SECTION 4. IMPLEMENTATION PLAN

4.1 Introduction

This section summarizes the implementation actions that VLAWMO will focus on during the next ten years. Implementation actions were strategically developed in coordination and collaboration with municipalities and partner organizations and are updated to stay current through annual partner meetings. These actions address issues and goals listed in Section 3- Priority Issues and Goals. A detailed list with estimated annual costs for implementation actions are included in the Implementation Table at the end of this section (Table 4-5).

Actions in the Implementation Table are organized into one of four core activities with an associated code: Administration (100), VLAWMO Implementation Programs (200), Project Technical Work (300), and Capital Improvement Projects (400) (Table 4-1). Codes are used for internal budgeting and implementation purposes, and are also used to connect goal measures and plan narrative to actions and activities in the Implementation Table. Descriptions of each core activity and associated programs are detailed throughout this section.

Table 4-1. Core Activities of VLAWMO.

Administration -100	VLAWMO Implementation Programs - 200	Project Technical Work - 300	Capital Improvement Projects - 400
• Office space, supplies, and training • Staff training • Equipment • Human resources	• Aquatic Invasive Species Management • Communication, Outreach, and Education • Monitoring • Capital Improvements – Early Coordination • Regulatory and Policy • General Analysis and Technical Work • VLAWMO Grants and Partnerships • Operations and Maintenance	• Modeling, feasibility studies, etc., related to specific projects and organized by subwatershed	• Larger partnership projects, organized by subwatershed

4.2 Administration - 100

Administration activities are associated with running the watershed, including but not limited to: office rent; office supplies; equipment; information technology purchases and support; financial, legal, audit, and bookkeeping costs; workers' compensation insurance; and staff training. Duties such as storm sewer utility fee assessment,

preparing the annual budget, preparing for Board and TEC meetings, and human resources activities also fall within this category.

4.3 VLAWMO Implementation Programs - 200

The VLAWMO Implementation Programs core activity is the most expansive, as it is inclusive of the following programs: Aquatic Invasive Species Management; Communication, Outreach, and Education; Monitoring; Capital Improvements - Early Coordination; Operations and Maintenance; Regulatory and Policy; General Analysis and Technical Work; and VLAWMO Grants and Partnerships.

4.3.1 Aquatic Invasive Species Management Program – 200A

VLAWMO adopted an Aquatic Plant Management Policy (Appendix X) in 2022. VLAWMO's aquatic plant management role is summarized as:

- Lead or partner for aquatic plant monitoring and education, treatment or removal of curly-leaf pondweed for water quality benefits, or native plant introduction
- Technical support and/or partner for management of other Aquatic Invasive Species (AIS) besides curly-leaf pondweed
- Lead for in-lake treatment or removal of other AIS to support ecological health and/or water quality on a project-by-project basis.

The issue of AIS in VLAWMO is discussed in Section 3.3.3. In addition to monitoring the presence of AIS and working to reduce and/or control in some cases (e.g., the common carp removal program), VLAWMO serves as a resource for interested residents to learn more about AIS. VLAWMO has facilitated citizen-science AIS programming, trainings, webinars, and workshops intended to reduce the spread of AIS. These are expected to continue into the future in partnership with other groups such as counties, lake associations, the University of Minnesota, and MN DNR AIS prevention programs.

Program Summary: Aquatic Invasive Species Management (200A)

Example Activities

- AIS workshops
- Common carp removal
- Sampling for hybrid Eurasian watermilfoil

Primary Issues Addressed

- Surface Water and Drinking Water Quality

Estimated Annual Funding

- $64,000-$82,000

4.3.2 Communication, Outreach, and Education Program – 200B

The Communication, Outreach, and Education Program includes activities such as volunteer coordination, stakeholder partnerships, educational materials and workshops, and newsletters and annual reports. VLAWMO recognizes that a cornerstone of sustainable watershed resources management is delivering programs that are effective in developing stakeholders' understanding of natural resources and encouraging stewardship behaviors. Communication and outreach with project stakeholders enable project success.

Activities through this program leverage existing partnerships and create new ones that initiate and support project implementation throughout the watershed. As such, VLAWMO provides resources and funding for community outreach and educational projects. VLAWMO updates its communication, outreach, and education program work plan as needed to continue advancing VLAWMO's broader organizational goals.

Communication, Outreach, and Education Objectives

- ✓ Support and enhance an informed citizenry that understands natural resource protection and responsible use.
- ✓ To observe community members demonstrating watershed protection behaviors.
- ✓ To observe resident volunteers educating their fellow watershed residents.
- ✓ To confirm that MS4 partners are collaborating, using resources, and making progress on MS4/SWPPP reporting.
- ✓ To provide active programs and foster partnerships that build participation and are relevant to residents and VLAWMO's mission.
- ✓ To observe that community members are knowledgeable and engaged in VLAWMO's direction, policies, meetings, and projects.

Partnerships are an important component of VLAWMO's work to conduct outreach activities that align with its mission. VLAWMO partners with community groups, non-profit organizations, and community members in engagement activities that align with watershed conservation and public outreach and support independent learning.

Another important aspect of this program is supporting member communities' public education and outreach requirements outlined in the MS4 general permit. VLAWMO collaborates with its member communities - MS4 permittees - to provide outreach support and education to assist with meeting regulatory requirements. For example, VLAWMO provides education and outreach on chloride reduction by providing educational resources to community members on salt application, sharing relevant event and learning opportunities, and directing interested parties to MPCA Smart Salting training. These efforts support MS4 permittees with reporting requirements, and they ensure the broader watershed community is informed on important stormwater topics.

Program Summary: Communication, Outreach, and Education (200B)

Example Activities

- Coordination of volunteer programs
- Installation of educational signage at notable project sites and other capital improvement projects

Primary Issues Addressed

- Communication and Outreach

Estimated Annual Funding

- $83,000-$109,000

4.3.3 Monitoring Program – 200C

VLAWMO carries out a robust data collection and analysis program on 15 lakes in the watershed, 6 sites on Lambert Creek, and through stand-alone studies or special projects. A summary of lake and creek sampling is shown in Figure 4-1. The purpose of the monitoring program is to track long-term water quality trends; provide a scientific basis to identify, target, and design programs and projects to meet goals; and to evaluate project and program effectiveness and progress towards water quality goals.

The monitoring program relies on baseline monitoring by VLAWMO staff, in addition to monitoring efforts from partners. SPRWS conducts increased monitoring of Pleasant and East Vadnais Lake, and VLAWMO monitors Lambert Creek which flows into East Vadnais Lake. The bulk of water samples are collected between May and September each year.

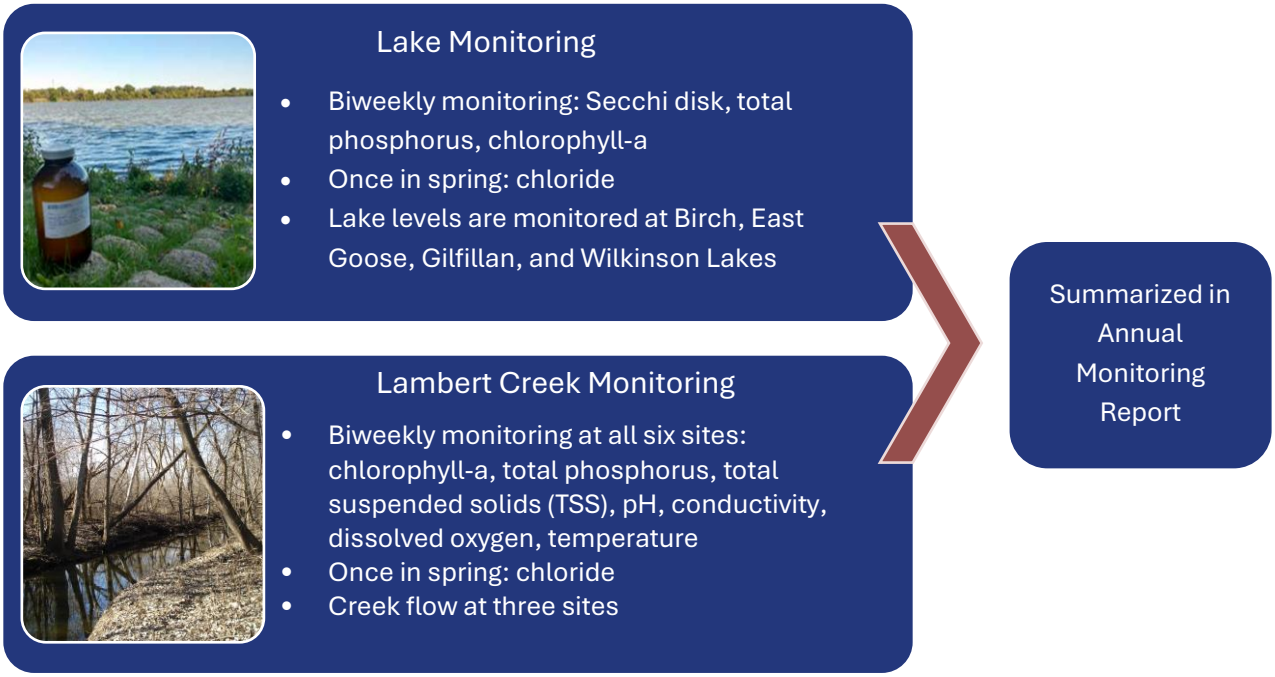


Figure 4-1: VLAWMO surface water quality monitoring efforts

Table 4-2. Sampling parameters. Sampling begins in early May and continues biweekly until late September. Parameters, waterbodies, and schedule are subject to change year-over-year.

Waterbodies*	Sechi Depth	Total Phosphorus	SRP	Chlorophyll-a	Chloride	Lake Level	Stream Flow	TSS
Amelia Lake	✓	✓	✓	✓	✓			
Black Lake	✓	✓	✓	✓	✓			
Birch Lake	✓	✓	✓	✓	✓	✓		
Charley Lake	✓	✓	✓	✓	✓			
Deep Lake	✓	✓	✓	✓	✓			
East and West Goose Lakes	✓	✓	✓	✓	✓	✓		
East and West Vadnais Lake	✓	✓	✓	✓	✓			
Gem Lake	✓	✓	✓	✓	✓			
Gilfillan Lake	✓	✓	✓	✓	✓	✓		
Pleasant Lake	✓	✓	✓	✓	✓			
Sucker Lake	✓	✓	✓	✓	✓			
Tamarack Lake	✓	✓	✓	✓	✓			
Wilkinson Lake	✓	✓	✓	✓	✓	✓		
Lambert Creek: Goose		✓		✓	✓			✓
Lambert Creek: Whitaker		✓	✓	✓	✓			✓
Lambert Creek: WBLSS**		✓	✓	✓	✓			✓
Lambert Creek: Oakmede		✓		✓	✓		✓	✓
Lambert Creek: County Rd F		✓		✓	✓		✓	✓
Lambert Creek: Koehler		✓		✓	✓		✓	✓

*Each lake has one monitoring location- see current monitoring report on VLAWMO website for map

**White Bear Lake Storm Sewer

Water samples are collected and analyzed following VLAWMO's quality assurance/quality control protocols identified in its Water Quality Sampling and Monitoring Quality Assurance Project Plan. SPRWS analyzes *E. coli* samples for special projects. VLAWMO uses contract labs for sample analysis. Data collected by VLAWMO are shared with partners and with the MPCA through annual submission into the Environmental Quality Information System (EQuIS). Data help inform possible project implementation and demonstrate progress toward water quality goals.

An important deliverable of the monitoring program is the Annual Monitoring Report, which includes the current year monitoring data and provides historical trends. The report is posted annually to VLAWMO's website. VLAWMO periodically reviews and updates its monitoring program to meet ongoing and developing needs for data.

Other monitoring and data collection efforts conducted by VLAWMO include:

- Automated Monitoring: VLAWMO monitoring is largely done through grab sampling. In addition, four automated samplers are in place along Lambert Creek to provide continuous flow data.
- Fish, Invertebrate, and Aquatic Plant Surveys: VLAWMO lakes have aquatic plant surveys available on the website. Plant surveys may include AIS delineations. Delineations are used to map AIS polygons to inform potential treatment options and adaptive management. Additionally, some lakes have fish and invertebrate reports available. Surveys are updated as needed and completed to track outcomes of specific projects. These are only done with partners and on a special project basis.
- Cyanobacteria (Blue-green Algae): VLAWMO uses a contract lab to analyze blue-green algae samples that are collected by VLAWMO staff as needed. This testing is done on an as needed basis per specific project needs.
- Bathymetry: Bathymetry and biovolume surveys are available for VLAWMO lakes. Biovolume provides a measure of aquatic plant density which can be used to inform AIS efforts. For example, surveys can be conducted at the height of curly-leaf pondweed density and then after senescence to document the extent of infestations. Plant density can also be used to provide data that demonstrate plant response to water quality improvement (e.g., common carp removal program and alum treatments). These surveys are done on an as needed basis per special project needs and not done on all areas, nor as part of the annual monitoring program.

Program Summary: Monitoring (200C)

Example Activities

- Annual monitoring report
- Chloride monitoring
- Lake and stream monitoring

Primary Issues Addressed

- Water Monitoring
- Chloride and Emerging Contaminants

Estimated Annual Funding

- $89,000-$116,000

4.3.4 Capital Improvement Projects – Early Coordination Program – 200D

VLAWMO recognizes the work required to identify and develop capital improvement projects. This program maintains relationships with partners and seeks ideas and opportunities for municipal capital improvement projects. This requires early coordination between VLAWMO and stakeholders. Directing funds and staff capacity to partner with municipalities to identify future projects ensures smooth operations toward VLAWMO's mission. Projects may be identified as stand-alone projects or combined with planned construction or redevelopment work.

Program Summary: Capital Improvement Projects – Early Coordination (200D)

Example Activities

- Coordination meetings
- Inventory of potential projects

Primary Issues Addressed

- Stormwater Management
- Erosion of Shorelines and Streambanks
- Infrastructure Partnership Projects
- Surface Water and Drinking Water Quality

Estimated Annual Funding

- $30,000-$39,000

4.3.5 Regulatory and Policy Program – 200E

VLAWMO does not operate a regulatory program for development review, with the exception of being the Local Government Unit (LGU) for the Wetland Conservation Act (WCA). All member cities and township are MS4s with approved permits to discharge stormwater, and they, along with MS4s Ramsey County, Anoka County, and the Minnesota Department of Transportation (MnDOT), are responsible for ensuring that development, redevelopment, and construction meets National Pollutant Discharge Elimination System (NPDES) requirements and local zoning regulations. Member cities and the township are required to operate a permitting program and have local controls consistent with the VLAWMO Water Management Policy (Appendix X).

4.3.5.1 Watershed Management Plan

VLAWMO must update its Watershed Management Plan every ten years. The previous Plan was approved in 2017. Thus, this fifth version of a VLAWMO Watershed Management Plan will be applicable from 2027-2036. The Plan revision process gives VLAWMO the opportunity to assess Plan progress, identify changes in watershed conditions and goals, and affirm organizational roles and mission. The Plan is intended to be a tool to guide operations and efforts. Plan amendments may be pursued as part of this program (see Section 5). Additionally, adjustments to the VLAWMO jurisdictional boundary may be pursued.

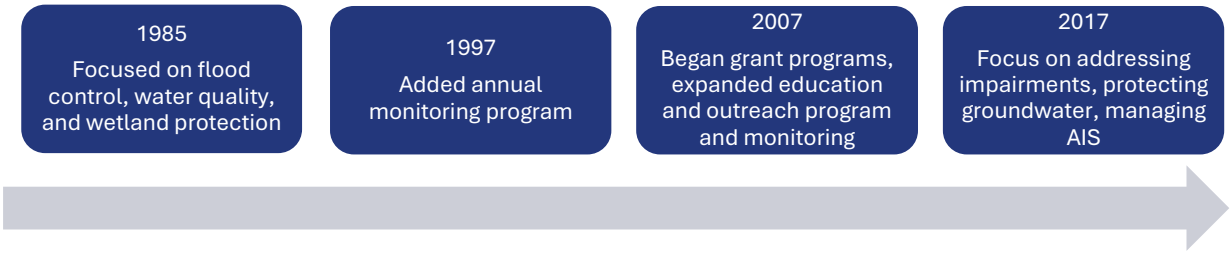


Figure 4-2. Previous versions of VLAWMO Watershed Management Plan

4.3.5.2 Wetland Conservation Act

VLAWMO is the LGU for WCA and administers the WCA for member communities. VLAWMO provides information on wetland requirements and resources for any activity that may be regulated by WCA. VLAWMO's role in administering WCA is described in the Water Management Policy (Appendix X).

Program Summary: Regulatory and Policy (200E)

Example Activities

- Assisting member communities in adherence to Water Management Policy

Primary Issues Addressed

- Wetland Conservation Act
- Stormwater Management Standards

Estimated Annual Funding

- $90,000-$117,000

4.3.6 General Analysis and Technical Work Program – 200F

Studies, modeling, and project feasibilities are vital components of VLAWMO's work. Studies and modeling are used to inform effective management decisions and are critical components of planning and implementing larger capital projects (e.g., feasibility studies, stormwater retrofit studies). VLAWMO relies on studies to adapt to changing conditions and incorporate new information. For example, VLAWMO completed an East Vadnais Lake Subwatershed Resiliency Study and intends to do similar resiliency studies in the Lambert Creek Subwatershed to continue adapting to climate change. Resiliency studies identify opportunities to mitigate flooding, protect source water, and improve surface water quality. Modeling work and feasibility studies are needed to fully understand issues, ensure projects are designed to adequately address issues, and build projects suited for the location and future storm events.

Program Summary: General Analysis and Technical Work (200F)

Example Activities

- Lambert Creek Resiliency Study
- East Vadnais Lake Subwatershed Resiliency Study
- Wetland assessment planning

Primary Issues Addressed

- All

Estimated Annual Funding

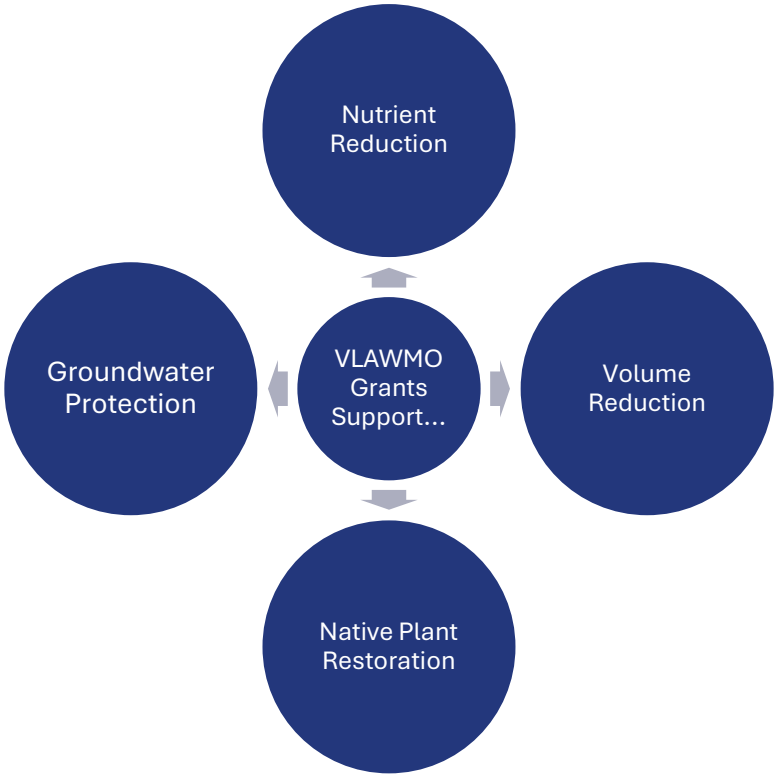
- $100,000-$130,000

4.3.7 VLAWMO Grants and Partnerships Program – 200G

Shoreline restoration. Photo Credit: VLAWMO

VLAWMO offers funding and assistance through grant programs to support public and private landowners in implementing projects to improve water quality. These grant programs are funded by VLAWMO's allocated budget and contain eligibility requirements specific to each program. Past projects have included rain barrels, rain gardens, shoreline stabilizations, pollinator gardens and native plantings, turf replacement and bee lawns, permeable pavement, and more. VLAWMO offers the following programs:

- **Rain Barrel Grant Program**: VLAWMO supports landowner installation of rain barrels to conserve water.
- **Soil Health Grant Program**: VLAWMO supports small-scale projects that enhance soil health and water quality, including projects that restore native vegetation.
- **Landscape Level 1 Grant Program**: VLAWMO provides funding for projects that reduce stormwater rate and volume and improve water quality, especially infiltration projects.
- **Landscape Level 2 Grant Program:** VLAWMO provides funding for large-scale projects that reduce stormwater volume and rate, add flood storage, conserve groundwater, or reduce nutrient loading. Priority is given to projects that provide regional benefits, such as those focused on groundwater conservation , stormwater retrofit or reconstruction, and enhanced street sweeping and chloride reduction. External grant funding may provide additional funding sources for Landscape Level 2 projects.



Program Summary: VLAWMO Grants and Partnerships (200G)

Example Activities

- Groundwater conservation projects
- Shoreline and streambank restorations
- Curb cut rain gardens

Primary Issues Addressed

- Stormwater Management Standards
- Groundwater Supplies and Conservation
- Natural Features and Habitat
- Climate Resiliency
- Erosion of Shorelines and Streambanks

Estimated Annual Funding

- $149,000-$194,000

4.3.8 Operations and Maintenance Program – 200H

4.3.8.1 VLAWMO Facilities

VLAWMO is responsible for upkeep and maintenance of infrastructure and some constructed BMPs. This includes stormwater management BMPs such as iron-enhanced sand filters, sedimentation basins, and a boat launch. Maintenance agreements for projects or BMPs are executed prior to installation and may be the responsibility of a landowner, member community, partner organization, or VLAWMO. A goal of this plan (see Section 3.8) is to create an inspection schedule for facilities. See Table 3-4 for a list of VLAWMO facilities.

Facility at Lambert Creek. Photo Credit: vlawmo.org

4.3.8.2 Public Drainage

As detailed in Section 3.8.1, VLAWMO is the local drainage authority and is responsible for inspection of the function of the main stem of Ramsey County Ditch 14 (Lambert Creek) pursuant to MN statute 103B. This consists of inspections and maintenance as identified in the annual inspection report maintenance. A Public Drainage System Inspection Protocol was developed and implemented in 2023. Additionally, VLAWMO adopted a Public Drainage Management Policy that identifies VLAWMO's approach in utilizing its Chapter 103B authorities, in conjunction with its municipal partners, to manage these systems. The policy identifies owners or operators of storm sewer systems/crossings within the public drainage system who are responsible for maintenance.

Program Summary: Operations and Maintenance Program (200H)

Example Activities

- Inspection of facilities
- Acting as Drainage Authority pursuant to MS 103B

Primary Issues Addressed

- Stormwater Management Standards
- Public Drainage Systems
- VLAWMO Facilities
- Climate Resiliency

Estimated Annual Funding

- $151,000-$198,000

4.4 Project Technical Work and Capital Improvement Projects – 300 / 400

Two of VLAWMO's core activities are completing technical work to inform capital improvement project design (300 level) and implementing capital improvement projects (400 level). VLAWMO's capital improvement program encompasses all capital improvement projects and is described in the JPA.

For purposes of this plan, project "technical work" includes feasibility studies, stormwater retrofit analyses, modeling, etc., to inform project scope. A capital improvement project is a physical improvement or structure built to last at least 25 years (with continued maintenance) and a total cost typically over $50,000. VLAWMO capital improvement projects are generally installed following project technical work.

For planning purposes, VLAWMO is organized into seven smaller subwatersheds, which allows detailed focus and targeting of specific areas and issues. The following pages summarize each subwatershed and the capital improvement projects that are planned within. The Implementation Table organizes each project's technical work and capital improvement project by subwatershed, with additional information including the primary entity leading the effort and estimated grant match or cost from VLAWMO.

Budget numbers in the Implementation Table are high-level estimates for the VLAWMO-only portion of total project costs. In many cases, estimated total project costs are much higher and anticipate local partner funding and/or outside grant funding. All projects listed are partnership and/or grant dependent.

Capital improvement projects in the Implementation Table were identified in coordination and collaboration with municipalities and partner organizations. However, it is important to note that these projects were identified based on information available at the time the Plan was written, and project details and annual costs are likely to change and may fluctuate leading up to and during implementation efforts. Costs and benefits of planned projects are evaluated annually. Specific projects, costs, and partnership details are adjusted as needed. VLAWMO staff communicate with stakeholders regularly in advance of internal planning cycles to assess priorities, needs, and opportunities to collaborate and coordinate efforts.

Projects with the greatest impact on water resources receive the highest priority for implementation. In addition to prioritizing high-benefit projects, VLAWMO considers and supports projects that arise through redevelopment or through partners implementing their Capital Improvement Plans.

Priority Resource Criteria

Prioritizing resources provides direction on where to target efforts. VLAWMO identified four criteria that are used to identify priority resources:

1. If the resource is in a 319 Priority Subwatershed
2. If the resource is in the Chain of Lakes used for drinking water
3. If a resource is in the Grant Program priority zones

4. If a resource is impaired, nearly impaired, barely impaired, or a lake of high biological significance

A summary of these criteria and VLAWMO waterbodies that meet each criteria is shown in Table 4-3. No one criteria will outrank another; VLAWMO staff will review all when determining and prioritizing projects. The list of resources and priority criteria will be used when pursuing and funding projects.

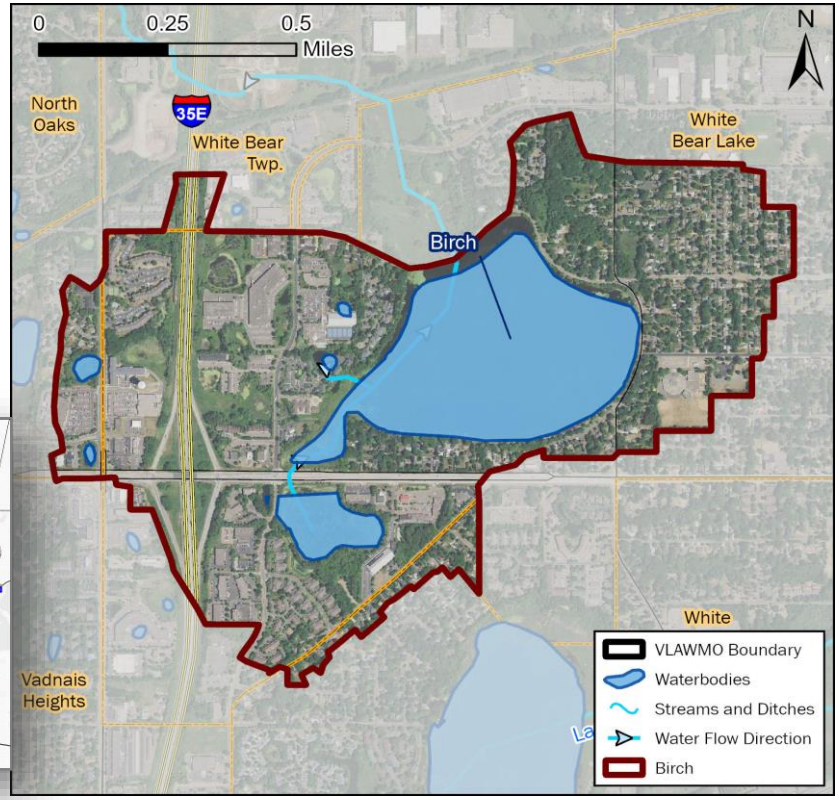
Table 4-3. VLAWMO resource prioritization criteria.

319 Priority Subwatershed Area	Drinking Water Chain of Lakes	Grant Program Priority Zones	Nearly / Barely*, Impaired Waterbodies, or Lakes of Biological Significance
• Wilkinson Lake • Tamarack Lake • Fish Lake • Birch Lake	• Charley Lake • Pleasant Lake • Sucker Lake • East Vadnais Lake • Lambert Creek	• Black Lake • Deep Lake • East and West Goose Lake • Lambert Creek • Wilkinson Lake	• **Barely Impaired:** Deep Lake (TP) • **Nutrient Impairment:** East and West Goose Lakes, Gilfillan Lake, Pleasant Lake, Tamarack Lake, West Vadnais Lake, Wilkinson Lake • **Bacteria Impairment:** Lambert Creek • **High Biological Significance:** Amelia

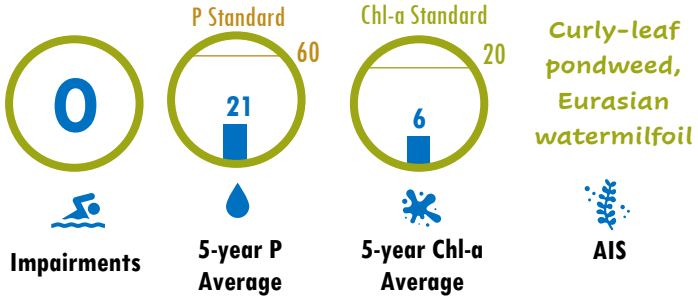
**Nearly impaired resources are defined as within 90-100% of the standard (no VLAWMO lakes qualify) and barely impaired as within 100-125% of the standard.*

4.4.1 Birch Lake Subwatershed

Birch Lake is a shallow lake with a walking path for recreation. Birch Lake has high water quality, low nutrient levels, and good clarity, which is distinctive for an urban lake. The Birch Lake Improvement District (BLID) supports VLAWMO's efforts to protect the lake, remove AIS, prevent fish kills, and monitor chloride. County Highway 96 and I-35E pass through this subwatershed, making chloride pollution from road salt a concern. VLAWMO monitors chloride in Birch Lake, which has the highest chloride concentration (average of 99 mg/L) of any VLAWMO lake but does not exceed state standards.



Birch Lake Quick Stats



Project Spotlight

✓ Removal of AIS (Begun in 2022)

Eurasian watermilfoil and curly-leaf pondweed are manually removed in partnership with BLID and with initial support from a DNR grant.

➔ Funded through AIS Grant from DNR, with partnership funding support from BLID and VLAWMO

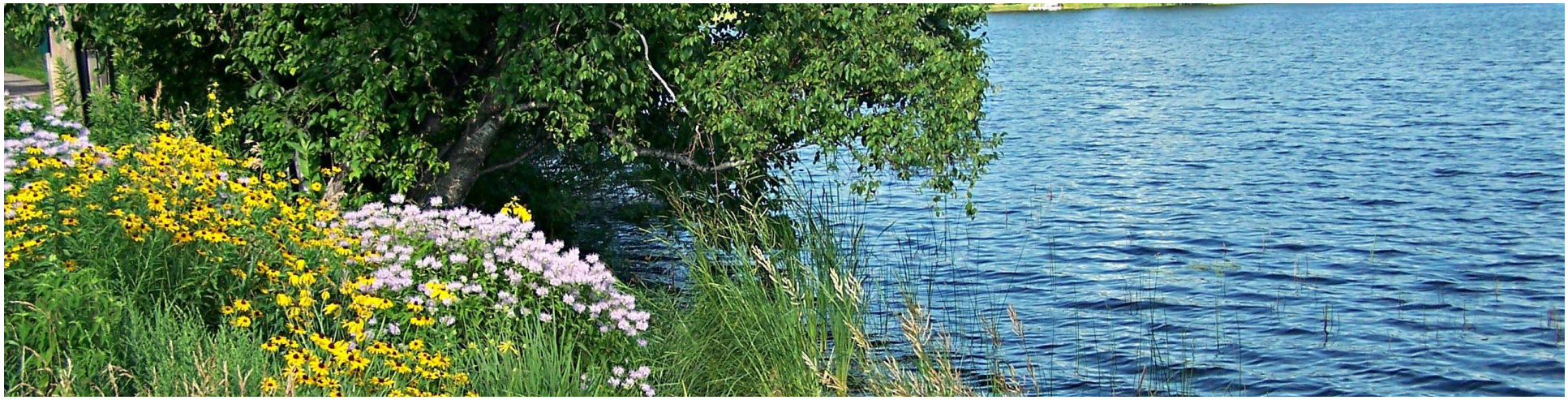
✓ Iron-Enhanced Sand Filter (2020)

A feasibility study determined that the residential development from the area that flows to 4th St and Otter Lake Road was releasing phosphorus and sediment into Birch Lake. An iron-enhanced sand filter was installed, which is estimated to reduce phosphorus loads into the lake by 8 lbs/year.

➔ Partially funded by a BWSR Clean Water Fund grant, with partnership funding support from VLAWMO, Ramsey County, City of White Bear Lake, and BLID

Iron-enhanced sand filter construction

Birch Lake Subwatershed: Planned Projects and Capital Improvement Projects



Pretreatment BMP – 301A / 401A

Determine feasibility, then based on findings implement a pretreatment BMP upstream of the iron-enhanced sand filter to reduce sediment loads entering the filter and decrease filter maintenance.

Birch Lake Outlet Channel Technical Work– 301B

Conduct a feasibility study to identify Birch Lake outlet channel potential repairs and stabilization to improve water quality leading to Wilkinson Lake.

Shoreline, Wetland, or Water Quality Partnership Technical Work – 301C

Partner with the City of White Bear Lake to identify Birch Lake shoreline, upstream wetland, or water quality projects that would reduce nutrient loading to Birch Lake.

Subwatershed Neighborhood Technical Work – 301D

Review opportunities and needs for neighborhood-level BMPs and projects that could include rain gardens or other stormwater BMPs to protect Birch Lake.

AIS Management – 301E

Continue partnership with BLID and manage aquatic invasive plants to improve water quality and ecosystem resilience.

Sports Center Shoreline Technical Work – 301F

Review potential project for Birch Lake shoreline restoration at the White Bear Lake Sports Center, then based on findings implement a BMP.

Rotary Park Restoration – 401G

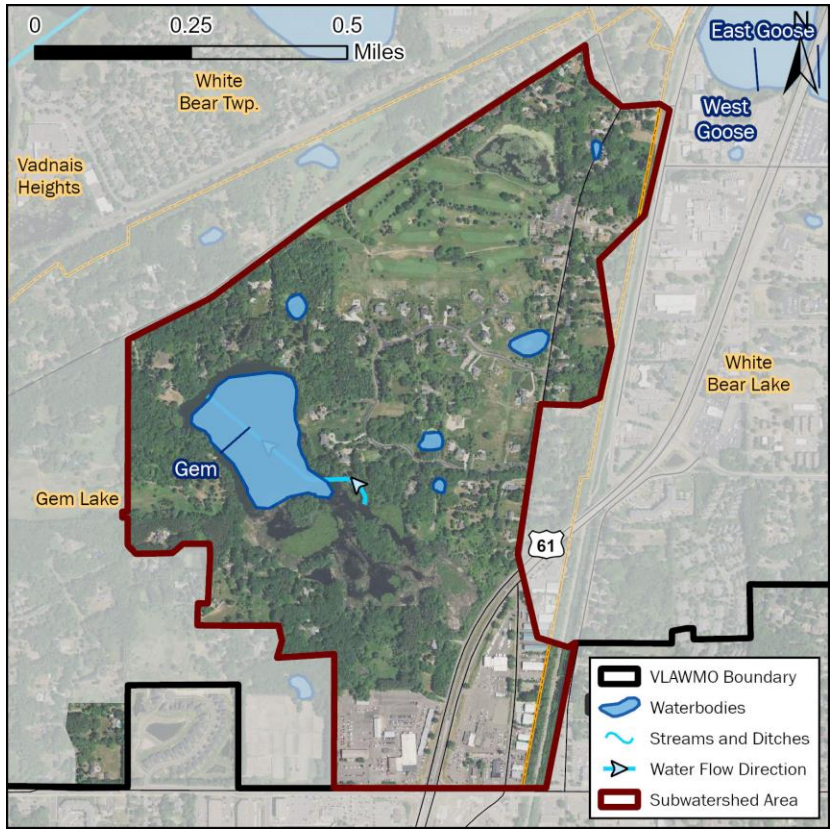
Wetland restoration at Rotary Nature Preserve which will improve water quality upstream in Wilkinson Lake and enhance habitat functions.

Future Technical Work / Capital Improvement Projects – 301H / 401H

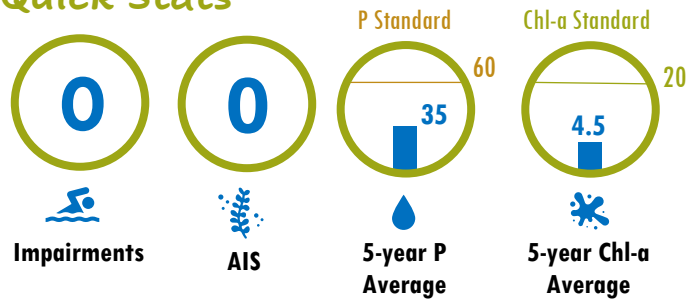
VLAWMO will technically and financially support technical work as opportunities arise in the Birch Lake Subwatershed. VLAWMO will technically and financially support the design and construction of CIPs identified in technical work or as opportunities arise.

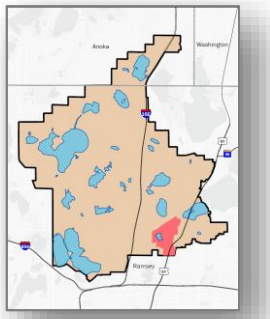
4.4.2 Gem Lake Subwatershed

Gem Lake, within the City of Gem Lake, is 48 acres and has no public access. The area is a mix of residential, industrial, and commercial properties. The lake has been monitored by VLAWMO staff since 2005. Gem Lake was impaired due to nutrients. The lake was delisted in 2018. It is believed that at least part of the improvement in water quality is due to the Highway 61 road reconstruction project, which reduced stormwater inflow to the lake. The Gem Lake subwatershed is landlocked. Water does not drain outside of the subwatershed boundary.



Quick Stats





Resource Spotlight – Gem Lake

- 48 acres
- 7 ft average depth- the south end of the lake is a wetland and it deepens in the north, with a maximum depth of 14 ft
- 183 ac-ft
- 363 subcatchment acres
- Surrounded by private property

Clear water in Gem Lake

Project Spotlight: Gem Lake Stormwater Retrofit Assessment

- A Stormwater Retrofit Assessment was completed for the Gem Lake subwatershed in 2012.
- It identifies and ranks BMP options and benefits at the catchment scale.

Gem Lake Subwatershed: Planned Projects and Capital Projects

Gem Lake. Photo Credit: VLAWMO

Commercial Area Retrofit– 302A / 402A

Partner with the cities of Gem Lake and White Bear Lake to investigate a retrofit project for stormwater management. Based on findings of the technical work, VLAWMO and partners will retrofit commercial areas to improve stormwater quality and/or quantity.

Smart Irrigation and Groundwater Conservation – 302B

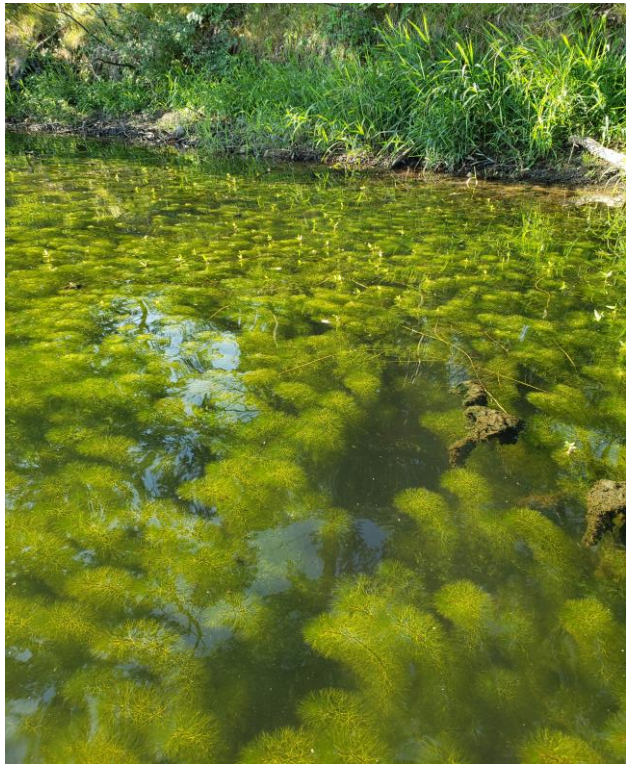
Investigate the potential and based on the findings partner with landowners for implementation of smart irrigation principles to conserve groundwater.

Regional, Subwatershed, or Neighborhood BMPs – 302C

As partnerships and technical work allows, work with the City of Gem Lake and/or Ramsey County and private landowners to install BMP projects for stormwater management, reduced sediment and nutrient loading, habitat, and water storage.

Future Technical Work / Capital Improvements – 302D / 402D

VLAWMO will technically and financially support technical work as opportunities arise in the Gem Lake Subwatershed. VLAWMO will technically and financially support the design and construction of CIPs identified in technical work or as opportunities arise.

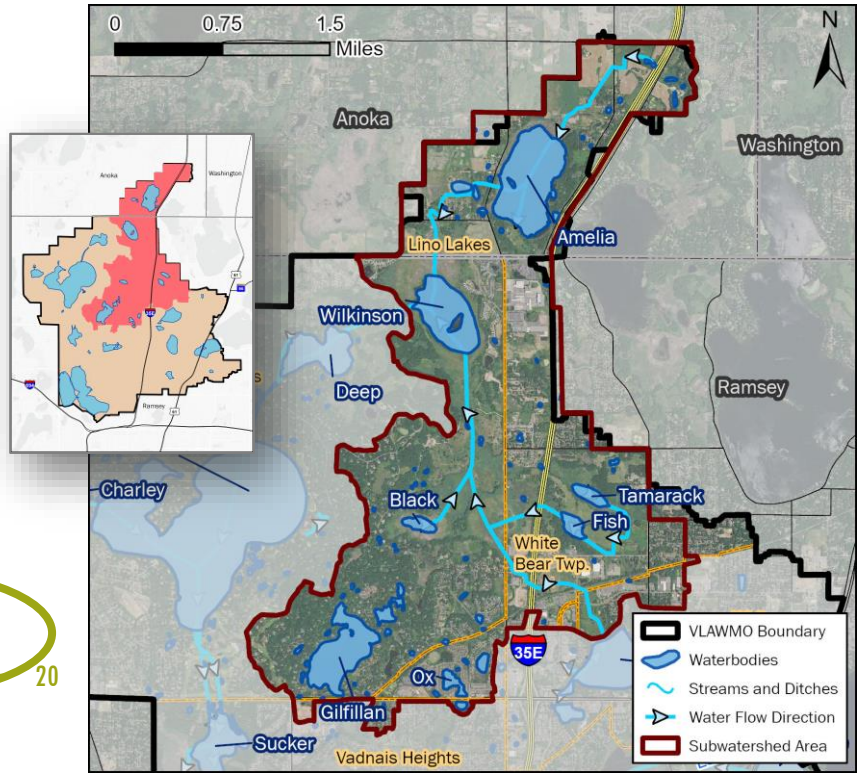


Native hornwort in Gem Lake.

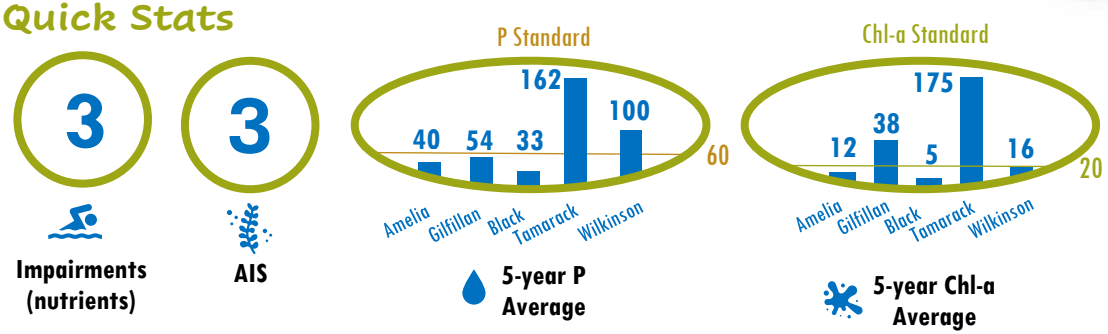
Photo credit: VLAWMO

4.4.3 Gilfillan-Tamarack-Black-Wilkinson-Amelia Subwatershed

VLAWMO monitors five lakes in this subwatershed: Gilfillan, Tamarack, Black, Wilkinson, and Amelia. It also contains Fish and Ox Lakes. This subwatershed includes Centerville Rd and I-35E. The waterbodies are primarily connected by surface water flow. Tamarack flows into Fish; Ox and Gilfillan flow into Black; Fish, Black, and Amelia flow into Wilkinson; and Wilkinson flows into Deep. Gilfillan, Tamarack, and Wilkinson Lakes are impaired due to nutrients. Internal loading, agricultural runoff, and stormwater are the primary sources of nutrients in these lakes. Most of the agricultural land remaining in VLAWMO is in this subwatershed. AIS in the subwatershed include curly-leaf pondweed in Gilfillan and Wilkinson Lakes, Eurasian watermilfoil in Amelia Lake, and flowering rush in a wetland near Amelia Lake.



Quick Stats



Project Spotlight

✓ Wilkinson Deep-Water Wetland Restoration (2024)

A wetland was installed where water from Birch, Tamarack, Gilfillan, and Black Lakes converge. The wetland converted a straight ditch into an elongated wetland that stores water and supports native vegetation. Vegetation was enhanced with native wetland plants, including submerged vegetation.

➔ 60% funded through EPA 319 funds administered by MPCA, with a 40% match by VLAWMO and North Oaks Company (landowner)

Wilkinson deep-water wetland

Gilfillan-Tamarack-Black-Wilkinson-Amelia Subwatershed: Planned Projects and Capital Improvement Projects

Small Watershed Projects – 303B and C / 403A, B, and C

Complete technical work for two EPA 319 Small Watershed Grant Program Projects. Based on findings of the technical work, VLAWMO and partners will provide a match to the grant and implement three projects to benefit Wilkinson Lake.

Amelia Drainage Project – 303D / 403D

Complete technical work to identify a project that would benefit the drainageway upstream of Amelia Lake. Based on findings of the technical work, VLAWMO and partners will pursue implementation of the project. This could include but is not limited to wetland restoration, streambank restoration, stormwater rate management, or greenway planning.

Wilkinson Lake Wetland Project Maintenance – 303E

Provide ongoing maintenance at the Wilkinson Deep-Water Wetland Restoration site as needed to maintain benefits and enhance resilience.

Local Partnership – Tamarack Nature Center – 303F

Investigate a partnership with Tamarack Nature Center for restoration or protection /management BMP work to improve wetland or lake condition.

Township / City BMP Retrofits – 303G

Determine feasibility, then based on findings, partner with White Bear Township and / or the cities of Lino Lakes, North Oaks, and White Bear Lake to retrofit existing BMPs to enhance stormwater management and reduce maintenance.

Cities / Township /North Oaks Homeowners Association / North Oaks City Partnership Water Quality /Groundwater Conservation Projects– 303H/ 403H

Work with partners to study possible implementation projects that will improve water quality and/or conserve groundwater, which could include but is not limited to rain gardens, shoreline stabilizations, and water reuse projects (where feasible and safe). Then based on findings implement a BMP.

Internal Loading / Alum Treatment– 403I / 403J

Address internal loading in Tamarack Lake through projects that could include alum treatment or BMPs to reduce subwatershed loading that contributes to internal loading. Address internal loading in Wilkinson Lake through projects that could include alum treatment or BMPs to reduce subwatershed loading that contributes to internal loading.

Water Reuse Project – 403K

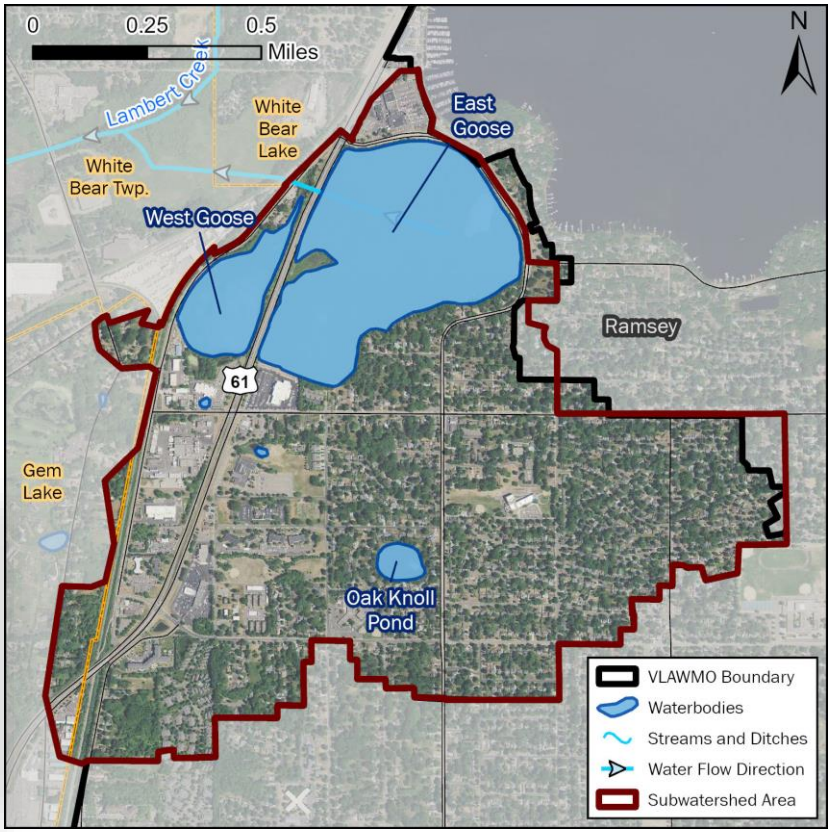
Implement a water reuse project at Polar Lakes Park.

Future Technical Work / Capital Improvement Projects – 303L / 403L

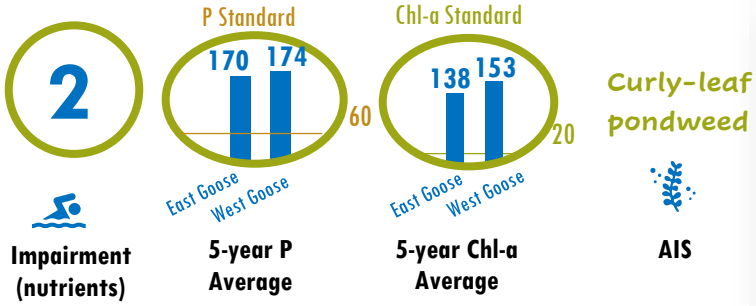
VLAWMO will technically and financially support technical work as opportunities arise in the Gilfillan-Tamarack-Black-Wilkinson-Amelia Subwatershed. VLAWMO will technically and financially support the design and construction of CIPs identified in technical work or as opportunities arise.

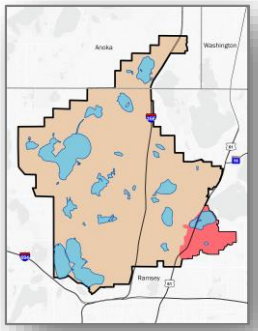
4.4.4 Goose Lake Subwatershed

Highway 61 splits East and West Goose Lakes, which are connected by two culverts under the highway. Both lakes are impaired due to nutrients, with the main source being internal loading, according to the VLAWMO TMDL (Wenck, 2014). Phosphorus loads in the lake originate from subwatershed development and historical wastewater discharge. East Goose Lake is identified by the DNR as a shallow lake. Presently, West Goose is considered a wetland by the DNR, but is locally referred to as a lake. This subwatershed also includes Oak Knoll Pond, which drains into East Goose Lake.



East and West Goose Quick Stats





Project Spotlight

✓ **Oak Knoll Pond (2024)**

Spent lime was applied through a demonstration project at Oak Knoll pond, which reduced TP loading from the pond and improved water clarity.

→ Funded through VLAWMO and the City of White Bear Lake

✓ **County Road F Rain Gardens (2020)**

Six curb cut rain gardens were retrofitted and treat over 1 million gallons of stormwater annually.

→ Funded by Ramsey County, City of White Bear Lake, and a VLAWMO Landscape Level 2 grant

Spent-Lime treatment

Goose Lake Subwatershed: Planned Projects and Capital Improvement Projects

Highway 61 Channel Restoration – 304A / 404A

Determine feasibility of channel restoration, erosion/sediment management, and/or sediment removal discharging to East Goose Lake. Based on findings of the technical work, VLAWMO and partners will pursue implementation of a partnership project which is expected to reduce sediment loading and improve water quality entering the Lake.

Goose Lakes Regional BMP Partnership – 304B / 404B

Conduct technical work to identify regional BMPs with City of White Bear Lake. Based on findings of the technical work, VLAWMO and partners will implement regional BMPs.

Regional, Subwatershed, or Neighborhood BMPs – 304C

Determine feasibility, then based on findings, partner with the City of White Bear Lake and/or Ramsey County to install BMP projects to reduce nutrient loading to Goose Lakes. Projects may have benefits for stormwater management, reduced sediment loading, habitat, and water storage.

City Street Partnership Projects – 304D

Partner with the City of White Bear Lake to install curb cut rain gardens to improve stormwater quality and reduce volume.

Future Technical Work / Capital Improvement Projects – 304E / 404E

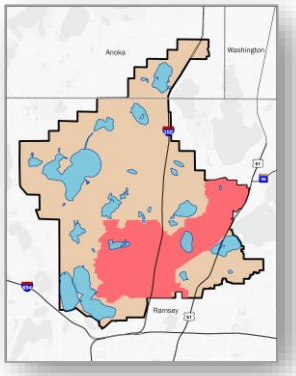
VLAWMO will technically and financially support technical work as opportunities arise in the Goose Lake Subwatershed. VLAWMO will technically and financially support the design and construction of CIPs identified in technical work or as opportunities arise.

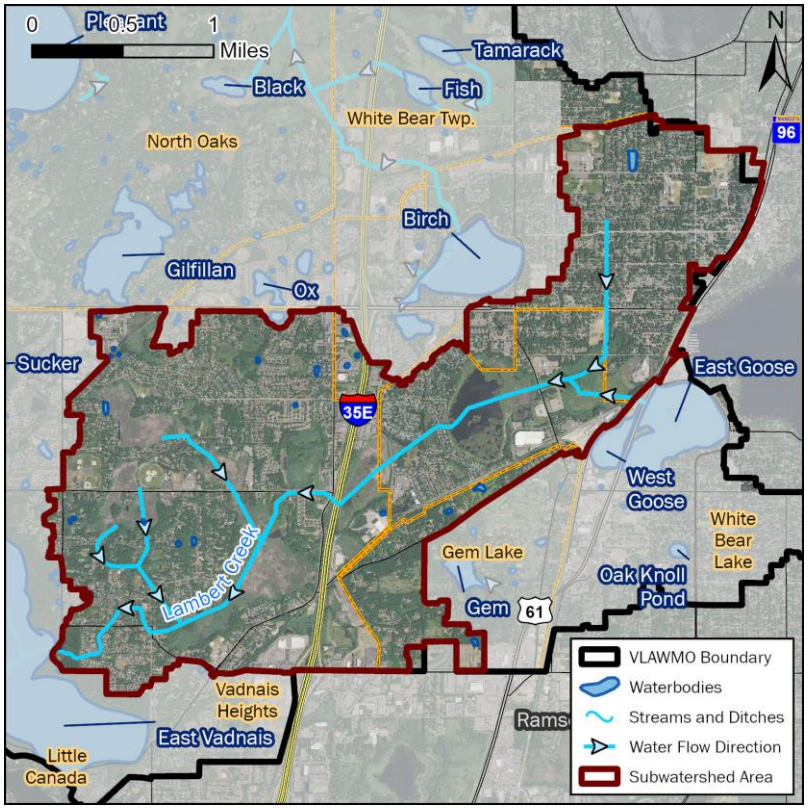
4.4.5 Lambert Creek Subwatershed

Lambert Creek, also known as Ramsey County Ditch 14, flows 4.2 miles through the southern portion of VLAWMO into East Vadnais Lake. Its headwaters are West Goose Lake and Whitaker Pond, and its tributaries include storm sewers from the City of White Bear Lake, City of Vadnais Heights, and White Bear Township. Lambert Creek is impaired due to bacteria. Source assessments have identified birds (e.g., waterfowl) as the likely source of excess bacteria. Lambert Creek passes through remnants of former shallow wetlands and lakes that were drained in the early 1900s.

Lambert Creek Quick Stats

- **1** — Impairment (bacteria)
- **6** — Monitoring sites
- **1 ft** — Average Depth
- **Curly-leaf pondweed, common carp** — AIS





Project Spotlight

✓ **Meander Project (2021)**

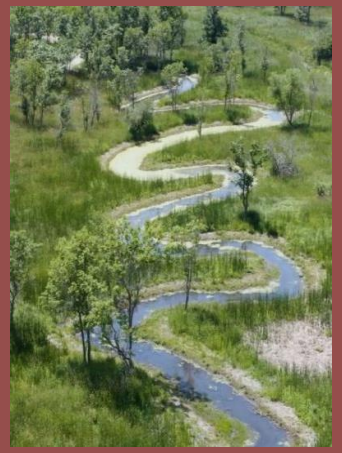
Sheet pile was replaced in Lambert Pond to add water storage, a portion of the creek was meandered to allow for floodplain connectivity and slow flow, and a biochar filter was constructed to remove bacteria.

➔ Funded through EPA 319 funds administered by MPCA with a cash match from VLAWMO. BWSR WBIF program also supported construction of the biochar filter.

✓ **White Bear Lake Street Rehabilitation Project (2024)**

Five curb cut rain gardens were installed in concert with the City of White Bear Lake's street project in a residential area that spanned across six streets within VLAWMO. These rain gardens store and treat stormwater and reduce volume and sediment entering Lambert Creek.

➔ Funded in partnership with the City of White Bear Lake, private residents, and VLAWMO through the Landscape Level 2 Grant program and BWSR WBIF program



Meandered Lambert Creek

Lambert Creek Subwatershed: Planned Projects and Capital Improvement Projects

Whitaker Wetland Retrofit Project – 405A

Continue to investigate, then based on findings, retrofit and/or repurpose Whitaker Wetland to enhance function in Columbia Park.

Lambert Sheet Pile Debt Services – 405B

Debt services on the Lambert Creek sheet pile replacement project.

Water Quality / Wetland Project – 305C / 405C

Complete technical work to investigate the feasibility or function of public drainage-associated water quality and wetland projects. Based on findings of the technical work, VLAWMO and partners will pursue projects.

Water Reuse Project– 305D / 405D

Complete technical work to identify potential water reuse projects that are feasible and safe. Based on findings of technical work, VLAWMO and partners will implement a water reuse project to reduce the need for groundwater use for irrigation and conserve groundwater.

Green Streets Project – 305E / 405E

Complete technical work to determine the feasibility of green street projects and possible BMP options. Based on findings of the technical work, VLAWMO and partners will implement a green streets demonstration project, which may include but is not limited to tree trenches, rain gardens, permeable pavement, or a reduction in impervious surfaces.

Commercial Property Project – 305F / 405F

Complete technical work for a retrofit of commercial property to reduce stormwater quantity and improve water quality. Based on findings of the technical work, VLAWMO and partners will implement the retrofit.

Resiliency Plan or Projects – 305G / 405G

Complete technical work to develop a Resiliency Plan. Based on technical work, VLAWMO and partners will implement projects from Plan findings to increase resiliency to extreme precipitation events.

Lambert Creek Drainage Partnership Projects – 305H / 405H

Complete technical work and based on outcomes, VLAWMO and partners will complete maintenance projects on the main stem of the Creek and/or branch ditches.

Lambert Creek Operation and Maintenance – 305I

Operations and maintenance of Lambert Creek facilities as needed to protect Creek water quality.

Municipality / City Street Project Partnership – 305J

continue to explore Partnership with Ramsey County and the municipalities of Vadnais Heights, White Bear Lake, Gem Lake, and White Bear Township for opportunities to implement BMPs as part of street renovation.

Municipality Water Quality in Parks/Public Spaces – 305K

Determine feasibility, then based on findings, partner and implement BMPs to enhance water quality in community parks and public spaces.

Groundwater Conservation Partnership Projects – 305L

Determine feasibility, then based on findings, partner and conduct necessary work to implement water conservation and reuse projects with existing partnerships.

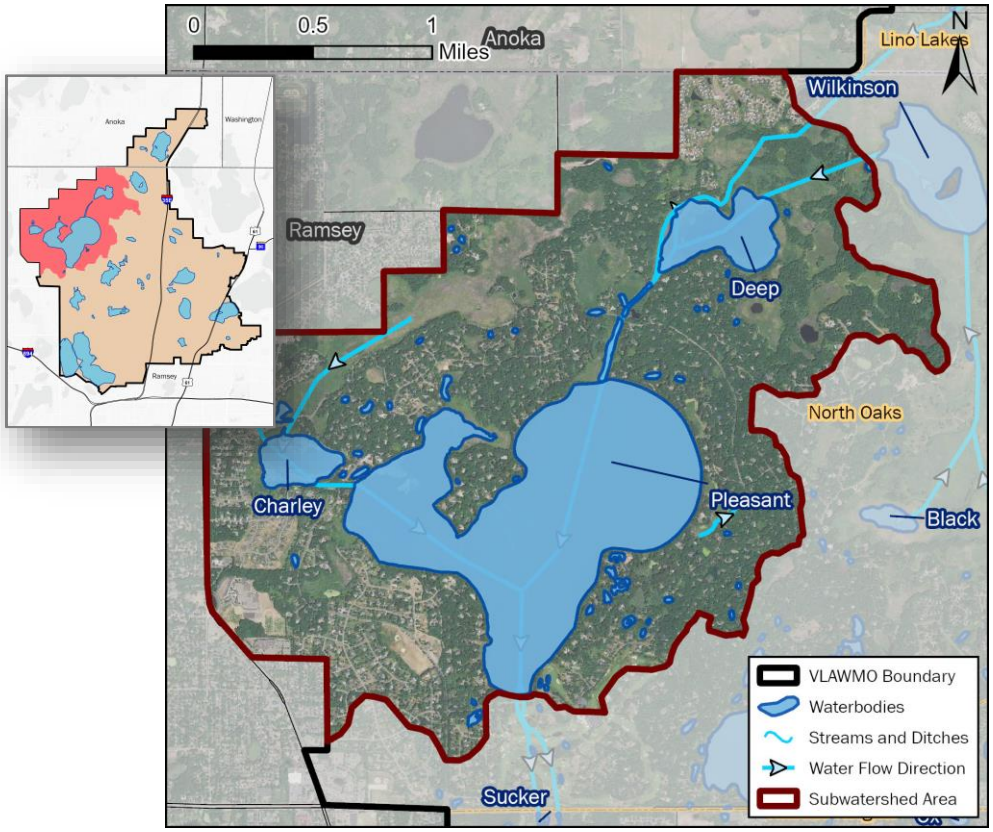
Future Technical Work / Capital Improvements – 305M / 405M

VLAWMO will technically and financially support technical work as opportunities arise in the Lambert Creek Subwatershed. VLAWMO will

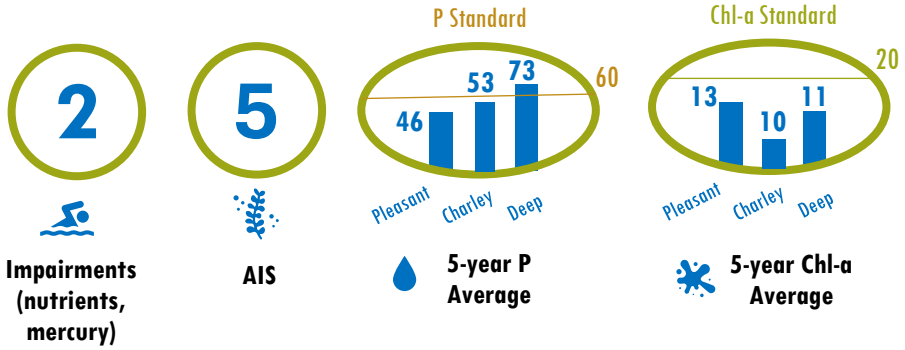
technically and financially support the design and construction of CIPs identified in technical work or as opportunities arise.

4.4.6 Pleasant-Charley-Deep Subwatershed

This subwatershed includes Pleasant, Charley, and Deep Lakes, part of the SPRWS Chain of Lakes. Charley Lake receives inflow from the Mississippi River via a pipe. Pleasant Lake is impaired due to nutrients and mercury in fish tissue. The largest sources of nutrients are internal loading and the Mississippi River. The common carp removal program has been active since 2019, and this subwatershed remains a priority for AIS removal. AIS in the subwatershed include common carp, curly-leaf pondweed, and Eurasian watermilfoil in Pleasant, Charley, and Deep, zebra mussels in Pleasant and Charley, and rusty crayfish in Pleasant Lake.



Quick Stats



Project Spotlight

✓ Carp Removal (2024)

The common carp removal program was initiated in 2019. Major removals were completed in 2022-2024. The project is ongoing {suggesting this delete since it won't be clear what "time" this is once WMP is adopted].

➔ Currently funded by VLAWMO. NOHOA and SPRWS have provided funding in data collection years and provide logistical support. NOC also provides collaboration and land access for the program.

Common carp removal

✓ Channel Restoration (2015)

The channel between Deep and Pleasant Lakes was restored to reduce bank erosion.

➔ Funded by VLAWMO and the North Oaks Homeowners Association, with a grant for installation work

Pleasant-Charley-Deep Subwatershed: Planned Projects and Capital Improvement Projects

Nutrient Management Partnership Project – 306A

Conduct technical work to investigate nutrient reduction in Pleasant, Charley, or Deep Lakes, which could include a feasibility study.

Carp Management Program – 306B

Continue carp management actions per ongoing technical work in Pleasant, Deep, and Charley Lakes, which improve water quality and recreation.

Lake Shoreline Management – 306C

Partner with the NOHOA/City of North Oaks to encourage lakeshore landowners to apply for VLAWMO grants for shoreline stabilization and restoration projects, which reduce erosion and nutrient loading and support native vegetation.

Regional, Subwatersheds, or Neighborhood BMPs – 306D

Partner with NOHOA and / or the City of North Oaks and private landowners to explore, study, and identify opportunities and implement projects to conserve groundwater or improve water quality in subwatershed lakes.

Infrastructure or Local Planning Technical Work – 306E

Partner with the NOHOA/City of North Oaks for opportunities to study and identify stormwater BMPs that could be implemented with planned construction or infrastructure work.

Oxygenation System Partnership and Technical Work – 306F

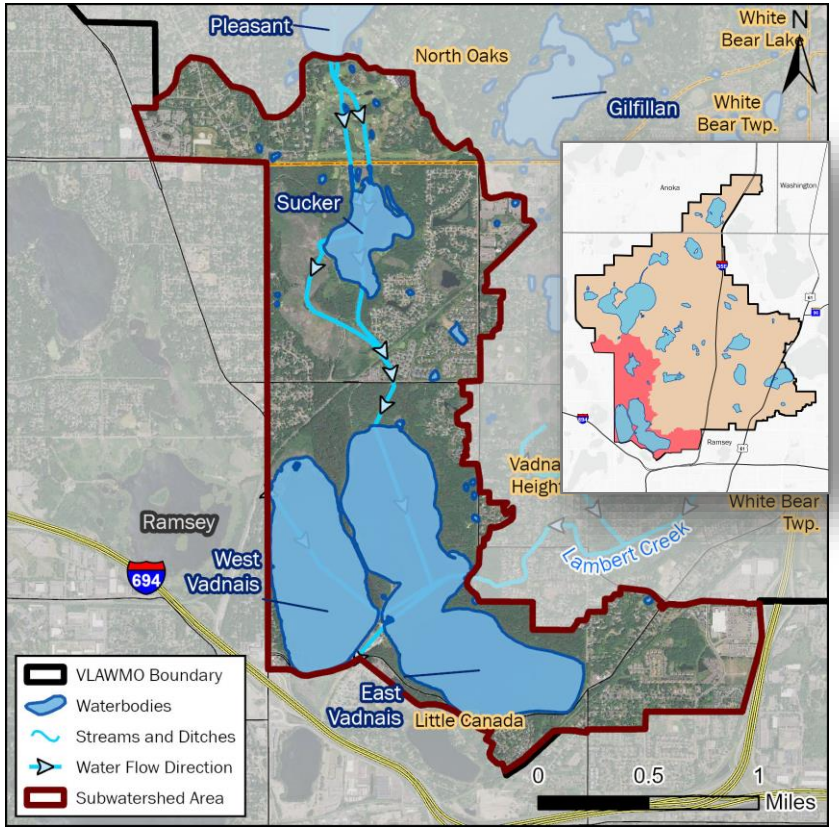
Study and Review technical work, partnership and funding opportunities and based on outcome of findings, pursue implementation as warranted of a potential upgrade to the existing oxygenation system or dosing in Pleasant Lake.

Future Technical Work / Capital Improvement Projects – 306G / 406G

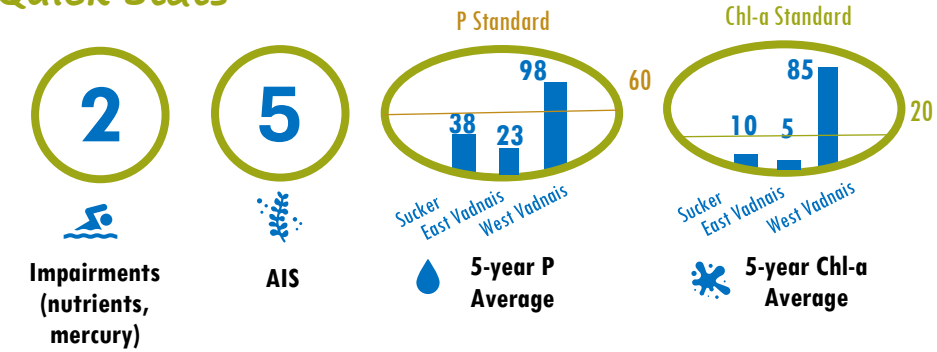
VLAWMO will technically and financially support technical work as opportunities arise in the Pleasant-Charley-Deep Subwatershed. VLAWMO will technically and financially support the design and construction of CIPs identified in technical work or as opportunities arise.

4.4.7 Sucker-Vadnais Subwatershed

This subwatershed contains East Vadnais Lake, used by about 450,000 people as a drinking water source. The west side of the lake has an intake pipe where water is withdrawn to the SPRWS plant in St. Paul. This subwatershed has parkland and protected areas to protect drinking water. West Vadnais Lake is impaired due to nutrients, and East Vadnais is impaired due to mercury in fish tissue. There is no detectable surface nor subsurface connection between East and West Vadnais Lakes. AIS include common carp, curly-leaf pondweed, and Eurasian watermilfoil in East and West Vadnais and Sucker Lakes, zebra mussels in Sucker and East and West Vadnais, and rusty crayfish in Sucker Lake.



Quick Stats



Project Spotlight

✓ Channel Restoration (2018)

The deteriorating Sucker Lake channel was reconstructed, along with new fishing platforms and native plantings.

➔ Funded by VLAWMO and the Clean Water Land & Legacy Amendment andRamsey County Parks

✓ East Vadnais Lake Subwatershed Resiliency Study (2024)

A resiliency study identified priority areas to focus work for adding water storage and reducing flood risk, protecting drinking water, and improving lake water quality.

➔ Funded by VLAWMO, the City of Vadnais Heights, Ramsey County, and SPRWS.

Sucker Channel

Sucker-Vadnais Subwatershed: Planned Projects and Capital Improvement Projects

Resiliency Project Technical Work – 307A / 407A

Determine project feasibility in BMP locations identified in 2024 Resiliency Study. Based on findings of the technical work, VLAWMO and partners will implement projects for flood mitigation, drinking water protection, and water quality improvement.

Trail Restoration Project – 307B / 407B

Complete technical work to investigate possible partnership BMPs/restoration between Vadnais Blvd and County Road E. Based on findings of the technical work, VLAWMO and partners will implement a restoration project for habitat restoration and improved water quality in East Vadnais Lake.

Park Restoration Technical Work – 307C

Identify partners and investigate potential projects for restoration work in Vadnais – Sucker Lake Regional Park which could improve native vegetation.

City Street Project Partnership – 307D

Determine feasibility, then based on findings, partner with the City of Vadnais Heights to implement city street projects such as rain gardens for stormwater management and groundwater conservation.

City Environment Initiatives – 307E

Determine feasibility, then based on findings, partner with the City of Vadnais Heights for sustainability and environmental project opportunities.

WMO Boundary work – 307F

Necessary technical work on boundary and potential inter-boundary partnerships.

Future Technical Work / Capital Improvement Projects – 307G / 407G

VLAWMO will technically and financially support technical work as opportunities arise in the Sucker-Vadnais Subwatershed. VLAWMO will technically and financially support the design and construction of CIPs identified in technical work or as opportunities arise.

4.5 Implementation Table

Table 4-5 contains the detailed implementation plan for VLAWMO from 2027-2036. Projects within each subwatershed align with those described in the subwatershed pages in Section 4.5. The costs in the table are high-level estimates for the portion of the estimated cost VLAWMO will be responsible for, adjusted annually for inflation. In many cases, estimated project costs are much higher and anticipate local partner funding and/or outside grant funding. All projects listed are partnership and/or grant dependent. These are a best estimate and may change or fluctuate leading up to or during project implementation.

Projects were identified in coordination and collaboration with municipalities and partner organizations with knowledge at the time of plan writing. Planned projects and funding may shift from what is listed based on changing resource conditions, funding availability, ability for partnership, or staff capacity. VLAWMO uses Table 4-5 for annual work planning. Projects with the greatest impact on water resources receive the highest priority for implementation. VLAWMO will also consider the following planning lenses during implementation efforts.

➔ Climate Resiliency

The Implementation Table includes technical work and capital projects that aim to build structural resilience to changing precipitation patterns and extreme storm events. The Table also includes communication and outreach events aimed at building community knowledge about the impacts of a changing climate, and grant programs to assist in voluntary landowner projects that also build resilience. During project prioritization efforts, VLAWMO will consider a project's impact in building climate resiliency.

➔ Environmental Justice

VLAWMO is intentional about considering areas of environmental justice to encourage meaningful involvement and increase engagement with underrepresented community groups. During project prioritization efforts, VLAWMO will consider a potential project's impact to underrepresented community groups as a factor to promote equity in implemented watershed projects.

Table 4-5 has numbers associated with each project. Core activities have the following numbers: Administration (100), VLAWMO Implementation Programs (200), Project Technical Work (300), and Capital Improvement Projects (400). Activities have a letter after the number that serve to order actions (i.e. there are 8 implementation programs, labeled 200A-H). Technical work and CIPs that go together have the same letter. Activities called out in each subwatershed are either the 300 or 400 level. The third digit identifies the subwatershed the activity belongs to (Table 4-4).

Table 4-4. Implementation labels

301/401	302/402	303/304	304/404	305/405	306/406	307/407
Birch Lake	Gem Lake	Gilfillan-Tamarack-Black-Wilkinson-Amelia	Goose Lake	Lambert Creek	Pleasant -Charley-Deep Lakes	Sucker and East & West Vadnais Lakes

Table 4-5. Implementation Table