recorded.

Summary table

	MPCA standard	1972 - 2015			2016		
		max	min	average	max	min	average
TP	<0.06 mg/l	0.72	0.026	0.16	0.133	0.056	0.077
Chl-a	<20 ug/l	242.4	2.7	46.2	24	6.23	13.5
Secchi	>1 m	3.2	0.1	1.3	2.8	1.15	1.95

Rainwater runoff, the water that flows across yards, parking lots, and streets into stormdrains, is one of the main causes of pollution in urban areas. You can take simple actions to help protect Rice Marsh Lake.

Keep the curb clean

Sweep up leaves, grass clippings and fertilizer from driveways and streets.

Water with care

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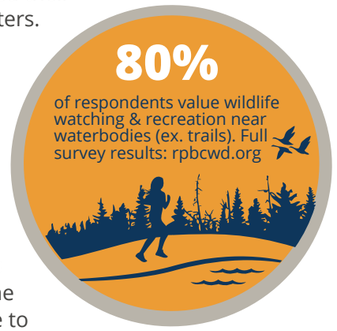

WATER QUALITY SHOWS IMPROVEMENT AFTER ALUM TREATMENT

Early this last May, Lake Riley was treated with alum with the goal improving water quality in the lake. When added to a lake, Alum (aluminum sulfate) binds with phosphorous in the sediments. Once bound, phosphorus can't be used by algae. Since phosphorous is a major food source for algae, this reduces the amount of it that can grow and reproduce, resulting in cleaner, clearer water.

Within a week after the treatment, staff noticed an increase in water clarity during routine water monitoring. Staff has continued to monitor Lake Riley, and there was an overall increase in water quality. An important component to helping the alum do its job is preventing more phosphorus from entering the lake. Help us by raking up leaves, cleaning up after your pet, and keeping stormdrains clear of debris.

The light blue streak is the alum before it sank to the bottom of the lake.

Dive deeper

Interested in learning more? Explore the following reports on our website.

Aquatic plants
Dunne, M. and Newman, R. 2017. Aquatic Plant Community of Lakes Lucy, Mitchell, Susan, Riley and Staring: Annual Report for 2016. University of Minnesota.

JaKa, J. and Newman, R. 2014. Aquatic Plant Community of Lakes Ann, Lotus, Lucy, Mitchell, Susan, Riley and Staring within the Riley Purgatory Bluff Creek Watershed: Final Report 2009 – 2014. University of Minnesota.

Watershed study
BARR Engineering. 2016. Rice Marsh Lake and Lake Riley Use Attainability Analysis.

Stormwater ponds
RPBCWD. 2013. Stormwater pond project.

Carp management
Bajer P.G., Headrick,M., Miller B. D. and Sorensen P. W. 2014. Development and implementation of a sustainable strategy to control common carp in Riley Creek Chain of Lakes. University of Minnesota.

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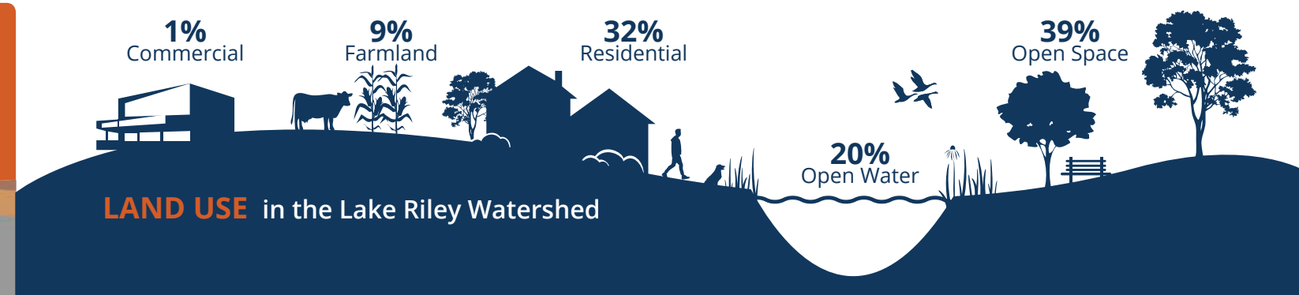
At 297 acres, and with an average depth of 23 ft, Lake Riley is one of the largest lakes in the Riley Purgatory Bluff Creek Watershed District. It is located on the boundary of the cities of Chanhassen and Eden Prairie and is a popular summer recreation stop.

CHARACTERISTICS

Size	297 acres
Volume	6230 acre-ft
Average depth	23 ft
Max depth	49 ft
Watershed size	1776 acres
Land draining directly into	818 acres
MPCA lake classification	Deep
Impairment listing	Mercury & Nutrients
Trophic status	Eutrophic
Common fish	Bluegill, Northern Pike, Yellow Perch, Yellow Bullhead
Invasive species	Curlyleaf Pondweed, Eurasian Watermilfoil, Common Carp

WATERSHED BOUNDARIES

Water that falls anywhere within the white boarder drains to Lake Riley.



How healthy is Lake Riley?

Water quality in Lake Riley improved in 2016, and all three parameters met or nearly met the clean water standards set by the Minnesota Pollution Control Agency (MPCA). This improvement follows the treatment of the lake with Alum in the spring of 2016. Read more about this project on the back page.

During the growing season (June - September), district staff visit Lake Riley every other week to collect water samples and take measurements. The samples are sent to a lab where they are tested for several compounds including total phosphorous (TP) and chlorophyll a (Chl-a). Staff also measure how clear the water is using a disk that is lowered into the water until it can no longer be seen. All three of these test help indicate if the water is clean.

Riley is classified as a "Deep Lake", which means that it is over 15 feet deep and light can not reach the bottom in most of the lake. To be considered healthy by the MPCA, it needs to be clear enough to see 1.4 meters down, and have very low TP and Chl-a levels.

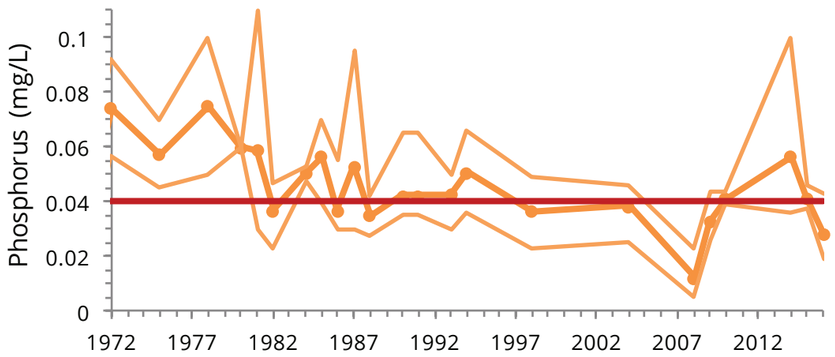
The graphs on the next page show the trends over time. The red line on each graph marks the MPCA standard. The goal for each graph is for the average values (the dots) to be below the red line.

A professional crew applies Alum to Lake Riley with a specialized boat.

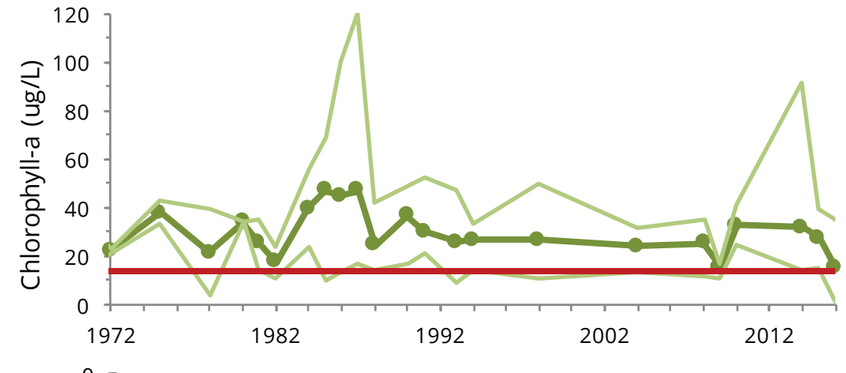
A staff member collects water level data from a sensor installed on Lake Riley. These data are available through the DNR Lake Finder Website.

Water quality graphs 1972 - 2016

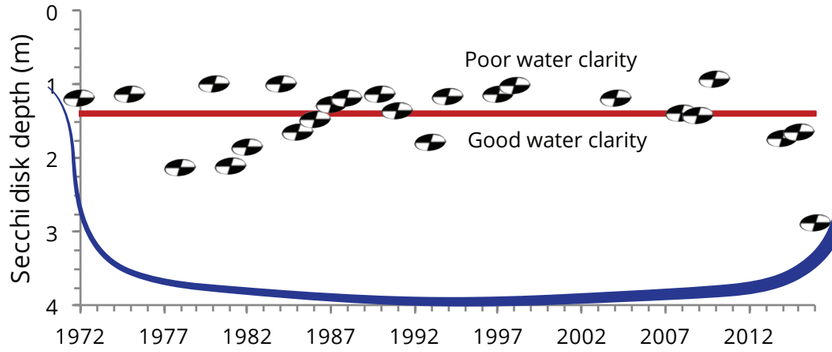
Points are growing season (Jun-Sep) averages. Thin lines are the min and max values for each year.



Phosphorus is a nutrient that plants and algae need for growth. It is often measured as total phosphorus (TP). Too much phosphorous can cause algae blooms.



Chlorophyll-a is the main pigment in algae, so measuring chl-a can tell us how much algae there is. Too much chl-a means that there are too many nutrients in the water.



Water clarity is measured using a **Secchi Disk**, a black and white disk the size of a dinner plate. It is lowered into the water, and the depth at which it is no longer visible is recorded.

Summary table

	MPCA standard	1972 - 2015			2016		
		max	min	average	max	min	average
TP	<0.04 mg/l	0.11	0.005	0.044	0.043	0.019	0.029
Chl-a	<14 ug/l	120	4	29.6	34.7	1	**14.9**
Secchi	>1.4 m	3.7	0.5	1.4	5.95	1.2	**2.9**

Rainwater runoff, the water that flows across yards, parking lots, and streets into stormdrains, is one of the main causes of pollution in urban areas. You can take simple actions to help protect Lake Riley.

Keep the curb clean

Sweep up leaves, grass clippings and fertilizer from driveways and streets.

Water with care

Grass requires 1-inch of water per week: about one hour of sprinkling per week if it has not rained.

Salt smart

The salt we use to melt ice can pollute our lakes and creeks. Use salt sparingly and always shovel first.

Reuse the rain

Collect and reuse rainwater with a rain barrel.

Build a raingarden

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What's happening

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IMPROVED WATER QUALITY SINCE ALUM TREATMENT

In November of 2012, the city of Eden Prairie conducted an Alum treament in Round Lake. Aluminum phosphate (Alum) is one method that can be used to help protect clean water. Alum reduces the growth of algae by trapping the nutriet phosphorus - algae's food source - in sediments. Like most other plants, algae require phosphorus to grow and reproduce. Decreasing available phosphorus decreases how much algae can grow, and the likelihood of a thick, green blooms in the summer. Water samples taken since the treatment show improvements for Round Lake! In fact, the lake met all three water quality standards in 2016 (see inside pages for data). Continued sampling will help monitor how the treatment responds over time.

An alum barge treating a lake.

Dive deeper

Interested in learning more? Explore the following reports on our website.

Aquatic plants
Blue Water Science. 2013 Aquatic plant surveys and water quality for Round Lake and two tributary ponds.

Watershed study
Barr Engineering. 2016. Purgatory Creek Watershed Use Attainability Analysis.

Stormwater ponds
RPBCWD. 2013. Stormwater pond project.

Paleolimnology
Ramstack J. M. and Edlund M. B. 2011. Historical water quality and ecological change of three lakes in the Riley Purgatory Bluff Creek Watershed District, MN.

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Round Lake

2016

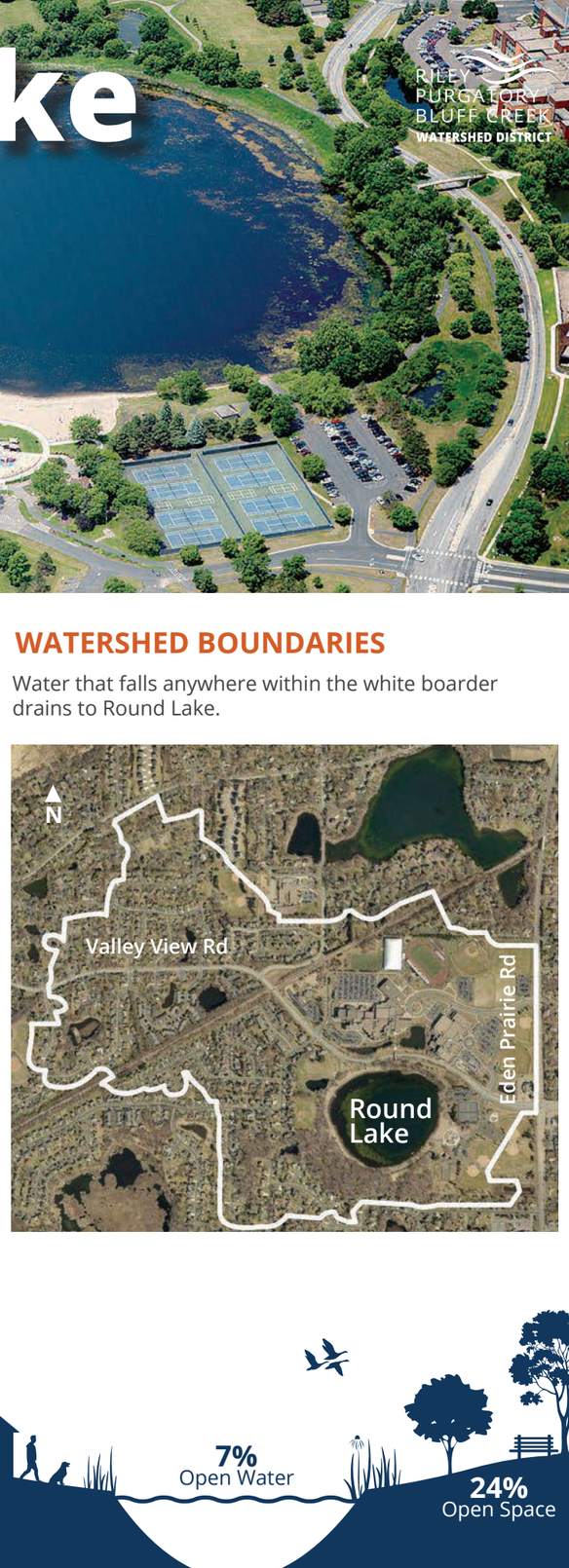
Located in Eden Prairie, Round Lake is a part of the Purgatory Creek Chain of Lakes. With a park and a trail system around the lake, it is a popular recreation spot.

CHARACTERISTICS

Size	30 acres
Volume	327 acre-ft
Average depth	11 ft
Max depth	37 ft
Watershed size	475 acres
Land draining directly into	105 acres
MPCA lake classification	Deep
Impairment listing	Mercury & Perfluorooctane
Trophic status	Eutrophic
Common fish	Bluegill, N. Pike, Yellow Bullhead, Yellow Perch
Invasive species	Curlyleaf Pondweed, Eurasian Watermilfoil, Common Carp

WATERSHED BOUNDARIES

Water that falls anywhere within the white boarder drains to Round Lake.



LAND USE in the Round Lake Watershed

How healthy is Round Lake?

Round Lake has been monitored for over 40 years. In that time, it has often failed to meet the clean water standards set by the Minnesota Pollution Control Agency (MPCA). However, there have been significant improvements since 2012 when the city of Eden Prairie conducted an alum treatment, and in 2016 it met all standards. Read more about alum on the back page.

During the growing season (June - September), the city of Eden Prairie visits Round Lake every other week to collect water samples and take measurements. The samples are sent to a lab where they are tested for several compounds including total phosphorous (TP) and chlorophyll a (Chl-a). Staff also measure how clear the water is using a disk that is lowered into the water until it can no longer be seen. All three of these parameters help indicate whether the water is clean.

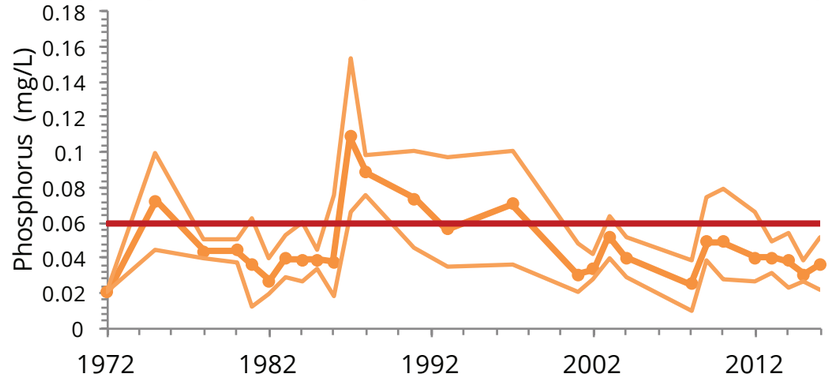
Round is classified as a “Deep Lake”, which means that it is over 15 feet deep and light can not reach the bottom in most of the lake. To be considered healthy by the MPCA, deep lakes need to be clear enough to see 1.4 meters down, and have very low TP and Chl-a.

Round Lake Park is a popular spot to visit, play, and explore.

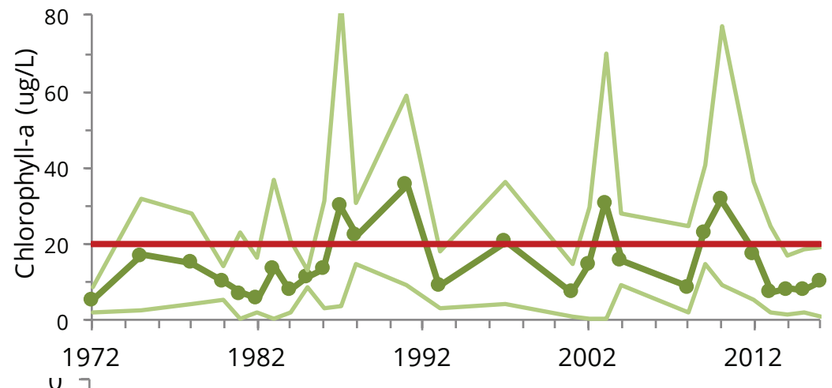
The park trail goes all the way around the lake.

Water quality graphs 1972 - 2016

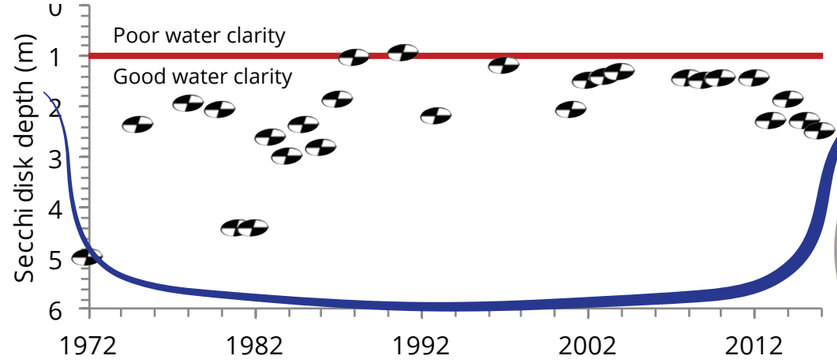
Points are growing season (Jun-Sep) averages. Thin lines are the min and max values for each year.



Phosphorus is a nutrient that plants and algae need for growth. It is often measured as total phosphorus (TP). Too much phosphorous can cause algae blooms.



Chlorophyll a is the main pigment in algae, so measuring chl-a can tell us how much algae there is. Too much chl-a means that there are too many nutrients in the water.



Water clarity is measured using a **Secchi Disk**, a black and white disk the size of a dinner plate. It is lowered into the water, and the depth at which it is no longer visible is recorded.

Summary table

	MPCA standard	1972 - 2015			2016		
		max	min	average	max	min	average
TP	<0.04 mg/l	0.15	0.01	0.045	0.052	0.022	**0.036**
Chl-a	<14 ug/l	83	0.2	15.4	19.2	1	**10.3**
Secchi	>1.4 m	6.2	0.5	2.2	4.45	1.13	**2.5**

Rainwater runoff, the water that flows across yards, parking lots, and streets into stormdrains, is one of the main causes of pollution in urban areas. You can take simple actions to help protect Round Lake.

Keep the curb clean

Sweep up leaves, grass clippings and fertilizer from driveways and streets.

Water with care

Grass requires 1-inch of water per week: about one hour of sprinkling per week if it has not rained.

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WILD RICE ON SIVER LAKE

Wild rice has been spotted on Silver Lake! Wild rice is uncommon in urban lakes. Northern wild rice is an aquatic grass native to the Great Lakes region, and usually found in Northern and Central Minnesota. It grows in shallow lakes, wetlands, and along streams in less than three feet of water. Wild rice, Minnesota's official state grain, is an important plant within the state. Not only is it an attractive source of food for migrating waterfowl, it is important agriculturally. Rice is a valuable crop culturally and economically. Wild rice needs clean water to flourish, and protecting Silver Lake will help promote this native Minnesota plant.

Dive deeper

Interested in learning more? Explore the following reports on our website.

Aquatic plants
Blue Water Science. 2014. Aquatic plant surveys for Silver Lake. Eden Prairie, MN.

Watershed study
BARR Engineering. 2016. Purgatory Creek Watershed Use Attainability Analysis.

Stormwater ponds
RPBCWD. 2013. Stormwater pond project.

Paleolimnology
BRamstack Hobbs J. M. and M. B. Edlund. 2015. Paleolimnological analysis of Silver Lake, Hennepin County, Minnsota. St. Croix Watershed Research Station.

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Located in Shorewood, Silver Lake sits at the edge of the watershed district. It is the only lake in the district that has wild rice, a rare plant to find in metro area lakes!

CHARACTERISTICS

Size	71 acres
Volume	190 acre-ft
Average depth	5 ft
Max depth	14 ft
Watershed size	361 acres
MPCA lake classification	Shallow
Impairment listing	Not Listed
Trophic status	Hypereutrophic
Common fish	Unknown
Invasive species	Curlyleaf Pondweed, Purple Loosestrife

WATERSHED BOUNDARIES

LAND USE in the Silver Lake Watershed

How healthy is Silver Lake?

Silver Lake water quality has been monitored since 1996. Since that time, it has consistently failed to meet the clean water standards set by the Minnesota Pollution Control Agency (MPCA). In recent years, water quality has improved, but still does not meet standards.

During the growing season (June - September), district staff visit Silver Lake every other week to collect water samples and take measurements. The water samples are sent to a lab where they are tested for several compounds including total phosphorous (TP) and chlorophyll a (Chl-a). Staff also measure how clear the water is using a disk that is lowered into the water until it can no longer be seen. All three of these parameters help indicate whether the water is clean. Find out more about each on the next page.

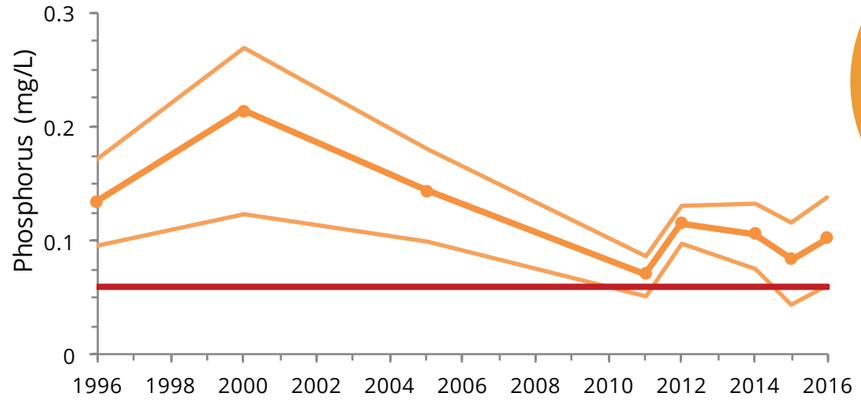
Silver is classified as a “Shallow Lake”, which means that it is generally less than 15 feet deep and light can reach the bottom in most of the lake. To be considered healthy by the MPCA, shallow lakes need to be clear enough to see one meter down, and have low TP and Chl-a levels. These shallow lake standards are listed in the summary table.

A staff members prepares to collect a water sample using a Van Dorn sampler.

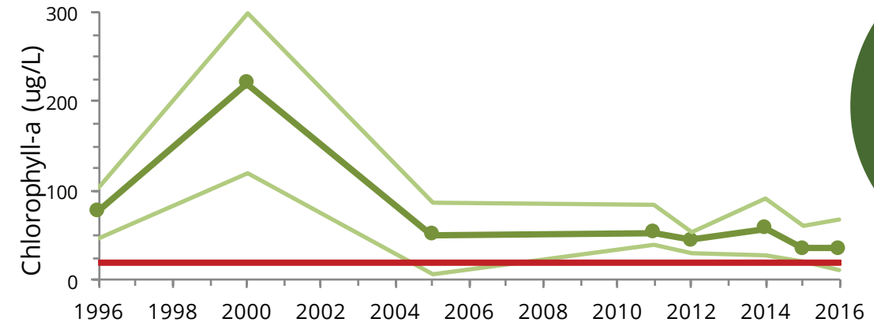
An egret hunts along the shores of Silver Lake.

Water quality graphs 1996 - 2016

Points are growing season (Jun-Sep) averages. Thin lines are the min and max values for each year.



Phosphorus is a nutrient that plants and algae need for growth. It is often measured as total phosphorus (TP). Too much phosphorous can cause algae blooms.



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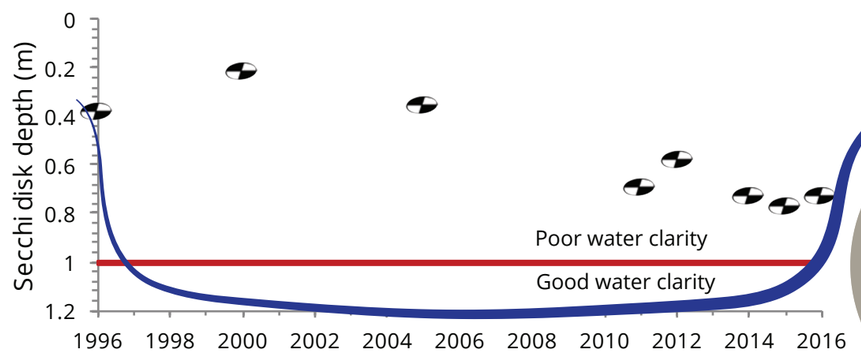

Water clarity is measured using a **Secchi Disk**, a black and white disk the size of a dinner plate. It is lowered into the water, and the depth at which it is no longer visible is recorded.

Rainwater runoff, the water that flows across yards, parking lots, and streets into stormdrains, is one of the main causes of pollution in urban areas. You can take simple actions to help protect Silver Lake.

Keep the curb clean
Sweep up leaves, grass clippings and fertilizer from driveways and streets.

Water with care
Grass requires 1-inch of water per week: about one hour of sprinkling per week if it has not rained.

Salt smart
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Reuse the rain
Collect and reuse rainwater with a rain barrel.

Build a raingarden
Raingardens soak up water and filter out pollution. Visit our website for help.

Summary table

	MPCA standard	1996 - 2015			2016		
		max	min	average	max	min	average
TP	<0.06 mg/l	0.27	0.05	0.12	0.14	0.061	0.102
Chl-a	<20 ug/l	300	8	74.6	67.6	11.6	**35.6**
Secchi	>1 m	1	0.2	0.6	1.1	0.7	**0.5**

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STARING LAKE CARP POPULATION ABOVE HEALTHY LEVEL

The district has wrapped up this season's carp monitoring on Staring Lake. It was discovered that this year, carp numbers surpassed the threshold at which they begin to harm the lake. Common carp, an invasive species to Minnesota water bodies, have a detrimental effect on our lakes and streams. They disturb sediment, reducing water quality and the presence of native plants. They also feed on macro invertebrates, which feed on algae. This can lead to excessive algal blooms on the lake which further impacts water quality. Since Staring Lake was above the threshold, the district is looking to hire commercial fisherman to net and remove the carp. In preparation, staff tagged 15 carp with radio transmitters (photo below). Carp tend to school together in the winter, and the transmitters will allow the fishermen to find large groups to target.

Dive deeper

Interested in learning more? Explore the following reports on our website.

Aquatic plants

Dunne, M. and Newman, R. 2017. Aquatic Plant Community of Lakes Lucy, Mitchell, Susan, Riley and Staring: Annual Report for 2016. University of Minnesota.

Freshwater Scientific Services. 2015. Staring Lake Eurasian Watermilfoil Early Detection and Rapid Response.

JaKa, J. and Newman, R. 2014. Aquatic Plant Community of Lakes Ann, Lotus, Lucy, Mitchell, Susan, Riley and Staring within the RPBCWD: Final Report 2009 – 2014. University of Minnesota.

Assessments

BARR Engineering. 2016. Purgatory Creek Watershed Use Attainability Analysis.

RPBCWD & BARR Engineering. 2015. Creek Restoration Action Strategy.

RPBCWD. 2013. Stormwater pond project.

Carp management

Sorensen P, Bajer P and M Headrick. 2015. Development and implementation of a sustainable strategy to control common carp in the Purgatory Creek chain of Lakes. University of Minnesota.

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Staring Lake

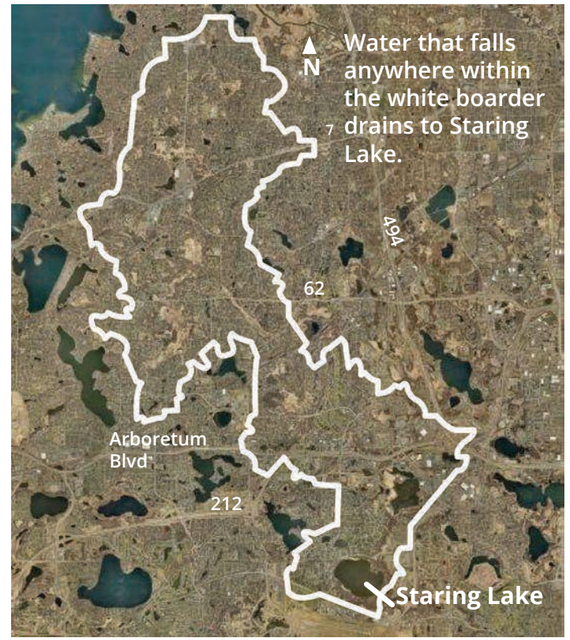
2016

Staring Lake is located in Eden Prairie, west of Flying Cloud Drive. and north of Pioneer Trail. Staring has a public boat ramp and a fishing pier. The Eden Prairie Outdoor Center is also located on its shores, off of Staring Lake Parkway.

CHARACTERISTICS

Size	166 acres
Volume	1,220 acre-ft
Average depth	7 ft
Max depth	16 ft
Watershed size	10,206 acres
Land draining directly into	314 acres
MPCA lake classification	Shallow
Impairment listing	Mercury & Nutrients
Trophic status	Hypereutrophic
Common fish	Bluegill, Black Crappie, Black Bullhead
Invasive species	Curlyleaf Pondweed, Eurasian Watermilfoil, Common Carp

WATERSHED BOUNDARIES



LAND USE in the Staring Lake Watershed

How healthy is Staring Lake?

For the past 40 years, Staring Lake water quality has failed to meet the clean water standards set by the Minnesota Pollution Control Agency (MPCA). The graphs on the next page show the trends over time. The red line on each graph marks the MPCA standard. The goal is for the average values (the dots) to be below the red line.

During the growing season (June - September), district staff visit Staring Lake every other week to collect water samples and take measurements. The samples are sent to a lab and tested for several compounds including total phosphorous (TP) and chlorophyll a (Chl-a). Staff also measure how clear the water is using a disk that is lowered into the water until it can no longer be seen. All three of these parameters help indicate whether the water is clean.

Staring is classified as a "Shallow Lake", which means that it is generally less than 15 feet deep and light can reach the bottom in most of the lake. This ample light means that shallow lakes often have a lot of aquatic plants, and are habitat to many types of fish and birds. To be considered healthy by the MPCA, shallow lakes need to be clear enough to see one meter down, and have low TP and Chl-a levels.

Common Carp are an invasive species. They can negatively impact water quality and lake health. The district works to manage carp in the lake.

Curlyleaf pondweed is another invader that the district works to manage. It can form dense mats and competes with native plants.

Rainwater runoff, the water that flows across yards, parking lots, and streets into stormdrains, is one of the main causes of pollution in urban areas. You can take simple actions to help protect Staring Lake.

Keep the curb clean
Sweep up leaves, grass clippings and fertilizer from driveways and streets.

Water with care
Grass requires 1-inch of water per week: about one hour of sprinkling per week if it has not rained.

Salt smart
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Build a raingarden
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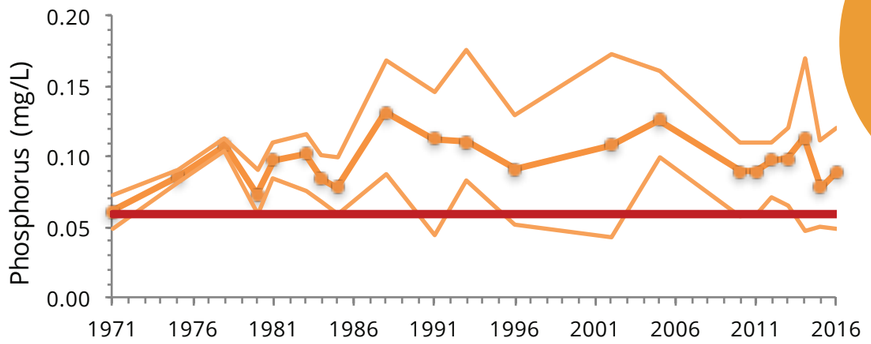
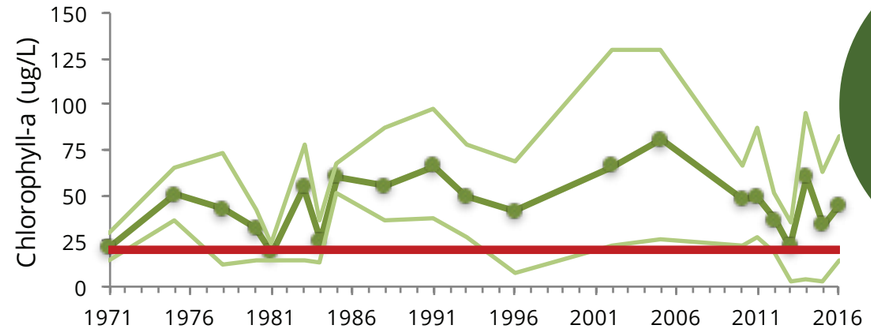
Water quality graphs 1971 - 2016

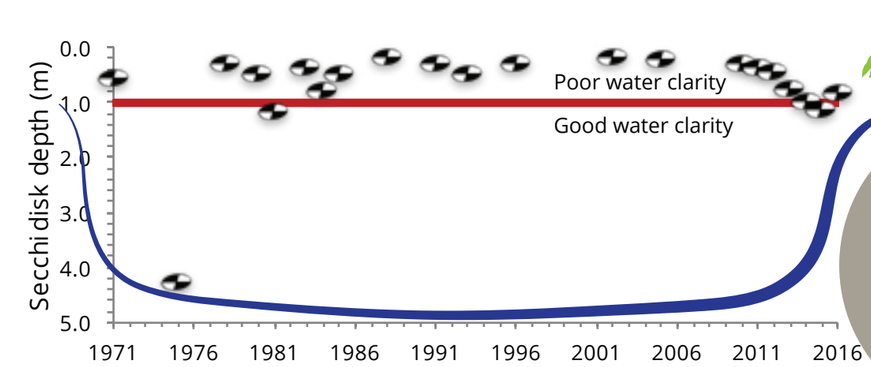
Points are growing season (Jun-Sep) averages. Thin lines are the min and max values for each year.



Phosphorus is a nutrient that plants and algae need for growth. It is often measured as total phosphorus (TP). Too much phosphorous can cause algae blooms.



Chlorophyll a is the main pigment in algae, so measuring chl-a can tell us how much algae there is. Too much chl-a means that there are too many nutrients in the water.



Water clarity is measured using a **Secchi Disk**, a black and white disk the size of a dinner plate. It is lowered into the water, and the depth at which it is no longer visible is recorded.

Summary table

	MPCA standard	Since 1971			2016		
		max	min	average	max	min	average
TP	<0.06 mg/l	0.175	0.043	0.098	0.12	0.049	0.089
Chl-a	<20 ug/l	130	2.7	47.3	82.8	14.2	44.3
Secchi	>1 m	4.3	0.2	0.8	1.8	0.6	0.8

What's happening

UPDATING THE WATERSHED MANAGEMENT PLAN

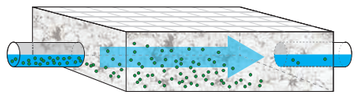
The plan guides district actions for a decade, and is currently being updated.

In 2016, the district embarked on a special outreach campaign to engage the community in updating the 10-Year Management Plan. This included public meetings, a survey, and tabling at local events. Over 500 residents shared their concerns about local waters. We gained insight into how residents use, and value water resources. This input helped frame the creation of the new plan's goals and strategies. Once completed, the plan will guide district actions over the next decade. The community can continue to engage with the district in this process in 2017. Join our email newsletter list to stay up to date! Subscribe at rpbcwd.org.

SPENT LIME FILTER COMPLETED AT LAKE SUSAN

A spent-lime filtration system was built at a culvert where stormwater flows into Lake Susan. Its purpose is to filter out phosphorus, a nutrient that can cause algae blooms and poor water quality. The system is designed to remove about 45 lbs of phosphorus annually from stormwater entering the lake. That's about 22,500 pounds of algae!

HOW IT WORKS



WHAT IT LOOKS LIKE

Dive deeper

Interested in learning more? Explore the following reports on our website.

Aquatic plants
Dunne, M. and Newman, R. 2017. Aquatic Plant Community of Lakes Lucy, Mitchell, Susan, Riley and Staring: Annual Report for 2016. University of Minnesota.

JaKa, J. and Newman, R. 2014. Aquatic Plant Community of Lakes Ann, Lotus, Lucy, Mitchell, Susan, Riley and: Final Report 2009 – 2014. University of Minnesota.

Watershed study
Wenck Associates Inc. 2013. Lake Susan Use Attainability Analysis.

Stormwater ponds
RPBCWD. 2013. Stormwater pond project.

Carp management
Bajer P.G., Headrick,M., Miller B. D. and Sorensen P. W. 2014. Development and implementation of a sustainable strategy to control common carp in Riley Creek Chain of Lakes. University of Minnesota.

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Lake Susan

2016

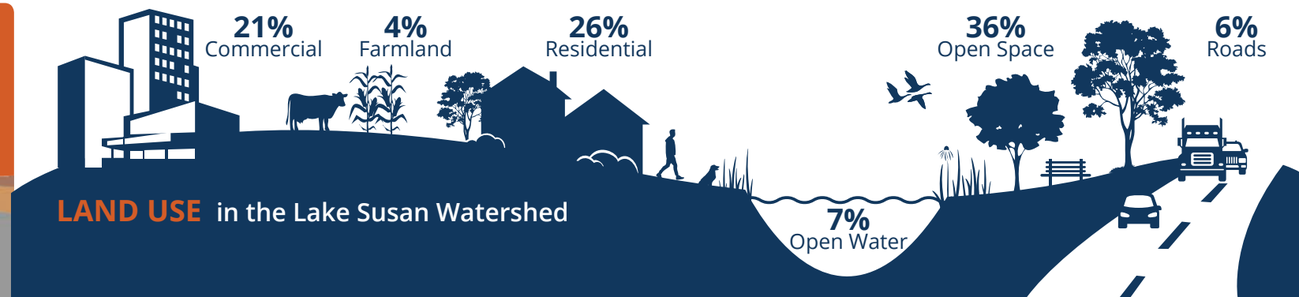
RILEY PURGATORY BLUFF CREEK WATERSHED DISTRICT

Located in Chanhassen, Lake Susan is a part of the Riley Creek Chain of Lakes. It is the third lake that Riley Creek flows through as it makes its way to the Minnesota River.

CHARACTERISTICS

Size	88 acres
Volume	885 acre-ft
Average depth	10 ft
Max depth	17 ft
Watershed size	1281 acres
Land draining directly into	66 acres
MPCA lake classification	Shallow
Impairment listing	Mercury & Nutrients
Trophic status	Eutrophic
Common fish	Bluegill, Black Crappie, Northern Pike, Black Bullhead
Invasive species	Curlyleaf Pondweed, Eurasian Watermilfoil, Common Carp

WATERSHED BOUNDARIES



LAND USE in the Lake Susan Watershed

How healthy is Lake Susan?

For the past 40 years, Lake Susan water quality has consistently failed to meet the clean water standards set by the Minnesota Pollution Control Agency (MPCA). In 2016, the highest chlorophyll a (algae) levels ever were detected.

During the growing season (June - September), district staff visit Lake Susan every other week to collect water samples and take measurements. The water samples are sent to a lab where they are tested for several compounds including total phosphorous (TP) and chlorophyll a (Chl-a). Staff also measure how clear the water is using a disk that is lowered into the water until it can no longer be seen. All three of these parameters help indicate whether the water is clean. Find out more about each on the next page.

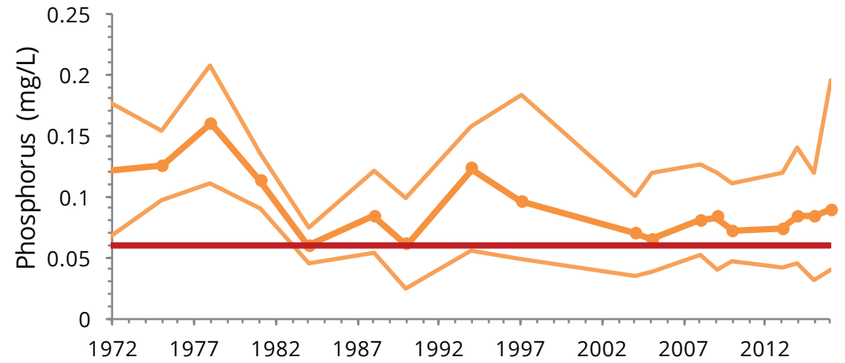
Susan is classified as a “Shallow Lake”, which means that it is generally less than 15 feet deep and light can reach the bottom in most of the lake. To be considered healthy by the MPCA, shallow lakes need to be clear enough to see one meter down, and have low TP and Chl-a levels. These shallow lake standards are listed in the summary table.

A winter day near wetlands that flow into Lake Susan.

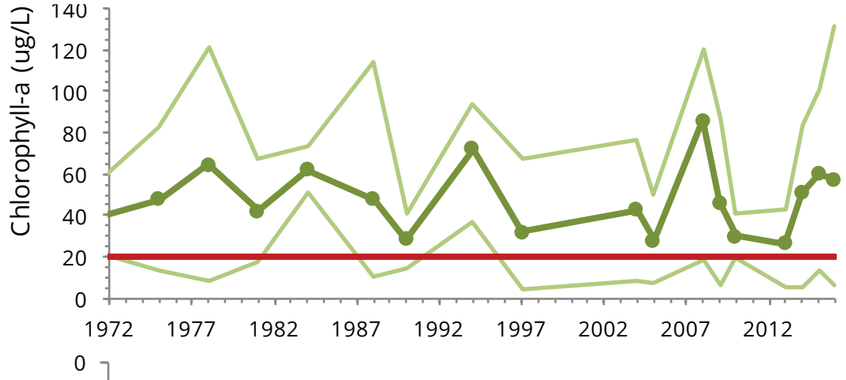
Staff collect water samples on Lake Susan.

Water quality graphs 1972 - 2016

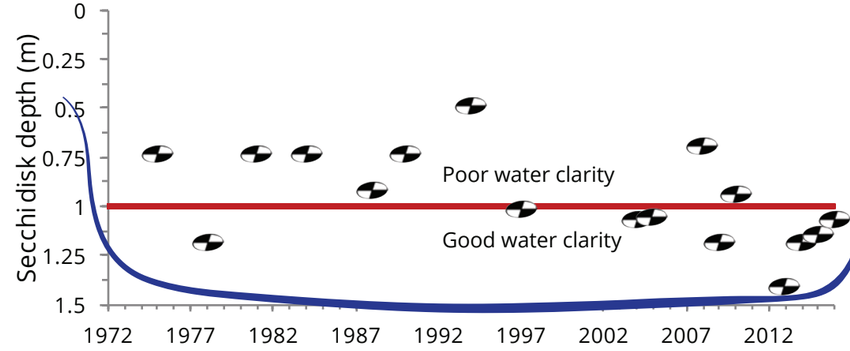
Points are growing season (Jun-Sep) averages. Thin lines are the min and max values for each year.



Phosphorus is a nutrient that plants and algae need for growth. It is often measured as total phosphorus (TP). Too much phosphorous can cause algae blooms.



Chlorophyll a is the main pigment in algae, so measuring chl-a can tell us how much algae there is. Too much chl-a means that there are too many nutrients in the water.



Water clarity is measured using a **Secchi Disk**, a black and white disk the size of a dinner plate. It is lowered into the water, and the depth at which it is no longer visible is recorded.

Rainwater runoff, the water that flows across yards, parking lots, and streets into stormdrains, is one of the main causes of pollution in urban areas. You can take simple actions to help protect Lake Susan.

Keep the curb clean

Sweep up leaves, grass clippings and fertilizer from driveways and streets.

Water with care

Grass requires 1-inch of water per week: about one hour of sprinkling per week if it has not rained.

Salt smart

The salt we use to melt ice can pollute our lakes and creeks. Use salt sparingly and always shovel first.

Reuse the rain

Collect and reuse rainwater with a rain barrel.

Build a raingarden

Raingardens soak up water and filter out pollution. Visit our website for help.

Summary table

	MPCA standard	1972 - 2015			2016		
		max	min	average	max	min	average
TP	<0.06 mg/l	0.208	0.024	0.084	0.195	0.04	**0.09**
Chl-a	<20 ug/l	121	3.9	45.4	132	6.23	**57.6**
Secchi	>1 m	3.6	0.3	1	2.95	0.4	**1.1**

What's happening

UPDATING THE WATERSHED MANAGEMENT PLAN

The plan guides district actions for a decade, and is currently being updated.

In 2016, the district embarked on a special outreach campaign to engage the community in updating the 10-Year Management Plan. This included public meetings, a survey, and tabling at local events. Over 500 residents shared their concerns about local waters. We gained insight into how residents use, and value water resources. This input helped frame the creation of the new plan's goals and strategies. Once completed, the plan will guide district actions over the next decade. The community can continue to engage with the district in this process in 2017. Join our email ist to stay up to date!

HELP PREVENT EROSION ON BLUFF CREEK

When the banks and slopes of Bluff Creek wear away and fall into the creek, the sediment harms plants and animals who rely on it for habitat. Eroding slopes are also a danger to people and buildings.

You can help us slow erosion down to healthy levels

Plants are important for holding soil in place. If you live on or near a creek, promote healthy plant growth on the slopes leading to the creek: don't dump leaves or debris - these can smother growing plants - and plant native species that have roots that grow deep.

Stormwater runoff from homes, parking lots, and roads increases erosion when it rushes into the creek after a rainfall. Even if you don't live near the creek, you can help prevent erosion by slowing down stormwater. Build a raingarden to soak water from your roof into the ground, or install a rainbarrel to catch, hold, and reuse it. If you live on a steep slope above a creek, don't discharge water or heavily water your landscape: saturated soils are prone to erosion and can contribute to slope failure.

YOU CAN HELP

Rainwater runoff, the water that flows across yards, parking lots, and streets into stormdrains, is one of the main causes of pollution in urban areas. You can take simple actions to help protect Bluff Creek.

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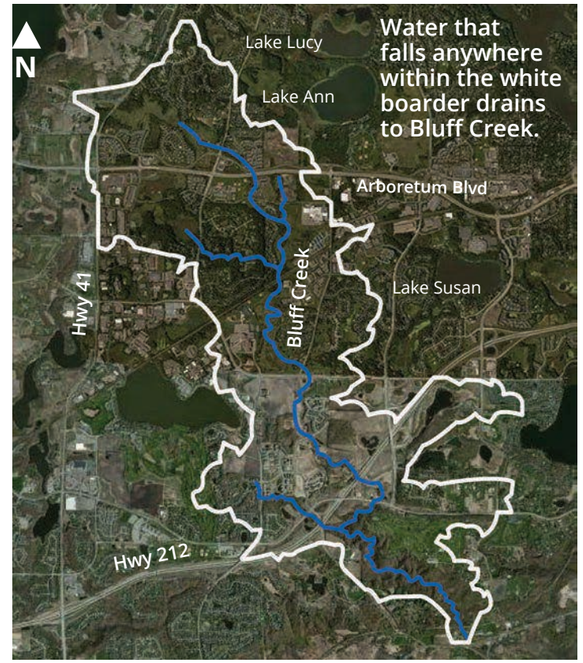
In the photo above, Bluff Creek winds its way south, past Chanhassen High School. Bluff is about seven miles long, and unlike Purgatory and Riley Creeks, does not connect any lakes on its way to the Minnesota River. It does however connect many wetlands and you can explore almost its entire length on trails.

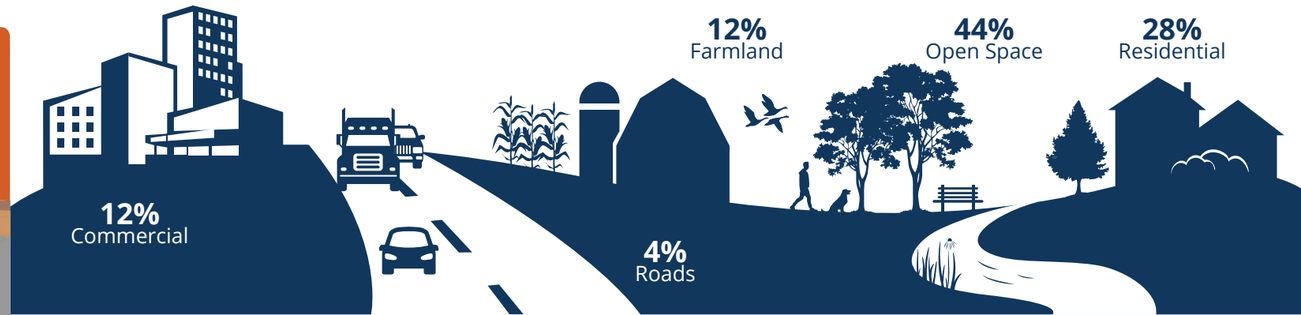
CHARACTERISTICS

Length	6.8 miles
Elevation change	232 ft
Watershed size	5.8 sq miles
# of cities in watershed	2
# of lakes connected	0
# of monitoring sites	5
# of parks	3
Impairment	Turbidity, Fish
Common fish	Brook Stickleback, Northern Fathead Minnow
Invasive species	Reed Canary Grass, Buckthorn

WATERSHED BOUNDARIES



LAND USE in the Bluff Creek Watershed



How healthy is Bluff Creek?

Keeping Bluff Creek healthy requires several tools and strategies. Implementing projects to stabilize the stream banks and restore creek reaches is one important strategy. Cleaning and slowing rainwater runoff before it reaches the creek is another. But before either of these can be done, we need to understand how the creek is doing and where it needs the most help.

The watershed district has been monitoring Bluff Creek since the 1970s. Recently, the district developed a new tool to assess the creek: the Creek Restoration Action Strategy (CRAS). The CRAS uses water quality data, as well as information on erosion and habitat to rank which creek sections are doing the best, and which are doing the poorly. Below, the three major types of data used in the assessment are described. On the next page, a creek map shows the results from 2016.

Water quality

District staff take samples at five sites during summer. They gather data on nutrient levels (phosphorus), algae, sediment, pH, and dissolved oxygen. These data let us know how clean the water is, and whether it is healthy for plants, animals, and people.

Erosion

Every year, staff walk along sections of the creek. They note sites with erosion, its severity, and whether any structures like houses or bridges are in danger. Erosion is also a problem because the sediment that erodes into the creek is a pollutant.

Habitat

Creeks are important habitat for insects, plants, fish, birds, and other animals. When staff check for erosion, they also assess the habitat. Reaches receive a score based on the quality of habitat they provide, and whether it needs to be restored.

Dive deeper

Interested in learning more? Explore the following reports on our website.

Assessment
RPBCWD & BARR Engineering. 2015. Creek Restoration Action Strategy.

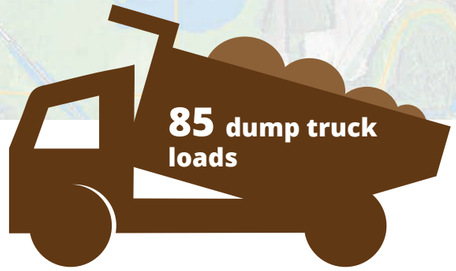
Implementation plan
BARR Engineering. 2013. Bluff Creek Watershed: Total Maximum Daily Load Implementation Plan.

Stormwater ponds
RPBCWD. 2013. Stormwater Pond Project.

2016 ASSESSMENT RESULTS

Each section of Bluff Creek is coded with one of five colors based on how healthy it is. Blue is the best and red the worst. The areas most in need of help are scattered throughout the whole length of the creek. The reach in the south-west corner is particularly degraded, and the district is working with its partners to investigate potential projects to improve it.

Each year, Bluff Creek carries the average equivalent of



of **sediment** into the **Minnesota River Valley**
[Metropolitan Council]

What's happening

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PURGATORY CREEK REACH RESTORED

In partnership with the City of Minnetonka, the district conducted its first-ever creek restoration in 2016. Near the intersection of County Road 101 and Townline Road, the partners stabilized eroding banks along close to 2000 feet of Purgatory Creek. The goal of the restoration is to improve water and habitat quality, and overall creek health. Staff will be returning in thespring of 2017 to check on the project and plant some additional native vegetation.

YOU CAN HELP

Rainwater runoff, the water that flows across yards, parking lots, and streets into stormdrains, is one of the main causes of pollution in urban areas. You can take simple actions to help protect Purgatory Creek.

Keep the curb clean
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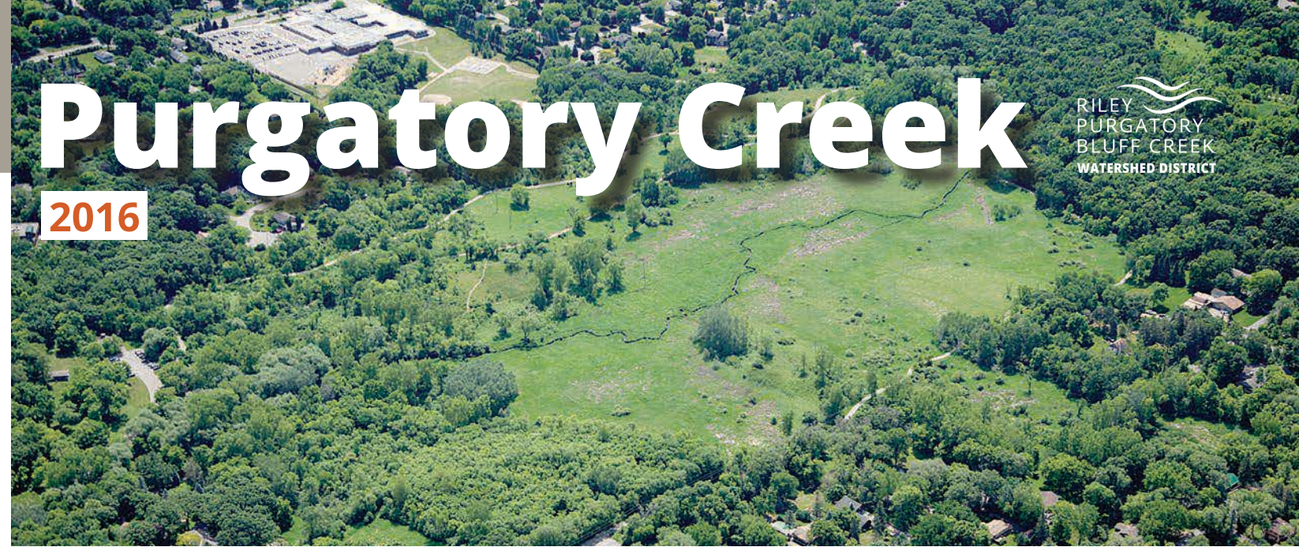


Purgatory Creek

RILEY PURGATORY BLUFF CREEK WATERSHED DISTRICT

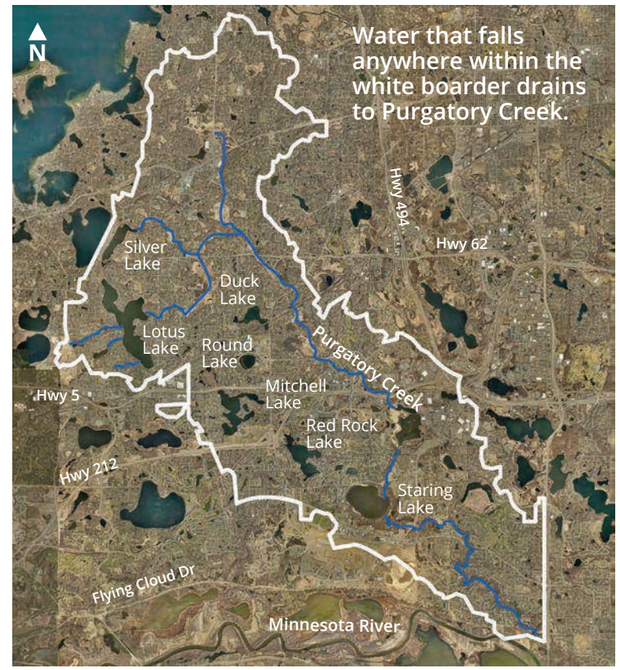
2016

Purgatory Creek has three headwaters: Lotus Lake in Chanhassen, Silver Lake in Shorewood, and wetlands in Minnetonka. After these forks join, the creek flows through the Purgatory Recreation Area and Staring Lake before eventually reaching the Minnesota River.

CHARACTERISTICS

Length	16 miles
Elevation change	178 ft
Watershed size	35.6 sq miles
# of cities in watershed	4
# of lakes connected	8
# of monitoring sites	10
# of parks	27
Impairment	Not listed
Common fish	Bluegill, White Sucker, Black Crappie, Yellow Perch
Invasive species	Curlyleaf Pondweed, Eurasian Watermilfoil, Common Carp

WATERSHED BOUNDARIES



LAND USE in the Purgatory Creek Watershed

How healthy is Purgatory Creek?

Keeping Purgatory Creek healthy requires several tools and strategies. Conducting projects to stabilize the stream banks and restore stretches is one important strategy. Cleaning and slowing rainwater runoff before it reaches the creek is another. But before either of these can be done, we need to understand how the creek is doing and where it needs the most help.

The watershed district has been monitoring Purgatory Creek since the 1970s. Recently, the district developed a new tool to assess the creek: the Creek Restoration Action Strategy (CRAS). The CRAS uses water quality data, as well as information on erosion and habitat to rank which creek sections are doing the best and which are doing the poorest. Below, the three major types of data used in the assessment are described. On the next page, a creek map shows the results from 2016.

Water quality

District staff take samples at eight sites during summer. They gather information about nutrient levels (phosphorus), sediment, pH, and dissolved oxygen. These data let us know how clean the water is, and whether it is healthy for plants, animals, and people.

Erosion

Every year, staff walk along sections of the creek. They note sites with erosion, its severity, and whether any structures like houses or bridges are in danger. Erosion is also a problem because the sediment that erodes into the creek is a pollutant.

Habitat

Creeks are important habitat for insects, plants, fish, birds, and other animals. When staff check for erosion, they also assess the habitat. Reaches receive a score based on the quality of habitat they provide, and whether it needs to be restored.

Dive deeper

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Assessment

BARR Engineering. 2016. Purgatory Creek Watershed Use Attainability Analysis.

RPBCWD & BARR Engineering. 2015. Creek Restoration Action Strategy.

BARR Engineering. 2013. Purgatory Creek Watershed: Total Maximum Daily Load Implementation Plan.

Carp management

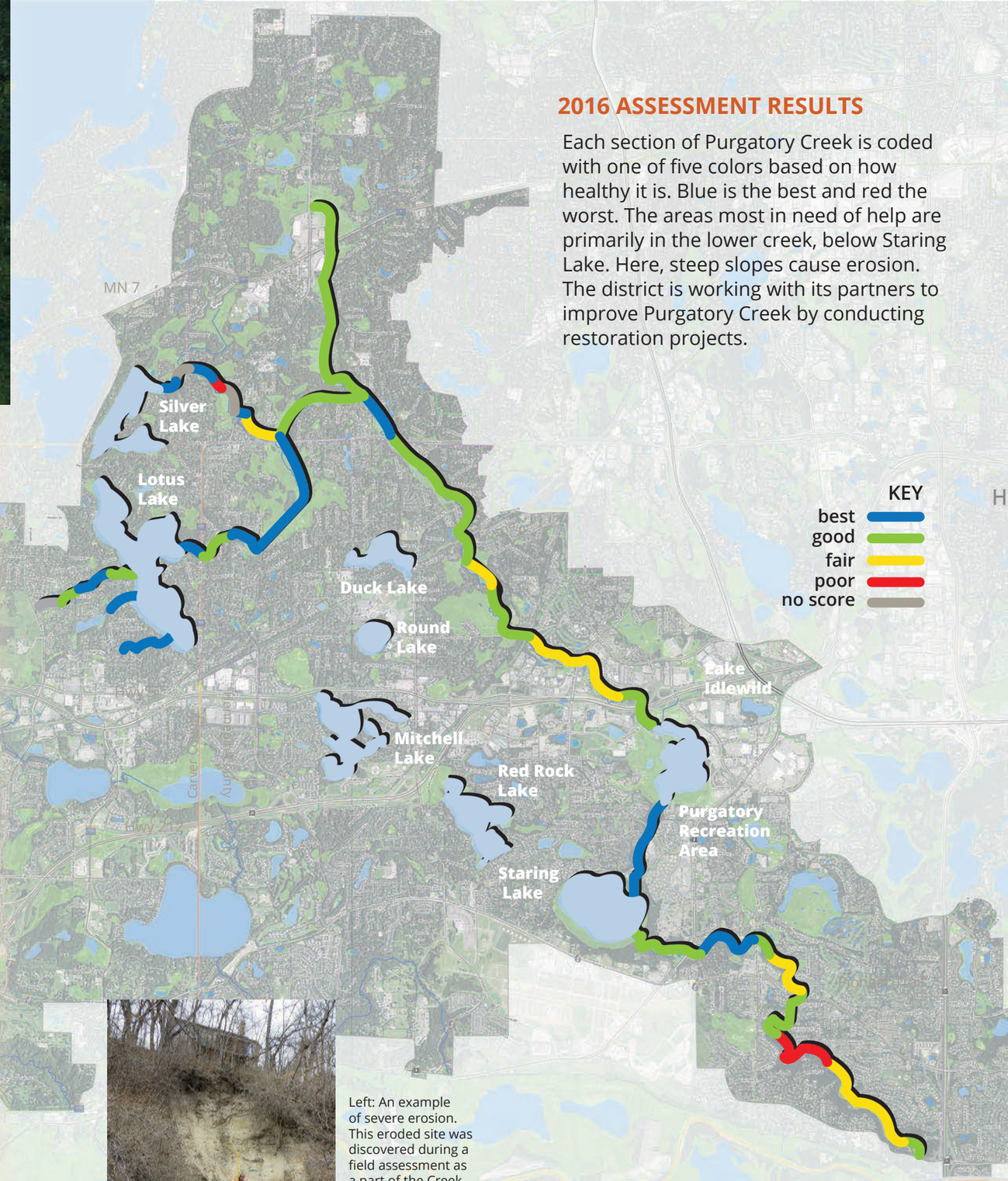
Sorensen P, Bajer P and M Headrick. 2015. Development and implementation of a sustainable strategy to control common carp in the Purgatory Creek chain of Lakes. University of Minnesota.

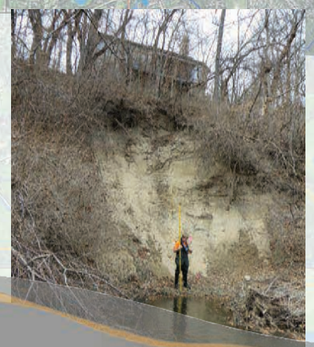
Stormwater ponds

RPBCWD. 2013. Stormwater Pond Project.

2016 ASSESSMENT RESULTS

Each section of Purgatory Creek is coded with one of five colors based on how healthy it is. Blue is the best and red the worst. The areas most in need of help are primarily in the lower creek, below Staring Lake. Here, steep slopes cause erosion. The district is working with its partners to improve Purgatory Creek by conducting restoration projects.





Left: An example of severe erosion. This eroded site was discovered during a field assessment as a part of the Creek Restoration Action Strategy.

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RESTORING RILEY CREEK

In 2007, the district completed the Riley Creek Lower Valley Stabilization Feasibility Study. The study determined that the part of the creek downstream of Lake Riley was rapidly eroding and required stabilization. Assessment in 2015 showed that the erosion was progressing and the district decided that action was needed to protect water quality in the creek. Dirt that erodes from the creek and the steep slopes leading down to it degrades fish and insect habitat, and eventually ends up in the Minnesota River. The Minnesota Pollution Control Agency (MPCA) has placed Lower Riley Creek on the 303(d) list of impaired waters for elevated turbidity (sediment). The district will begin stabilizing and restoring the most eroded sections of Riley Creek in 2017. This area is near the Riley Creek Conservation Area in Eden Prairie.

The red section is the location of the restoration.

YOU CAN HELP

Rainwater runoff, the water that flows across yards, parking lots, and streets into stormdrains, is one of the main causes of pollution in urban areas. You can take simple actions to help protect Riley Creek.

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Water with care
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Riley Creek

2016

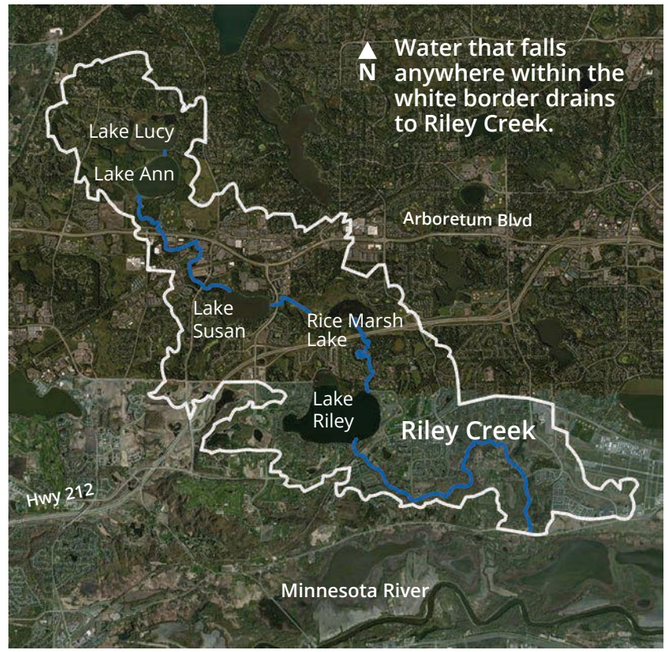
RILEY PURGATORY BLUFF CREEK WATERSHED DISTRICT

Riley Creek begins at lakes Lucy and Ann in Chanhassen and flows through three, downstream lakes - Susan, Riley, Rice Marsh - before descending to the Minnesota River Valley. The creek has mild topography in the upper and middle portions of the watershed, but below Lake Riley the banks become steep.

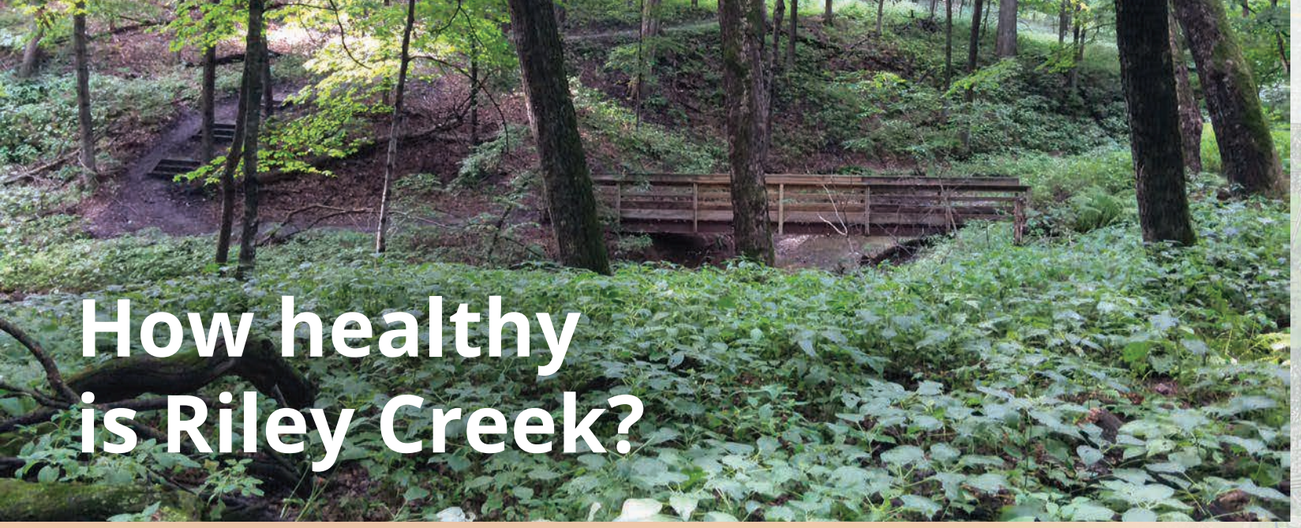
CHARACTERISTICS

Length	9.6 miles
Elevation change	230 ft
Watershed size	10 sq miles
# of cities in watershed	2
# of lakes connected	5
# of monitoring sites	5
# of parks	11
Impairment	Turbidity
Common fish	Green Sunfish, Fathead Minnow, Bluntnose Minnow
Invasive species	Buckthorn, Common Carp

WATERSHED BOUNDARIES



LAND USE in the Riley Creek Watershed



How healthy is Riley Creek?

Keeping Riley Creek healthy requires several tools and strategies. Conducting projects to stabilize the stream banks and restore stretches is one important strategy. Cleaning and slowing rainwater runoff before it reaches the creek is another. But before either of these can be done, we need to understand how the creek is doing and where it needs the most help.

To this end, the watershed district as well as the Metropolitan Council have been monitoring Riley Creek water quality for almost 20 years. Recently, the district developed a new tool to assess the creek: the Creek Restoration Action Strategy (CRAS). The CRAS uses water quality data, as well as information on erosion and habitat to rank which creek sections are doing the best, and which are doing the poorest. Below, the three major types of data used in the assessment are described. On the next page, a creek map shows the results from 2016.

Water quality

District staff take samples at five sites during summer. They gather information about nutrient levels (phosphorus), sediment, pH, and dissolved oxygen. These data let us know how clean the water is, and whether it is healthy for plants, animals, and people.

Erosion

Every year, staff walk along sections of the creek. They note sites with erosion, its severity, and whether any structures like houses or bridges are in danger. Erosion is also a problem because the sediment that erodes into the creek is a pollutant.

Habitat

Creeks are important habitat for insects, plants, fish, birds, and other animals. When staff check for erosion, they also assess the habitat. Reaches receive a score based on the quality of habitat they provide, and whether it needs to be restored.

Dive deeper

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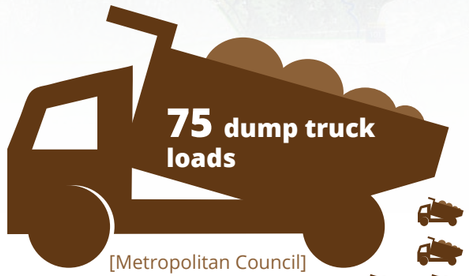
Stormwater ponds
RPBCWD. 2013. Stormwater pond project.

Restoration prioritization
RPBCWD & BARR Engineering. 2015. Creek Restoration Action Strategy.

Carp management
Bajer P.G., Headrick,M., Miller B. D. and Sorensen P. W. 2014. Development and implementation of a sustainable strategy to control common carp in Riley Creek Chain of Lakes. University of Minnesota.

2016 ASSESSMENT RESULTS

Each section Riley Creek is coded with one of five colors based on how healthy it is. Blue is the best and red the worst. There is considerable erosion in lower Riley Creek, below Lake Riley, and the creek is listed as impared for turbidity by the Minnesota Pollution Control Agency. This means it has too much sediment in its water. The district is working with its partners to improve Riley Creek by conducting restoration projects at the sites in most need.



[Metropolitan Council]

Each year, Riley Creek carries the average equivalent of 75 dump truck loads of **sediment** into the **Minnesota River Valley**

Budget Description Number		Item & Description	Budget Amount	Change from '16 increase (decrease)
	1	**Accounting and Audit** Preparation of the District's annual audit, provide monthly accounting services.	$ 39,500.00	$ 5,500.00
	2	**Advisory Committees** Budget to cover Miscellaneous expenses related to the duties and activities of District advisory Committees.	$ 4,000.00	$ (500.00)
	3	**Insurance and bonds** District general liability, workers compensation, property/casualty, public official liability insurance	$ 12,000.00	$ 2,000.00
	4	**Engineering Services** Oversight of all District Engineerins activities. Engineering attendance at meetings of the District - covers board and related project meetings, mini case studies, assisting in District water management planning activities, and other matters requiring District Engineer.	$ 103,000.00	$ -
	5	**Legal Services** Legal advice at meetings, research on various issues for Board consideration, preparation and publication of legal notices, preparation of Board resolutions, and other matters requiring legal counsel.	$ 75,000.00	$ -
	6	**Manager Compensation** Manager per diems for regular and special meeting attendance. Manager expenses incurred in the performance of official manager duties, such as attendance at conferences and meetings and related expenses.	$ 18,500.00	$ -
	7	**Dues and Publications** Dues for appropriate organization memberships (MAWD, League of Minnesota Cities, etc.) and for purchase of necessary publications and reference materials.	$ 8,000.00	$ 4,500.00
	8	**Office Cost** Rent, Office supplies, utilities, purchase additional equipment, janitorial expenses and office expansion.	$ 95,000.00	$ 27,500.00
	9	**Permit Review and Inspection** Provides for engineering assistance in review of permit applications, clarifying problems with the developer, meet developer on-site, coordinate permit issues with communities, counties, and other regulatory bodies. Inspects projects.	$ 90,000.00	$ (10,000.00)
	10	**Recording Services** Recording Services for the District.	$ 15,000.00	$ -
	12	**Staff Cost**	$ 450,000.00	$ 184,500.00

	Includes salary, taxes, insurance, benefits and employee expenses (mileage, parking,professional development and supplies) for existing full time staff as well as 2 new positions Water Resources Technician, and Permit and Professional Development Coordinator and part time clerical help - last position tbd). This budget includes an allowance for salary increases and benefit costs.		
13	**10-year Management Plan** Develop District next 10-year Plan. This is a multi-year project with an anticipated cost of $175,000.	$ 75,000.00	$ (25,000.00)
14	**AIS Inspection and early response** Support AIS inspections in Chanhassen and Eden Prairie. Support early rapid response to new infestation.	$ 75,000.00	$ -
15	**Buffer Demonstration Site** This project was to be implemented in 2015. However, our potential demonstration site fell through and the project did not move forward.	$ -	$ -
16	**Cost-share** Provides technical assistance and funds for our cost-share program.	$ 200,000.00	$ 50,000.00
17	**Creek Restoration Action Strategy** Developed a prioritization scheme across all three watershed.	$ -	$ -
18	**Creek Restoration Action Strategies Phase 2** Provide funds to determine causes and solution to the deterioration of the creek reach.	$ 20,000.00	$ (5,000.00)
19	**Data Collection and Monitoring** Monitor and collect water quality data as identifies in our lakes and creeks report as well as collecting data for potential CIP sites and monitoring effectiveness of implmented CIPs.	$ 180,000.00	$ -
20	**District Groundwater Assessment** Assess curent state of groundwater located in the District. Identify needs and coordinate accordingly.	$ 30,000.00	$ 30,000.00
21	**District Wide Floodplain Evaluation - Atlas 14/SMM model** Maintain and update SWMM model.	$ 30,000.00	$ (25,000.00)
22	**Education and Outreach** Develop education materials to raise awareness. Fund master water stewards program. Support programs that engage our community from youth to local decision makers. Maintain and enhance website.	$ 114,000.00	$ -
23	**Plant Restoration - U of M** Partner with the University of Minnesota to implement plan restoration measures on Lake Susan, Lake Riley, Mitchell Lake and Staring Lake.	$ 75,000.00	$ -
24	**Repair and Maintenance Fund *** Develop and implement grant program that LGU can use to repair and maintain stormwater infrastructure. *This is a multi year program that has a balance of $102,005.*	$ 100,000.00	$ 100,000.00

25	**Survey and Analysis Fund *** Funds in this category are funds dedicated in helping the District survey its resources as well as for analysis *This is a multi year program that has a balance of $13,837.*	$ -	$	-
26	**TMDL - MPCA** Assist and provide input in the TMDL process.	$ 10,000.00	$	(20,000.00)
27	**Bluff Creek Fish Passage and Creek Stabilization *** Implement creek stabilization and fish passage to address impairment on Bluff Creek. *This is a multi-year project that has a balance $375,155.27. Partners in this project include Lower Minnesota River Watershed Distric t ($50,000), City of Chanhassen ($50,000), and Hennepin County Regional Railroad Authority ($50,000). The District also received a Clean Water Legacy Grant for $150,000.*	$ -	$	-
28	**Chanhassen High School *** Implement capture and reuse project at Chanhassen High School. *This is a multi-year project that is funded by a Stormwater Metropolitan Council Grant ($200,000), City of Chanhassen and the District match of $50,000.*	$ 50,000.00	$	45,000.00
29	**Chanhassen Town Center*~** Implement a study to identify opportunities to implement water quality improvement project in Chanhassen town center. *This is a multi-year project funded by the Clean Water Legacy Funds ($48,000) and with a District match of $12,000. The City of Chanhassen is a partner on this project. No additional funds are*	$ -	$	-
30	**CLP Treatment - Lake Riley/Susan (WQ)** Implement curlyleaf pondweed treatment on Lake Susan and develop new 5-year plant management plan if identified as necessary.	$ 10,000.00	$	-
31	**CLP Treatment - Riley (WQ)** Implement curlyleaf pondweed treatment on Lake Riley and develop new 5-year plant management plan if identified as necessary.	$ 10,000.00	$	-
32	**Lake Lucy Iron Enhanced *** No additional funds needed at this time. Working with HOA to implement water quality improvement project on their outlot along Lake Lucy Road. *This is a multi-year project with an anticipated cost of $450,000. No additional funds are being levied for this project. Funds available are $449,937.68*	$ -	$	(400,000.00)
33	**Lake Lucy Plant Management Plan** Project complete. No additional funds are needed.	$ -	$	-
34	**Lake Lucy Spent Lime** Project was canceled due to lack of support from homeowners - no additional funds are needed at this time.	$ -	$	-
35	**Lake Riley - EWM Treatment** Implement curlyleaf pondweed treatment on Lake Riley and develop new 5-year plant management plan if identified as necessary. Increase in cost is due to utilizing a renovate 40.	$ 25,000.00	$	15,000.00

36	**Lake Riley - Alum Treatment 1st dose *** Alum treatment was implemented in 2016. District will be monitoring but no additional funds are needed at this time. *This is a multi-year project. No additional funds are needed at this time. Monitoring will continue to assess longetivity at efficacity of the treatment.*	$ -	$	(60,000.00)
37	**Lake Susan Alum Feasibility** Feasibility will be completed in 2016.	$ -	$	(11,500.00)
38	**Lake Susan Improvement Phase 1 *** The Spent Lime project will be completed in 2016 and the District will be monitoring in 2017 through their data collection program. The City of Chanhassen was a partner on this project. No additional funds are needed at this time. *This was a multi-year project that will be completed in 2016.*	$ -	$	-
39	**Lake Susan Water Quality Improvement Phase 2 *~** Lake Susan Water Quality project is looking at capturing and resuing water from towncenter. Project is still in feasibility. *This is a multi-year project funded by the Clean Water Legacy Funds ($233,400) and with $150,000 District funds levied in 2015. The City of Chanhassen is a partner on this project. No additional funds are being levied for this project.*	$ -	$	-
40	**Rice Marsh Lake Alum Feasibility Phase 1** Rice Marsh Lake UAA identified the need to control internal loads in RML.	$ -	$	(11,500.00)
41	**Rice Marsh Lake Paleolimnology** Study is now completed. No additional funds are needed at this time.	$ -	$	-
42	**Rice Marsh Lake Water Quality Improvement - Feasibility Phase 1** Rice Marsh Lake UAA identified the need to control watershed loads in RML.	$ 20,000.00	$	20,000.00
43	**Rice Marsh Lake Winter Fish Kill Prevention (WQ)** Maintaing Carp Control system on Rice Marsh Lake as part of the Riley Creek Chain of Lakes Carp Managmeent Plan.	$ 10,000.00	$	(5,000.00)
44	**Rice Marsh Lake/Lake Riley UAA** Study is completed and has moved into implementation.	$ -	$	-
45	**Riley Creek Restoration (Reach E and D3) *~** Provide funds to implement feasibility, design and restoration of Reach E and D3 on Riley Creek. *This is a multi-year project. The District anticipates additional levy in 2018 for this project. Anticipated cost for the project is $1,515,000. Remainder of cost would be levied in 2018. The City of Eden Prairie and the Lower Riley Creek Watershed District interested in partnering in this effort but funds have not yet been committed.*	$ 600,000.00	$	335,000.00
46	**Fire Station 2 (Eden Prairie)** Implement a project to capture and reuse water at fire station 2 in Eden Prairie.	$ 20,000.00	$	20,000.00

	This is a multi-year project that is funded by a Stormwater Metropolitan Council Grant ($99,287), City of Chanhassen and the District match of $19,206.50 each.			
47	**Purgatory Creek Rec Area- Berm/retention area - feasibility/design** The District and the City of Eden Prairie will be doing a feasibility to design phase to determine maintenance and repairs needed for this area.	$ 50,000.00	$	50,000.00
48	**Hyland Lake UAA** Hyland Lake UAA has not been updated since 2004 and needs to be updated.	$ 20,000.00	$	20,000.00
49	**Lotus Lake - Feasability Phase 1** The UAA identified management of external loads to Lotus Lake.	$ 20,000.00	$	20,000.00
50	**Mitchell Lake Plant Management (CLP - WQ)** Implement curlyleaf pondweed treatment on Mitchell Lake that is consistent with plant management plan.	$ 15,000.00	$	-
51	**Purgatory Creek at 101*** Project will be implemented in 2016 - no additional funds are needed for the creek restoration on Purgatory Creek near highway 101. The City of Minnetonka was a partner on this project. *This is a multi-year project. Total levied $661,094.*	$ -	$	-
52	**Purgatory Creek Lakes UAA *** UAA will be completed in 2016 - no additional funds are needed. *This is a multi-year project. Total levied $250,000.*	$ -	$	(50,000.00)
53	**Red Rock Lake Plant Management (CLP - WQ)** Implement curlyleaf pondweed treatment on Red Rock Lake that is consistent with plant management plan.	$ 15,000.00	$	-
54	**Silver Lake Restoration - Feasibility Phase 1** Provide funds to develop a restoration plan that would preserve/enhance wild rice preservation while also improving water quality.	$ 20,000.00	$	20,000.00
55	**Silver Lake Paleolimnology** Work is completed. No additional funds are needed.	$ -	$	-
56	**Staring Lake - Plant Management - EWM Treatment and CLP** Implement and develop plant management plan for Staring Lake. Implement herbicide treatment for curlyleaf pondweed and eurasian watermilfoil treatment.	$ 20,000.00	$	20,000.00
57	**Reserve** Contingency funds.	$ 135,000.00	$	72,000.00

	Budget Description	2015 BUDGET	Actual 2015	2016 BUDGET	Actual 2016	Proposed 2017 BUDGET
	REVENUES					
	Plan Implementation Levy	$ 2,431,500.00	$ 2,417,053.77	$ 2,481,500.00	$ 2,481,500.00	**$ 2,859,000.00**
	Permit	15000	20100	15000	10540	**15000**
	Grant Income		84,934.01			
	Data Collection Income		8,830.50		1000	
	Other Income		535.17		18.83	
	TOTAL REVENUE	$ 2,446,500.00		$ 2,496,500.00	$ 2,493,058.83	**$ 2,874,000.00**
	EXPENDITURES					
	Administration					
1	Accounting and Audit	$ 32,500.00	$ 31,134.72	$ 34,000.00	$ 25,559.79	**$ 39,500.00**
2	Advisory Committees	$ 4,500.00	$ -	$ 4,500.00	$ 147.45	**$ 4,000.00**
3	Insurance and bonds	$ 10,000.00	$ 3,191.64	$ 10,000.00	$ 7,649.28	**$ 12,000.00**
4	Engineering Services	$ 96,000.00	$ 100,824.23	$ 103,000.00	$ 3,358.62	**$ 103,000.00**
5	Legal Services	$ 130,000.00	$ 125,161.49	$ 75,000.00	$ 58,343.88	**$ 75,000.00**
6	Manager Compensation	$ 18,500.00	$ 12,394.36	$ 18,500.00	$ 7,180.05	**$ 18,500.00**
7	Dues and Publications	$ 3,500.00	$ 5,275.00	$ 3,500.00	$ 4,000.00	**$ 8,000.00**
8	Office Cost	$ 79,500.00	$ 68,161.04	$ 67,500.00	$ 46,851.83	**$ 95,000.00**
9	Permit Review and Inspection	$ 150,000.00	$ 155,420.03	$ 100,000.00	$ 122,299.66	**$ 90,000.00**
10	Recording Services	$ 15,000.00	$ 11,975.49	$ 15,000.00	$ 4,305.51	**$ 15,000.00**
12	Staff Cost	$ 248,500.00	$ 231,359.64	$ 265,500.00	$ 154,537.56	**$ 450,000.00**
	Subtotal	$ 788,000.00	$ 744,897.64	$ 696,500.00	$ 434,233.63	**$ 910,000.00**
	Programs and Projects					
	District Wide					
13	10-year Management Plan			$ 100,000.00	$ 43,813.28	**$ 75,000.00**
14	AIS Inspection and early response	$ 50,000.00	$ 53,364.43	$ 75,000.00	$ 11,563.71	**$ 75,000.00**
15	Buffer Demonstration Site	$ 15,000.00	$ -			
16	Cost-share	$ 130,000.00	$ 90,549.93	$ 150,000.00	$ 63,983.08	**$ 200,000.00**
17	Creek Restoration Action Strategy	$ -	$ 36,467.55			
18	Creek Restoration Action Strategies Phase 2			$ 25,000.00	$ -	**$ 20,000.00**
19	Data Collection and Monitoring	$ 170,000.00	$ 172,636.26	$ 180,000.00	$ 109,171.73	**$ 180,000.00**
20	District Groundwater Assessment					**$ 30,000.00**
21	District Wide Floodplain Evaluation - Atlas 14/SMM model	$ 110,000.00	$ 117,996.50	$ 55,000.00	$ 73,243.00	**$ 30,000.00**
22	Education and Outreach	$ 65,000.00	$ 41,550.66	$ 114,000.00	$ 43,412.78	**$ 114,000.00**
23	Plant Restoration - U of M	$ 75,000.00	$ 43,212.04	$ 75,000.00	$ 37,746.04	**$ 75,000.00**
24	Repair and Maintenance Fund *					**$ 100,000.00**
25	Survey and Analysis Fund *				$ 24,165.26	
26	TMDL - MPCA			$ 30,000.00	$ 1,165.45	**$ 10,000.00**
	Subtotal	$ 615,000.00	$ 555,777.37	$ 804,000.00	$ 408,264.33	$ 909,000.00
	Bluff Creek					
27	Bluff Creek Fish Passage and Creek Stabilization *	$ -	$ 19,466.54		$ 3,633.00	
28	Chanhassen High School *			$ 5,000.00		**$ 50,000.00**
	Subtotal	$ -	$ 19,466.54	$ 5,000.00	$ 3,633.00	$ 50,000.00
	Riley Creek					
29	Chanhassen Town Center*~	$ 15,000.00	$ 11,286.50		$ 6,354.50	
30	CLP Treatment - Lake Riley/Susan (WQ)	$ 12,000.00	$ 4,905.60	$ 10,000.00	$ 2,138.85	**$ 10,000.00**
31	CLP Treatment - Riley (WQ)	$ -	$ -	$ 10,000.00	$ 3,850.00	**$ 10,000.00**
32	Lake Lucy Iron Enhanced *	$ 50,000.00		$ 400,000.00	$ 62.32	
33	Lake Lucy Plant Management Plan	$ -	$ 466.81			
34	Lake Lucy Spent Lime	$ -	$ 3,152.16			
35	Lake Riley - EWM Treatment	$ 10,000.00	$ 3,430.72	$ 10,000.00	$ 4,819.00	**$ 25,000.00**
36	Lake Riley - Alum Treatment 1st dose *	$ 200,000.00	$ 19,375.53	$ 60,000.00	$ 215,289.49	
37	Lake Susan Alum Feasibility			$ 11,500.00	$ 11,005.32	
38	Lake Susan Improvement Phase 1 *	$ 50,000.00	$ 49,538.10		$ 191,522.47	
39	Lake Susan Water Quality Improvement Phase 2 *~	$ 150,000.00	$ 9,331.68		$ 1,301.30	
40	Rice Marsh Lake Alum Feasibility Phase 1	$ -		$ 11,500.00	$ 11,005.52	
41	Rice Marsh Lake Paleolimnology	$ -	$ 19,563.00			
42	Rice Marsh Lake Water Quality Improvement - Feasibility Phase 1					**$ 20,000.00**
43	Rice Marsh Lake Winter Fish Kill Prevention (WQ)	$ 15,000.00	$ 1,656.41	$ 15,000.00	$ 732.02	**$ 10,000.00**
44	Rice Marsh Lake/Lake Riley UAA	$ -	$ 79,499.09			
45	Riley Creek Restoration (Reach E and D3) *~	$ -		$ 265,000.00	$ 75,787.18	**$ 600,000.00**
	Subtotal	$ 502,000.00	$ 202,205.60	$ 793,000.00	$ 523,867.97	$ 675,000.00
	Purgatory Creek					
46	Fire Station 2 (Eden Prairie)	$ -	$ -	$ -		**$ 20,000.00**
47	Purgatory Creek Rec Area- Berm/retention area - feasibility/design					**$ 50,000.00**
48	Hyland Lake UAA					**$ 20,000.00**
49	Lotus Lake - Feasability Phase 1					**$ 20,000.00**
50	Mitchell Lake Plant Management (CLP - WQ)	$ 15,000.00	$ 3,482.81	$ 15,000.00	$ 3,905.25	**$ 15,000.00**
51	Purgatory Creek at 101*	$ 250,000.00	$ 78,840.28		$ 27,057.53	
52	Purgatory Creek Lakes UAA *	$ 200,000.00	$ 94,836.50	$ 50,000.00	$ 147,192.50	
53	Red Rock Lake Plant Management (CLP - WQ)	$ 15,000.00	$ 12,382.81	$ 15,000.00	$ 7,097.78	**$ 15,000.00**
54	Silver Lake Restoration - Feasibility Phase 1					**$ 20,000.00**
55	Silver Lake Paleolimnology	$ 22,000.00	$ 19,125.00		$ 2,188.00	
56	Staring Lake - Plant Management - EWM Treatment and CLP	$ 8,000.00	$ 7,968.00			**$ 20,000.00**
	Subtotal	$ 510,000.00	$ 216,635.40	$ 80,000.00	$ 187,441.06	$ 180,000.00
			Reserve/Contingency			
57	Reserve	$ 16,500.00		$ 108,000.00		**$ 135,000.00**
	TOTAL EXPENDITURE	**$ 2,431,500.00**		**$ 2,486,500.00**	$ 1,557,439.99	**$ 2,859,000.00**
	EXCESS REVENUES OVER (UNDER) EXPENDITURES	$ 15,000.00		$ 10,000.00		$ 15,000.00
	ESTIMATED FUND BALANCE BEGINNING				$ 1,798,675.85	**$ 2,974,003.27**
	ESTIMATED FUND BALANCE ENDING				$ 2,974,003.27	

* Denotes multi-year projects and programs - please see budget description sheet for further details

Committed funds from past levies to Multi-year Projects or Programs $ 1,512,585.90

District funds were already allocated in the past and are expected to be used for their respective project

This budget has been revised from the board workshop to show a decrease in creek budget by 100K, increase by 25K in staff to reflect possible clerical staff addition, increase by 30K for the berm based on further washout from recent rain events, increase in reserve by 35K and increase in office cost by 10K to reflect increase in space.

County	Payable 2016 Taxable Net Tax Capacity	Net Tax Capacity Percent Distribution	Apportioned Payable 2017 Levy