2016 Valley Branch Watershed District Infrastructure and Conveyance Systems Inspections

Prepared for
Valley Branch Watershed District Board of Managers

November 2016
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I hereby certify that this 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.

Nathan Campeau
PE #: 44917

November 28, 2016
Date
1.0 Executive Summary

The Valley Branch Watershed District (VBWD) owns, operates, and/or maintains a number of infrastructure and conveyance systems throughout the VBWD, including streams, storm sewers, manholes, catch basins, water level control structures, infiltration basins, bank stabilizations, and dams. Natural and constructed, these systems convey, store, or treat surface water throughout the VBWD.

This report describes 21 VBWD systems (Figure 1-1) inspected by Barr on a regular basis. Observations made by Barr staff during each inspection, including recommendations for maintenance and further inspection are provided. This report also documents maintenance activities performed by VBWD in 2016, including many activities recommended by Barr in the 2015 inspection report. Where maintenance or inspection is recommended in 2017, a cost estimate and priority level (high, medium, and low) are provided.

In general, the VBWD systems continue to perform well, with some exceptions as documented in the report. We recommend that the Managers authorize Barr to continue monitoring VBWD systems (natural and constructed) in 2017. Several of the systems can be inspected less than once a year (biennially, triennially, etc.); those systems would not be scheduled for re-inspection until 2018 or beyond. We also recommend that 17 of the 21 systems be inspected by Barr staff in 2017, for a total estimated cost of $67,000.

Barr recommends 17 maintenance activities, classified as Low, Medium, and High priority. While completing all repairs would cost an estimated $594,000, we recommend that VBWD authorize the completion of all High-priority maintenance activities, for a total estimated cost of $111,500.

Barr estimates that the completion of all 2017 inspection and maintenance activities recommended in this report (assuming only High-priority items are addressed in 2017) would cost $178,500.
Figure 1-1

INFRASTRUCTURE AND CONVEYANCE SYSTEMS
2016 Infrastructure and Conveyance Systems Inspections Report
Valley Branch Watershed District
2.0 Systems Inspections

This section summarizes Barr’s inspections of Valley Branch Watershed District (VBWD) infrastructure and natural conveyance systems and subsequent maintenance recommendations. VBWD systems are shown on Figure 1-1 and maintenance recommendations are shown on Figure 5-1. Systems are generally organized geographically from northwest to southeast.

2.1 Project 1007

2.1.1 Background

In 1987, the VBWD constructed Project 1007—a large flood control project ($4.25 million). This project provides an outlet for many landlocked and flood-prone lakes in the northwest portion of the watershed, directing water to a Minnesota Department of Transportation (MnDOT) storm sewer along Interstate 94 and, ultimately, to the St. Croix River. The project included construction of new outlets for Long Lake, Lake Olson, Deer Pond, Hedges Pond, Hedges Bog, Lake Jane, Crombie Pond, Beutel Pond, Eagle Point Lake, Lake Elmo, Horseshoe Lake, the West Lakeland Storage Site (North, Middle, and South Ponds), and the MnDOT Rest Area Pond. VBWD has operated Project 1007 since construction. Project 1007 comprises approximately 5 miles of pipe, 60 manholes, and water level control structures (including over 40 catch basins/manholes), two dams, and approximately 2 miles of open channels.

VBWD performs periodic maintenance on system components, as needed. This includes annual mowing of the Rest Area Pond and the side slopes of the channels between Horseshoe Lake and Interstate 94 and the West Lakeland Storage Site South Pond.

Several Project 1007 components were repaired in 2016 as part of 2016 Capital Improvements Project maintenance (2016 CIP). Those repairs are listed in Section 4.0. In addition, VBWD’s contractor removed fallen trees across the Project 1007 portion of Raleigh Creek in the summer and fall of 2016.

2.1.2 Observations

Barr staff inspects Project 1007 open channels, water level control structures, and dams on an annual basis. The remaining manholes and catch basins are inspected every 3 years on a rotating basis, unless maintenance activities require more frequent inspection. On October 17 and 18, 2016, Patrick Brockamp and Josh Phillips conducted the regular (annual) inspection of Project 1007 components, as well as components repaired as part of the 2016 CIP. On October 25, 2016, Nathan Campeau, PE, inspected the Rest Area Pond Dam and the Eagle Point Lake Dam (part of the Project 1007 system). While most open channels, manholes, catch basins, and structures were accessible for inspection, some locations were not fully accessible due to seasonally high water elevations.

During this inspection, Barr staff observed higher water flows throughout the Project 1007 system than typical for this time of year.

Appendices A and B contain separate inspection reports for Eagle Point Lake Dam and the Rest Area Pond, previously provided to the Managers.
Barr staff noted a number of issues that require maintenance, as noted below.

### 2.1.3 Recommendations

All of Project 1007’s components appeared to be performing adequately; however, we suggest that the Managers consider the maintenance items listed below. Relevant photos are provided following the recommendations list.

1. Continue annual mowing of the Rest Area Pond Dam and spillway.
2. Continue annual mowing of the side slopes of the channels between Horseshoe Lake and Interstate 94, including the West Lakeland Storage Site South Pond.
3. Remove accumulated dead trees and debris near the Rest Area Pond Outlet and within the pipe to Structure 2 (Photo 1). The Managers authorized Buelow Excavating to perform this work in 2016; however, due to high water levels in 2016 this work could not be completed. We anticipate that the work will be done in 2017.
4. Remove trees at West Lakeland Storage sites including:
   a. Downed trees (three locations) in West Lakeland Storage Site Channel, south of the South Pond (Photo 2, Photo 3, and Photo 4). The Managers authorized Buelow Excavating to perform this work in 2016; however, due to high water levels in 2016 this work could not be completed. We anticipate that the work will be done in 2017.
   b. Downed trees in West Lakeland Storage Site Channel, south of the North Pond (Photo 5).
5. Coordinate with The Royal Golf Club for removal of:
   a. Downed trees in the channel downstream of Lake Elmo (Photo 6 and Photo 7).
   b. The abandoned, low-hanging bridge in the channel downstream of Lake Elmo (Photo 8).
6. Inspect the Project 1007 storm sewer via video. This storm sewer has not been inspected since construction in 1987; many municipalities conduct video inspections of their infrastructure every 5 to 10 years.
7. Replace wooden stop logs with aluminum stop logs at all water level control structures (3, 4, 5, 10, 9, 11, and 12).
8. Replace wooden stop logs at Structure 6. These are leaking significantly and should be replaced quickly (Photo 9). The Managers authorized this work in the spring of 2016. Due to high water levels and the length of time required to manufacture the aluminum stop logs, the work has not been completed, but is expected to be done by February 1, 2017.
9. Prepare and publish a newspaper article documenting the completion of the Project 1007 inspection and describing the history and benefits of the project.
10. Monitor two animal burrows and investigate animal management; both burrows are located at the top of the Rest Area Pond Dam, below the elevation of the emergency spillway.

Barr recommends continuing the annual inspection of Project 1007, including the associated dams.
Photo 1 (November 2015): Barr recommends removing dead trees and debris from the Rest Area Pond Outlet.

Photo 2 (November 2015): Barr recommends removing fallen trees from the West Lakeland Storage Site channel, south of South Pond.
Photo 3 (November 2015): Barr recommends removing fallen trees from the West Lakeland Storage Site channel, south of South Pond.

Photo 4 (October 2016): Barr recommends removing fallen tree from the West Lakeland Storage Site channel, south of South Pond.
Photo 5 (October 2016): Barr recommends removing fallen trees from the West Lakeland Storage Site channel, south of North Pond.

Photo 6 (October 2016): Barr recommends coordinating with The Royal Golf Club for removal of fallen trees in the channel downstream of Lake Elmo.
Photo 7 (October 2016): Barr recommends coordinating with The Royal Golf Club for removal of fallen trees in the channel downstream of Lake Elmo.

Photo 8 (October 2016): Barr recommends coordinating with The Royal Golf Club for removal of an abandoned, low-hanging bridge in the channel downstream of Lake Elmo.
2.2  Echo Lake Outlet

2.2.1  Background

The Echo Lake Outlet was a cooperative project with the City of Mahtomedi to construct a new, restricted outlet from Echo Lake. The City of Mahtomedi modified the Echo Lake Outlet in 1999 to restrict outflows and protect downstream areas from flooding, as required by the VBWD. In 2002, the city installed a metal fence in front of the outlet to prevent debris from accumulating on the outlet structure.

2.2.2  Observations

Patrick Brockamp and Josh Phillips inspected the Echo Lake Outlet on October 18, 2016, and found the structure in good condition. The inlet was submerged, but did not appear to be obstructed or plugged. Water was flowing through the low-flow orifice in the outlet structure.

2.2.3  Recommendations

Barr recommends continuing the annual inspection of this project.

2.3  Weber Pond Outlet

2.3.1  Background

Weber Pond is a 7.5-acre wetland in the City of Mahtomedi that is split in two by an old streetcar embankment. In 2001, VBWD constructed a restricted outlet from the larger upstream portion of Weber
Pond to the smaller downstream portion of the pond to replace the previous temporary outlet and limit the flood level of Long Lake.

### 2.3.2 Observations
Patrick Brockamp and Josh Phillips inspected the Weber Pond Outlet on October 18, 2016, and found the structure in good condition. The water level in the pond was higher than previous years. The inlet grate was submerged, but did not appear to be obstructed or plugged.

### 2.3.3 Recommendations
Barr recommends continuing the annual inspection of this project.

### 2.4 Long Lake Ravine Stabilization Project

#### 2.4.1 Background
The Long Lake Ravine Stabilization Project was constructed by the VBWD in 2009. The project included channel grading, riprap, and natural vegetation to stabilize the head of a ravine entering Long Lake from the west. A portion of the stream entering the ravine is contained within a culvert and manhole to give neighboring landowners access to their property.

#### 2.4.2 Observations
Jeff Weiss, PE, visited the site on November 19, 2016. The project area was in good condition with well-established vegetation and no signs of erosion. There was water flowing through the project area, and velocities appeared to be low in the re-meandered section of the site. The rock vanes toward the downstream end of the project appeared to be intact and functioning as intended.

#### 2.4.3 Recommendations
Barr recommends continuing the biennial inspection of this project, as scheduled for 2018.

### 2.5 DeMontreville Ravine Stabilization Project

#### 2.5.1 Background
The DeMontreville Ravine Stabilization Project was constructed by the VBWD in 2009. The ravine runs through the City of Lake Elmo’s DeMontreville Wildlife Park, connecting the ponds downstream of Long Lake with Lake DeMontreville. Boulder cross vanes, straight vanes, and natural vegetation were installed to repair and stabilize the stream banks throughout the ravine. To reduce the amount of sediment entering Lake DeMontreville, a sedimentation basin was also installed. In 2015, VBWD’s contractor installed a baffle box and a flat, slotted grate at Catch Basin 47 to reduce plugging caused by leaf and tree debris and promote more efficient flow through the outlet.

#### 2.5.2 Observations
On October 18, 2016, Patrick Brockamp and Josh Phillips inspected the project. The vegetation along the entire ravine is well-established, including the tree and shrub plantings. The boulder vanes appeared to be
in good condition, with only minor debris buildup (removed during the inspection). Barr staff observed
downed trees near Cross Vane 2 on the banks of the channel. They also observed accumulated sediment in
the DeMontreville Ravine sedimentation basin and in Lake DeMontreville at the outlet from the basin to the
lake. The basin is now completely full, allowing additional sediment to accumulate in the lake.

The improvements at Catch Basin 47 appear to be functioning well and Barr staff observed no plugging or
flow backup; however, vegetation and sedimentation are encroaching on the baffle box. Over time, this
may decrease the performance of the baffle box and inlet grate, potentially plugging Catch Basin 47 and
creating localized flooding.

### 2.5.3 Recommendations

To restore the lake shoreline and the sediment-removal capacity of the basin, Barr recommends
excavating sediment from Lake DeMontreville at the outlet from the basin to the lake and from the
sedimentation basin (Photo 10 and Photo 11). New state rules require sediment sampling and permitting
before removal; depending on sampling results, landfill disposal may be necessary. In addition, Barr
recommends removal of two downed trees near Cross Vane 2 at DeMontreville Ravine (Photo 12). Barr
also recommends continuing the annual inspection of this project.

![Photo 10 (October 2014): Barr recommends removing the accumulated sediment in the basin on the
downstream end of DeMontreville Ravine and at the basin outlet to Lake DeMontreville.](image-url)
Photo 11 (October 2016): Barr recommends removing the accumulated sediment in Lake DeMontreville.

Photo 12 (November 2016): Barr recommends removing two downed trees at DeMontreville Ravine on the bank near Cross Vane 2.
2.6 Olson Lake Estates Pond Outlet Project

2.6.1 Background
VBWD constructed the Olson Lake Estates Outlet in 1996 to connect the overflow from the Olson Lake Estates Pond (located west of Lake Olson in an Oakdale housing development) to Project 1007. This allows the stormwater runoff from the housing development to bypass Lake Olson and discharge to Project 1007 downstream of Crombie Pond—protecting the water quality of Lake Olson. The project included the construction of 19 manholes. These are inspected every 3 years on a rotating basis, unless maintenance activities necessitate more frequent inspection.

2.6.2 Observations
On October 18, 2016, Patrick Brockamp and Josh Phillips inspected six manholes and found them all to be in good condition. During this inspection, Barr staff observed both standing and flowing water in the system. Water depths were generally 2–3 inches deep.

2.6.3 Recommendations
Barr recommends that VBWD inspect the storm sewer via video. The Olson Lake Estates Pond Outlet storm sewer has not been inspected since construction in 1996. Many municipalities use video to inspect their infrastructure every 5 to 10 years. Barr also recommends continuing the annual inspection of this project.

2.7 Raleigh Creek Bank Stabilization Project

2.7.1 Background
The VBWD Raleigh Creek Bank Stabilization Project, constructed in 2009, includes two reaches. The first reach is in Oakdale’s Anna’s Grove development, located between the railroad tracks and 31st Street North, primarily on City of Oakdale property. A small section of the creek meanders onto private property, currently owned by Tony Ulrich (7650 31st Street North). The second reach is approximately 350 feet upstream of Tablyn Park in Lake Elmo on private properties currently owned by David Moore, Jr. (8680 Stillwater Boulevard) and Michael Reid (8740 Stillwater Boulevard). Stabilization work included installation of cross vanes for grade control, two new outlets for stormwater ponds, root wads, live stakes, and plantings.

2.7.2 Observations
This project was most recently inspected in June 2016. Most areas remained in stable condition; however, minor erosion was present upstream of a rock vane installed on the Moore property. The channel upstream of the project was incised with some undercut banks.

2.7.3 Recommendations
Barr recommends continued biennial monitoring of the minor erosion on the Moore property and the stream upstream of the property to determine if additional action is necessary. The next planned inspection is in 2018.
2.8 Raleigh Creek

2.8.1 Background
Raleigh Creek is a perennial stream that drains water from portions of Oakdale and Lake Elmo, ultimately discharging to Eagle Point Lake. Both Project 1007 and the Raleigh Creek Bank Stabilization Project (described in Section 2.1 and 2.7) include the reach of Raleigh Creek downstream of Stillwater Boulevard (CSAH 6).

2.8.2 Observations
While Barr staff members have regularly observed several reaches of Raleigh Creek during inspection of other projects, a comprehensive inspection of the creek had not been completed for approximately 5 years. All accessible portions of the creek were inspected and assessed by Christian Frias and Rena Weis on June 27, 2016, including the project areas referenced in Section 2.7.

The erosion control measures for projects referenced in Section 2.7 were in good shape. Some minor erosion was observed on various banks in other areas of the creek, but does not currently require corrective action.

2.8.3 Recommendations
Barr recommends completing a triennial inspection of the entire creek, with the next inspection in 2019.

2.9 Farney Creek Stabilization Project

2.9.1 Background
VBWD constructed the Farney Creek Stabilization Project in 2005 on the property currently owned by Aaron and Trista Goldstrohm (8171 21st Street North) within the Torre Pines subdivision of Lake Elmo. In March 2013, VBWD installed riprap to repair bank erosion caused by a July 2011 storm. In May 2013, the contractor returned to make final adjustments and repair minor damage to the lawn and sprinkler caused during riprap installation. In the spring of 2014, the homeowners noted new erosion downstream of the repaired area and adjacent to a private walking bridge.

In 2015, the owners of the home at 8219 21st Street North (Joe and Tammy Dunckel), downstream of the Goldstrohms, also contacted the VBWD Engineer regarding eroding banks on their property. The issue was assessed in 2015.

2.9.2 Observations
Jeff Weiss, PE, conducted a site investigation June 20, 2016, that included all portions of Farney Creek upstream of Inwood Avenue. On June 27, Christian Frias and Rena Weis completed a site investigation along Farney Creek from Inwood Avenue to a wetland approximately 2,000 feet downstream. The erosion on the Goldstrohm and Dunckel properties has not become noticeably worse. The cause of the erosion downstream of the area previously repaired on the Goldstrohm property (Photo 13) was not apparent. Grasses and flowers previously planted on the bank have continued to colonize the eroded area and
should help provide some vegetative reinforcement. At the eroding bank upstream of the walking bridge, the contours of the stream bed are directing base flow into the toe of the bank. At the Dunckel property, the channel appears to be slightly incised and a small headcut was observed near the parcel line between the Goldstrohm and Dunckel properties (Photo 14 and Photo 15). Barr staff observed additional minor-to-moderate erosion at several locations both upstream and downstream of Inwood Avenue.

Aside from the small headcut, system problems have not been observed; however, it is possible that the erosion is caused by slight enlargement of the channel related to development in the upstream subwatershed. Though the contributing subwatershed is not densely developed and some runoff is routed through stormwater ponds, development nonetheless fundamentally changes the hydrology of the subwatershed and usually increases the total volume of runoff reaching area water bodies.

2.9.3 Recommendations

Barr recommends stabilizing the headcut observed near the property line between the Goldstrohm and Dunckel properties to prevent erosion from migrating upstream. Adjacent eroding streambanks should also be graded and revegetated. We also recommend inspecting the stabilization project in 2017 and the entire creek in 2021.

Photo 13 (June 2016): Bank erosion on the Goldstrohm property (8171 21st Street North) near a headcut on Farney Creek. Barr recommends stabilizing the headcut and adjacent eroding banks.
**Photo 14 (June 2016):** Bank erosion and incised channel on the Dunckel property (8219 21st Street North), a short distance downstream of the headcut (**Photo 15**). Barr recommends stabilizing the headcut and nearby streambanks.

**Photo 15 (June 2015):** Debris jam and potential headcut on Farney Creek. Barr recommends stabilizing this headcut and adjacent banks.
2.10 Goetschel Pond Ravine Stabilization Project

2.10.1 Background

VBWD constructed the Goetschel Pond Ravine Stabilization Project in 2008 in the City of Lake Elmo, with final plantings installed in early 2009. The ravine drains to Goetschel Pond and affects land on property currently owned by:

- Julie and Michael Nelson (4768 Larkspur Lane North).
- Kevin and Maureen Tholen (4854 Linden Trail North).
- Anthony and Sara Yocum (4886 Linden Trail North).
- The Fields of St. Croix Homeowners Association (some parcels).
- The Robert Engstrom Companies (outlots).

Prior to the project, residents reported erosion and accumulation of sediment at the downstream end of the ravine. Stabilization required:

- Importing fill to rebuild the base.
- Installing an armored channel to prevent future erosion of the base.
- Installing vegetated reinforced soil slope (VRSS) to stabilize a steep slope adjacent to a private residence.
- Repairing an upstream detention pond to prevent stormwater seepage near the outlet pipe.

2.10.2 Observations

On January 12, 2016, a representative from the Fields of St. Croix Homeowners Association contacted Barr to report that sediment had accumulated at the downstream end of the ravine and plugged a culvert under a trail. Jeff Weiss, PE, visited the site with a representative of the homeowners association on May 20, 2016. They observed no problems with the sites stabilized during the original project; however, they did observe erosion on the opposite side of the ravine, but no evidence that it was caused by surface drainage. The homeowners association representative committed to following up with adjacent homeowners to make sure they were not draining their pool over the side of the ravine and inadvertently causing erosion.

2.10.3 Recommendations

Barr recommends continuing the biennial inspection of this project, with the next inspection in the spring of 2018.
2.11 Goose Lake Ravine Stabilization Project

2.11.1 Background
VBWD constructed the Goose Lake Ravine Stabilization Project in 2008 at 9200 10th Street North (former Zimmerhakl residence) and 9140 10th Street North (Dennis and Karen Geffre residence) to stabilize significant erosion at the head of the ravine. Final plantings were installed early in 2009. Mr. Zimmerhakl had made several attempts to stabilize the channel on his property, with mixed results. The initial project included installation of rock vanes, plantings, and an armored channel through the steepest and most actively eroding portion of the channel. High flows in the following years undermined the armoring and caused additional erosion in the armored channel. Two large rock vanes were installed in the ravine in December 2012 to act as grade control and stop erosion.

2.11.2 Observations
Jeff Weiss, PE, visited the project site on June 20, 2016. Despite installation of the two rock vanes in December 2012, erosion problems have persisted and boulders in one of the vanes have been displaced. The channel has widened between the vanes and shows downcutting upstream of the upstream vane (Photo 16).

2.11.3 Recommendations
Barr recommends (1) installing two more vanes to prevent additional downcutting, (2) repairing the vane with the displaced boulder, and (3) installing armoring in select places to prevent general bank erosion and keep erosion and headcutting from moving around the sides of the vanes. Barr also recommends continued annual inspection of this project.

Photo 16 (May 2015): Channel widening and erosion at Goose Lake ravine; Barr recommends installation of two additional vanes and some armoring.
2.12 Downs Lake Flood Duration Reduction Project

2.12.1 Background
VBWD constructed the Downs Lake Flood Duration Reduction Project in 2002 to provide an emergency flood outlet from Downs Lake and a complex of wetland and lowlands adjacent to it. The project created a lower overflow from Downs Lake to Horseshoe Lake, which is part of the Project 1007 system. Efforts included the installation of pipes, a check valve (which acts as a flap gate), and two gates which require manual operation. The operating plan for the gates allows the water level on Downs Lake to be lowered under certain conditions.

2.12.2 Observations
Patrick Brockamp and Josh Phillips inspected the project on October 17, 2016. With the exception of missing and sheared bolts on Structure 2, all components were operational and in good condition. One missing bolt was replaced during the inspection. In 2015, VBWD hired a contractor to clear brush to facilitate inspection and operation; however, brush is starting to grow back and may need to be cleared again in a few years.

2.12.3 Recommendations
Barr recommends inspection of the storm sewer via video. This storm sewer has not been inspected since construction in 2002. Many municipalities conduct a video inspection of their infrastructure every 5 to 10 years. Barr also recommends continued annual inspection of this project.

2.13 Oakgreen Avenue Infiltration Basin

2.13.1 Background
VBWD completed the Oakgreen Avenue Infiltration Basin Project in 2008. The project involved the construction of a large infiltration basin at the top of an eroding ravine that feeds runoff directly to Valley Creek. The basin is approximately 0.4 acres and reduces runoff volume and sediment to Valley Creek. VBWD and an Environmental Protection Agency 319 grant paid for the project.

2.13.2 Observations
Barr staff thoroughly inspected this project in June 2015 and found it in good condition.

2.13.3 Recommendations
Barr recommends continuing the biennial inspection of this project, with the next inspection in 2017.

2.14 Valley Creek Ravine Stabilization Projects—Landucci and Moynagh Ravine

2.14.1 Background
The Valley Creek Ravine Stabilization Projects—Landucci and Moynagh Ravine (also known as the Clean Water Fund Ravine 2 West Project) stabilized approximately 2,100 feet of eroding ravine in the Valley
Creek subwatershed of Afton with 29 check dams and a riprapped drop structure. A grant from the Clean Water Fund matched with VBWD dollars paid for construction of the projects. The Landucci Ravine Stabilization Project was completed in December 2015 and the Moynagh Ravine Stabilization Project was completed in October 2016. The Moynagh Ravine property was recently sold to Jim and Marjorie Wade.

2.14.2 Observations
Barr conducted warranty inspections in 2016 for the Landucci Ravine Stabilization Project. A formal inspection was not performed at the Moynagh Ravine Stabilization Project aside from construction observation.

2.14.3 Recommendations
Barr recommends annual inspection of these projects, with the next inspection in 2017.

2.15 Blasko Dam Removal Project

2.15.1 Background
VBWD completed the Blasko Dam Removal Project in late summer 2010 at the request of landowners Scott and Audrey Blasko (14020 Valley Creek Trail South). The existing dam was removed and replaced with a series of boulder weirs that maintain upstream water levels, allow upstream fish passage, and prevent channel downcutting at the upstream bridge on Valley Creek Trail. The boulder weirs also result in less upstream pool area; associated reductions in solar input benefit the trout population.

2.15.2 Observations
Barr staff inspected the project in April 2015. Scott Blasko was present during the inspection. The project site was in good overall condition, with no observed erosion. There has not been a large flood at this site since construction; these typically occur following rapid snowmelt or large precipitation events when the ground is frozen.

2.15.3 Recommendations
Improvement of the riparian buffer (buckthorn removal, establishment of additional native vegetation) may enhance this site. Barr recommends that the site be re-visited and inspected in 2017 and that the opportunity to improve the riparian buffer be discussed further with the Blaskos.

2.16 Valley Creek Upstream Stabilization Project

2.16.1 Background
The Valley Creek Upstream Stabilization Project addressed bank erosion exacerbated by a severe flood in the spring of 2007. The work was done on properties owned by Jeff and Angela Polacek (14100 Valley Creek Trail South) and Joseph Meissner (14186 Valley Creek Drive South). Work on the Polacek property consisted of stabilizing a short portion of streambank using a root wad, grading, biolog, and revegetation. More extensive remediation was required on the Meissner property, located several hundred feet downstream of the Polaceks. This included repair of two significantly eroded banks using a combination
of grading, root wads, boulder vanes, and riprap, as well as replacement of an illegal weir/culvert with a boulder riffle more amenable to fish passage. The work was completed in 2008 and paid for by the VBWD and an Environmental Protection Agency 319 grant. In 2009 VBWD also repaired erosion of a contributing ravine where it joins the creek (caused by early spring snowmelt). These repairs were paid for by VBWD.

2.16.2 Observations
This project was inspected in 2015 and was in good condition.

2.16.3 Recommendations
Barr recommends continuing the biennial inspection of this project, with the next inspection in 2017.

2.17 Valley Creek Downstream Stabilization Project
2.17.1 Background
In 2009, VBWD completed the Valley Creek Downstream Stabilization Project at 15901 Putnam Boulevard South (property formerly owned by Tom Johnson and now owned by Tim and Diane Rivas) and 2398 St. Croix Trail South (property owned by Susan Stanton). The project was paid for by the VBWD and an Environmental Protection Agency 319 grant paid. The purpose of the project was to stabilize the badly eroded and incised channel reach. To accomplish this, VBWD:

- Installed a series of eight boulder riffles to achieve channel grade control.
- Created floodplain terraces to provide connectivity to the floodplain.
- Restored the riverbanks with native vegetation.

Channel banks susceptible to erosion were stabilized using bioengineering methods (primarily root wads). A native vegetation buffer was also established along the project corridor to provide additional protection and habitat.

The project has largely been successful, and the associated reach of Valley Creek is considered stable; however, at the upstream reach of the project, Tim and Diane Rivas have not maintained the full extent of the native buffer, which has increased the potential for future erosion. In addition, the channel was eroding the east bank at the upstream-most riffle and repair was recommended to prevent further erosion.

The recommended repairs consisted of repositioning the boulders on the left side of the riffle (looking downstream) and adding additional boulders to further reinforce the riffle. Barr also recommended repairing the bank immediately downstream of Riffle 8 by installing root wads, provided that Mr. Rivas would agree to stop mowing the overbank adjacent to the erosion area. Mr. Rivas agreed to stop mowing in certain vulnerable areas, but not to maintain the extent of the original buffer.
2.17.2 2016 Repairs

Based on input from the Managers at their July 23, 2015, meeting, Barr developed construction drawings for the repairs and solicited quotes from two contractors who were working on other projects in the area (Nadeau Companies, LLC and G.F. Jedlicki, Inc.); however, the Minnesota Department of Natural Resources (MnDNR) area hydrologist and fisheries staff advised that construction could not occur during the fish spawning restriction period (September 1, 2015, to April 1, 2016). MnDNR also requested minor modifications to the stabilization design, including additional root wads.

Barr revised the project design to incorporate MnDNR recommendations and address worsening erosion at the upstream-most riffle caused by a beaver dam. Updated bids were obtained in late June 2016, and the Managers selected Nadeau Companies to perform the work (Photo 17). Construction was largely completed in August 2016, with final seeding and mulching done in September.

2.17.3 Recommendations

Barr recommends biannual inspection of the project until repairs are considered stable.

![Photo 17 (August 2016): Nadeau Companies repaired Riffle 8 and a downstream eroding bank on a reach of the Valley Creek Downstream Stabilization Project.](image)

2.18 Valley Creek

2.18.1 Background

Valley Creek comprises three major reaches: the North Fork, the South Fork, and the Main Stem. The North Fork flows 1.6 miles from Lake Edith to its confluence with the South Fork. Below the confluence of the North and South Forks, the Main Stem of Valley Creek flows 1.8 miles to the mouth of the creek at the St. Croix River. The perennially flowing reaches of Valley Creek make up a trout stream.
The South Fork of Valley Creek has areas of both perennial and intermittent flow. From a point approximately 0.75 miles east of Neal Avenue (CSAH 71) to its junction with the Main Stem (a 2.5-mile stretch) the South Fork flows year round. Upstream of this location, it is dry most of the time, but flows during rain or snowmelt. The most upstream and western end of intermittent flow is about half a mile west of Manning Avenue (Highway 95) and north of Valley Creek Road, in Woodbury. A southern leg of the South Fork includes a privately owned dam and splits into three reaches that each extend to near 40th Street South.

The Blasko Dam Removal Project and the Valley Creek Upstream Stabilization Project (described in Section 2.15 and Section 2.16) are on the South Fork of Valley Creek. The Valley Creek Downstream Stabilization Project (described in and Section 2.17) is on the Main Stem of the creek. The Oakgreen Avenue Infiltration Basin (discussed in Section 2.13) and the stabilization projects on the Landucci and Moynagh Ravine (discussed in Section 2.14) are within the watershed of the South Fork of Valley Creek.

2.18.2 Observations
Barr staff members have regularly observed several reaches of Valley Creek and some ravines in the subwatershed while inspecting stabilization and maintenance projects; however, a comprehensive inspection has not been completed in over 10 years.

2.18.3 Recommendations
Barr recommends completing an inspection and erosion inventory of the entire creek and major ravines every 3 years. The next inspection should occur in 2017 and include prioritization of erosion sites.

2.19 30th and Trading Post Ravine Stabilization Project
2.19.1 Background
VBWD stabilized approximately 325 feet of an eroding ravine with a concrete drop structure and 130 feet of 60-inch-diameter pipe. The project site is near the intersection of 30th Street South and Trading Post Trail South in the Valley Creek subwatershed of Afton. Construction of the project was completed in December 2015 and funded by a grant from the Clean Water Fund with matching VBWD dollars.

2.19.2 Observations
Barr conducted warranty inspections in 2016.

2.19.3 Recommendations
Barr recommends annual inspection of 30th and Trading Post site, with the next inspection in 2017.

2.20 Kelle’s Creek
2.20.1 Background
Kelle’s Creek, formerly part of the Lower St. Croix Watershed Management Organization (LSCWMO), was added to the VBWD in 2009. Kelle’s Creek has areas of both perennial and intermittent flow. The
perennially flowing portion of the creek starts about 0.45 miles northeast of the intersection of Trading Post Trail and Afton Boulevard (CSAH 18) in a steep-walled valley that extends approximately 2.8 miles to the mouth of the St. Croix River. Information from the LSCWMO indicated that there were potential erosion issues in this area. Upstream, the creek is intermittent—dry most of the time but flowing during rain or snowmelt events.

In 2013, Barr staff conducted a detailed erosion inventory and survey of the main channel of Kelle’s Creek. The purpose of the survey, ordered by the Managers, was to gather information that would facilitate the completion of projects in-progress and identify additional eroded areas requiring repair. Barr presented the survey findings to the Managers in June 2013 and made concept-level recommendations for stabilization in August 2013. The Managers discussed Barr’s findings and chose to do minimal work in the creek to avoid creating new erosion problems.

Erosion issues in the main channel of Kelle’s Creek were reassessed in 2015. These efforts included two site visits (an April 16 visit by Barr staff with Managers Lucas and Marchan and a May 6 visit by Barr staff only) to inspect a total of 31 erosion sites identified in 2013. These sites are shown on Figure 2-1. Following these inspections, Barr recommended that VBWD perform maintenance on some of the most severe scarps and monitor Kelle’s Creek and its tributaries. In the summer of 2015, VBWD hired a contractor to remove fallen trees that appeared to be directing flow into the stream bank and exacerbating localized erosion.

VBWD has funded several projects implemented by the Washington Conservation District (WCD) in the Kelle’s Creek subwatershed to stabilize eroding ravines.

2.20.2 Observations

Neither the creek nor the tributary ravines were visited in 2016.

2.20.3 Recommendations

Barr recommends triennial inspection and a complete photographic inventory of Kelle’s Creek and its tributaries. Because the 2015 inspection was a partial inspection, we recommend that the next full inspection be done in 2017.
Figure 2-1

KELLE’S CREEK INSPECTION AND SCARP LOCATIONS
2016 Infrastructure and Conveyance Systems Inspections Report
Valley Branch Watershed District
2.21 Swede Hill Creek Subwatershed

2.21.1 Background

The Swede Hill Creek subwatershed has a drainage area of 836 acres, or approximately 1.3 square miles, and contains several steep-sided ravines and bluffs that drain directly to the St. Croix River. Most of the subwatershed is undeveloped and heavily forested; there are no perennial streams, MnDNR public waters, or other significant waterbodies.

2.21.2 Observations

Barr has not performed inspections in the Swede Hill Creek subwatershed.

2.21.3 Recommendations

As outlined in the 2015 VBWD Watershed Management Plan, Barr recommends performing inventories of springs and erosion to identify areas of special concern with regards to karst geology and potential locations for ravine and gully stabilization. Pending 2017 inventory results, Barr recommends a feasibility study to identify slope and bluff stabilization projects for potential implementation. Barr recommends inspecting the Swede Hill Creek subwatershed every five years.

2.22 Cost-Share Projects with More Than $5,000 in VBWD Contribution

2.22.1 Background

VBWD provides cost-share assistance (administered by the WCD) for projects that improve water quality and natural resources. In 2016, the VBWD asked the WCD to provide inspection reports for projects that received more than $5,000 in VBWD funding. A full list of these projects is shown in Table 2-1. Three inspection reports provided by the WCD are included in Appendix C.

2.22.2 Recommendations

Barr recommends that the VBWD continue to request annual inspection reports from the WCD and Ramsey Conservation District for all projects that received $5,000 or more from the VBWD.
### Table 2-1  Cost-Share Projects Receiving More than $5,000 in VBWD Contributions

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Grant Year</th>
<th>Grant Type</th>
<th>VBWD Contribution</th>
<th>Inspected in 2016?</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>White Property</td>
<td>2016</td>
<td>Individual</td>
<td>$6,988.60</td>
<td>No</td>
<td>Project not complete, will install in 2017</td>
</tr>
<tr>
<td>Kramer/Kirkwold Property</td>
<td>2015</td>
<td>Individual</td>
<td>$5,000.00</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Landucci Property</td>
<td>2015</td>
<td>Buckthorn</td>
<td>$10,110.00</td>
<td>No</td>
<td>Project partially complete</td>
</tr>
<tr>
<td>Wiesner/Hill Property</td>
<td>2015</td>
<td>CWF/Match</td>
<td>$22,419.00</td>
<td>No</td>
<td>Project partially complete</td>
</tr>
<tr>
<td>Homestead Development</td>
<td>2015</td>
<td>Community</td>
<td>$13,250.00</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Mutter Property</td>
<td>2015</td>
<td>Individual</td>
<td>$7,900.00</td>
<td>No</td>
<td>Project completed in fall 2016</td>
</tr>
<tr>
<td>McComb/Kotz Property</td>
<td>2013</td>
<td>Special Incentive</td>
<td>$10,700.00</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Gurney Property</td>
<td>2012</td>
<td>Individual</td>
<td>$5,550.00</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Lake Elmo Streets</td>
<td>2012</td>
<td>Special Incentive</td>
<td>$27,822.00</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>DeMontreville Boat Launch</td>
<td>2011</td>
<td>Community</td>
<td>$9,000.00</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Lake Elmo Roadways</td>
<td>2011</td>
<td>Community</td>
<td>$17,000.00</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Lake Elmo Roadways</td>
<td>2009</td>
<td>Community</td>
<td>$28,750.00</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Joy Park Shoreline, Maplewood</td>
<td>2009</td>
<td>Community</td>
<td>$18,789.10</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Century College</td>
<td>2009</td>
<td>Community</td>
<td>$50,000.00</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Mahtomedi Public Works</td>
<td>2008</td>
<td>Community</td>
<td>$22,500.00</td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>
3.0 Non-System Specific Activities

3.1 Web mapping

3.1.1 Background
Barr maintains an online map to assist with inspection and maintenance activities and information requests. While this web map has been a cost-saving tool for the VBWD, one limitation is that much of the District’s infrastructure was constructed before digital surveying and mapping was done and not precisely located on the existing map. During the October 2016 inspections, Barr staff collected GPS locations of many structures that are part of VBWD-constructed systems, including Project 1007, the Olson Lake Estates Pond Outlet Project, the Downs Lake Flood Duration Reduction Project, and the Echo Lake and Weber Pond Outlets.

3.1.2 Recommendations
Barr recommends that the VBWD web map be updated with the GPS locations collected during the October 2016 inspections.

3.2 Beaver-Removal Cost-Share Program

3.2.1 Background
Over the last 10 years, beaver activity—particularly the construction of dams—has damaged several Valley Creek locations, including the Johnson property, Rivas property, and areas near Lake Edith. In 2016, VBWD hired a contractor to remove a beaver dam and other debris on the Johnson property at a cost of $7,340. A beaver dam on the Rivas property contributed to erosion at a rock riffle and streambank; required repairs, funded by VBWD, were $33,315. Beaver typically live in colonies of five or six; removal costs range from $50 to $100 per beaver.

To reduce costs related to beaver activity, the Managers established a beaver-removal cost-share program at their November 10, 2016, meeting. Homeowners are required to hire a beaver trapper and can submit their receipts to VBWD for full reimbursement.

3.2.2 Recommendations
Barr recommends that the beaver-removal cost-share program be included in the 2017 VBWD operations and maintenance budget.

3.3 General Maintenance

3.3.1 Background
As outlined in this report, VBWD maintains a number of structures and systems throughout the watershed to protect the District’s water resources and property. Emergency maintenance issues frequently come up during the course of the year and cannot wait for VBWD’s normal annual budgeting process to be addressed. Most of these issues are tree and debris removal from streams and channels to protect the
stream from erosion and adjacent properties from flooding. In 2016 alone, the Managers were required to act on over $12,000 in unanticipated maintenance expenses. Contractor costs for most items were less than $3,000. In addition to contractor costs, Barr staff members spend time preparing related memos for the Board packet; this adds to the total cost for these relatively inexpensive maintenance projects. Additionally, waiting 2 to 4 weeks for Manager authorization increases the risk of damage to the water resource or property.

3.3.2 Recommendations

Barr suggests that the Managers consider giving Barr authorization to hire contractors for maintenance activities less than $3,000.
4.0 Maintenance Work Performed in 2016

The Managers took the following actions in 2016:

1. Hired Tri County Services Inc. to remove a beaver dam, several downed trees, and woody debris from within the banks of Valley Creek on the Shari Johnson property. The work was completed in June 2016 for $7,340.

2. Hired Buelow Excavating to:
   a. Remove several fallen trees from various channels and remove some brush growing near flared-end sections in the West Lakeland Storage Site. The Managers approved $2,409 for removals; however, due to high water levels, the project could not be completed and only $1,351 was spent. Buelow Excavating plans to complete the remaining work in 2017.
   b. Remove several fallen trees along Raleigh Creek between Tablyn Park and Lake Elmo Park Reserve. This work was completed in July 2016 for $2,292.
   c. Remove a fallen tree along Raleigh Creek on the Proulx property. This work was completed in September 2016 for $850.
   d. Mow the Rest Area Pond Dam crest and spillway. This work was completed in October 2016 for $500.
   e. Mow the side slopes of the channels between Horseshoe Lake and Interstate 94, including the West Lakeland South Storage Sites. The Managers approved $1,800 for mowing; however, due to high water levels, only the channels could be mowed. This work was completed in October 2016 for $1,300.
   f. Remove two fallen trees along Raleigh Creek between Tablyn Park and Lake Elmo Park Reserve. This work was completed in November 2016 for $1,600.
   g. Remove accumulated dead trees and debris near the outlet of the Rest Area Pond. The Managers approved $1,411 for removals; however, due to high water levels, the work could not be completed. Buelow Excavating plans to complete the remaining work in 2017.

3. Hired Minger Construction Co. Inc. to remove and replace wooden stop logs at Structure 6 (Eagle Point Lake Dam) with new aluminum stop logs. The Managers approved this work for a total of $27,500. Due to high water levels and the length of time required to manufacture the aluminum stop logs, the work has not been completed. Minger anticipates the work will be done by February 1, 2017.

4. Hired Nadeau Companies to perform maintenance on a rock riffle in Valley Creek on the Rivas property. This work was completed in September 2016 for $36,545.

5. Barr completed the following activities in 2016:
a. Requested that WCD submit annual inspection reports to VBWD on all projects that VBWD supported with contributions of more than $5,000.

b. Completed an erosion inventory on Farney Creek upstream of Ideal Avenue in June 2016 to determine whether there are systemic issues contributing to erosion at the Goldstrohm and Dunckel properties.

c. Developed a step-by-step set of procedures in June 2016 to implement the existing MnDNR-approved operations (emergency drawdown) plan.

d. Coordinated with The Royal Golf Club to remove debris, downed trees, and old pedestrian bridges in the channel from Lake Elmo through Tartan Park (some of these items were removed in June 2016, some remain).

e. Coordinated with Washington County Parks to remove two small trees near Structure 7 at Eagle Point Lake Dam. Barr confirmed that this work was completed during October 2016 inspections.

f. Replaced a broken manhole cover for MH-2 at the Rest Area Pond Dam in October 2016; the cost of the cover was $266.04.

g. Cleaned threads and replaced bolts at MH-37 in October 2016.

h. Prepared and distributed literature to Tri-Lakes area residents regarding the history and benefits of Project 1007.

The total cost of the completed repairs was $44,704.04, excluding Barr fees.
5.0 Recommendations

We recommend that the Managers consider the inspection, operation, and maintenance items summarized in Table 5-1 and Table 5-2. If the Managers agree to the recommended actions, we will obtain bids from contractors to perform the work and present those bids to the Managers for consideration. Several recommended projects could be grouped and performed by a single contractor to reduce costs. Maintenance locations are shown on Figure 5-1.

5.1 Inspections

Table 5-1 summarizes the recommended inspection frequency and inspection/reporting cost for each VBWD system described in Section 2.0.

Table 5-1 2017 Recommended Inspection Activities

<table>
<thead>
<tr>
<th>System</th>
<th>Inspection Frequency</th>
<th>Last Inspected</th>
<th>Next Recommended Inspection</th>
<th>Estimated 2017 Inspection/Reporting Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project 1007</td>
<td>Annual</td>
<td>2016</td>
<td>2017</td>
<td>$19,000</td>
</tr>
<tr>
<td>Echo Lake Outlet</td>
<td>Annual</td>
<td>2016</td>
<td>2017</td>
<td>$1,000</td>
</tr>
<tr>
<td>Weber Pond Outlet</td>
<td>Annual</td>
<td>2016</td>
<td>2017</td>
<td>$1,000</td>
</tr>
<tr>
<td>Long Lake Ravine Stabilization Project</td>
<td>Biennial</td>
<td>2016</td>
<td>2018</td>
<td>NA</td>
</tr>
<tr>
<td>DeMontreville Ravine Stabilization Project</td>
<td>Annual</td>
<td>2016</td>
<td>2017</td>
<td>$1,000</td>
</tr>
<tr>
<td>Olson Lake Estates Pond Outlet Project</td>
<td>Annual</td>
<td>2016</td>
<td>2017</td>
<td>$2,500</td>
</tr>
<tr>
<td>Raleigh Creek Bank Stabilization Project</td>
<td>Biennial</td>
<td>2016</td>
<td>2018</td>
<td>NA</td>
</tr>
<tr>
<td>Raleigh Creek</td>
<td>Triennial</td>
<td>2016</td>
<td>2019</td>
<td>NA</td>
</tr>
<tr>
<td>Farney Creek Stabilization Project</td>
<td>Annual</td>
<td>2016</td>
<td>2017</td>
<td>$1,000</td>
</tr>
<tr>
<td>Goetschel Pond Ravine Stabilization Project</td>
<td>Biennial</td>
<td>2016</td>
<td>2018</td>
<td>NA</td>
</tr>
<tr>
<td>Goose Lake Ravine Stabilization Project</td>
<td>Annual</td>
<td>2016</td>
<td>2017</td>
<td>$1,000</td>
</tr>
<tr>
<td>Downs Lake Flood Duration Reduction Project</td>
<td>Annual</td>
<td>2016</td>
<td>2017</td>
<td>$1,500</td>
</tr>
<tr>
<td>Oakgreen Avenue Infiltration Basin</td>
<td>Biennial</td>
<td>2015</td>
<td>2017</td>
<td>$1,000</td>
</tr>
<tr>
<td>Valley Creek Ravine Stabilization Projects—Landucci and Moynagh Ravine</td>
<td>Annual</td>
<td>2016</td>
<td>2017</td>
<td>$1,000</td>
</tr>
<tr>
<td>Blasko Dam Removal Project</td>
<td>Biennial</td>
<td>2015</td>
<td>2017</td>
<td>$1,000</td>
</tr>
<tr>
<td>Valley Creek Upstream Stabilization Project</td>
<td>Biennial</td>
<td>2015</td>
<td>2017</td>
<td>$1,000</td>
</tr>
<tr>
<td>Valley Creek Downstream Stabilization Project</td>
<td>Biannual</td>
<td>2016</td>
<td>2017</td>
<td>$1,000</td>
</tr>
<tr>
<td>Valley Creek</td>
<td>Triennial</td>
<td>2005</td>
<td>2017</td>
<td>$20,000</td>
</tr>
<tr>
<td>30th and Trading Post Ravine Stabilization Project</td>
<td>Annual</td>
<td>2016</td>
<td>2017</td>
<td>$1,000</td>
</tr>
<tr>
<td>Kelle’s Creek</td>
<td>Triennial</td>
<td>2015 (partial)</td>
<td>2017</td>
<td>$8,000</td>
</tr>
<tr>
<td>Swede Hill Creek Subwatershed</td>
<td>Every 5 years</td>
<td>NA</td>
<td>2017</td>
<td>$5,000</td>
</tr>
<tr>
<td><strong>TOTAL 2017</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>$67,000</strong></td>
</tr>
</tbody>
</table>
### 5.2 Operations and Maintenance Items

Table 5-2 summarizes responsible parties, planning-level cost estimates, and estimated priority (High, Medium, or Low) for recommended maintenance activities. Estimates are for total project costs including contractor time, Barr time, and expenses.

**Table 5-2  Recommended Operations and Maintenance Activities Based on 2016 Inspections**

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Responsible Party</th>
<th>Planning-Level Cost Estimate</th>
<th>Estimated Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Annual mowing of the Rest Area Pond Dam and spillway</td>
<td>VBWD</td>
<td>$500</td>
<td>High</td>
</tr>
<tr>
<td>2</td>
<td>Annual mowing of channel side slopes between Horseshoe Lake and Interstate 94, including the West Lakeland Storage Site South Pond</td>
<td>VBWD</td>
<td>$2,000</td>
<td>High</td>
</tr>
<tr>
<td>3</td>
<td>Remove accumulated dead trees and debris near the Rest Area Pond Outlet and within the pipe to Structure 2 (Photo 1)</td>
<td>VBWD</td>
<td>$1,500 (Authorized)</td>
<td>High</td>
</tr>
<tr>
<td>4</td>
<td>Remove:</td>
<td>VBWD</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Downed trees (two locations in West Lakeland Storage Site Channel, south of the South Pond)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Downed tree (one new location in West Lakeland Storage Site Channel, south of South Pond)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Downed trees in West Lakeland Storage Site Channel between the Middle and North Ponds (Photo 2, Photo 3, Photo 4, and Photo 5)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Coordinate with The Royal Golf Club to remove downed trees and an old pedestrian bridge in the channel downstream of Lake Elmo (Photo 6, Photo 7, and Photo 8)</td>
<td>VBWD / The Royal Golf Club</td>
<td>$0</td>
<td>High</td>
</tr>
<tr>
<td>6</td>
<td>Inspect the Project 1007 storm sewer via video</td>
<td>VBWD</td>
<td>$85,000</td>
<td>Low</td>
</tr>
<tr>
<td>7</td>
<td>Replace wooden stop logs with aluminum stop logs at all structures (3, 4, 5, 9, 10, 11, 12)</td>
<td>VBWD</td>
<td>$210,000</td>
<td>Low</td>
</tr>
<tr>
<td>8</td>
<td>Replace wooden stop logs at Structure 6 with aluminum stop logs (Photo 9)</td>
<td>VBWD</td>
<td>$30,000 (Authorized)</td>
<td>High</td>
</tr>
<tr>
<td>9</td>
<td>Prepare and publish a newspaper article documenting the completion of the Project 1007 system inspection and describing the history and benefits of the project</td>
<td>VBWD</td>
<td>$2,000</td>
<td>High</td>
</tr>
</tbody>
</table>

**DeMontreville Ravine Stabilization Project**

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Responsible Party</th>
<th>Planning-Level Cost Estimate</th>
<th>Estimated Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Remove accumulated sediment from the sedimentation basin at the downstream end of the ravine and the outlet into Lake DeMontreville (Photo 10 and Photo 11)</td>
<td>VBWD</td>
<td>$95,000</td>
<td>Medium</td>
</tr>
<tr>
<td>11</td>
<td>Remove two downed trees at DeMontreville Ravine on the bank near Cross Vane 2 (Photo 12)</td>
<td>VBWD</td>
<td>$1,000</td>
<td>High</td>
</tr>
</tbody>
</table>

**Olson Lake Estates Pond Outlet Project**

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Responsible Party</th>
<th>Planning-Level Cost Estimate</th>
<th>Estimated Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>Inspect the Olson Lake Estates storm sewer via video</td>
<td>VBWD</td>
<td>$20,000</td>
<td>Low</td>
</tr>
<tr>
<td>Item</td>
<td>Description</td>
<td>Responsible Party</td>
<td>Planning-Level Cost Estimate&lt;sup&gt;1&lt;/sup&gt;</td>
<td>Estimated Priority</td>
</tr>
<tr>
<td>------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-------------------</td>
<td>------------------------------------------</td>
<td>--------------------</td>
</tr>
<tr>
<td>13</td>
<td><strong>Farney Creek Stabilization Project</strong>&lt;br&gt;Complete stabilization of headcut and eroding banks at the Goldstrohm and Dunckel properties (<a href="#">Photo 13, Photo 14, and Photo 15</a>)</td>
<td>VBWD</td>
<td>$65,000&lt;sup&gt;2&lt;/sup&gt;</td>
<td>Medium</td>
</tr>
<tr>
<td>14</td>
<td><strong>Goose Lake Ravine Stabilization Project</strong>&lt;br&gt;Install two additional vanes and armoring to prevent additional erosion (<a href="#">Photo 16</a>)</td>
<td>VBWD</td>
<td>$50,000&lt;sup&gt;2&lt;/sup&gt;</td>
<td>High</td>
</tr>
<tr>
<td>15</td>
<td><strong>Downs Lake Flood Duration Reduction Project</strong>&lt;br&gt;Inspect the Downs Lake Flood Duration Reduction Project storm sewer via video</td>
<td>VBWD</td>
<td>$7,500</td>
<td>Low</td>
</tr>
<tr>
<td>16</td>
<td><strong>General</strong>&lt;br&gt;Update web mapping with infrastructure locations acquired by GPS</td>
<td>VBWD</td>
<td>$2,000</td>
<td>High</td>
</tr>
<tr>
<td>17</td>
<td>Beaver-removal cost-share program</td>
<td>VBWD</td>
<td>$3,000</td>
<td>High</td>
</tr>
<tr>
<td>18</td>
<td>General maintenance</td>
<td>VBWD</td>
<td>$15,000</td>
<td>High</td>
</tr>
</tbody>
</table>

<sup>1</sup> Costs do not include any snowpack monitoring or any work (Barr or contractor) associated with a potential drawdown of lakes in the spring to mitigate flooding.

<sup>2</sup> Does not include costs associated with acquiring easements; no easements are assumed to be needed.

### 5.3 Maintenance Costs

Table 5-3 summarizes the estimated project costs by priority.

**Table 5-3 Summary of Maintenance Costs**

<table>
<thead>
<tr>
<th>Priority Rank</th>
<th>Planning-Level Cost Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Priority</td>
<td>$111,500</td>
</tr>
<tr>
<td>Medium Priority</td>
<td>$160,000</td>
</tr>
<tr>
<td>Low Priority</td>
<td>$322,500</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>$594,000</strong></td>
</tr>
</tbody>
</table>
### Project 1007

1. Annual mowing of the Rest Area Pond Dam and spillway
2. Annual mowing of channel side slopes between Horsethief Lake and Interstate 494, including the West Lakeland Storage Site South Pond
3. Remove debris near the Rest Area Pond Outlet and in the pipes to Structure 1
4. Remove downed trees in West Lakeland Storage Site channels (multiple sites)
5. Coordinate with The Royal Golf Club to remove downed trees and an old rotten bridge in the channel downstream of Lake Elmo
6. Inspect the Project 1007 storm sewer via video
7. Replace wooden step logs with aluminum step logs at all structures (2, 3, 6, 9, 10, 11, 12)
8. Replace wooden step logs at Structure 8 with aluminum step logs
9. Prepare and publish a newspaper article documenting the completion of the Project 1007 inspection and describe the history and benefits of the project

### DeMontreville Ravine Stabilization Project

10. Remove accumulated sediment from the sedimentation basin at the downstream end of the ravine and the outlet into Lake DeMontreville
11. Remove two downed trees at DeMontreville Ravine on the bank near Cross Venz

### Olson Lake Estates Pond Outlet Project

12. Inspect the Olson Lake Estates storm sewer via video

### Finney Creek Stabilization Project

13. Complete stabilization of headcut and eroding banks at the Goldsbrothen and Dunsford properties

### Goose Lake Ravine Stabilization Project

14. Install two additional trees and stumps to prevent additional erosion

### Downs Lake Flood Duration Reduction Project

15. Inspect the Downs Lake Flood Duration Reduction Project storm sewer via video

### General

16. Update web mapping with infrastructure locations acquired by GPS
17. Beaver-removal cost-share program
18. General maintenance

---

**Figure 5-1**

MAINTENANCE RECOMMENDATIONS
2016 Infrastructure and Conveyance Systems Inspections Report
Valley Branch Watershed District
Appendix A

2016 Eagle Point Lake Dam Inspection Report
November 4, 2016

Mr. Jason Boyle  
Dam Safety Unit  
Division of Waters  
Minnesota Department of Natural Resources  
500 Lafayette Road  
St. Paul, MN 55155  

Re: 2016 Annual Inspection of Eagle Point Lake Dam  
Valley Branch Watershed District

Dear Mr. Boyle:

On October 17 and 25, 2016, Patrick Brockamp, EIT (Barr Engineering Co.), and I performed inspections of the Eagle Point Lake Dam and its control structures. This was done in accordance with Special Provision 8 of the Minnesota Department of Natural Resources permit for the dam, issued to the Valley Branch Watershed District (VBWD). The inspection report form and photographs of the dam and control structures are enclosed. The results of the inspection are summarized below.

- The inspections revealed the dam to be in generally good condition.

- The water level of Eagle Point Lake was elevated due to the large amount of precipitation this season, resulting in upstream lakes discharging to the lake. The water levels we recorded on October 17, 2016, were at elevation 896.3 feet, approximately 2.3 feet above the top of the primary outlet stop log weir in Structure 6 and 0.05 feet above the weir into the secondary outlet structure (Structure 7).

- In 2015, we observed damage to the wooden stop log weir in Structure 6. We are replacing the wooden stop logs with aluminum stop logs, which are currently being fabricated. Installation is planned for this winter. The wooden stop log weir was submerged during 2016 inspections and could not be inspected.

- No debris was observed in either the primary or secondary outlet structures.

- In 2015, we observed small trees in the dam near Structure 7. In response to our request, Washington County Parks removed these trees. During this year’s inspections, we observed trees outside of the dam footprint, limiting access to the outfall emergency pipe. We plan to ask Washington County Parks to remove these trees to facilitate inspection access.
If you have any questions or need additional information, please contact me at 952-832-2854 or ncampeau@barr.com.

Sincerely,

Nathan Campeau, P.E.

Enclosures

c: VBWD Managers
## INSPECTION REPORT

**EAGLE POINT LAKE DAM**

**Valley Branch Watershed District**

Inspected by Nathan Campeau, PE, and Patrick Brockamp, EIT

**October 17 and 25, 2016**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Deficiency Observed</th>
<th>Remarks</th>
<th>Photo #</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>I. OUTLET STRUCTURES</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. Accumulation of debris</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B. Cracking or spalling of concrete</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C. Deterioration of concrete</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D. Abnormal leakage</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E. Unusual or inadequate operational behavior</td>
<td>X</td>
<td>Damage to downstream side of stoplogs in Structure 6 observed in 2015 inspection. New aluminum stop logs have been ordered.</td>
<td>7</td>
</tr>
<tr>
<td><strong>II. UPSTREAM EMBANKMENT SLOPE</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. Wave erosion</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B. Cracks</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C. Slides or sloughs</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D. Subsidence</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E. Damage to slope protection</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F. Other erosion</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G. Vegetation failure</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H. Tree growth</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I. Animal burrows</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>III. DOWNSTREAM EMBANKMENT SLOPE</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. Wave erosion</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B. Cracks</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C. Slides or sloughs</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D. Subsidence</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E. Other erosion</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F. Excessive seepage or boils</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G. Vegetation failure</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H. Tree growth</td>
<td>X</td>
<td>Tree growth outside of dam footprint, but limiting access to secondary outfall pipe.</td>
<td>11</td>
</tr>
<tr>
<td>I. Animal Burrows</td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
INSPECTION REPORT (continued)
EAGLE POINT LAKE DAM
Valley Branch Watershed District

PHOTOGRAPHS (taken October 17, 2016, unless otherwise noted)

- Photo 1: Upstream face, looking toward left abutment (north)
- Photo 2: Downstream face, looking toward left abutment (north)
- Photo 3: Downstream face, looking toward right abutment (south)
- Photo 4: Upstream face, looking toward right abutment (south)
- Photo 5: Downstream side of weir in primary outlet (Nov. 4, 2015)
- Photo 6: Upstream side of weir in primary outlet (Nov. 4, 2015)
Photo 7: Damage to downstream side of stoplogs in Structure 6 (November 4, 2015)

Photo 8: Inlet to secondary structure

Photo 9: Inside of secondary structure (October 25, 2016)

Photo 10: Inlet to secondary structure

Photo 11: Trees limiting access to secondary outfall pipe (October 25, 2016)
Appendix B

2016 Rest Area Pond Dam Inspection Report
November 4, 2016

Mr. Bryce Fossand, P.E.
MnDOT Water Resources Engineering
1500 West County Road B2
Roseville, MN 55113

Re: 2016 Annual Inspection of Interstate 94 Rest Area Pond Dam

Dear Mr. Fossand:

On October 25, 2016, you, Eric Brenna of MnDOT, and I inspected the Interstate 94 Rest Area Pond Dam (Permit 86-6270). Barr staff (Pat Brockamp and Josh Phillips) also performed an inspection of the dam on October 17, 2016. Two copies of related documents are enclosed:

- Chart of historic water levels
- Completed Rest Area Pond Dam inspection form
- Comment sheet
- Photographs from the inspection

We found the dam and outlet structure to be in good condition. We estimated the water level of the pond at Elevation 835.5 feet, approximately 1.5 feet above the low-flow outlet elevation and 7 feet below the secondary outlet weir.

VBWD has performed the following maintenance on the Rest Area Pond Dam since the 2015 inspection:

- Mowing the entire dam and spillway, completed in October 2016 before the inspections
- Replacing a broken manhole cover at Structure 2

While no immediate repairs or maintenance appear to be needed, VBWD plans the following maintenance activities before the next inspection in fall 2017:

- Mowing the entire dam and spillway.
- Continued monitoring of two animal burrows and investigation of animal management; both burrows are located at the top of the dam, below the elevation of the emergency spillway.
- Removing tree debris near the pond outlet; this work was authorized in 2016, but has not been performed due to high water.

Please contact me with any corrections to the inspection form. If we do not hear from you, we will assume that you have forwarded this information to Jason Boyle at the Department of Natural Resources Dam
Safety Unit, 500 Lafayette Road, St. Paul, MN, 55155. If you have any questions or need additional information, please contact me at (952) 832-2854.

Sincerely,

Nathan Campeau, P.E.

Enclosures

c:  VBWD Managers
## Dam No.
I-94 Rest Area Pond

<table>
<thead>
<tr>
<th>Type</th>
<th>Location</th>
<th>Maintenance Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pond</td>
<td>1.0 Mile East of Rest Area</td>
<td>Metro-Oakdale</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item</th>
<th>Rating</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Vegetation Cover</td>
<td>Good</td>
<td>See note&lt;br&gt;See Remarks 1 and 3</td>
</tr>
<tr>
<td>2. Rip Rap</td>
<td>Good</td>
<td>Good&lt;br&gt;Good</td>
</tr>
<tr>
<td>3. Spillway</td>
<td>Good</td>
<td>Good&lt;br&gt;Good</td>
</tr>
<tr>
<td>4. Seepage Rate</td>
<td>None Observed</td>
<td>None Observed&lt;br&gt;None Observed&lt;br&gt;None Observed</td>
</tr>
<tr>
<td>5. Pond Elevation</td>
<td>Approx. 831</td>
<td>Approx. 833.3&lt;br&gt;Approx. 832.4&lt;br&gt;Approx. 835.5</td>
</tr>
<tr>
<td>6. Changes in Stream Area</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>7. Photographs</td>
<td>Taken</td>
<td>Taken 10-29-13&lt;br&gt;Taken 10-27-14&lt;br&gt;Taken 11-06-15&lt;br&gt;Taken 10-17-16</td>
</tr>
<tr>
<td>8. Structure #2</td>
<td>Good</td>
<td>Good&lt;br&gt;Good</td>
</tr>
<tr>
<td>9. 60&quot; RCP</td>
<td>Good</td>
<td>Good&lt;br&gt;See Remark 2</td>
</tr>
<tr>
<td>10. RCP</td>
<td>Good</td>
<td>Good&lt;br&gt;Good</td>
</tr>
</tbody>
</table>

---

**Inspected By:**

- **Date:** Oct. 29, 2013
  
  Peter Hinck and
  Jennifer Koehler

- **Date:** Oct. 27, 2014
  
  Jennifer Koehler and
  Amy Anderson

- **Date:** Nov. 6, 2015
  
  Nathan Campeau and
  Patrick Brockamp

- **Date:** Oct. 17 & 25, 2016
  
  Nathan Campeau and
  Patrick Brockamp

---

Bridge Inspections Engineer

---

- See Other Side
1 - Condition of vegetation cover (brush and trees cleared)
2 - Condition of Rip Rap
3 - Condition of Spillway
4 - Check drainage pipe on downstream side
5 - Top pond water elevation
6 - Look for changes of downstream area (new building, excavation, etc.)
7 - Take representative photos

Rating
G - Good – No repairs needed
F - Fair – Minor repairs
P - Poor – Repairs needed
U - Unsatisfactory – Repairs needed immediately
Other Comments and Observations

- Valley Branch Watershed District (VBWD) and Minnesota Department of Transportation staff inspected the dam on October 17 and 25, 2016.

- In general, dam and appurtenant structures are in good condition.

- The water level of the pond is above the low-flow control elevation and water is discharging from the pond.

- VBWD’s contractor mowed the dam and spillway in October 2016, before the inspections.

- Inspectors observed woody debris at the pond outlet (flared end inlet to Structure 2) during the 2015 inspections, and VBWD has hired a contractor to remove the debris. High water levels prevented removal of the woody debris prior to the 2016 inspections. The pond outlet was submerged and could not be inspected.

- Inspectors observed animal burrows at two locations on the top of the dam below the elevation of the emergency spillway. Inspectors will monitor these locations and investigate animal management.
2016 I-94 Rest Area Pond Dam Inspection Photographs (October 17, 2016)

Photo 1: Upstream face, looking toward right abutment (south)

Photo 2: Spillway, looking east-northeast

Photo 3: Crest, looking toward right abutment (south)

Photo 4: Downstream face, looking toward right abutment (south)
2016 I-94 Rest Area Pond Dam Inspection Photographs (continued)

Photo 5: Animal burrows, south end of crest

Photo 6: 60-inch-diameter reinforced-concrete pipe outlet (submerged)

Photo 7: Outlet structure, upstream side of weir

Photo 8: Outlet structure, downstream side of weir
Gurney Steve A & Barbara J Saniti
8281 26th St N
Lake Elmo Mn  55042

Thank you for helping protect and restore natural resources in Valley Branch Watershed District!

Dear Gurney Steve A & Barbara J Saniti,

This letter is a follow-up from our regular annual inspections of projects installed throughout the watershed. Funding for your project was provided by Valley Branch Watershed District while the Washington Conservation District supplied technical assistance. Our review will help you make sure your project looks good and functions properly long-term.

On 2016-06-27, we conducted an inspection of the Urban BMPs project located at 8281 26th St N, Lake Elmo Mn  55042. Our inspection process looks at several factors critical to the functionality of your project and determines if maintenance is needed to ensure the overall success of the project. A summary of our inspection findings is below. If maintenance is needed for your project, please make the improvements as suggested below or, if you need clarification, contact Tara Kline (651-330-8220 x28) or Bryan Pynn (651-330-8220 x36) at the Washington Conservation District.

Regards,

David J. Bucheck

President
Valley Branch Watershed District Board of Managers

**Inspection Summary**

Your project does not require any maintenance, thank you for sustaining your practice. We greatly appreciate your help.
Thank you for helping protect and restore natural resources in Valley Branch Watershed District!

Dear Homestead Homeowners Assoc,

This letter is a follow-up from our regular annual inspections of projects installed throughout the watershed. Funding for your project was provided by Valley Branch Watershed District while the Washington Conservation District supplied technical assistance. Our review will help you make sure your project looks good and functions properly long-term.

On 2016-06-29, we conducted an inspection of the Urban BMPs project located at 11075 14th St N, Lake Elmo Mn 55042. Our inspection process looks at several factors critical to the functionality of your project and determines if maintenance is needed to ensure the overall success of the project. A summary of our inspection findings is below. If maintenance is needed for your project, please make the improvements as suggested below or, if you need clarification, contact Tara Kline (651-330-8220 x28) or Bryan Pynn (651-330-8220 x36) at the Washington Conservation District.

Regards,

David J. Bucheck
President
Valley Branch Watershed District Board of Managers

**Inspection Summary**

Your project requires maintenance, please follow the notes below:

Vegetative management needed: weeding
McComb, Anne E
2813 Division St N
North St Paul Mn 55109-1676

Thank you for helping protect and restore natural resources in Valley Branch Watershed District!

Dear McComb, Anne E,

This letter is a follow-up from our regular annual inspections of projects installed throughout the watershed. Funding for your project was provided by Valley Branch Watershed District while the Washington Conservation District supplied technical assistance. Our review will help you make sure your project looks good and functions properly long-term.

On 2016-06-24, we conducted an inspection of the Urban BMPs project located at 2813 Division St N, North St Paul Mn 55109-1676. Our inspection process looks at several factors critical to the functionality of your project and determines if maintenance is needed to ensure the overall success of the project. A summary of our inspection findings is below. If maintenance is needed for your project, please make the improvements as suggested below or, if you need clarification, contact Tara Kline (651-330-8220 x28) or Bryan Pynn (651-330-8220 x36) at the Washington Conservation District.

Regards,

David J. Bucheck
President
Valley Branch Watershed District Board of Managers

**Inspection Summary**

Your project does not require any maintenance, thank you for sustaining your practice. We greatly appreciate your help.