

Reitz Lake TMDL Implementation Plan



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1.0 Introduction

Reitz Lake, a deep drainage lake located in the North Central Hardwood Forest (NCHF) ecoregion in the center of Carver County, Minnesota, was designated as an impaired water by the Minnesota Pollution Control Agency (MPCA) and the US Environmental Protection Agency (EPA) for total phosphorus concentrations the exceed State established standards. Carver County Land and Water Services (CCLWS) has completed a Total Maximum Daily Load (TMDL) to quantify the pollutant reductions needed to meet the water quality standards for total phosphorus in the lake in accordance with Section 303(d) of the Clean Water Act.

Table 1.1. Identification of Impaired Waterbody.

Lake	DNR Lake #	Affected Use	Pollutant or Stressor
Reitz Lake	10-0052	Aquatic recreation	Excess Nutrients

Reitz Lake is a deep, 90-acre lake located just east of the rapidly growing City of Waconia. The lake has a 15 acre shallow bay and the total lake area is 51 percent littoral. Reitz Lake has a direct watershed of 3,529 acres with no other lakes contributing to the water load of the lake. Although groundwater likely enters the lake, the majority of inflow is due to precipitation runoff from the surrounding watershed. Land use in the watershed is primarily tilled agriculture with rapidly increasing conversions to residential developments. The TMDL concluded that over the last ten years, in order for the lake to meet the identified State Standard of 40 µg/L total phosphorus, a 9-84 percent reduction in total phosphorus must be made depending on yearly precipitation.

It is of importance to note that the Reitz Lake watershed is one of three Best Management Practice (BMP) priority sub-watershed's currently being targeted in the Carver and Bevens (includes Silver) Creek Fecal Coliform TMDL Implementation Plan. Many of the fecal coliform reduction BMPs that are to be implemented in this watershed will also reduce total phosphorus. As such, any BMP listed here that has already been addressed by the Fecal Coliform TMDL will be credited as a phosphorus reduction leading towards the final total phosphorus goal. The following Implementation Plan details the specific activities the stakeholders in the watershed plan to undertake to attain the reductions noted below in order to meet the TMDL determined for the lake.

2.0 TMDL Summary

A key aspect of a TMDL is the development of an analytical link between loading sources and receiving water quality. To establish that link, historical in-lake water quality data was analyzed along with a stepped-up monitoring program which included in-lake water quality sampling, tributary and outlet monitoring in addition to fish population, shoreline and aquatic plant surveys. A detailed account of the monitoring procedures and results can be found in the Reitz Lake Excess Nutrients TMDL document. Figure 2.1 documents in-lake total phosphorus exceedances over the last ten years.

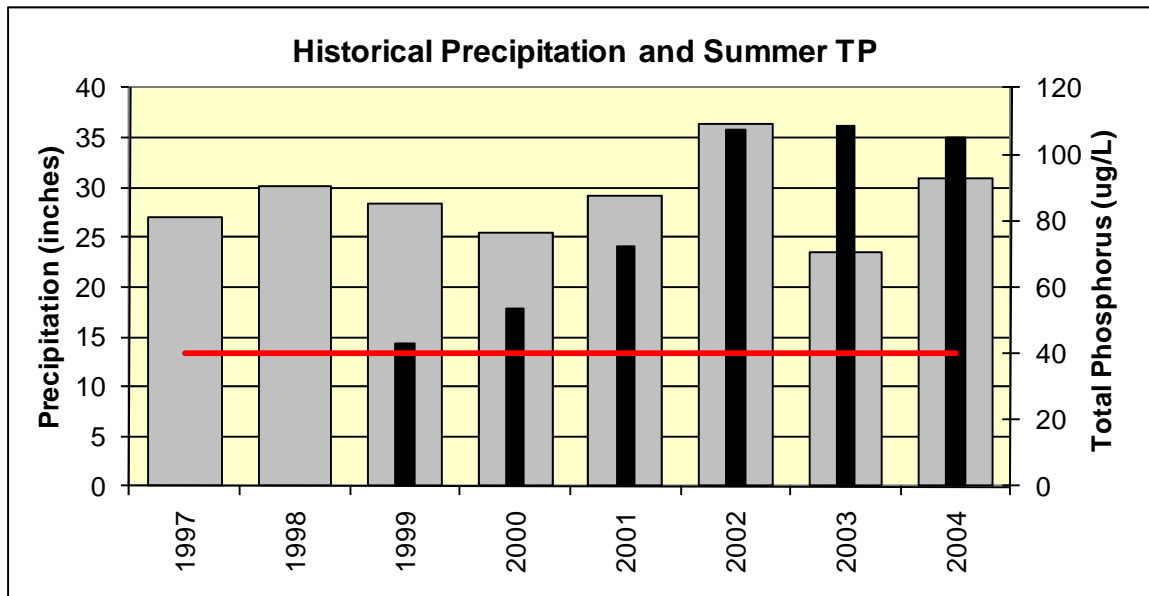


Figure 2.1. Summer growing season (June 1st- September 30th) Total Phosphorus levels (black bars) since 1999 paired with precipitation. The red line is the State Standard and goal for Reitz Lake. The lake was not monitored in 1997 or 1998.

Total phosphorus load violations have occurred since the onset of regular monitoring in 1999. However, the severity of the violation varies with yearly precipitation. Years of higher precipitation lead to an increase in runoff of phosphorus from the surrounding land; furthermore, increased water levels allow for carp recruitment from downstream wetlands which further increase phosphorus levels due to rooting for food in the shallow areas of the lake.

To better understand seasonal changes in water quality, a series of water quality modeling exercises were completed. This aided in translating target in-lake phosphorus concentration into allocations, loading responses and final goal reductions of phosphorus loading from the watershed and within the lake. The models used throughout the process included BATHTUB, Reckhow-Simpson spreadsheet and a Canfield-Bachman spreadsheet.

Critical conditions for the load and wasteload allocations were defined by setting the TMDL for the summer growing season where recreational use is the highest and, more importantly, is the season where problematic algal blooms occur. Loads in this TMDL are set for phosphorus since this is typically the limiting nutrient for nuisance aquatic plants.

The TMDL concluded that over the last ten years, in order for the lake to meet the identified State Standard of 40 µg/L total phosphorus, a 9-84 percent reduction in total phosphorus must be made depending on yearly precipitation. Because the lake has a large littoral area, is close to the border of the Western Corn Belt Plains (WCBP) ecoregion, and the total phosphorus must be reduced by a high percentage, an interim goal of 65 µg/L, WCBP deep lake standard will be used to measure our success. This interim goal is not part of the TMDL and will only be used as a milestone as part of the Reitz Lake Implementation Plan. Over the last ten years, the lake water quality has ranged from meeting the interim standard to needing a 50 percent reduction. The WCBP total phosphorus interim goal is set as a measurable milestone along the way to the NCHF final goal of 40 µg/L. After best management practices have been implemented in the watershed, success will be determined and adaptive management will be applied to work towards the final goal.

Loads were expressed both as annual and daily loads; however, an annual load better represents this TMDL because the growth of phytoplankton and aquatic plants respond to changes in the annual load and not the daily load. In addition, the assimilative capacity of the lake varies with changes in the water load and ultimately precipitation amounts. The TMDL was developed for an average precipitation conditions (Table 2.1).

Table 2.1 TMDL as set for critical conditions.

Load Units	TMDL	WLAs			LAs			MOS	RC
		City of Waconia	Laketown Township	Construction/Industrial	Atmospheric	Internal	non-MS4		
kg/yr	163.84	31.28	6.97	0.16	7.00	18.60	99.83	Implicit	0
kg/day	0.45	0.09	0.02	0.0004	0.02	0.05	0.27	Implicit	0

To develop the appropriate loads in the load and wasteload allocations, conservative estimations and assumptions were used. Atmospheric loading is assumed to remain constant regardless of precipitation quantities and because there are no BMPs to address phosphorus loads from precipitation. The internal load was estimated utilizing current internal loads, and the assumption that the internal load will decrease as external loads are reduced (Pers. Comm. Heiskary). In addition, the corresponding sediment phosphorus release (0.05 mg/m²/day average over the whole lake area) rate was compared to sediment release rates for mesotrophic and oligotrophic lakes, as determined by Gertrude Nurnburg (2002).

Waste Load Allocations (WLA) were developed for Municipal Separate Storm Sewer System (MS4) permitted cities and townships within the county. Currently, one city and one township are designated as MS4 within the boundaries of this TMDL: the City of Waconia (MS400232), and Laketown Township (MS400142). All MS4 WLAs were based upon 2020 land use and 2030 boundaries for those areas.

Derivation of the LAs for internal loading and non-MS4 area loading as well as WLAs for MS4 area loading were done as follows:

- 1) Using the total loading capacity (TMDL) as determined per Section 6.1.1. subtracted the following loads:
 - a. any WLAs for wastewater facilities and construction/industrial stormwater
 - b. atmospheric allocationThe resulting load is the combined allowable load for the watershed runoff and internal loading.
- 2) Determined future external loading to the lake from the watershed (if no reductions were to be done) using export coefficients as outlined in Table 5.3 multiplied by 2020 land use areas.
- 3) Estimated future internal loading to the lake (if no reductions were to be done) as the internal loading from benchmark BATHTUB modeling per Section 5.4.2.
- 4) Determined the ratio of combined allowable load calculated in step 1 to the sum of the overall future loading from step 2 plus internal loading from step 3.
- 5) Separated regulated MS4 community area loading out of the direct watershed loading. Regulated MS4 loading was determined using 2020 Land Use GIS shapefiles using only designated “developed” land use areas within defined 2030 municipal boundaries (i.e., those areas projected to contribute to a stormwater conveyance; specifically, single family, multi-family, commercial and public/industrial).
- 6) Multiplied the following loads by the calculated ratio in step 4:
 - a. non-MS4 area loading (from step 5)
 - b. MS4 area loading (from step 5)
 - c. internal loading (from step 3)

The resulting loads are the non-MS4 area LA, the MS4 area WLA and internal loading LA.

These allocations represent aggressive goals. Consequently, implementation will be conducted using adaptive management principals. It is difficult to predict the nutrient reduction that would occur from implemented strategies because we do not know the exact contribution of each pollutant source to the lake, and many of the strategies affect more than one source. Continued monitoring and “course corrections” responding to monitoring results are the most appropriate strategy for attaining the water quality goals established in this TMDL

3.0 Implementation Plan Development

The activities and BMPs identified in the implementation plan are the result of several stakeholder and permanent citizen advisory committee meetings led by Carver County Water Management staff.

Carver County Water Management staff reviewed the Reitz Implementation Plan with the Water, Environment, & Natural Resource Committee (WENR) on July 31st 2007 and January 27th, 2009. The committee was given the opportunity to give input on possible implementation scenarios between Carver County, the City of Waconia, and Laketown Township.

Comments/remarks received included:

- Maybe the County WMO should assume all of the TMDL implementation responsibility.
- Cost sharing should definitely be the implementation approach.
- How is it determined which BMP provides how much load reduction? (limited research available)
- Contribution of other lakes and adjacent wetlands is key
- Developers and landowners should be expected to contribute. City's plan for lake use should be factored in.
- Other considerations should be rough fish elimination, alum treatments, and city housekeeping (e.g. street sweeping).

Initial comments were taken into consideration and the Implementation Plan was amended as needed to incorporate those changes. At that point the draft was emailed to interested parties in the Lakeshed in February 2009 for another opportunity to review and comment on the plan. In addition to the WENR committee and local interested parties, the City of Waconia has played a role in the development of the Reitz Lake Implementation Plan. A draft of the plan was provided to the City and its consultant for review and comment in February of 2009.

The stakeholders agreed that implementation should be a joint effort, with CCWMO taking lead in ongoing coordination, identification of BMPs general education and identified monitoring activities. The City of Waconia will take responsibility for BMP implementation and monitoring (for areas of watersheds within the City boundaries) as required in their Stormwater Pollution Prevention Program (SWPPP) and MS4 permits.

4.0 Recommended Phosphorus Management Strategies

Based on the Reitz Lake TMDL, it will be necessary to address the internal and external loading when considering how to manage Reitz Lake. As previously stated, to meet the goals of the TMDL a 9-84 percent reduction in the phosphorus load to the lake is needed. With the appropriate level of staffing, funding, BMPs and management options, this is a feasible effort. A combination of all these factors is estimated to reduce the phosphorus loading to the lake by approximately 76 percent.

It should be noted that as part of another Carver, Bevens, and Silver Creek TMDL, the CCWMO is currently implementing a fecal coliform reduction plan that focuses on minimizing runoff and thus reducing fecal coliform (or E. coli) bacteria numbers. A number of the BMPs targeted and implemented in this plan will also aid in the reduction of phosphorus to the lakes within Carver, Bevens and Silver Creek watersheds. With that said, the two main contributors of indicator bacteria are feedlot sources as well as Subsurface Sewage Treatment Systems (SSTS). Failing SSTS are not mentioned in this plan because we feel they are adequately addressed in the Carver, Bevens, and Silver Creek TMDL Implementation Plan.

Although the CCWMO will be the lead on the implementation of the Reitz Lake Excess Nutrient TMDL, in some instances individual stakeholders (i.e. City of Waconia) will be ultimately responsible for implementing the identified BMPs. These activities will be included in the National Pollutant Discharge Elimination System (NPDES) Phase II Permits that the stakeholders hold (both CCWMO and City of Waconia), and activities will be reported annually.

CCWMO realizes that each of the following tasks relate to corresponding reduction strategies and that the tasks must be completed based on acceptance, staff and funding availability. Hence, this implementation plan's activities will commence upon the availability of funding. To accomplish this, the tentative timelines (listed as follows) were set for each task to correspond with the project goals. The timelines are defined as: Short Term, 0-5 years from the inception of the plan; Medium Term, 5-12 years from the inception of the plan; and Long Term, greater than 12 years or on-going from the inception of the plan.

External Load

Direct runoff from the Reitz Lake watershed will decrease the quality of water in the Lake. Thus, areas of main implementation focus will include the Reitz Lake watershed and direct inflow.

Internal Load

Internal sources of phosphorus have an impact on water quality in Reitz Lake and will undoubtedly need to be addressed in this TMDL, knowing that we must first manage external sources of phosphorus. Attacking and controlling external factors first will give

us a better opportunity to achieve the goals in the implementation plan and corresponding TMDL. When we are confident that external sources are controlled, internal sources will be attacked and managed adaptively to bring us to the final goal of the TMDL.

4.1 External Loading Reduction Strategies

External loading reduction strategies include a variety of agricultural and urban BMPs. Examples of agricultural BMPs are reduced tillage, buffer strips, nutrient management, manure management, grassed waterways, contour farming, and terraces. Urban BMP examples include stormwater detention basins, street sweeping, rain gardens, shoreline restorations, and enhanced infiltration (e.g., core aeration of grassy areas).

Buffer strips along ditches, streams, wetlands and lakes can reduce nutrient runoff from agricultural cropland. Areas of high erosion potential or wetland restoration identified in the Reitz Lake subwatershed will be targeted for these practices.

Areas with the greatest potential to pollute surface water will be targeted for BMP establishment first. In non-MS4 areas, BMP establishment will be on a voluntary basis. State and federal grant monies will be solicited by the CCWMO to cost share BMP establishment and incentives if needed.

Our interim goal of the external reduction strategies is to reduce phosphorus in each of the Reitz Lake subwatersheds by an aggregate total of 46 percent of the total external load and have an in-lake phosphorus level of 65 ug/L. The final goal of the external reduction strategies to reduce phosphorus in the contributing watersheds by roughly 72 percent or 359 kg/yr allowing us to achieve an in-lake phosphorus level of 40 ug/L.

Target Watersheds: Reitz Lake Subwatersheds

Timeline: Long Term

Estimated total cost of all tasks: \$746,000

4.1.1 Agricultural Cropland Runoff control and storage BMPs

Task 1. Identify and prioritize key erosion/restoration areas within the Reitz Lake watersheds. Identification will be based on monitoring results, Geographical Information Systems data for vulnerable or erosion-prone soils, and/or visual inspections of field conditions.

- 1) Responsible Parties: CCWMO, Carver Soil and Water Conservation District (SWCD), Natural Resources Conservation Service (NRCS)
- 2) Timeline: Short Term
- 3) Estimated Cost: \$2,500

Task 2. Identify and educate landowners through meetings, brochures, Carver County quarterly newspaper (The Citizen), Carver County Website, and various workshops.

- 1) Responsible Parties: CCWMO, Carver SWCD
- 2) Timeline: Long Term
- 3) Estimated Cost: \$5,000

Task 3. Design and implement cropland BMPs to reduce phosphorus inputs to Reitz Lake. BMPs will be targeted on lands identified as significant contributors of phosphorus and sediment. Agricultural BMPs will be designed and implemented to reduce sediment and nutrients into Reitz Lake. Examples could be, but are not limited to, nutrient management, crop residue management, and other practices utilized by the Carver SWCD and NRCS and identified in the NRCS field handbook available electronically at www.nrcs.usda.gov/technical/efotg/.

- 1) Responsible Parties: CCWMO, Carver SWCD, NRCS
- 2) Timeline: Long Term
- 3) Estimated Cost: \$150,000

Task 4. Design and implement practices that will reduce sediment and nutrients into Reitz Lake by installing buffer strips, wetland restorations, alternate rock inlets or other water retention devices or practices identified by qualified staff.

- 1) Responsible Parties: CCWMO, Carver SWCD, NRCS
- 2) Timeline: Long Term
- 3) Estimated Cost: \$150,000

4.1.2 Animal Manure/Feedlot Management

Animal manure management and to a lesser extent feedlot run-off will be examined and appropriate measures will be taken to ensure that these activities do not result in a phosphorus load entering Reitz Lake. Many of the practices are also outlined in the NRCS field handbook and will be utilized again to control any problem areas that are encountered or previously identified in our modeling.

Task 1. Identify potential areas and contact landowners to inform them of funding and projects that they can initiate to benefit Reitz Lake and their properties.

- 1) Responsible Parties: CCWMO, Carver SWCD
- 2) Timeline: Long Term
- 3) Estimated Cost: \$1,500

Task 2. Identify and educate landowners through meetings, brochures, Carver County quarterly newspaper (The Citizen), Carver County Website, and various workshops.

- 1) Responsible Parties: CCLWS/CCWMO, Carver SWCD
- 2) Timeline: Long Term
- 3) Estimated Cost: \$5,000

Task 3. Work directly with the landowners that have feedlots or land application of manure on their properties. For active feedlots the MINNFARM computer software will be used to identify potential pollution problems. Current NRCS technical practices and standards will be used for feedlot pollution abatement and manure application.

- 1) Responsible Parties: CCLWS/CCWMO, Carver SWCD
- 2) Timeline: Long Term
- 3) Estimated Cost: \$40,000

4.1.3 Urban/Development Runoff

It was agreed upon that improved management of urban runoff, particularly from lakeshore properties and those properties within the Reitz Lake direct watershed, would reduce phosphorus loading to the Lake. Urban/developed phosphorus runoff management will include, but is not limited to, the following components; installation of rain gardens, street sweeping, removal of leaf litter from streets, installation of shoreline buffers, stabilization of eroding lakeshore infiltration/detention ponds, erosion and sediment control and utilizing low impact development techniques.

Urban development brings about an increase in impervious surface due to new roads, rooftops, parking lots, channelization and piping. These surfaces do not let rain water soak into the ground so massive amounts of water run into storm sewers which empty into nearby water bodies or streams. In addition, monitoring and modeling has indicated that urban pollutant loads are directly related to watershed imperviousness. The CCWMO requires filtration/bio-retention treatment for new development and promotes and encourages reduction in runoff and increased infiltration in re-development and retrofits. The CCWMO addresses the uses of components such as infiltration ponds, silt fencing and minimization of new impervious surfaces in the County Water Management Plan and Rules. The CCWMO will continue to take the lead on ensuring preventative measures are installed during construction as well as retrofits and will evaluate increased standards in the update of its Plan and Rules.

Task 1. Utilize Carver County's GIS to identify potential project areas and "hotspots" within the Reitz Lake sub-watersheds (i.e. areas without current stormwater management). Then research and identify what practices outlined above or from the Minnesota Stormwater BMP Manual should be considered.

- 1) Responsible Parties: CCWMO, Carver SWCD, City of Waconia
- 2) Timeline: Long Term
- 3) Estimated Cost: \$10,000

Task 2. Identify and educate landowners through meetings, brochures, Carver County Website, and various workshops.

- 1) Responsible Parties: CCWMO, Carver SWCD, City of Waconia
- 2) Timeline: Long Term
- 3) Estimated Cost: \$5,000

Task 3. Design and implement urban BMPs to reduce phosphorus inputs to Reitz Lake based on interest of targeted landowners and available monies. BMPs including but not limited to rain gardens, shoreline restorations and urban BMPs will be designed and implemented to reduce phosphorus inflows into Reitz Lake.

- 1) Responsible Parties: CCLWS/CCWMO, Carver SWCD, City of Waconia
- 2) Timeline: Long Term
- 3) Estimated Cost: \$250,000

Task 4. Identify current and future street sweeping schedules that the City of Waconia has in place and, if necessary, conduct a load analysis to determine optimum level of sweeping necessary. If necessary, work with the city to implement a continual spring and fall schedule for sweeping within the sub-watersheds. The City has identified this BMP in both the Local Water Management Plan and the SWPPP.

- 1) Responsible Parties: CCLWCCWMO, Carver SWCD, City of Waconia
- 2) Timeline: Medium Term
- 3) Estimated Costs: \$2,000

Task 5. Identify current and future stormwater pond clean out schedules within the subwatersheds to ensure proper operation and maintenance schedules are in place. A maintenance plan is included in the City's Local Water Management Plan. If necessary, work with the City to develop and implement a schedule that will more adequately treat the run-off leaving these areas. In addition, we could also identify and retrofit any current stormwater ponds within the sub-watersheds that could be updated with current standards.

- 1) Responsible Parties: CCWMO, Carver SWCD, City of Waconia
- 2) Timeline: Medium Term
- 3) Estimated Costs: \$50,000

Task 6. All currently undeveloped land within the Reitz Lake Watershed will be required to meet current and any amended stormwater standards including volume reduction and runoff treatment. Review and updates of both the CCWMO plan and ordinances will include the pollutant reduction methods needed for the Reitz TMDL. The City plan and SWPPP will need to be updated to meet any revised CCWMO plans and ordinances. Additional low impact development (LID) practices will be encouraged during the site design and review process. Incentives will be considered in order to promote these practices.

- 1) Responsible Parties: CCWMO, Carver SWCD, City of Waconia
- 2) Timeline: Long Term
- 3) Estimated Costs: \$25,000

Task 7. Ongoing monitoring of Reitz Lake and tributaries as outlined in section 5.5.

- 1) Responsible Parties: CCWMO
- 2) Timeline: Long Term
- 3) Estimated Costs: \$50,000

4.2 Internal Loading Reduction Strategies

Based on monitoring and modeling results and meetings all parties involved have determined that controlling and reducing internal loading of phosphorus may play a role in meeting the determined reductions. Internal phosphorus loading could be reduced by the implementation of the following methods: fish barriers, rough fish control, removal of invasive aquatic plants and establishment of native vegetation, motorized boat wake restrictions, and alum dosing. Furthermore, reductions to the external load will aid in diluting and flushing out of the nutrient rich sediments in Reitz Lake and will minimize future internal loading.

The CCWMO will partner with the Minnesota Department of Natural Resources (MDNR) to determine possible fish barrier sites and feasibility. Possible barrier sites include the lake's two inlets and the outlet. The purpose would be to prevent carp from utilizing surrounding wetland areas as breeding grounds. In addition to the barriers, the CCWMO will coordinate with the MDNR and University of Minnesota to determine if rough fish removal is necessary.

Native aquatic plants would promote improved water quality by minimizing re-circulation of bottom sediments, competing with algae for nutrients, and providing habitat for zooplankton (which eat algae). Currently Reitz Lake is overpopulated by invasive species including Eurasian Watermilfoil and Curlyleaf Pondweed; there are many instances where lakeshore residents clear aquatic vegetation by various means. CCWMO and Carver SWCD will pursue a partnership with the MDNR to reduce the

invasive species currently present and establish a healthy native aquatic plant population in areas of the lake less than 15 feet in depth.

Motorized boat traffic wake restrictions could aid in the reduction of in-lake nutrient re-circulation, especially in the western shallow bay of Reitz Lake. The mixing is a result of wind mixing, rough fish rooting and boat motors in areas less than 10 feet in depth. Homeowners have identified that lake use by motor boats can be moderate on the weekends and restricting speed near the shoreline may yield a reduction in sediment/nutrient re-suspension in shallow areas of the lake. Wake restrictions would also reduce the erosion impacts the waves have on shoreline and should be looked at more closely.

Aluminum sulfate (Alum) is a chemical addition that forms a non-toxic precipitate with phosphorus. The alum binds with water column phosphorus and precipitates to become part of the lake sediments, making that phosphorus unavailable for algal growth. Alum also forms a barrier between lake sediments and the water to restrict phosphorus release from the sediments. The CCWMO will inquire if alum or any other internal manipulation is a viable option and if so will establish the treatment area and dosing rates.

Another important issue that has been discussed in detail throughout this project is the fact that there is currently a two inch sewer line that lies on the lake bottom and carries effluent from one pumping station to another pumping station approximately 3000 feet on the opposite side of the lake. This line was installed as part of an Army Corp of Engineers project in 1985. Laketown Township is currently responsible for the system (referred to as the 201 system) and its maintenance. Through discussions with lakeshore owners and township staff the age of the line is in question and there is fear that the line breaking or being compromised would pose a great risk to the water quality of the lake. It would behoove all parties to look at all available options to remove this from the lake.

The interim goal of the internal reduction strategy is to reduce the internal phosphorus load in Reitz Lake to 36 kg/year by the midpoint of the project (date depends on start date). It is the final goal of the internal reduction strategies to reduce the internal phosphorus load in Reitz Lake to 19 kg/year.

Target Locations: Reitz Lake Sub-watershed's

Timeline: Long Term

Estimated total cost of all tasks: \$582,500

4.2.1 In-Lake Strategies

Task 1. Identify fish barrier sites and the possibility of rough fish removal success. If fish removal is deemed beneficial, begin a program to adequately address the goal of the TMDL.

- 1) Responsible Parties CCWMO, MDNR
- 2) Timeline: Short Term
- 3) Estimated Cost: \$30,000

Task 2. Chemical or mechanical removal of invasive aquatic plant species and replacement with diverse native aquatic plant species.

- 1) Responsible Parties CCWMO, Carver SWCD, MDNR
- 2) Timeline: Long Term
- 3) Estimated Cost: \$75,000

Task 3. Determine if designation of near shore wake-restricted zones is necessary and determine appropriate actions and steps for implementation, including signage and education.

- 1) Responsible Parties CCWMO
- 2) Timeline: Short Term
- 3) Estimated Cost: \$2,500

Task 4. Determine if alum treatment(s) to Reitz Lake to reduce internal phosphorus loading is feasible and viable. If so, then implement an alum treatment. Also, consider and schedule long-term treatment options as suggested by state agencies and/or consultants.

- 1) Responsible Parties CCWMO, MDNR
- 2) Timeline: Long Term
- 3) Estimated Cost: \$175,000

Task 5. Determine the feasibility of drawing down the lake or other viable mechanical options (aeration, barely straw, dredging, etc) to reduce phosphorus loading. Implement if feasible and funding is available.

- 1) Responsible Parties CCWMO, MDNR
- 2) Timeline: Long Term
- 3) Estimated Cost: \$50,000

Task 6. Remove and reroute the 201 system's effluent sewer line from the lake.

1) Responsible Parties	CCWMO, MDNR, City of Waconia, Met Council
2) Timeline:	Long Term
3) Estimated Cost:	\$250,000

4.3 Project Timeline and Measurable Milestones

4.3.1 Timeline

The first priority of the implementation plan will be to address each of the short term goals identified in the external and internal reduction strategies, followed by medium and long term goals. Many of the tasks involved in implementing these goals will overlap and complement one another while others may not need to be completed after initial assessment or pertinent information is made available. Each task will ultimately be completed as resources and opportunities present themselves, which could allow some long and medium term tasks to be completed sooner rather than later.

4.3.2 Measurable Milestones

As noted above, our measureable milestone will be ultimately bringing Reitz Lake into compliance with state water quality standards by 2030. Along the way, our first milestone will be measured in-lake phosphorus concentrations at 65 ug/L by the year 2020 and a long term positive trend indicating that the changes being made are working.

As we progress through implementation if it appears that our completed tasks are not providing enough treatment to reach our interim and final goals we would utilize Bathtub (as outlined in the Reitz Lake TMDL) with up to date data and land use information to identify new hot spots and problem areas that may not have been previously addressed. If discrepancies are identified, the implementation plan will be updated.

5.0 Reasonable Assurance

5.1 Introduction

When establishing a TMDL, reasonable assurances must be provided demonstrating the ability to reach and maintain water quality endpoints. Several factors control reasonable assurances, including a thorough knowledge of the ability to implement BMPs, as well as the overall effectiveness of the BMPs. Carver County is positioned to implement the TMDL and ultimately achieve water quality standards.

5.2 Carver County

The Carver County Board of Commissioners (County Board), acting as the Water Management Authority for the former Bevens Creek (includes Silver Creek), Carver Creek, West Chaska Creek, East Chaska Creek, and South Fork Crow River watershed management organization areas, has established the “Carver County Water Resource Management Organization” (CCWMO). The purpose of establishing the CCWMO is to fulfill the County’s water management responsibilities under Minnesota Statute and Rule. The County chose this structure because it will provide a framework for water resource management as follows:

- Provides a sufficient economic base to operate a viable program.
- Avoids duplication of effort by government agencies.
- Avoids creation of a new bureaucracy by integrating water management into existing County departments and related agencies.
- Establishes a framework for cooperation and coordination of water management efforts among all of the affected governments, agencies, and other interested parties.
- Establishes consistent water resource management goals and standards for at least 80% of the county.

The County Board is the “governing body” of the CCWMO for surface water management and the entire county for groundwater management. In function and responsibility the County Board is essentially equivalent to a joint powers board or a watershed district board of managers. The Reitz Lake watershed is part of the CCWMO.

In order to fulfill legislative requirements for surface and groundwater, Carver County developed a Water Management Plan that was adopted in 2001. The goal of the Plan is to protect, preserve and manage the county’s surface and groundwater systems in the midst of rapid growth and intensive agricultural activity. The plan presents sustainable and equitable methods to reach that goal by providing guidance and specific standards for decision-makers, residents, landowners, educators, and implementing staff at the local level. Within the Water Management Plan, there are twelve priority areas the county has identified needing immediate and continued action. These include: SSTS,

feedlots, construction site erosion and sediment control, stormwater management, land use practices for urban and rural areas, water quality assessment, wetland management, groundwater, natural resource management, education, TMDL's, and solid waste.

Multiple county departments help implement the CCMWO plan. The Carver County Board of Commissioners is the governing board. The WENR committee acts as the citizen advisory board and the Planning & Water Management department is responsible for administration, implementation and coordination. Implementation is also the responsibility of Environmental Services, University of Minnesota Extension, and the Carver SWCD.

The County is uniquely qualified through its zoning and land use powers to implement corrective actions to achieve TMDL goals. The County has stable funding for water management each year, but will likely need assistance for full TMDL implementation in a reasonable time frame, and will continue its baseline-monitoring program. Carver County has established a stable source of funding through a watershed levy in the CCWMO taxing district (adopted 2001). This levy allows for consistent funding for staff, monitoring, and engineering costs, as well as on the ground projects. The County has also been very successful in obtaining grant funding from local, state and federal sources due to its organizational structure.

Carver County recognizes the importance of the natural resources within its boundaries, and seeks to manage those resources to attain the following goals:

1. Protect, preserve, and manage natural surface and groundwater storage and retention systems.
2. Effectively and efficiently manage public capital expenditures needed to correct flooding and water quality problems.
3. Identify and plan for means to effectively protect and improve surface and groundwater quality.
4. Establish more uniform local policies and official controls for surface and groundwater management.
5. Prevent erosion of soil into surface water systems.
6. Promote groundwater recharge.
7. Protect and enhance fish and wildlife habitat and water recreational facilities.
8. Secure the other benefits associated with the proper management of surface and ground water.

Water management involves the following County agencies: Carver County Land and Water Services Division; Carver County Extension; and the Carver SWCD. The County Land and Water Services Division is responsible for administration of the water plan and coordinating implementation. Other departments and agencies will be called upon to

perform water management duties that fall within their area of responsibility. These responsibilities may change as the need arises. The key entities meet regularly as part of the Joint Agency Meeting (JAM) process to coordinate priorities, activities, and funding.

5.3 Regulatory Approach

5.3.1 Watershed Rules

Water Management Rules establish standards and specifications for the common elements relating to watershed resource management including: water quantity; water quality; natural resource protection; erosion and sediment control; wetland protection; shoreland management; and floodplain management. Of particular benefit to nutrient TMDL reduction strategies are the stormwater management and infiltration standards which are required of new development in the CCWMO. The complete water management rules are contained in the Carver County Code, Section 153. The Rules will be evaluated, updated and enforced along with the watershed plan to address TMDL's where needed.

5.3.2 NPDES Permits

The MPCA issues NPDES permits for point source discharges into waters of the state. These permits have both general and specific limits on pollutants that are based on water quality standards. Permits regulate discharges with the goals of protecting public health and aquatic life, and assuring that every facility treats wastewater. More information about permits, water quality data, and other MPCA programs can be found on the agency's Web site: <http://www.pca.state.mn.us/water>.

MS4s that have been designated by the MPCA for permit coverage under Minn. R. ch. 7090 are required to obtain a NPDES/SDS stormwater permit. The stormwater program for MS4s is designed to reduce the amount of sediment and pollution that enters surface and ground water from storm sewer systems to the maximum extent practicable. As part of the permit, the city of Waconia will be required to develop and implement a SWPPP to reduce the discharge of pollutants from their storm sewer system. The SWPPP's are required to cover six "minimum control measures" to ensure adequate stormwater management and pollution prevention. Measures include:

- 1) Public education and outreach.
- 2) Public participation/involvement.
- 3) Illicit discharge, detection and elimination.
- 4) Construction site runoff control.
- 5) Post-construction site runoff control, and
- 6) Pollution prevention/good housekeeping.

For more information visit the MPCA Web site:

<http://www.pca.state.mn.us/water/stormwater/stormwater-ms4.html>.

5.4 Non-Regulatory Approaches

5.4.1 Education

The implementation of this Plan relies on three overall categories of activities: Regulation, Incentives, and Education. For most issues, all three means must be part of an implementation program.

The County has taken the approach that regulation is only a supplement to a strong education and incentive based program to create an environment of low risk. Understanding the risk through education can go a long way in preventing problems. In addition, education, in many cases, can be a simpler, less costly and more community-friendly way of achieving goals and policies. Education efforts can provide the framework for more of a “grass roots” community plan implementation, while regulation and incentives traditionally follow a more “top-down” approach. It is recognized, however, that education by itself will not always meet intended goals, has certain limitations, and is characteristically more of a long-term approach. To this end, Carver County created the Environmental Education Coordinator position in 2000. This position has principal responsibility for development and implementation of the water education work plan.

Several issues associated with the water plan were identified as having a higher priority for educational efforts. These were identified through discussions with the advisory committees, based on ease of immediate implementation and knowledge of current problem areas and existing programs. The higher priority objectives are not organized in any particular order. The approach to implement the Reitz Lake TMDL will mimic the education strategy of the water plan. Each source reduction strategy will need an educational component, and will be prioritized based on the number of landowners, type of source, and coordination with existing programs.

5.4.2 Incentives

Many of the existing programs on which the water management plan relies are incentive-based programs offered through the County and the Carver SWCD. Some examples include: state and federal cost share funds directed at conservation tillage, crop nutrient management, rock inlets, conservation buffers, and low interest loan programs for SSTS upgrades. Reducing nutrient sources will need to rely on a similar strategy of incorporating incentives into implementing practices on the ground. After the approval of the TMDL by the EPA and the County enters the implementation phase, it is anticipated that we will apply for monies to assist landowners in the application of BMPs identified in the Implementation Plan.

5.5 Effectiveness Monitoring

Regular bi-weekly in lake monitoring of Reitz Lake from April-October of each year will continue as identified in the Water Plan. In-lake monitoring includes collection of water

column profiles (temperature, dissolved oxygen) and discrete water sample collection from the surface including phosphorus, secchi dish depths, total nitrogen, and chlorophyll-a. However, after implementation of nutrient reduction strategies a stepped-up approach of monitoring will be conducted including integrated depth sampling as well as in-let and outlet sampling. Adaptive management relies on the County conducting additional monitoring as BMPs are implemented in order to determine if the implementation measures are effective and how effective they are.

Additional areas that may be monitored include; hypolimnetic sampling to aid in determining internal load reductions; sampling at the two lake inlets, particularly during the spring when flow occurs; additional sampling in the shallow bay of Reitz Lake; and land use change monitoring. Inflow monitoring will be initiated during and after implementation of the TMDL to quantify external load reductions, as will hypolimnetic sampling. An automated stream sampler has been established at the primary outflow where continuous flow data will be collected and composite samples collected during rainfall runoff events. Samples will be analyzed for total phosphorus, total nitrogen and total suspended solids. The flow and water quality data will be used to estimate phosphorus loading to the lake to confirm the TMDL reductions.

Furthermore, assessment of the stormwater discharge may be monitored to better grasp the nutrient loads caused by runoff from surrounding land. This monitoring will assist in evaluating the success of projects and identify changes needed in management strategies. Revision of management and monitoring strategies will occur as needed.

6.0 Adaptive Management

The phosphorus allocations represented in this TMDL represent aggressive goals; consequently, implementation will be conducted using adaptive management principles. Adaptive management is appropriate because it is difficult to predict the phosphorus reduction that will occur from implementing strategies with the scarcity of information available to demonstrate expected reductions. Limited reduction research is available for BMPs at this time, but this is expected to change in the next several years as state agencies and local experience provide more accurate reduction data. The County has and will continue to look at viable tools that will help to predict and measure the actual reductions that installation of a particular BMP may have.

Future technological advances may alter the specific course of actions detailed here. Continued targeted monitoring based on a project work plan and “course corrections” responding to monitoring results are the most appropriate strategy for attaining the water quality goals established in this TMDL.

