



AGENDA OF THE SPECIAL MEETING OF
THE CITY COUNCIL
CITY OF BIRCHWOOD VILLAGE
WASHINGTON COUNTY, MINNESOTA
July 31, 2024
5:00 P.M.

NOTE: Due to Open Meeting Law restrictions, the City Council may be discussing agenda items for the first time. Your patience and understanding is appreciated during this process.

APPROVE AGENDA

CITY BUSINESS

Tighe-Schmitz Project and Funding – Lori Tella, Washington Conservation District* (pp.2-15)

- A. Tighe-Schmitz Project Background
- B. Potential Projects identified
- C. WBIF Funding Opportunity
- D. Project Costs
- E. Roles and Responsibilities
- F. Next Steps

ADJOURN

Additional Links for Review:

<https://bwsr.state.mn.us/watershed-based-implementation-funding-program>

<https://cityofbirchwood.com/wp-content/uploads/2024/07/2040-Comprehensive-Plan.pdf> (p. 60)

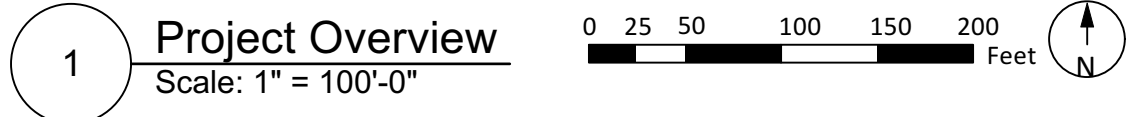
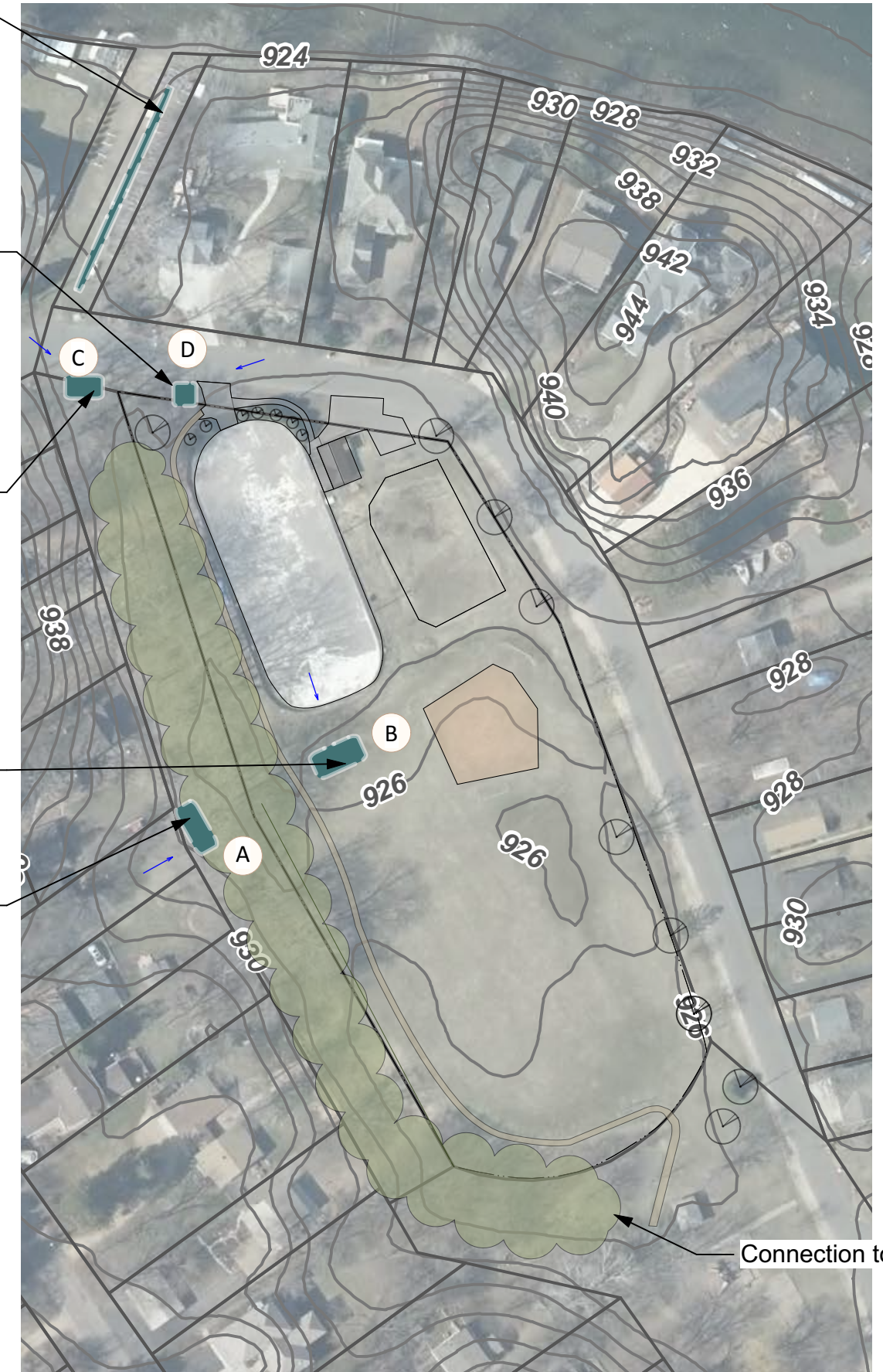
E. Swale and sump at inlet in ROW at Dellwood Beach [WBL-02 BMP 22]

D. Inlet to convert to filtration basin [not ranked]

C. Rain Garden/ Basin in Park above existing outlet to lake [see WBL 02, BMP 5]

B. Filtration Basin at the Park [BMP 06 WBL-10]

A. Infiltration Basin or Pond at manhole to Preibe Lake Outlet [see WBL 10, BMP 6]



1

Project Overview
Scale: 1" = 100'-0"



Washington Conservation District
455 Hayward Ave N
Oakdale, MN 55128
(651) 330-8220
www.mnwcd.org



plan created by:

| | | | |
|---|----------------------------------|----------|----------|
| Project Address: 410 Lake Avenue, Birchwood, MN | Drawn | Reviewed | Revision |
| Project Manager: Lori Tella | Washington Conservation District | | |

RCWD
RICE CREEK WATERSHED DISTRICT
4325 Pheasant Ridge Drive, Suite 611 - Blaine, MN 55449
(763) 398-3070
www.ricecreek.org

Project Title
Tighe-Schmitz Park

Sheet Title
Project Overview

CAD File Name
Project Overview-Tighe-Schmitz WIP 7.16.24.rvt

Date
9/25/23

L1
of
2 1

| Project # | Entity Requesting Funding (Grantee) | Fiscal Agent | Name of Project | Project Description | Water Resource | Grant Funds Requested | Non-State Match | Total Project Cost | TIMING | Proposed Measurable Outcomes | Plan Reference | Supplement Existing Funding | BWSR Eligibility Check | Additional Comments |
|-----------|--|----------------------------------|--|---|-----------------------------------|-----------------------|-----------------|--------------------|-----------|--|----------------|-----------------------------|--|--|
| | Washington Conservation District (on behalf of Birchwood Village) | Washington Conservation District | Tighe-Schmitz Park WQ Improvement Projects | This project will implement 3-5 bmp practices including biofiltration basins and swales that have direct connection to White Bear Lake and Hall's Marsh. These projects include BMP 06, BMP 05 and BMP 22. They have been ranked and identified in the SE White Bear Lake SW Retrofit analysis. | Hall's Marsh and White Bear Lake. | \$75,000 | \$7,500 | \$82,500 | 2025-2027 | Pollutant Load Reductions of 9 lb TP/yr, 2500 lb/yr of TSS | | | Pg 4-32, Section 4.3.14 Regional Water Management Partnership Projects. " Further, implementation of projects identified in a 2017 Southeast White Bear Lake Stormwater Retrofit analysis completed by the Washington Conservation District will be targeted through Regional Water Management Partnership funds. Funding for this capital improvement project will likely be through District ad valorem funds, municipal funding, and State water quality grant funding." This project is identified on SE White Bear Lake SW Retrofit analysis (page 32- 53) for the WBL-10 and WBL-02 Subwatersheds. | SOURCE: 4.3.14 Regional Water Management Partnership Projects: https://www.ricccreek.org/wp-content/uploads/document-library/RCWD_2020_Watershed_Management_Plan_Updated_August |

PROJECT OVERVIEW

| | | | | | | | | | | | | | | |
|-------|---|--|----------------------------------|----------|---------|----------|-----------------------------|-----------------------------|--|--|--|----------|--|--|
| A | Tighe-Schmitz Park WQ projects, WBL-10, Priebe Lake Outlet Treatment (IESF or Wet Pond) WBL-10 [A] | WBL-10: Priebe Lake Outlet Treatment/ Wet Pond or Basin near final manhole at Tighe-Schmitz Park. | White Bear Lake and Hall's Marsh | \$25,000 | \$2,750 | \$27,500 | 2026 | 3.8 lb/yr TP, 859 lb/yr TSS | SE White Bear Lake Stormwater Retrofit | Pg 4-32, Section 4.3.14 Regional Water Management Partnership Projects. " Further, implementation of projects identified in a 2017 Southeast White Bear Lake Stormwater Retrofit analysis completed by the Washington Conservation District will be targeted through Regional Water Management Partnership funds. Funding for this capital improvement project will likely be through District ad valorem funds, municipal funding, and State water quality grant funding." This project is identified on SE White Bear Lake SW Retrofit analysis (page 52) for the WBL-10 Subwatershed. | SOURCE: 4.3.14 Regional Water Management Partnership Projects: https://www.ricccreek.org/wp-content/uploads/document-library/RCWD_2020_Watershed_Management_Plan_Updated_August | UNRANKED | | |
| B | Tighe-Schmitz Park WQ projects WBL-10, BMP 6 [B], Filtration Basin at Park | WBL-10, BMP 06: Filtration Basin at Park. Existing catchbasin is last structure before pipe outlet into Hall's Marsh, in which this pipeshed drains the entire Priebe Lake outlet system. Catchbasin is full of leaf debris and backs up for weeks at a time in the park. Clean out catchbasin, add minimum 6" rise to catchbasin, install 800 sf filtration basin with 12" ponding, 12-24" of replacement media, and an underdrain with a knife valve tied to the catchbasin. | White Bear Lake and Hall's Marsh | \$15,000 | \$1,650 | \$16,500 | 2026 | 1.2 lb/yr TP, 395 lb/yr TSS | SE White Bear Lake Stormwater Retrofit | Pg 4-32, Section 4.3.14 Regional Water Management Partnership Projects. " Further, implementation of projects identified in a 2017 Southeast White Bear Lake Stormwater Retrofit analysis completed by the Washington Conservation District will be targeted through Regional Water Management Partnership funds. Funding for this capital improvement project will likely be through District ad valorem funds, municipal funding, and State water quality grant funding." This project is identified on SE White Bear Lake SW Retrofit analysis (page 52- 53) for the WBL-10 Subwatershed. | -\$10,000 (2017) Maintenance, 10 year cost (\$5,000) \$500/year | #22 | | |
| C | Tighe-Schmitz Park WQ projects WBL-02 BMP 5 [C], Biofiltration Basin above outlet to Lake | WBL-02, BMP 5: Biofiltration Basin - Install filtration basin above catchbasin to Lake. Add riser to Catchbasin rim to gain critical depth to allow for underdrain installation and connection to shallow catchbasin. Area is 600 sf, 12" ponding, 1.5 depth of 70/30 sand/peat soil replacement. Underdrain controlled via knife valve. Very steep slopes and a history of heavy sediment loads in rain events. | White Bear Lake and Hall's Marsh | \$20,000 | \$2,200 | \$22,000 | 2026 | 2.8 lb/yr TP, 851 lb/yr TSS | SE White Bear Lake Stormwater Retrofit | Pg 4-32, Section 4.3.14 Regional Water Management Partnership Projects. " Further, implementation of projects identified in a 2017 Southeast White Bear Lake Stormwater Retrofit analysis completed by the Washington Conservation District will be targeted through Regional Water Management Partnership funds. Funding for this capital improvement project will likely be through District ad valorem funds, municipal funding, and State water quality grant funding." This project is identified on SE White Bear Lake SW Retrofit analysis PG 32 of analysis | -\$17,658 in 2017, Maintenance Cost = \$775/year | #21 | | |
| E | Tighe-Schmitz Park WQ projects WBL-02 BMP 22 [E], Swale with Rip Rap Sump | WBL-02 BMP 22: Install/ enhance swale at western end of public ROW that connects to lake. Install riprap sump at inlet that flows into 200' long vegetated swale, 4' wide bottom and 21' side slopes, with 2' checkdams in flowpath. Very steep slopes and a history of heavy sediment loads in rain events. | White Bear Lake and Hall's Marsh | \$15,000 | \$1,100 | \$11,000 | 2026 | 1.2 lb/yr TP, 395 lb/yr TSS | SE White Bear Lake Stormwater Retrofit | Pg 4-32, Section 4.3.14 Regional Water Management Partnership Projects. " Further, implementation of projects identified in a 2017 Southeast White Bear Lake Stormwater Retrofit analysis completed by the Washington Conservation District will be targeted through Regional Water Management Partnership funds. Funding for this capital improvement project will likely be through District ad valorem funds, municipal funding, and State water quality grant funding." This project is identified on SE White Bear Lake SW Retrofit analysis PG 32 of analysis | -\$9,308 in 2017, O&M Maintenance Cost= \$900/yr | #34 | | |
| TOTAL | | | | | | \$7,700 | \$77,000 | 7.8 lb/yr | | | | | | |
| OTHER | | | | | | | | | | | | | | |
| F | Tighe-Schmitz Park WQ projects WBL-02 UNRANKED, 5 Shoreline Restorations | Up to 5 non-priority shorelines with 15' wide buffers. No specific Location. 13,000 sf | WBL | \$75,000 | \$7,500 | \$82,500 | TP 3 lb/yr, TSS 500 lb/yr. | | | Pg 4-32, Section 4.3.14 Regional Water Management Partnership Projects. " Further, implementation of projects identified in a 2017 Southeast White Bear Lake Stormwater Retrofit analysis completed by the Washington Conservation District will be targeted through Regional Water Management Partnership funds. Funding for this capital improvement project will likely be through District ad valorem funds, municipal funding, and State water quality grant funding." This project is identified on SE White Bear Lake SW Retrofit analysis WBL-02 Subwatershed. (pg 30) | \$73,400 (2017), \$5,000 per year = \$1,000 per site maintenance cost | #44 | | |
| | Tighe-Schmitz Park WQ projects WBL-02 Street Sweeping and Wetland and Buffer Restoration | Increase sweeping (4x per year) | WBL | \$820 | \$100 | \$920 | TP 1.1 lb/yr, TSS 464 lb/yr | | | Pg 4-32, Section 4.3.14 Regional Water Management Partnership Projects. " Further, implementation of projects identified in a 2017 Southeast White Bear Lake Stormwater Retrofit analysis completed by the Washington Conservation District will be targeted through Regional Water Management Partnership funds. Funding for this capital improvement project will likely be through District ad valorem funds, municipal funding, and State water quality grant funding." This project is identified on SE White Bear Lake SW Retrofit analysis WBL-02 Subwatershed. PG 31 | | | | |
| D | Tighe-Schmitz Park WQ project D, Basin by ice rink [Unranked - NOT IDENTIFIED] | Not Ranked: Add basin and allow for underdrain installation and connection to shallow catchbasin. Area is 600 sf, 12" ponding, 1.5 depth of 70/30 sand/peat soil replacement. Underdrain controlled via knife valve. Clogged inlet. History of heavy sediment loads in rain events. | White Bear Lake and Hall's Marsh | \$15,000 | \$1,650 | \$16,500 | 2026 TBD | | SE White Bear Lake Stormwater Retrofit | | | UNRANKED | | |

Catchment WBL-10



| Existing Catchment Summary | | EXISTING CONDITIONS | | | | |
|----------------------------|-------|----------------------------|-----------------------|--------------------------|-----------------|------------------|
| Acres | 35.10 | <i>Existing Conditions</i> | Base Loading | Treatment | Net Treatment % | Existing Loading |
| Dominant Land Cover | MDRNA | | TP (lb/yr) | 1.1 | 6% | 16.1 |
| Volume (acre-feet/yr) | 9.50 | | TSS (lb/yr) | 460.0 | 7% | 6,339 |
| TP (lb/yr) | 16.07 | | Volume (acre-feet/yr) | 0.0 | 0% | 9.5 |
| TSS (lb/yr) | 6,339 | | BMP Type | Street Sweep 2x annually | | |

CATCHMENT DESCRIPTION

WBL-10 is mostly medium density, single-family residential land use; with a few larger lots with wooded depressions. Roads are a mix of curbed and uncurbed, and drainage is not uniformly distributed to catchbasins or practices. Steep slopes, heavy tree canopy, abundance of gravel driveways, and irregular geography all contribute to heavy TSS loads. This catchment flows direct to Hall’s Marsh via overland flow in the southeast, and joins the Priebe Lake network and outlets via Tighe-Schmitz Park to Hall’s Marsh.

EXISTING STORMWATER TREATMENT

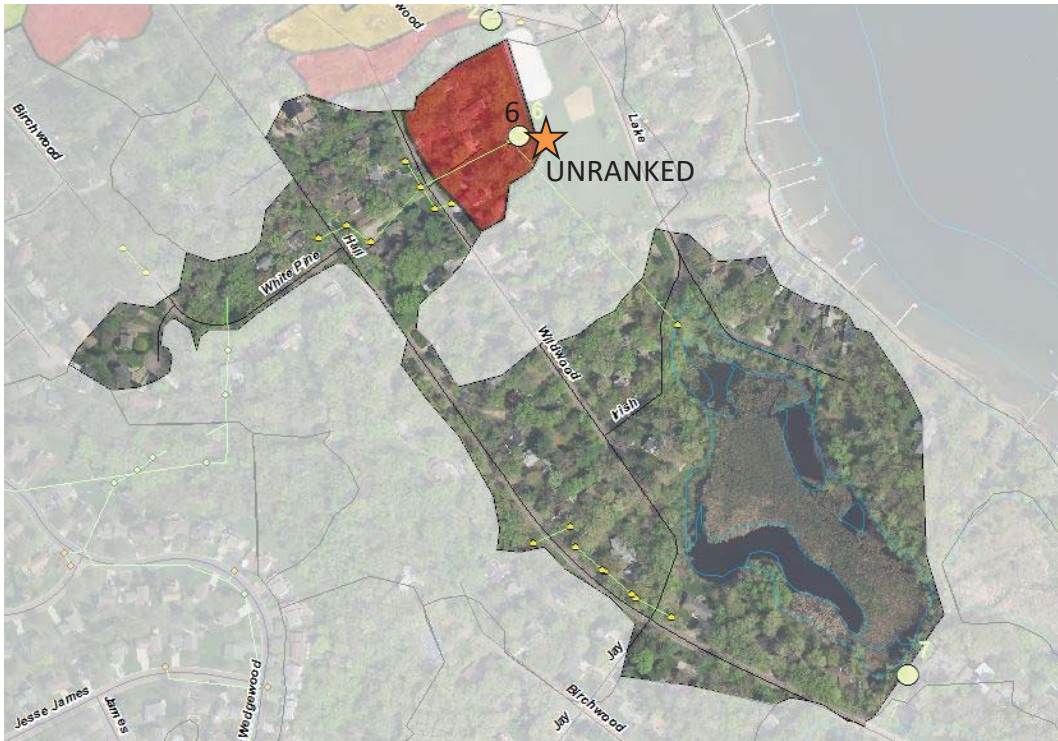
Street sweeping of city streets occurs approximately twice annually, with mechanical broom sweeper. There are improvements to drainage issues, but no infiltration or filtration practices present. Additional practices and increased street sweeping can help to alleviate the pressure on downstream resources.

WBL-10: RETROFIT RECOMMENDATIONS

RANK 6/46 - **Increased Street Sweeping:** Increase Street Sweeping from 2x/year to 4x/year.

RANK 22/46 - **BMP 6: Filtration Basin at Park:** Clean catchbasin, add riser and drain tile to ponded area at west side of Tighe-Schmitz Park to create functioning filtration basin

UNRANKED - **Priebe Lake Outlet Treatment:** IESF or Wet Pond near final manhole at Tighe-Schmitz Park.



| RETROFIT OPTIONS | | | | | | | |
|-----------------------|---------------------------|-----------------------------------|-------|--|------------|------------------------------------|-------|
| Catchment WBL-10 | | | | | | | |
| Cost/Removal Analysis | | BMP6: BioFiltration Basin in Park | | Increased Street Sweeping to 4x per year | | Total Reductions (all implemented) | |
| | | New trtmt | Net % | New trtmt | Net % | New trtmt | Net % |
| Treatment | TP (lb/yr) | 3.81 | 24% | 1.1 | 7% | 4.9 | 30% |
| | TSS (lb/yr) | 849 | 13% | 464.0 | 7% | 1313.0 | 21% |
| | Volume (acre-feet/yr) | 0.9 | 10% | 0.0 | 0% | 0.9 | 10% |
| | Number of BMP's | 1 | | 1 | | 1 | |
| | BMP Size/Description | 1,000 | sf | 1.230 | curb miles | All Practices | |
| Cost | BMP Type | Moderately Complex BioFiltration | | Street Sweeping | | Sweeping and Filtration Basin | |
| | Materials/Labor/Design | \$22,650.00 | | \$420.33 | | \$23,070.33 | |
| | Promotion & Admin Costs | \$400 | | \$400 | | \$800 | |
| | Probable Project Cost | \$23,050 | | \$820 | | \$23,870 | |
| | Annual O&M | \$750 | | \$0 | | \$750 | |
| | 10-yr Cost/lb-TP/yr | \$802 | | \$77 | | \$439 | |
| | 10-yr Cost/2,000lb-TSS/yr | \$7,197 | | \$354 | | \$3,775 | |

WBL-10: BMP 6 Filtration Basin at Park

Rank
22/46

Drainage Area – 2.5 acres

Location – Behind 501 Wildwood Ave, in Tighe-Schmitz Park

Property Ownership – Public

Description – Existing catchbasin is last structure before pipe outlet into Hall’s Marsh; in which this pipeshed drains the entire Priebe Lake outlet system. Catchbasin is full of leaf debris and backs up for weeks at a time in the park. Clean out catchbasin, add minimum 6” riser to catchbasin, install 800 sf filtration basin with 12” ponding, 12-24” of replacement media, and an underdrain with a knife valve tied to the catchbasin. See “UNRANKED” practice profile on next page for alternatives to this practice.



| Cost/Removal Analysis | | RETROFIT OPTIONS | |
|-----------------------|---------------------------|-----------------------------|-------|
| | | Catchment WBL-10 | |
| | | BMP 6 - Biofiltration Basin | |
| | | New trtmt | Net % |
| Treatment | TP (lb/yr) | 1.53 | 36% |
| | TSS (lb/yr) | 588.0 | 35% |
| | Volume (acre-feet/yr) | 1.0 | 26% |
| | Number of BMP's | 1 | |
| | BMP Size/Description | 800 | sf |
| | BMP Type | Complex Biofiltration | |
| Cost | Materials/Labor/Design | \$9,891.30 | |
| | Promotion & Admin Costs | \$400 | |
| | Probable Project Cost | \$10,291 | |
| | Annual O&M | \$400 | |
| | 10-yr Cost/lb-TP/yr | \$934 | |
| | 10-yr Cost/2,000lb-TSS/yr | \$4,861 | |

WBL-10: UNRANKED - Alternative Practices at Park

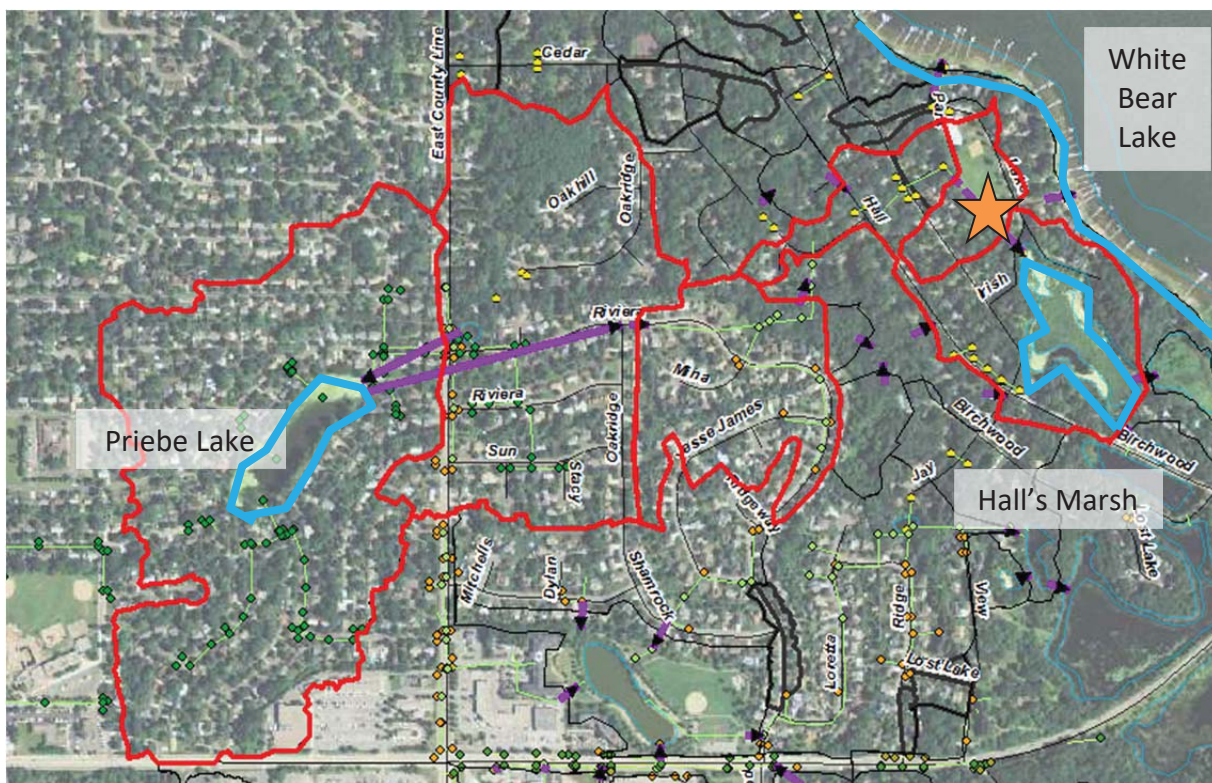
Drainage Area – Entire Priebe Lake Catchment Area and adjoining pipesheds

Location – Tighe-Schmitz Park

Property Ownership – Public

UNRANKED

Description – Priebe Lake is a shallow water body with a history of algal blooms and apparent poor water quality. The lake was routed through a new outlet pipe in 1981. The entire Priebe Lake catchment (City of White Bear Lake) drains through the existing storm sewer network in Mahtomedi and Birchwood Village and discharges into Hall's Marsh. Although Hall's Marsh and Priebe Lake are not considered priority water bodies by the Rice Creek Watershed District, it is evident that the Priebe Lake catchments can have a direct impact on White Bear Lake since in most normal to wet years Hall's Marsh is directly connected via surface water to White Bear Lake.



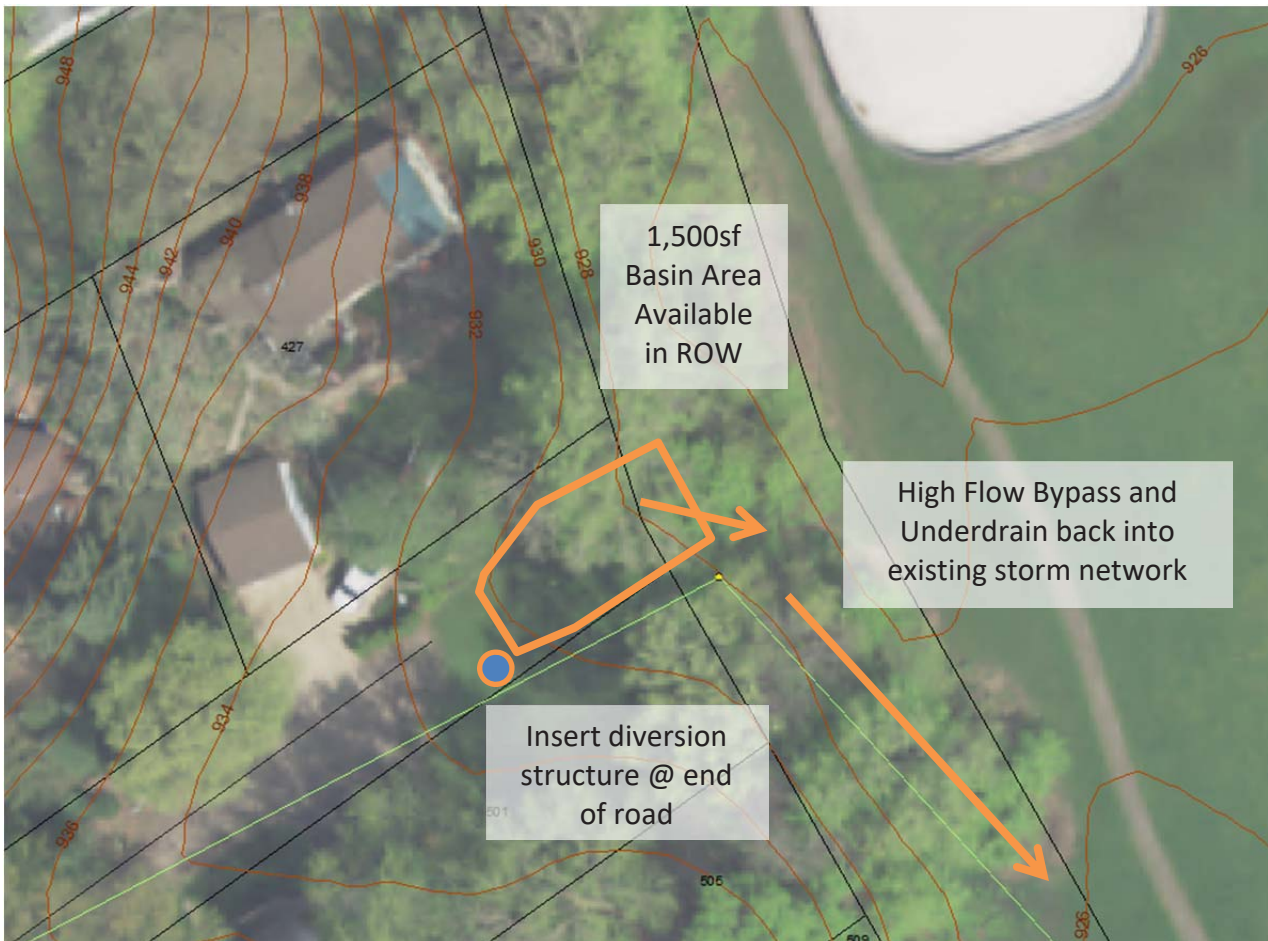
At Tighe-Schmitz Park resides the last catchbasin along the path of the Priebe Lake discharge network to Hall's Marsh. The park itself used to be a wetland until it was filled in 60's. As a result, many areas within the park still exhibit seasonal and semi-permanent flooding; limiting the types and frequency of activities that can be performed at the site.

There are multiple views on how to best utilize the park; from a push to modernize the facilities and increase structured programming at the park to a desire to see it reverted back into a wetland. While these different uses may seem incompatible, there are opportunities in which the city and the watershed could address multiple issues equally on the site. See next pages for Alternatives One and Two.

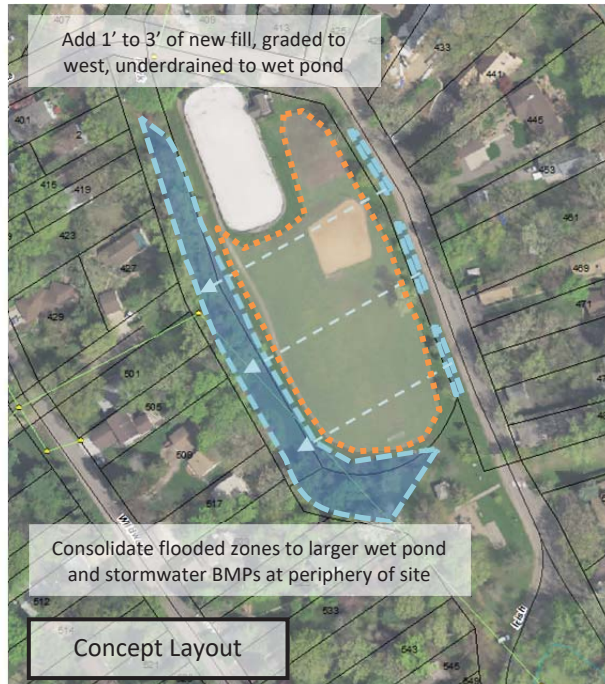


Alternative One: Install Iron Enhanced Sand Filter (IESF) in ROW to treat Priebe Lake outlet flows prior to discharging to Hall's Marsh.

Understanding TP and TSS effluent concentrations from Priebe Lake and surrounding catchments at this discharge point would be critical in determining effectiveness of treatment. A manhole structure would be inserted at 932' (end of road access) to divert low flows through the iron-enhanced sand filter, and a highflow bypass pipe would take the rest downstream. The IESF would be installed at the 930' or 932' contour. There would be roughly 1500 sf of usable basin area (with minor regrading). Final sizing and depth would be determined by dissolved phosphorus concentrations that were determined by monitoring of this pipe outlet. Additional wet storage can be inserted below the sand filter as well for further treatment (see BMP 6).



Alternative Two: Park regrading and Wetland/Wet Pond facility expansion. There are multiple views on how to best use the park space; expand recreation opportunities and update facilities, or revert to the historic wetland character. Given that there are always drainage issues in the fields due to the presence of a high water table (former wetland), it makes sense to strike a balance between recreation needs, stormwater management, and wetland restoration. This calls for regrading the park in select areas by raising the field grade by 1-3'; and working with the periphery zones that are always flooded and restoring them to a combination of wetland and stormwater BMPs. A feasibility study and community support for the proposal would need to be coordinated, but the end product could address multiple uses and community needs in one site. The IESF in Alternative One could be incorporated in this scenario as well. See image for concept layout.



Catchment WBL-02



| Existing Catchment Summary | | EXISTING CONDITIONS | | | | |
|----------------------------|-------|---------------------|-----------------------|--|-----------------|------------------|
| Acres | 34.51 | Existing Conditions | Base Loading | Treatment | Net Treatment % | Existing Loading |
| Dominant Land Cover | MDRNA | | TP (lb/yr) | 0.7 | 4% | 19.9 |
| Volume (acre-feet/yr) | 9.45 | Treatment | TSS (lb/yr) | 322.0 | 5% | 6,770 |
| TP (lb/yr) | 19.94 | | Volume (acre-feet/yr) | 0.0 | 0% | 9.4 |
| TSS (lb/yr) | 6,770 | | BMP Type | Street Sweeping, Shoreline Restoration | | |

CATCHMENT DESCRIPTION

WBL-02 is mostly comprised of medium density, single-family residential clustered on 50'-75' wide shoreline lots (making impervious concentrations higher than an average lake lot). There are not many roads that drain into the lake from this catchment. There is not much observed erosion via aerial inspection, so critical shoreline repairs were not identified.

EXISTING STORMWATER TREATMENT

Street sweeping of city streets and parking lots occur approximately twice annually, but road coverage is very small. There is one cost-share shoreline restoration on record.

WBL-02: RETROFIT RECOMMENDATIONS

RANK 3/46 - **Increased Street Sweeping:** Increase Street Sweeping from 2x/year to 4x/year.

RANK 21/46 - **BMP 5: BioFiltration Basin:** Raingarden in park above existing outlet to lake.

RANK 34/46 - **BMP 22 Swale with Riprap Sump :** Swale and riprap sump along public ROW draining to lake.

RANK 44/46 - **Typical Shoreline Restorations:** Up to 5 non-priority shorelines with 15' wide enhanced shoreline buffers. No specific locations chosen (no BMP Profile included).



| Cost/Removal Analysis | | RETROFIT OPTIONS | | | | | | | | | |
|-----------------------|---------------------------|----------------------------------|-------|--------------------------------|-------|-------------------------------|-------|--|------------|-------------------------------------|-------|
| | | Catchment WBL-02 | | | | | | | | | |
| | | BMP 5: BioFiltration Basin | | BMP 22: Swale with Riprap Sump | | Typical Shoreline Restoration | | Increased Street Sweeping to 4x per year | | Total Reductions (all implemented) | |
| | | New trtmt | Net % | New trtmt | Net % | New trtmt | Net % | New trtmt | Net % | New trtmt | Net % |
| Treatment | TP (lb/yr) | 2.86 | 14% | 1.23 | 6% | 3.00 | 15% | 1.2 | 6% | 8.3 | 42% |
| | TSS (lb/yr) | 851 | 13% | 395 | 6% | 500 | 7% | 520.0 | 8% | 2266.0 | 33% |
| | Volume (acre-feet/yr) | 0.7 | 8% | 0.3 | 4% | 0.0 | 0% | 0.0 | 0% | 1.0 | 11% |
| | Number of BMP's | 1 | | 1 | | 20 | | 1 | | 23 | |
| | BMP Size/Description | 600 | sf | 1,200 | sf | 13,000 | sf | 0.360 | curb miles | All Practices | |
| | BMP Type | Moderately Complex BioFiltration | | Dry Swale | | Lakeshore Restoration | | Street Sweeping | | Sweeping, BioFiltration, and Shores | |
| Cost | Materials/Labor/Design | \$17,158.00 | | \$8,808.00 | | \$66,900.00 | | \$271.56 | | \$93,137.56 | |
| | Promotion & Admin Costs | \$500 | | \$500 | | \$6,500 | | \$400 | | \$7,900 | |
| | Probable Project Cost | \$17,658 | | \$9,308 | | \$73,400 | | \$672 | | \$101,038 | |
| | Annual O&M | \$450 | | \$900 | | \$5,850 | | \$0 | | \$7,200 | |
| | 10-yr Cost/lb-TP/yr | \$775 | | \$1,485 | | \$4,397 | | \$56 | | \$1,678 | |
| | 10-yr Cost/2,000lb-TSS/yr | \$5,208 | | \$9,270 | | \$52,760 | | \$258 | | \$16,874 | |

WBL-02: BMP 5 Filtration Basin + BMP 22 Swale

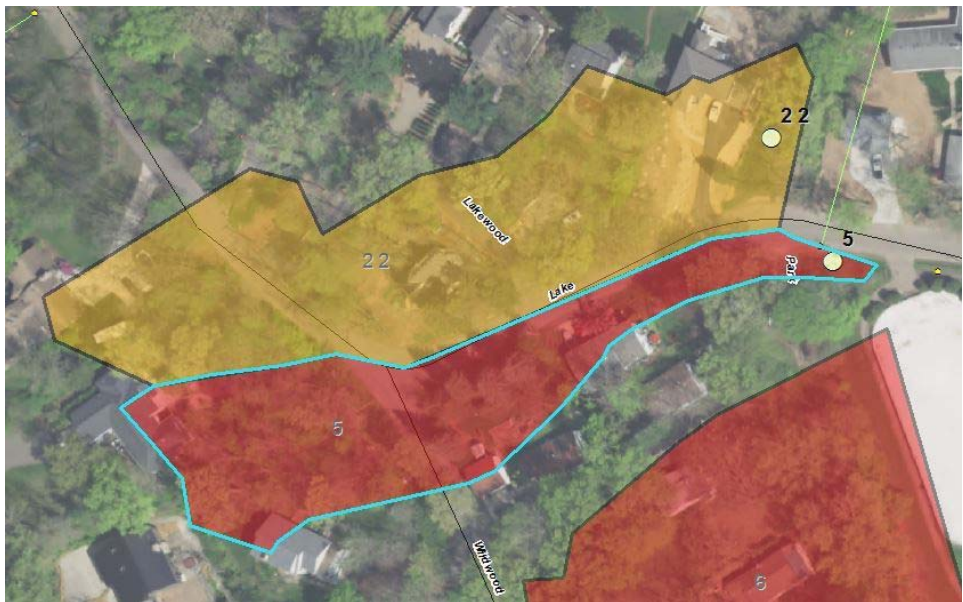
Drainage Area – BMP 5 = 0.99 acres BMP 22 = 1.65 acres
Location – Intersections Lake Dr at Tighe-Schmitz Park
Property Ownership – Public ROW/Private

Rank
21/46

Rank
34/46

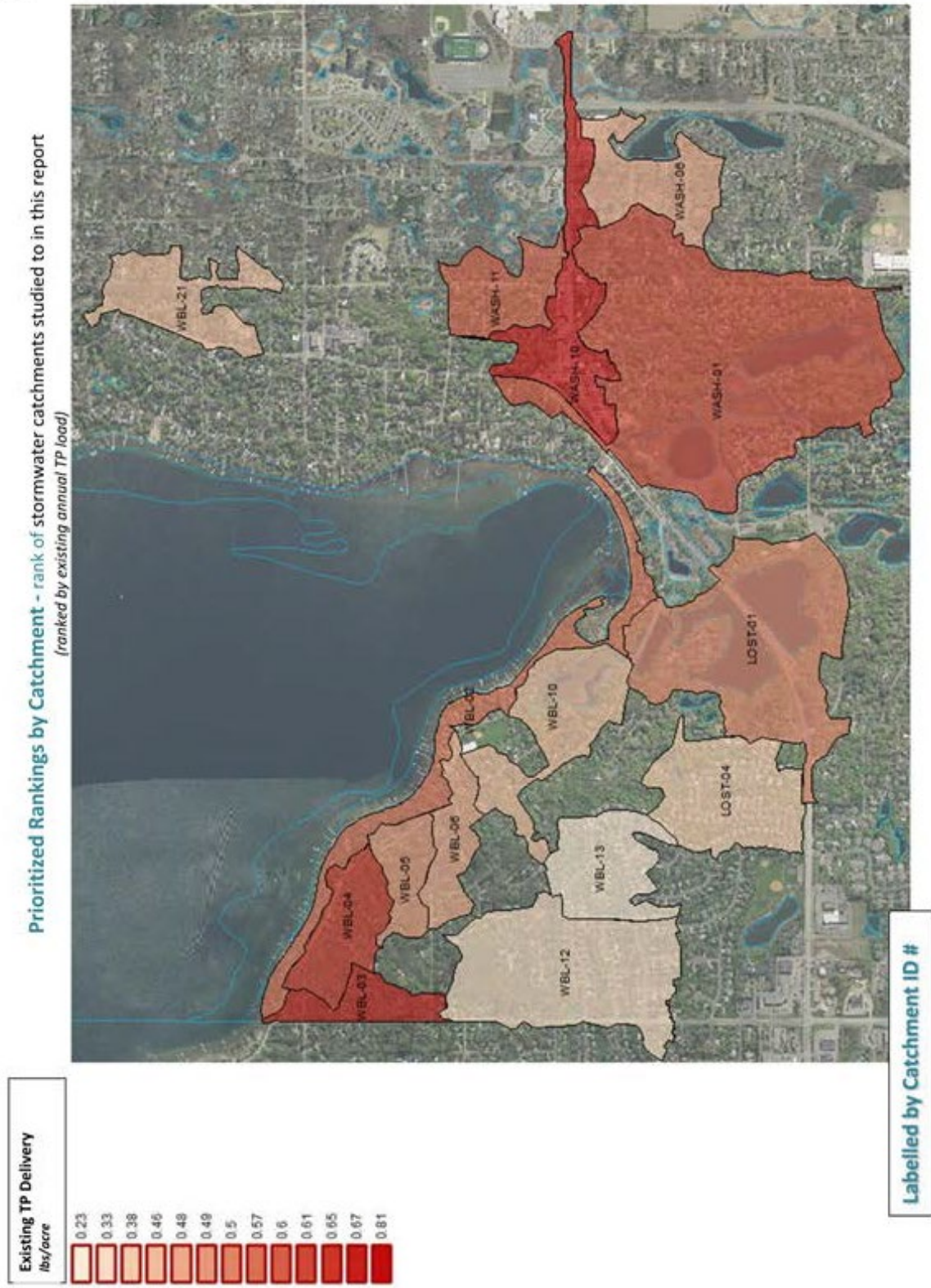
BMP 5 Description – Install filtration basin above existing catchbasin to lake. Add riser to Catchbasin rim to gain critical depth to allow for underdrain installation and connection to shallow catchbasin. Area is 600 sf, 12” ponding depth, 1.5’ depth of 70/30 sand/peat soil replacement. Underdrain controlled via knife valve. Very steep slopes in drainage area with history of heavy sediment loads in rain events.

BMP 22 Description – Install swale at western end of public ROW that connects to lake. Install riprap sump at inlet that flows into 200’ long vegetated swale, 4’ wide bottom and 3:1 side slopes, with 2 checkdams along flow path. Very steep slopes in drainage area with history of heavy sediment loads in rain events.



| Cost/Removal Analysis | | RETROFIT OPTIONS | | Cost/Removal Analysis | | RETROFIT OPTIONS | |
|-----------------------|---------------------------|----------------------------------|-------|-----------------------|---------------------------|--------------------------------|-------|
| | | Catchment WBL-02 | | | | Catchment WBL-02 | |
| | | BMP 5: BioFiltration Basin | | | | BMP 22: Swale with Riprap Sump | |
| | | New trtmt | Net % | | | New trtmt | Net % |
| Treatment | TP (lb/yr) | 2.86 | 14% | Treatment | TP (lb/yr) | 1.23 | 6% |
| | TSS (lb/yr) | 851 | 13% | | TSS (lb/yr) | 395 | 6% |
| | Volume (acre-feet/yr) | 0.7 | 8% | | Volume (acre-feet/yr) | 0.3 | 4% |
| | Number of BMP's | 1 | | | Number of BMP's | 1 | |
| | BMP Size/Description | 600 | sf | | BMP Size/Description | 1,200 | sf |
| | BMP Type | Moderately Complex BioFiltration | | | BMP Type | Dry Swale | |
| Cost | Materials/Labor/Design | \$17,158.00 | | Cost | Materials/Labor/Design | \$8,808.00 | |
| | Promotion & Admin Costs | \$500 | | | Promotion & Admin Costs | \$500 | |
| | Probable Project Cost | \$17,658 | | | Probable Project Cost | \$9,308 | |
| | Annual O&M | \$450 | | | Annual O&M | \$900 | |
| | 10-yr Cost/lb-TP/yr | \$775 | | | 10-yr Cost/lb-TP/yr | \$1,485 | |
| | 10-yr Cost/2,000lb-TSS/yr | \$5,208 | | | 10-yr Cost/2,000lb-TSS/yr | \$9,270 | |

Figure 6-5. Catchment Analysis Map



In May of 2017, the Washington Conservation District prepared the SE White Bear Lake Stormwater Retrofit Analysis for the Rice Creek Watershed District. This document analyzed and provided a prioritized list (ranked by cost effectiveness) of stormwater retrofit recommendations to improve the treatment of stormwater runoff in several drainage areas connected to White Bear Lake, Lost Lake and Lake Washington. The analysis considers all of Birchwood Village’s runoff areas (catchments) and provides a detailed analysis with recommendations. Note that these catchments are not official and were created in order to rank practices more effectively by geographic area. The existing stormwater management practices within each catchment were analyzed for the annual pollutant loading of the following: Total Phosphorous (TP), Total Suspended Solids (TSS), and Water Quality Volume (WQV). (See Figure 6-5. Catchment Analysis Map). Although the City has not analyzed which SWA projects it may consider, it will review the recommendations as part of any feasibility study.

Table 6-2. Catchment Analysis Results (Source: RCWD South East White Bear Lake Stormwater Retrofit Analysis Report, 2017)

| Project Rank | Catchment ID Lake ## | Retrofit Type | Projects Identified | TP Reduction (lb/yr) | TSS Reduction (lb/yr) | Volume Reduction (ac-ft/yr) | Total Cost | Annual Operations & Maintenance (2017 Dollars) | \$ Cost /lb-TP/Year (10-year) | \$ Cost/ton-TSS/year (10-year) |
|--------------|----------------------|--|---------------------|----------------------|-----------------------|-----------------------------|------------|--|-------------------------------|--------------------------------|
| 1 | LOST-01 | Increased Street Sweeping to 4x per year | 1 | 2.78 | 1209 | 0.00 | \$784 | \$0 | \$28 | \$130 |
| 2 | WBL-02 | Increased Street Sweeping to 4x per year | 1 | 1.30 | 520 | 0.00 | \$672 | \$0 | \$56 | \$258 |
| 3 | WBL-10 | Increased Street Sweeping to 4x per year | 1 | 1.07 | 464 | 0.00 | \$820 | \$0 | \$77 | \$354 |
| 4 | WBL-04 | Increased Street Sweeping to 4x per year | 1 | 0.96 | 416 | 0.00 | \$781 | \$0 | \$81 | \$375 |
| 5 | WBL-03 | Increased Street Sweeping to 4x per year | 1 | 0.50 | 216 | 0.00 | \$798 | \$0 | \$160 | \$739 |
| 6 | WBL-05 | Increased Street Sweeping to 4x per year | 1 | 0.29 | 128 | 0.00 | \$730 | \$0 | \$252 | \$1,140 |
| 7 | WBL-05 | Increased Street Sweeping to 4x per year | 1 | 0.26 | 114 | 0.00 | \$721 | \$0 | \$277 | \$1,265 |
| 8 | WBL-04 | BMP 29: Expand SAFL Baffle to Grit Chamber | 1 | 1.99 | 691 | 0.00 | \$8,100 | \$200 | \$528 | \$3,730 |
| 9 | WBL-03 | BMP 0: Pipe Repair + Grit Chamber | 2 | 2.28 | 1012 | 0.00 | \$15,325 | \$200 | \$760 | \$3,424 |

| Project Rank | Catchment ID Lake-## | Retrofit Type | Projects Identified | TP Reduction (lb/yr) | TSS Reduction (lb/yr) | Volume Reduction (ac-ft/yr) | Total Cost | Annual Operations & Maintenance (2017 Dollars) | \$ Cost /lb-TP/Year (10-year) | \$ Cost/ton-TSS/year (10-year) |
|--------------|----------------------|---|---------------------|----------------------|-----------------------|-----------------------------|------------|--|-------------------------------|--------------------------------|
| 10 | WBL-02 | BMP 5: BioFiltration Basin | 1 | 2.86 | 851 | 0.71 | \$17,658 | \$450 | \$775 | \$5,208 |
| 11 | WBL-10 | BMP 6: BioFiltration Basin in Park | 1 | 3.81 | 849 | 0.95 | \$23,050 | \$750 | \$802 | \$7,197 |
| 12 | WBL-06 | BMP 31: Infiltration Basin South of Cedar Lower | 1 | 1.23 | 464 | 0.19 | \$9,104 | \$225 | \$923 | \$4,894 |
| 13 | WBL-05 | BMP 4: BioFiltration Basin | 1 | 1.53 | 588 | 0.99 | \$10,291 | \$400 | \$934 | \$4,861 |
| 14 | WBL-04 | BMP2: BioFiltration Basin in Front Yard | 1 | 2.91 | 871 | 1.19 | \$23,554 | \$200 | \$1,167 | \$5,868 |
| 15 | WBL-02 | BMP:38-42: Swale with Riprap Sump | 1 | 1.23 | 395 | 0.33 | \$9,308 | \$900 | \$1,485 | \$9,270 |
| 16 | WBL-04 | BMP3: Expand Swale and Sump | 2 | 0.40 | 169 | 0.34 | \$5,000 | \$100 | \$1,508 | \$7,101 |
| 17 | WBL-04 | BMP30:Bioinfiltration Basin in Woods | 1 | 1.27 | 478 | 0.64 | \$18,950 | \$200 | \$1,648 | \$8,766 |
| 18 | WBL-06 | BMP 33: Infiltration Basin North of Cedar | 1 | 0.73 | 321 | 0.34 | \$9,920 | \$300 | \$1,763 | \$8,050 |
| 19 | WBL-06 | BMP 31 +32 ALT Combined | 2 | 1.49 | 583 | 0.68 | \$21,894 | \$600 | \$1,873 | \$9,569 |
| 20 | WBL-06 | BMP 32: Infiltration Basin South of Cedar Upper | 1 | 0.57 | 236 | 0.31 | \$14,940 | \$375 | \$3,262 | \$15,839 |
| 21 | WBL-03 | BMP 1: Curb Cut Raingarden | 1 | 0.70 | 65 | 0.00 | \$20,086 | \$525 | \$3,619 | \$77,957 |
| 22 | WBL-02 | Typical Shoreline Restoration | 20 | 3.00 | 500 | 0.00 | \$73,400 | \$5,850 | \$4,397 | \$52,760 |