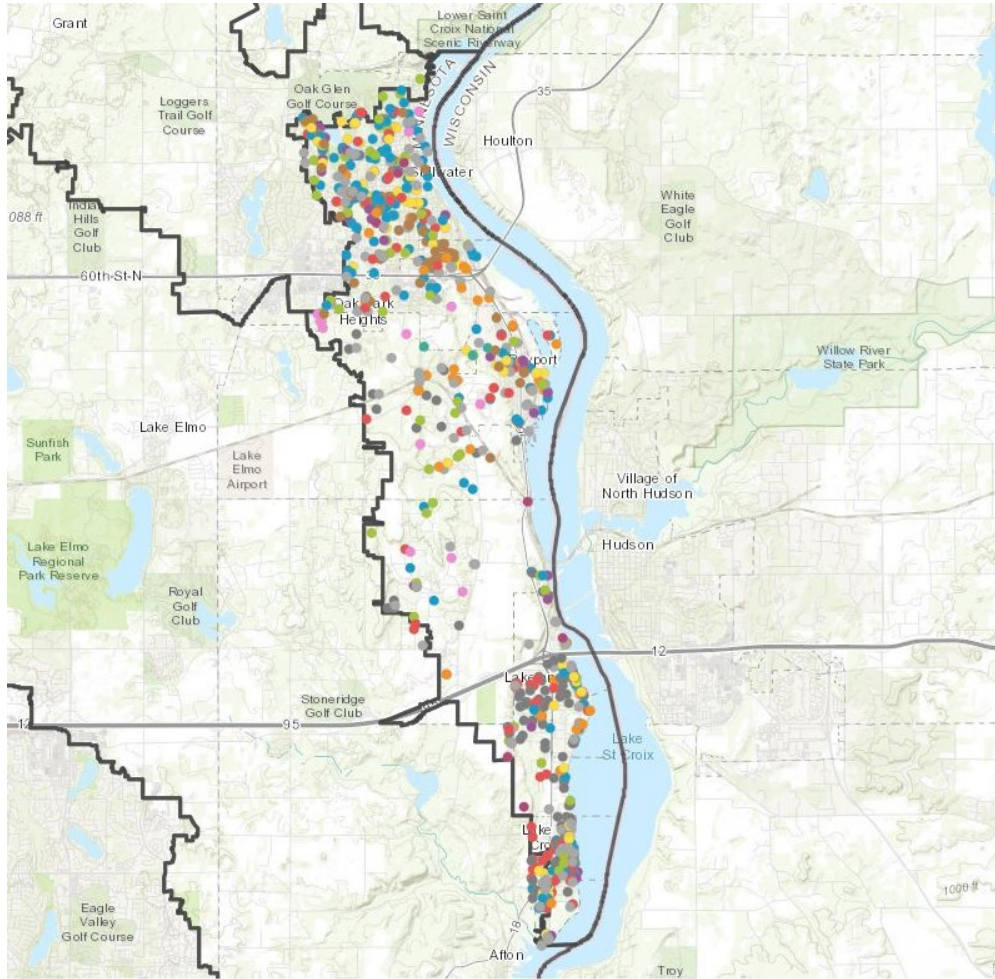


2024 BMP Inventory & Assessment

Middle St. Croix Watershed Management Organization

December, 2024



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1. Executive Summary

In 2024 the MSCWMO contracted the Washington Conservation District to inspect and assess over 150 historic CIP and cost-share incentive projects for present-day water quality function. Many of these practices (primarily bioretention practices within city right-of-way) are considered to be outside their effective life of 10 years. The goal of this assessment was to characterize the continued efficacy of each practice and to identify opportunities for practice retrofit within prioritized Lily Lake, Lake McKusick, St. Croix Direct, and Perro Creek subwatersheds. The result is a list of five proposed initiatives that include rehab or retrofit of 26 existing bioretention practices distributed throughout the district, ranked and prioritized by cost effectiveness in terms of pounds of total phosphorus (TP) removed per dollar.

This document is a summary of BMP inspections conducted in spring 2024 to establish a clear and comprehensive inventory of existing stormwater BMPs throughout the district, their maintenance status, and opportunities for rehabilitation or retrofit. A summary of practice inspection results (including those not identified for targeted retrofit), and retrofit recommendations can be found in Section 3 and Appendix A of this report.

2. BMP Inventory & Assessment

2.1. Background & Procedure

The Washington Conservation District BMP maintenance program manages an ArcGIS Online database in combination with several ArcGIS applications, including Survey123 and Field Maps, to collect and store data pertaining to BMP condition and performance. Inspection reports completed in the field using Survey123 indicate whether maintenance of a particular practice is needed and allow the inspector to add performance notes related to inlet/pre-treatment devices, hydraulic function, structural condition, vegetation, and aesthetics. A brief summary of inspection notes are included for potential retrofit opportunities in Section 3 of this report. Full PDF versions of the Survey123 inspection reports can be found in Appendix A.

2.2. Summary of Findings

Of the 151 practices inspected in 2024, 23 were rated as “non-functional”, 32 were rated as “partially functioning”, 41 were rated as “degraded aesthetics”, and 55 were rated at “no maintenance required”. In some cases, practices were rated “non-functional” if the practice had been removed. The retrofit opportunities summarized below include practices outside or close expiration of their effective life of 10 years. All practices prioritized for retrofit were rated as either “non-functional” or “partially functioning”. These practices represent the best opportunity for retrofit based on their position in prioritized subwatersheds, designed water quality benefit, public visibility, and cost effectiveness with respect to pounds of TP removed. Practice retrofits were grouped together by historic project or funding source with which they were originally installed. Grouping retrofits by project further enhances cost effectiveness by reducing mobilization and labor cost when spread across multiple practices.

Table 1. Cost Effectiveness of retrofits with respect to TP reduction.

Project Rank	Project ID	Catchment ID	Retrofit Type	TP Reduction (lb/yr)	TSS Reduction (lb/yr)	Probable Project Cost	Estimated Annual Operations & Maintenance	Estimated cost/ lb-TP/year (30-year)	Estimated cost/ ton-TSS/year (30-year)
1	Eagle Ridge Raingardens	McK-11, 12, 18, 25	Pretreatment Retrofit	2.9	564	\$24,947	\$360	\$417	\$1,522
2	Oak Park Heights Area D Raingardens	SCDN-13 & 14	Pretreatment Retrofit	3.3	696	\$45,797	\$360	\$564	\$1,654
3	Amundson Raingardens	McK-19, 21, 27	Retrofit/Rehabilitation	1.1	220	\$30,748	\$360	\$1,275	\$11,681
4	Lily Lake Phase I & II Raingardens	Lily-01, 02, 03, 04	Pretreatment Retrofit	0.7	124	\$18,250	\$360	\$1,422	\$23,184

3. Retrofit Opportunities & Recommendations

3.1. Amundson Drive Rain Garden Retrofits

There are five raingardens located along Amundson Drive and one on Meadowlark Drive which remove a combined 1.83 lbs TP annually. These raingardens are in various states of dysfunction and disrepair due to silt and sediment accumulation, failing or inadequate inlet pretreatment, poor underlying soils, and improper sizing for the contributing drainage area. The raingarden on Meadowlark Dr. suffers mainly from poor vegetation establishment. The others require more comprehensive rehab or retrofit, including sediment removal, inlet replacement or addition, outlet and overflow elevation adjustments, and resizing for greater volume capacity.

The cost of retrofitting five raingardens along Amundson Drive (including sediment excavation, media replacement, and pretreatment structure replacement) is estimated to be approximately, \$31,000 and is assumed to remove approximately 1.1 lbs TP and 220 lbs TSS annually based on 2024 modeling (MIDS).

<i>Cost/Removal Analysis</i>		RETROFIT OPTIONS	
		<i>Catchment(s): McK-19, 21, 27</i>	
		Retrofit/Rehabilitation	
		New Treatment	Net %
Treatment	TP (lb/yr)	1.1	50%
	TSS (lb/yr)	220.4	55%
	Volume (acre-feet/yr)	0.64	27%
	Number of BMP's	5	
	BMP Size/Description	250	sf
	BMP Type	Rehabilitation	
Cost	Design & Construction	\$29,248	
	Promotion & Admin Costs	\$1,500	
	Probable Project Cost (2024)	\$30,748	
	Annual O&M	\$360	
	30-yr Cost/lb-TP/yr	\$1,275	
	30-yr Cost/2,000lb-TSS/yr	\$11,681	

1201 Amundson Dr Raingarden (Retrofit)

Functioning as flow through/on line due to inadequate berm elevation downstream. No inlet pretreatment.

1140 Amundson Dr Raingarden (Retrofit)

Sediment accumulation in raingarden bottom. No inlet pretreatment. Consider retrofitting with structural pretreatment in conjunction with sediment removal and replanting.

1055 Amundson Dr Raingarden (Retrofit)

Limited ponding depth with no pretreatment. Small drainage area. Consider retrofitting with structural inlet pretreatment and excavate to increase ponding depth.

1020 Nena Dr Raingarden (Retrofit)

Poor underlying soils and ineffective underdrain restricting drainage within 48 hour period. Media replacement recommended. Complete replacement of Rain Guardian Bunker needed.

750 Amundson Drive Raingarden (Retrofit)

Poor underlying soils and ineffective underdrain restricting drainage within 48 hour period. Accumulated sediment removal and media replacement recommended. Complete replacement of Rain Guardian Bunker needed. Expand basin footprint as feasible.

3.2. Lily Lake Phases I & II Raingardens

There are five raingardens located throughout the Lily Lake subwatershed that would benefit from partial rehabilitation and addition of structural inlet pre-treatment. The majority of these curb-cut basins were installed in 2011 with turf inlets, which have a tendency to clog and restrict flow to the basin over time, degrading their efficacy. Adding pretreatment structures (e.g. Rain Guardian Bunkers or paver pretreatment) will help facilitate annual maintenance and long-term efficacy for many of these gardens.

The cost of retrofitting these eight raingardens within the portion of the Lily Lake subwatershed (Catchments Lily-01, 02, 03, and 04) is estimated to be approximately, \$18,000 and is assumed to remove approximately 0.7 lbs TP and 124 lbs TSS annually based on 2024 modeling (MIDS).

Cost/Removal Analysis		RETROFIT OPTIONS	
		Catchment(s): Lily-01, 02, 03, 04	
		Pretreatment Retrofit	
		New Treatment	Net %
Treatment	TP (lb/yr)	0.7	20%
	TSS (lb/yr)	124	20%
	Volume (acre-feet/yr)	0.8	20%
	Number of BMP's	5	
	BMP Size/Description	250	Sf (typ.)
	BMP Type	Pretreatment Replacement/Rehabilitation	
Cost	Design & Construction	\$16,750	
	Promotion & Admin Costs	\$1,500	
	Probable Project Cost (2024)	\$18,250	
	Annual O&M	\$360	
	30-yr Cost/lb-TP/yr	\$1,422	
	30-yr Cost/2,000lb-TSS/yr	\$23,184	

904 Willard Street Raingarden (Retrofit)

Turf inlet maintenance to restore function or installation of structural pretreatment for greater longevity. *Originally installed as a CIP/cost-share incentive practice.*

1310 Oak St W Raingarden (Removed)

Removed during 2023 street reconstruction. *Originally installed as a CIP/cost-share incentive practice.*

510 Owens St S Raingarden (Inspect/Maintain)

Limited drainage are with limited ponding. Rehabbed by WCD in 2023. Edging maintenance needed. *Originally installed as a CIP/cost-share incentive practice.*

1308 Pine St Raingarden (Inspect/Maintain)

Inlet sediment scrape needed. Very limited ponding with little room for structural pretreatment. *Originally installed as a CIP/cost-share incentive practice.*

1401 Pine St Raingarden (Inspect/Maintain)

Very small drainage area. No urgent maintenance needs. *Originally installed as a CIP/cost-share incentive practice.*

419 Greeley St S Raingarden (Removed)

Removed. Time or reason unknown. *Originally installed as a CIP/cost-share incentive practice.*

701 Greeley St S Raingarden (Retrofit)

Sediment buildup at turf inlet. Potential retrofit opportunity for expanded footprint and addition of structural inlet pretreatment. *Originally installed as a CIP/cost-share incentive practice.*

1006 Abbott St W Raingarden (Removed)

Removed during street reconstruction. *Originally installed as a CIP/cost-share incentive practice.*

824 Greeley St S Raingarden (No Action)

No inlet, far undersized. Planned street reconstruction for 2024/2025. Recommendation is to remove or defer responsibility to landowner. *Originally installed as a CIP/cost-share incentive practice.*

922 Abbott St W Raingarden (Retrofit)

Small basin footprint. Sediment buildup at turf inlet restricting flow. Consider replacing turf inlet with paver or splash block forebay. *Originally installed as a CIP/cost-share incentive practice.*

812 Abbott St W Raingarden (Inspect/Maintain)

Small drainage area. Functioning adequately. Homeowner keeping up with maintenance. *Originally installed as a CIP/cost-share incentive practice.*

813 Anderson St W Raingarden (Retrofit)

New curb. Sediment buildup at turf inlet. Consider replacing turf inlet with paver/splash block inlet pretreatment. *Originally installed as a CIP/cost-share incentive practice.*

712 Anderson St W Raingarden (Removed)

Removed during street reconstruction. *Originally installed as a CIP/cost-share incentive practice.*

918 Harriet St Raingarden (Removed)

None found. Possibly removed during street reconstruction or prior to. *Originally installed as a CIP/cost-share incentive practice.*

805 Churchill St W Raingarden (Inspect/Maintain)

In great shape. Well cared for. Supplement with native vegetation as needed. *Originally installed as a CIP/cost-share incentive practice.*

1517 Pine St W Raingarden (Inspect/Maintain)

Rained in last 6 hrs. Performing well. Sediment scrape, inlet cleanout, and supplemental planting needed. *Originally installed as a CIP/cost-share incentive practice.*

612 Lake Dr Raingarden (Retrofit)

Sediment buildup at inlet and basin bottom. Standing water at inlet. Needs sediment scrape and structural inlet pretreatment. *Originally installed as a CIP/cost-share incentive practice.*

406 Hemlock St S Raingarden (Inspect/Maintain)

Minor sediment buildup at turf inlet, not impacting function. Raingarden looks well cared for. *Originally installed as a CIP/cost-share incentive practice.*

1201 Willard Raingarden (Inspect/Maintain)

Weeding, mulching, supplemental planting needed. Inlet to be reconstructed during 2024 street improvements. *Originally installed as a CIP/cost-share incentive practice.*

3.3. Eagle Ridge Drive Rain Garden Retrofits

There are seven raingardens located west of Lake McKusick that are in various states of degraded function. Many of the older gardens along Eagle Ridge Trl (installed in 2007-08) were installed during street reconstruction as permitted practices without structural inlet pretreatment. Others, such as the 1171 Lecuyer Dr, 1035 Eagle Ridge Trl, and 821 Eagle Ridge Ln raingardens—were installed as cost-share/incentive projects between 2012 and 2014. Adding pretreatment structures (e.g. Rain Guardian Turrets) will help facilitate annual maintenance and long-term efficacy for many of these gardens.

The cost of retrofitting these seven raingardens within in the Eagle Ridge neighborhood of Lake McKusick (Catchments McK-11, 12, 18, and 25) is estimated to be approximately, \$25,000 and is assumed to remove approximately 2.9 lbs TP and 564 lbs TSS annually based on 2024 modeling (MIDS).

Cost/Removal Analysis		RETROFIT OPTIONS	
		Catchments: Mck-11, 12, 18, 25	
		Pretreatment Retrofit	
		New Treatment	Net %
Treatment	TP (lb/yr)	2.9	49%
	TSS (lb/yr)	564	53%
	Volume (acre-feet/yr)	1.85	26%
	Number of BMP's	7	
	BMP Size/Description	300	sf (typ.)
	BMP Type	Pretreatment Device	
Cost	Design & Construction	\$23,447	
	Promotion & Admin Costs	\$1,500	
	Probable Project Cost (2024)	\$24,947	
	Annual O&M	\$360	
	30-yr Cost/lb-TP/yr	\$327	
	30-yr Cost/2,000lb-TSS/yr	\$857	

1171 Lecuyer Dr Biofiltration (Inspect/Maintain)

Sediment buildup in inlet and basin bottom. Sediment scrape needed to lower bottom elevation to bottom of inlet. Volunteer tree removal, Canada thistle + RCG control, replacement planting and mulching needed. *Originally installed as cost-share/incentive practice.*

1034 Eagle Ridge Trl Biofiltration (Retrofit)

No standing water in basin, water exiting underdrain to culvert. Function seems to be ok. High flows at turf inlet with minor scouring. Consider adding Rain Guardian turret in future to increase longevity. *Originally installed as cost-share/incentive practice.*

1013 Eagle Ridge Trl Raingarden (Retrofit)

No standing water despite rain in last 24 hrs. Minor sediment accumulation. Function adequate. Sediment removal needed. Consider replacing bullet paver pretreatment with bunker for enhanced pretreatment. Manage for aesthetics. Enhance planting as budget allows. *Originally installed as permitted practice.*

821 Eagle Ridge Ln Biofiltration (Retrofit)

Sediment buildup in basin bottom. Underdrain seems to be functioning. May have capacity for second inlet on south side for additional treatment of cul-de-sac. Candidate for retrofit. *Originally installed as cost-share/incentive practice.*

620 Eagle Ridge Trl Raingarden (Retrofit)

City repaired old cost share garden. Diagnosed by WCD, city repaired sinkholes and drainage issues. Consider retrofitting with structural inlet pretreatment. *Originally installed as permitted practice.*

580 Eagle Ridge Trl Raingarden (Retrofit)

Landowners on either side sharing maintenance responsibilities. No standing water despite rain in past 24 hrs. Function appears to be adequate, despite lack of pretreatment. Consider

adding Rain Guardian turret in future to increase longevity. *Originally installed as permitted practice.*

230 Wildwood Ct Raingarden (Retrofit)

No standing water despite recent rain. Function appears to be adequate. Consider adding Rain Guardian turret to prevent sediment accumulation and increase practice longevity. *Originally installed as permitted practice.*

100 Mallard Ct Raingarden (Retrofit)

Similar to others on Eagle Ridge. Consider adding inlet pretreatment. Verify sediment accumulation and veg maintenance needs. Consider adding Rain Guardian turret in future to increase longevity. *Originally installed as permitted practice.*

3.4. Oak Park Heights 2015-16 Street Reconstruction Gardens

Eight raingardens installed as a part of the 2015-16 Oak Park Heights Street Reconstruction project were designed as biofiltration basin with Rain Guardian “Bunker” inlet pretreatment structures. Many of these bunkers have warped and heaved over time, leading to reduced efficacy and annual maintenance difficulties. These inlets will need to be replaced within the next 10 years. Retrofit of these practices will include pretreatment structure replacement, removal of accumulated sediment, and replanting.

The cost of retrofitting the eight raingardens within Catchments SCDN-13 and SCDN-14 is estimated to be approximately, \$46,000 and is assumed to remove approximately 3.3 lbs TP and 696 lbs TSS annually based on 2024 modeling (MIDS).

Cost/Removal Analysis		RETROFIT OPTIONS	
		Catchment(s): SCDN-13 & 14	
		Pretreatment Retrofit	
		New Treatment	Net %
Treatment	TP (lb/yr)	3.3	58%
	TSS (lb/yr)	696	69%
	Volume (acre-feet/yr)	1.2	16%
	Number of BMP's	8	
	BMP Size/Description	300	sf (typ.)
	BMP Type	Pretreatment Device	
Cost	Design & Construction	\$44,297	
	Promotion & Admin Costs	\$1,500	
	Probable Project Cost (2024)	\$45,797	
	Annual O&M	\$360	
	30-yr Cost/lb-TP/yr	\$472	
	30-yr Cost/2,000lb-TSS/yr	\$544	

15051 64th St N Biofiltration (Retrofit)

Heaving and warping at inlet. Eventual replacement needed, but for now not significantly impacting function. *Originally installed as cost-share/incentive practice.*

15092 64th St N Biofiltration 1 (Retrofit)

Significant sediment buildup. Sediment and leaf debris removal recommended followed by replanting. *Originally installed as cost-share/incentive practice.*

15092 64th St N Biofiltration 2 (Retrofit)

Likely overdue for sediment scrape and replanting. Rain Guardian warping and heaving. Eventually replacement needed. *Originally installed as cost-share/incentive practice.*

15100 Upper 63rd St N Biofiltration (Retrofit)

Heaving and warping at inlet. Significant sediment and debris buildup. Remove sediment and debris. Eventual inlet replacement needed. *Originally installed as cost-share/incentive practice.*

15194 63rd St N Biofiltration (Retrofit)

Significant sediment buildup at inlet. Clean out immediately. Rain Guardian bunker in need of replacement within the next 5-10 years. *Originally installed as cost-share/incentive practice.*

15239 63rd St N Biofiltration (Retrofit)

Significant sediment buildup at inlet. Overflowing on downstream end. Buildup berm on downstream end to prevent overflowing and washout. *Originally installed as cost-share/incentive practice.*

15112 62nd St Biofiltration (Retrofit)

Inlet warped and heaving. Needs replacement. *Originally installed as cost-share/incentive practice.*

15048 62nd St Biofiltration (Retrofit)

Inlet cleanout needed. Needs sediment removal and complete replanting. Rain Guardian Bunker warping, likely in need of replacement within the next 5-10 years. *Originally installed as cost-share/incentive practice.*

Upper 61st and Peabody Bioinfiltration (Replace)

Inlet scrape required to remove sediment and debris. Consider replacing turf inlets with concrete reinforced turf to facilitate future clean-out. *Originally installed as permitted practice.*

62nd St N Biofiltration (Replace)

Inlets have been damaged and cracked, possibly due to vehicle traffic leading to significant erosion and sedimentation. Aggregate debris accumulation at the inlet from recent road resurfacing is also significant. Complete replacement is required. *Originally installed as permitted practice.*