Lake Winona
Phosphorus Reduction Project
(Total Maximum Daily Load) Report

Minnesota Pollution Control Agency

July 2021

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Document Number: wq-iw8-32e

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Abbreviations

ac	acres
ALASD	Alexandria Lake Area Sanitary District
BMP	Best Management Practice
BWSR	Board of Water and Soil Resources
chl-*a*	chlorophyll-a
DNR	Minnesota Department of Natural Resources
EPA	United States Environmental Protection Agency
FQI	Floristic Quality Index
HUC	Hydrologic Unit Code
Kg	kilogram
Kg/yr	kilogram per year
LA	Load Allocation
m	meter
mgd	million gallons per day
mg/L	milligrams per liter
mL	milliliter
MnDOT	Minnesota Department of Transportation
MOS	Margin of Safety
MPCA	Minnesota Pollution Control Agency
MS4	Municipal Separate Storm Sewer Systems
NCHF	North Central Hardwood Forest
NPDES	National Pollutant Discharge Elimination System
POTW	Publicly Owned Treatment Works
SSS	Site Specific Standard
SWPPP	Storm Water Pollution Prevention Plan
TAC	Technical Advisory Committee
TMDL	Total Maximum Daily Load
TP	Total phosphorus
TSS	Total Suspended Solids
WinSLAMM	Windows version of the Source Loading and Management Model
WLA	Waste Load Allocation
WRAPS	Watershed Restoration and Protection Strategies
WWTP	Wastewater Treatment Plant
1W1P	One Watershed One Plan

Executive Summary

The Clean Water Act (1972) requires that each State address any waterbody that is deemed impaired according to state regulations. A Total Maximum Daily Load (TMDL) Study is thus required by the U.S. Environmental Protection Agency (EPA) as a result of the federal Clean Water Act. A TMDL identifies the pollutant that is causing the impairment, how much of that pollutant can enter the waterbody and still allow it to meet water quality standards, and apportions load reductions to the various sources of the pollutant.

This TMDL study is for Lake Winona, which is located in the Long Prairie River Watershed (Hydrologic Unit Code [HUC] 07010108), in central Minnesota. Lake Winona was listed in 2002 on the EPA 303(d) list of impaired waters due to elevated phosphorus levels.

Information from multiple sources was used to evaluate the ecological health of the lake:

- All available water quality data over the past 10 years;
- Sediment phosphorus concentrations;
- Fisheries surveys;
- Plant surveys;
- Watershed and in-lake water quality response models; and
- Stakeholder input

The following pollutant sources were evaluated: watershed runoff, atmospheric deposition, lake internal loading, and point sources. An inventory of pollutant sources was used to develop a lake response model for the impaired lake. This model was then used to determine the pollutant reductions needed for the impaired lake to meet water quality standards.

The findings from this TMDL study will be used to aid the selection of implementation activities as part of current Long Prairie River Watershed One Watershed One Plan (1W1P) efforts. A Watershed Restoration and Protection Strategy (WRAPS) report is already complete for the watershed, and may be updated in the future. The purpose of the WRAPS report is to support local working groups in jointly developing scientifically-supported restoration and protection strategies to be used for subsequent implementation planning. The WRAPS report is available on the MPCA Long Prairie River Watershed website:

http://www.pca.state.mn.us/index.php/water/water-types-and-programs/watersheds/long-prairie-river.html

1. Project Overview

1.1 Purpose

This TMDL study addresses aquatic recreation use impairments due to eutrophication/excess nutrients (phosphorus) in Lake Winona in the Long Prairie River Watershed (HUC 07010108) in central Minnesota (Table 1). The goal of this TMDL is to provide wasteload allocations (WLAs) and load allocations (LAs), and to quantify the pollutant reductions needed to meet the state water quality standards. This TMDL is being established in accordance with Section 303(d) of the Clean Water Act, because the State of Minnesota has determined that Lake Winona exceeds the established state standards.

Considerable effort has been expended to characterize Lake Winona and to identify means for improving the water quality of the lake. Important contributions to this body of work include the Clean Lakes Project, which culminated in the 1994 diagnostic study and implementation plan for Lake Winona (WSN 1994), the ongoing water quality sampling by Alexandria Lakes Area Sanitary District (ALASD), the Minnesota Pollution Control Agency (MPCA) sponsored water quality reviews and data collection program associated with the Lake Winona TMDL project (Earth Tech, June 2008; AECOM, October 2009), and the MPCA TMDL program sponsored water quality modeling of the hydrologic and nutrient budgets of Lake Winona (AECOM, November 2009).

1.2 Identification of Waterbody

Lake Winona (Table 1, Figure 1), located in the North Central Hardwoods Forests (NCHF) Ecoregion, was listed in 2002 as an impaired waterbody because it exceeded the numeric translators used to interpret the narrative standard that refers to “excess algae.” Nutrients continue to exist at high concentrations in the lake.

Table 1. TMDL listing information

DNR ID#:	21-0081-00
Pollutant or Stressor:	Nutrients/eutrophication
Impairment:	Aquatic recreation
Year First Listed:	2002
Target completion:	2025
CALM Category:	5

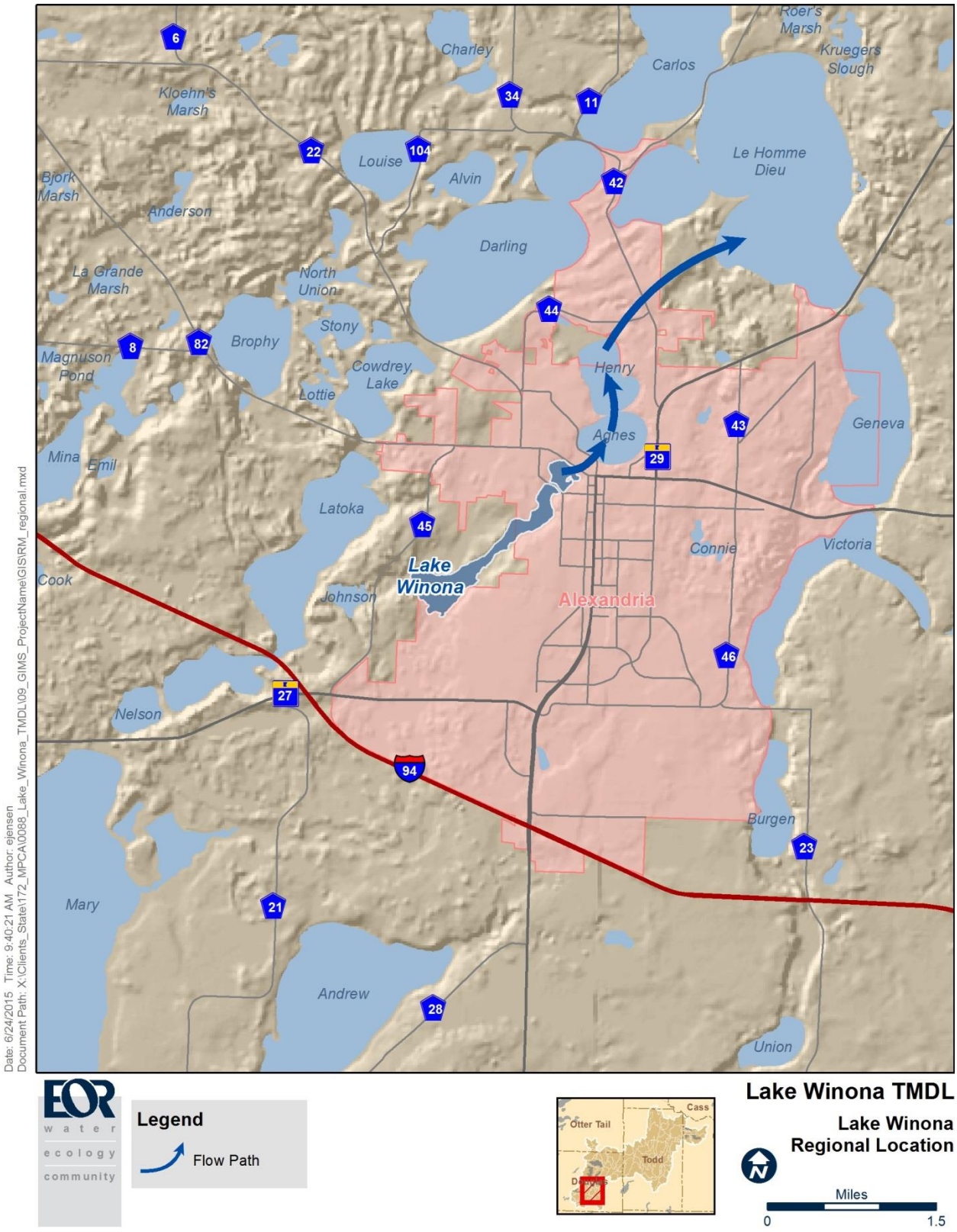

Figure 1. Lake Winona regional setting

1.3 Priority Ranking

The MPCA's schedule for TMDL completions, as indicated on the CWA Section 303(d) impaired waters list, reflects Minnesota's priority ranking of this TMDL. The MPCA has aligned TMDL priorities with the watershed approach and WRAPS cycle. The schedule for TMDL completion generally corresponds to the WRAPS report completion following on the initial 10-year monitoring cycle. The MPCA developed a state plan Minnesota's TMDL Priority Framework Report to meet the needs of EPA's national measure (WQ-27) under EPA's Long-Term Vision for Assessment, Restoration and Protection under the CWA Section 303(d) Program. As part of these efforts, the MPCA identified water quality impaired segments, which will be addressed by TMDLs. The waters addressed by this TMDL are part of that MPCA prioritization plan to meet the EPA's national measure.

1.4 Description of the Impairment and Stressors

Total phosphorus (TP) has been identified as the nutrient that management practices will focus on for this TMDL. As phosphorus concentrations increase in a lake, so will primary production of chlorophyll-a (chl-*a*; algae). If phosphorus concentrations increase enough, shallow lakes can change from being macrophyte-dominated to algae-dominated. Both an increase in chl-*a* concentration, and a switch to an algae-dominated lake will reduce the transparency of a lake, as measured by Secchi depth. Lake Winona currently resides in an algae-dominated stable state. In this relationship between lake nutrients and productivity, phosphorus is often referred to as a causal factor, with chl-*a* and Secchi depth being referred to as the response factors indicating the ecological change in the lake. For the restoration of Lake Winona through the actions recommended by this TMDL, phosphorus loads (including both external and internal sources) will be reduced such that the response variables chl-*a* and Secchi depth meet the nutrient standards for the lake.

2. Applicable Water Quality Standards and Numeric Water Quality Targets

Numeric lake eutrophication standards were adopted by the State of Minnesota in 2007 (Minn. R 7050.0220.3) and approved by the EPA in 2008. These numeric standards have since become the basis for listing and de-listing eutrophication-impaired lakes. Minnesota state rules allow for site-specific standards (SSS, Minn. R. 7050.0220, subp. 7). A SSS was adopted for Lake Winona in 2014, which will serve as a basis for its listing and delisting. The water quality of Lake Winona does not meet the 2008 eutrophication standards or the 2014 SSS for either TP (the causal variable) or for chl-*a* and Secchi depth (the response variables). The current eutrophication standards applicable to Lake Winona are provided in Table 2. Minn. R. ch. 7050.0222, subp. 4a states eutrophication standards are compared to data averaged over the summer season (June through September). Exceedance of the TP standard and either the chl-*a* or Secchi disk standard is required to indicate a polluted condition.

State of Minnesota Rules, under the jurisdiction of the MPCA, use a classification system of beneficial uses of waters of the state, along with narrative and numeric water quality standards and

nondegradation provisions to protect beneficial uses, including the physical, chemical, and biological integrity of waters of the state. Beneficial uses of Lake Winona are Class 2B, 3B, 4A, 4B, 5, and 6. Class 2B surface waters shall have water quality that permits the propagation and maintenance of a healthy community of cool or warm water sport or commercial fish and associated aquatic life, and their habitats. In addition, Class 2B waters shall be suitable for aquatic recreation of all kinds, including bathing, for which the waters may be used. It is the Class 2B beneficial uses of Lake Winona in particular that will be protected by the SSS. In simple terms, the SSS were set at the levels that will enable the lake to support aquatic life and recreation, since a reduction in algal blooms, increased transparency and increased macrophyte growth are all consistent with an improved aesthetic quality and the needs of the sport fish that are found in the lake.

Lake Winona is defined as a shallow lake (Minn. R. 7050.0150, subp. 4). "Shallow lake" means an enclosed basin filled or partially filled with standing fresh water with a maximum depth of 15 feet or less or with 80% or more of the lake area shallow enough to support emergent and submerged rooted aquatic plants (the littoral zone). Lake Winona meets both criteria of this definition, having a maximum depth of nine feet and 100% littoral zone.

TP is the "cause" variable of lake eutrophication standards. It can be managed, unlike chl-*a* and Secchi depth, which are the "response" variables of lake eutrophication standards. As phosphorus concentrations increase in a lake, so will primary production. Increases in primary production are indicated by increases in chl-*a*. If phosphorus concentrations increase enough, shallow lakes can change from being macrophyte (submerged aquatic plants)-dominated to algae-dominated. Both an increase in chl-*a* concentration, and a switch to an algae-dominated lake will reduce the transparency of a lake, as measured by Secchi depth. The precise TP concentration where the lake "shifts" from one state to the other may or may not correspond to the TP standard. The existing chl-*a* and Secchi standards (i.e. ≤ 20 chl-*a*, ≥ 1.0 m Secchi depth) are the primary emphasis for establishing a SSS TP standard. Since Lake Winona currently exceeds all parts of the applicable lake eutrophication standard, a model was used to determine the level of TP that should allow the chl-*a* and Secchi standards to be met.

The technical approach for SSS development for Lake Winona can be found in the EPA approved March 2014 report: *Lake Winona site-specific standard for eutrophication* (MPCA 2014). The Lake Winona SSS establishes a TP standard needed for the response variables of chl-*a* and Secchi to meet the existing lake eutrophication standards for shallow lakes in the NCHF ecoregion (Table 2). Given the lake's very small watershed, relative shallowness, short water residence time, and proximity within the city of Alexandria, the focus for the SSS for Lake Winona is on reducing the frequency and severity of nuisance algal blooms, and improving transparency such that rooted macrophytes can become established. Following is a summary of pertinent standard setting considerations and the SSS:

- TP = 75 µg/L as a summer-mean as measured at the established South Winona sampling site (see Figure 2).
- Viable chl-*a* ≤ 20 µg/L as a summer-mean as measured at the South Winona sampling site. This should keep maximum chl-*a* below 60 µg/L and reduce frequency of 30 µg/L (severe nuisance

blooms) from about 55% to 60% of the summer to about 30% of the summer. This value is also equivalent to the current chl-*a* standard for shallow NCHF lakes.

- Secchi as a summer-mean of 1.0 m or greater as measured at the South Winona sampling site. This value is equivalent to current Secchi standard for shallow NCHF lakes. It also corresponds with the TP and chl-*a* criteria based on extensive Lake Winona TMDL modeling.
- Meeting these standards in South Winona will be fully protective of North Winona as well since the North exhibits slightly lower TP and chl-*a* as compared to South Winona as a result of in-lake "processing" as water moves from south to north in the lake.
- An average annual loading from ALASD based on the NPDES permit limit to achieve average annual growing season in-lake phosphorus concentrations of 75 µg/L.

To assess compliance with the TMDL, water quality will be monitored at consistent sites within North and South Winona (see Figure 2). Data from South Winona will be used to assess compliance with the TMDL. This approach provides a margin of safety (MOS) as the lake was originally listed based on a whole-lake average from both basins.

In addition to meeting phosphorus standards, chl-*a* and Secchi transparency standards must be met. Based on the relationships established during the development of the Lake Winona site-specific standard, it is expected that by meeting the phosphorus target in the lake, the chl-*a* and Secchi standards will likewise be met.

Table 2. Comparison of ecoregion-based standards for shallow lakes to the site-specific standard for Lake Winona

Parameter	North Central Hardwood Forests	Northern Glaciated Plains	Winona SSS
Total Phosphorus (µg/L)	≤ 60	≤ 90	≤ 75
Chlorophyll-a (µg/L)	≤ 20	≤ 30	≤ 20
Secchi Transparency (m)	≥ 1.0	≥ 0.7	≥ 1.0

3. Watershed and Waterbody Characterization

3.1 Lake Characteristics

Lake Winona is 183 acres (ac) in size and has a mean depth of 4.4 feet (Table 3). The lake is widest at the southern end and extends in a linear fashion 1.6 miles from southwest to northeast. It is narrowest and shallowest at its midpoint, where it is only 300 feet from shoreline to shoreline and approximately 3 feet deep. While it is a shallow lake, overall the lake bed along the shoreline has a moderate slope, so the lake depth reaches 3 plus feet a relatively short distance from the shoreline. Only 42 ac of the lake have a depth of 3 feet or less.

Approximately the northern 80% of the lake basin lies in surficial outwash, while the southwestern 20% of the basin lies in undifferentiated glacial drift (Lindholm et al. 1972). Data from WSN (1994) indicate

the lake to have a groundwater flow through lake, with the groundwater flow direction being from the southeast to northwest. Sediment core sampling during the MPCA sponsored Phase 2 TMDL data collection program identified there to be sand under a two to eight inch thick layer of fine, predominantly inorganic sediments at the southern and northern ends of the lake.

Lake Winona is a No Wake lake, boating speeds being restricted to five miles per hour throughout the lake, with a public boat landing at the southern end. Local residents use the lake for pleasure boating. A retirement home on the lake maintains a dock and pontoon boat to take residents on pleasure cruises during summer months. Indications are that fishing activity is sporadic but does occur by lake residents. Carp have become established in the lake in recent history, adding to the management needs of the lake. Swimming in the lake is infrequent.

Table 3. Lake Winona physical characteristics

Characteristic	Value
Surface area (ac)	183
Littoral area (% total area)	100%
Volume (acre-feet)	809
Mean depth (feet)	4.4
Maximum depth (feet)	9
Watershed area (incl. lake area, ac)	1,636.1
Watershed area: Lake surface area	9:1

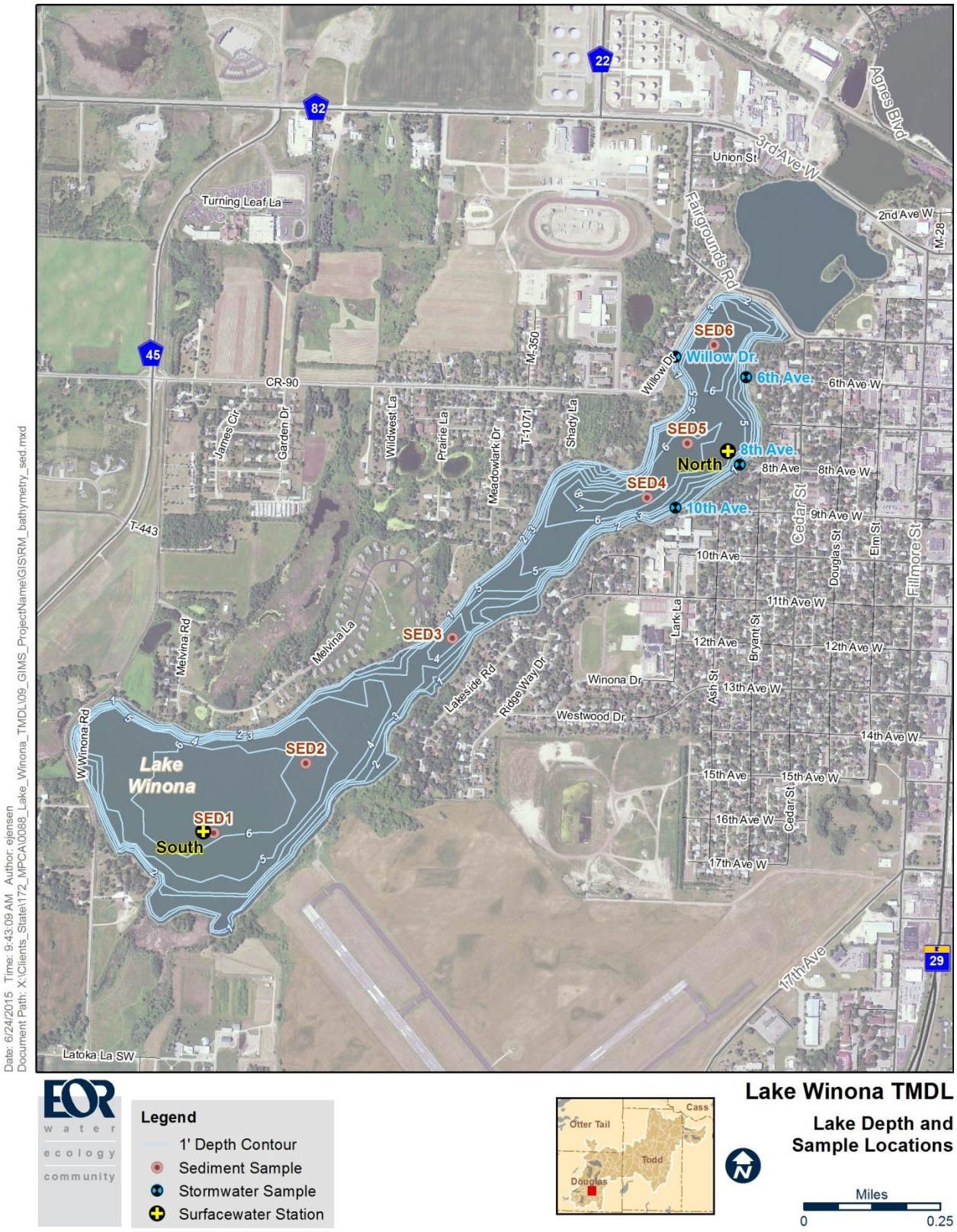

Figure 2. Lake Winona depth contours and sediment and stormwater sample locations

3.2 Subwatersheds

The city of Alexandria (City) is located on the east and north sides of the lake, with the Alexandria airport and suburban lands in LaGrand Township on the south and west. Urban land uses dominate the watershed. The total watershed area of Lake Winona is 1,636 ac (including the lake surface area of 183 ac), resulting in a watershed area to lake surface area ratio of approximately 9:1. The ALASD publicly owned treatment works (POTW) discharges into the south end of Lake Winona.

Water discharges northward from Lake Winona through culverts under Willow Drive, 3rd Avenue West, and Agnes Boulevard Northwest to Lake Agnes, which is interconnected with Lake Henry. From the Lake Henry outlet, water discharges through a series of wetlands, channels, and pipes to Lake Le Homme Dieu, which connects to Lake Carlos and ultimately the Long Prairie River, a tributary of the Mississippi River.

Table 4. Lake Winona subwatershed areas

Name	Area (ac)
Lake Surface	182.6
South Alexandria	318.8
Stormwater Basin	533.7
South LaGrand	171.2
Northeast Alexandria	370.7
Northwest LaGrand	59.1
Total (including lake surface)	1,636.1

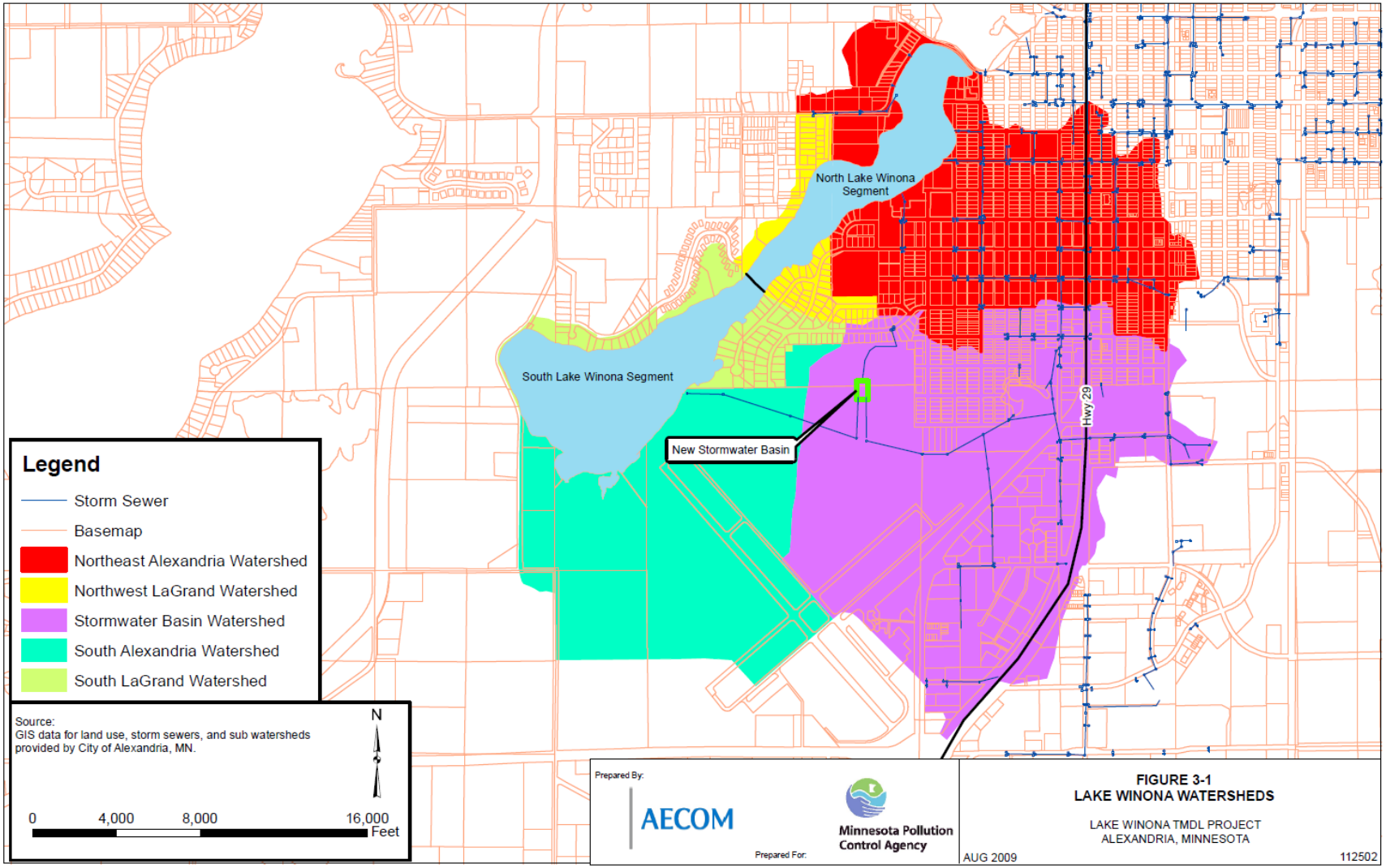

Figure 3. Lake Winona subwatersheds (AECOM 2009)

3.3 Land Use

GIS files provided by the City were used to identify land use and pollutant source areas within the Lake Winona Watershed, with the land use areas identified for each watershed being shown on Figure 3 and tabulated in Table 5. An important feature regarding the watershed is the dominance of urban land uses (near 100%). Soils throughout the Lake Winona Watershed are sandy, which naturally infiltrate more rain and produce less runoff than silt or clay dominated soils.

Table 5. Lake Winona land use by subwatershed

Land Use Type	Description	Area (ac)					
		South Alexandria	Stormwater Basin	South LaGrand	Northeast Alexandria	Northwest LaGrand	Total
Commercial	Airport	212.36	204.34	--	--	--	**570.46**
	Commercial	--	115.34	--	24.64	--	
	Public Facilities	--	--	--	13.78	--	
Highway	Rural	--	6.65	--	--	--	**21.92**
	Curb and Gutter	--	8.73	--	6.54	--	
Industrial	Industrial	--	8.98	--	--	--	**8.98**
Institutional	Hospital/ College	--	36.65	--	4.14	--	**139.35**
	School	--	--	--	15.48	1.64	
	Nursing Home	--	--	--	5.49	--	
	ALASD WWTP	75.95	--	--	--	--	
Residential	Lakes/ Wetlands	5.09	2.20	--	1.90	--	**529.88**
	High Density	--	19.74	--	11.82	--	
	Low/Med. Density	13.00	79.06	48.05	227.55	37.05	
	Open Space	--	--	4.14	--	--	
	Public Park	0.31	32.48	1.60	1.44	--	
	Rural	3.26	--	--	--	--	
	Vacant/ Cropland	9.15	20.18	2.41	9.45	--	
Total		**319.12**	**534.35**	**56.20**	**322.23**	**38.69**	**1270.59**

3.4 Current/Historic Water Quality

3.4.1 Water Quality

Summer period (June to September) routine monthly monitoring of Lake Winona by ALASD began in 1980 at south and north sample points (see Figure 2 and Figure 4 through Figure 9), and continues to this date (Earth Tech 2008, ALASD 2009 and 2010). Lake conditions have improved since the monitoring began. Data from the ALASD monitoring, along with additional data collected by the MPCA, was used to describe water quality conditions and trends from a monitoring station in the north and south end of Lake Winona (see Figure 2).

A 10-year assessment period for Lake Winona was chosen for this TMDL from 2005 through 2014, to incorporate the watershed hydraulic modeling period of 2000 through 2009 with in-lake water quality monitoring data collected through 2014. The 10-year growing season (June through September) average TP, chl-*a*, and Secchi depth are reported in Table 6 below. Annual long-term trends in growing season average water quality are illustrated for the north and south monitoring stations in Figure 4 to Figure 9.

The following graphs present water quality data for Lake Winona. Because of the extended time line of this TMDL report's review, four additional years of data were collected after the TMDL was developed and the report was written. Appendix C presents an update of the water quality data summary. TP and chl-*a* concentrations have decreased since this TMDL was developed, and transparency has remained relatively the same.

Table 6. 10-year growing season mean TP, chlorophyll-*a*, and Secchi for Lake Winona, 2005–2014

Basin (Monitoring station)	Parameter	2005–2014 Growing Season (June–September)	
		Average	CV
South Basin (21-0081-00-102)	Total phosphorus (µg/L)	204	5%
	Chlorophyll-*a* (µg/L)	175	7%
	Secchi transparency (m)	0.55	12%
North Basin (21-0081-00-103)	Total phosphorus (µg/L)	183	5%
	Chlorophyll-*a* (µg/L)	164	7%
	Secchi transparency (m)	0.43	18%

*CV = coefficient of variation, defined in BATHTUB as standard error divided by the mean

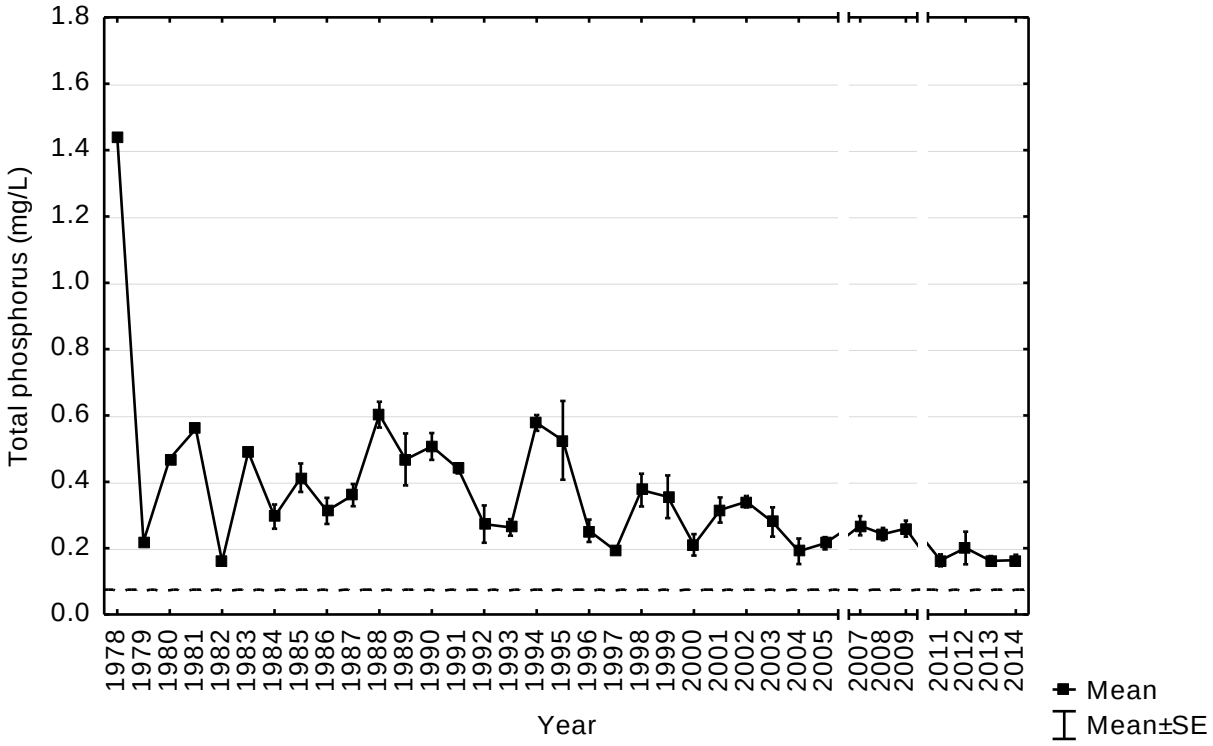

Figure 4. Growing season average phosphorus concentration, Lake Winona South (station 102)
Dashed line represents the site-specific standard of 0.075 mg/L

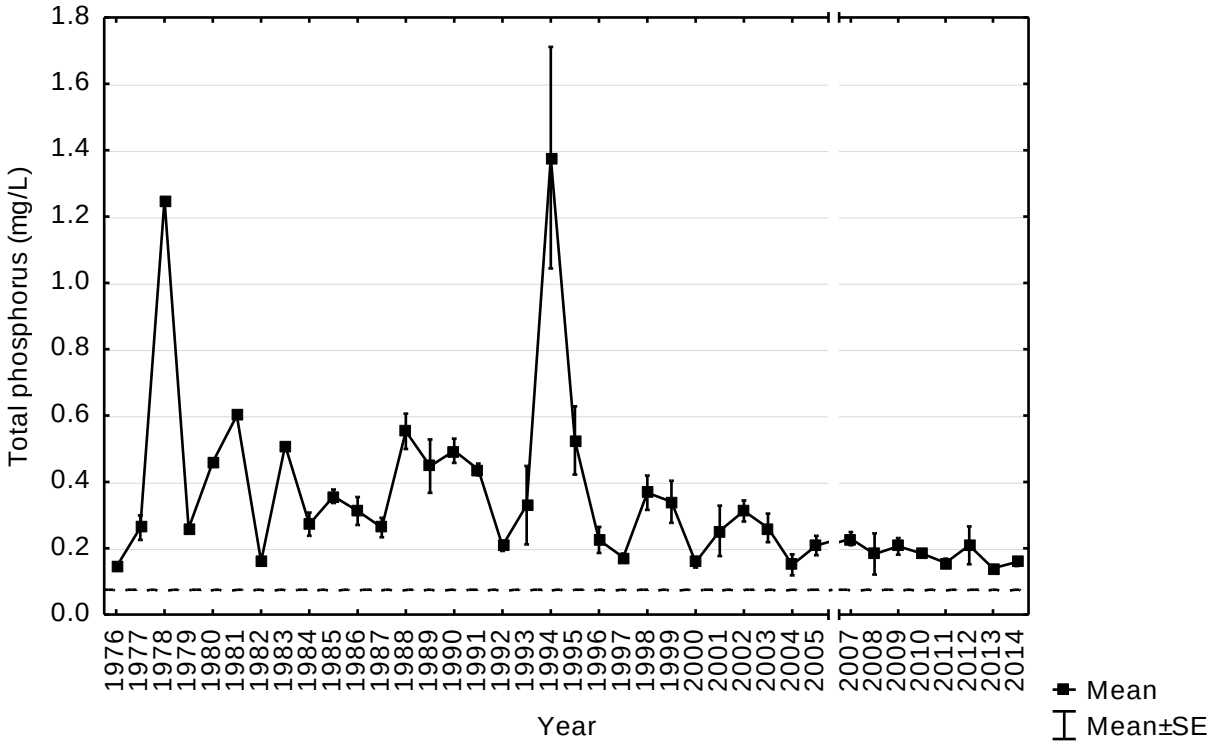

Figure 5. Growing season average phosphorus concentration, Lake Winona North (station 103)
Dashed line represents the site-specific standard of 0.075 mg/L

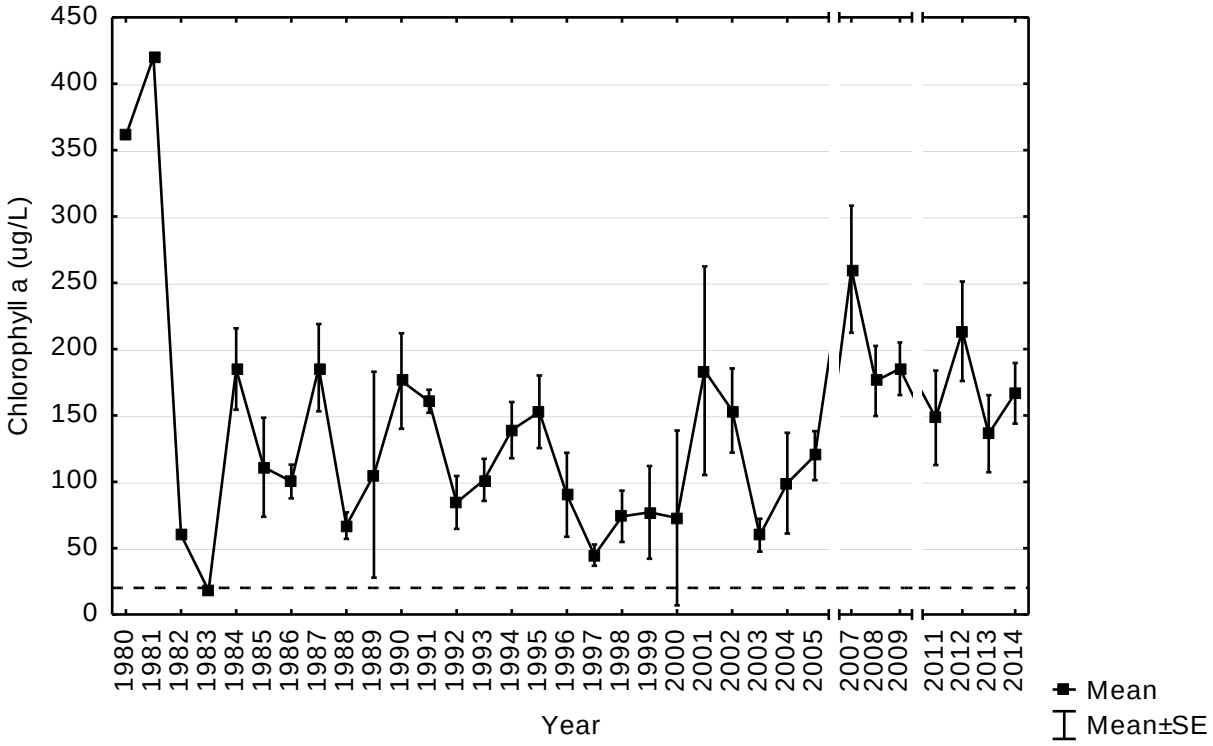

Figure 6. Growing season average chlorophyll-a concentration, Lake Winona South (station 102)
Dashed line represents the site-specific standard of 20 µg/L

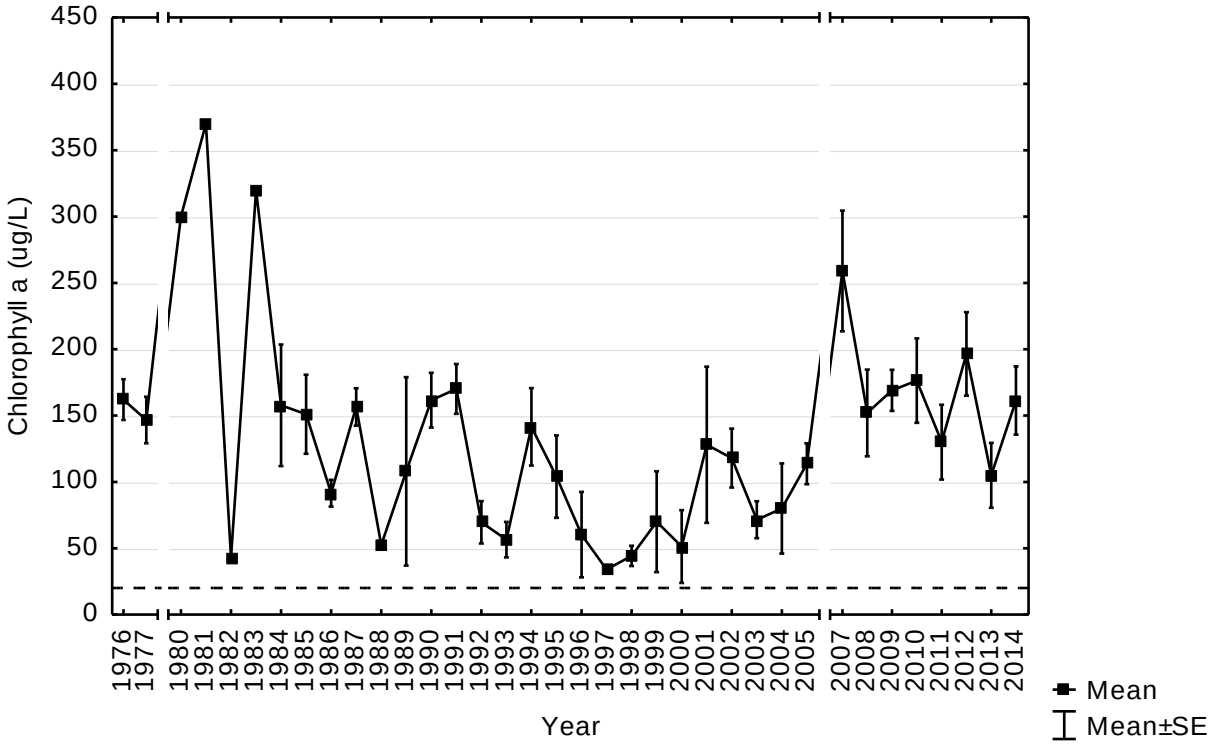

Figure 7. Growing season average chlorophyll-a concentration, Lake Winona North (station 103)
Dashed line represents the site-specific standard of 20 µg/L

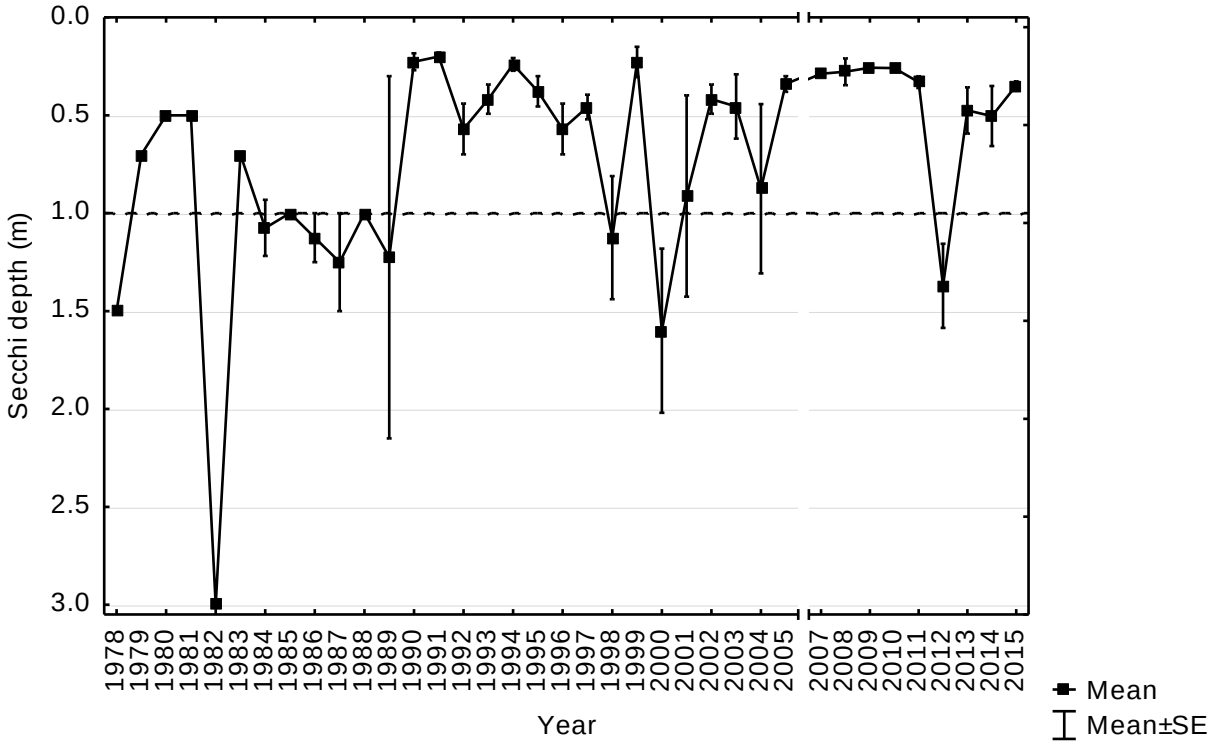

Figure 8. Growing season average Secchi depth, Lake Winona South (station 102)
Dashed line represents the site-specific standard of 1.0 m

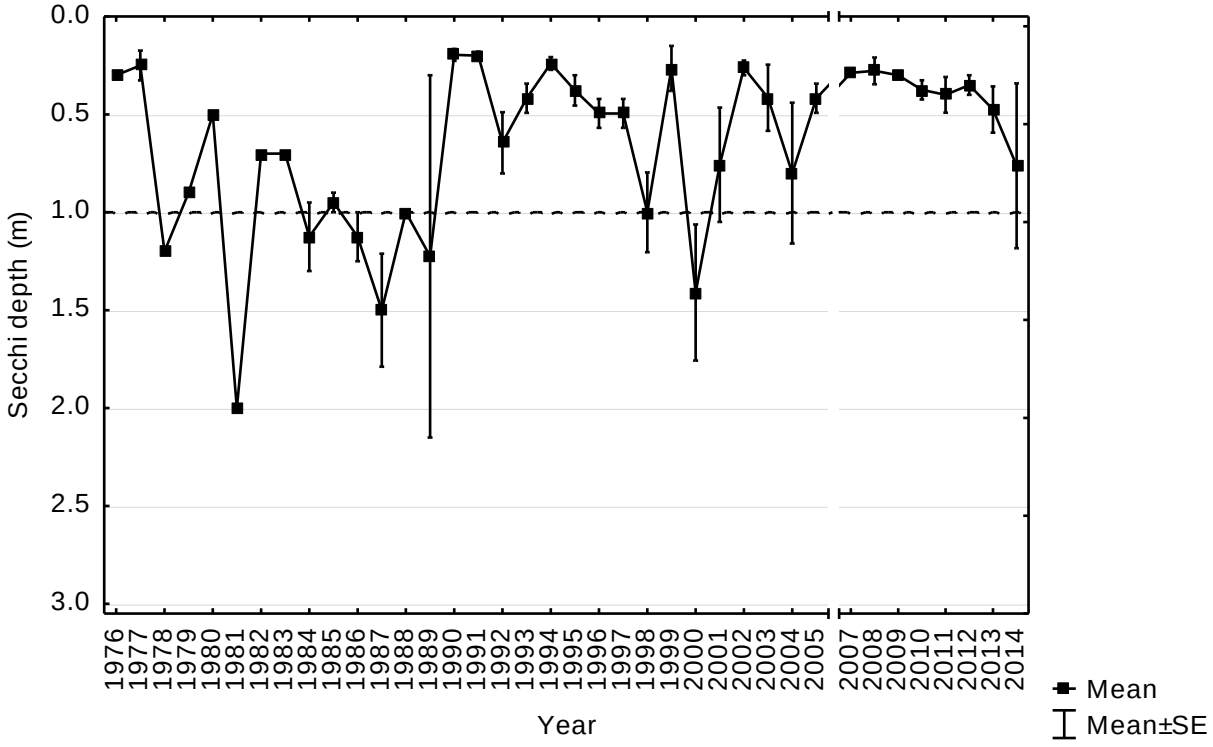

Figure 9. Growing season average Secchi depth, Lake Winona North (station 103)
Dashed line represents the site-specific standard of 1.0 m

3.4.2 Aquatic Plants

Macrophytes, which are often called submerged aquatic vegetation, are important to the ecology of shallow lakes. Heiskary and Lindon (2005) cite some of the key benefits that macrophytes provide to shallow lakes:

- Macrophytes support aquatic life.
- Macrophytes help to slow water velocities, which increases sedimentation and decreases both turbidity and wind resuspension of sediments. Decreased turbidity allows greater light penetration and growth of macrophytes.
- Macrophytes store nutrients, preventing algal growth.
- Macrophytes provide a refuge for zooplankton from predators, which increases algal grazing by zooplankton.
- Shoreline areas with diverse submergent vegetation exhibit significantly more fish than shorelines with little or no vegetation.

The relationship between macrophytes and water quality is not necessarily straightforward. Lakes with good water quality typically have a diverse population of macrophytes. On the other hand, some lakes have relatively diverse macrophyte populations and elevated TP concentrations. However, the presence of a healthy macrophyte population is important to the water quality of a shallow lake like Lake Winona.

WSN (1994) reported historic macrophyte survey results for Lake Winona. An aquatic plant survey taken in Lake Winona in 1977, one year after ALASD started discharging into Lake Winona at the present outfall point, found ten species of aquatic plants. In 1990, a macrophyte survey of Lake Winona found four of the species identified in 1977, and one species not found in 1977 (bulrush). The 2008 macrophyte survey (Earth Tech 2008) found four of the species identified in 1990, and one species not found in 1977 or 1990 (giant burr reed). A measure of aquatic plant diversity, the Floristic Quality Index (FQI), for which a value of 9 was computed for 2008, is one of the lowest FQI observed for a shallow lake in the ecoregion. It is apparent that the macrophyte diversity of Lake Winona has decreased since 1977, with the apparent loss of northern water milfoil, coontail, Canada waterweed, spike rush, arrowhead, spatterdock, and duckweed.

3.4.3 Fisheries

The earliest fisheries data for Lake Winona are Minnesota Department of Natural Resources (DNR) records of fish removals that were completed because winter kills were expected during the upcoming winter. Fish removal data, the records of which go back to the 1950s, show a predominance of black bullhead. The earliest fish surveys, involving the use of nets to measure fish populations, were completed in 1979 and 1985 by the DNR. These show black bullhead dominated Lake Winona at those times. White sucker and yellow perch were of secondary importance in terms of numbers and mass, with there also being very small populations of northern pike, black crappie, and walleye (WSN 1994).

Carp were not present historically in Lake Winona; however, the carp barrier dam located between Lake Henry and Lake Le Homme Dieu failed sometime after 2004, allowing carp to enter the Winona, Agnes, Henry chain of lakes. The 2008 DNR fish survey of Lake Winona shows common carp were found to dominate the lake, being approximately three fourths of the fish found by weight, at 71 pounds of carp per set, a high number. There were still a number of other species of fish found in Lake Winona,

including most significantly black bullhead, black crappie, largemouth bass, northern pike, walleye, and white sucker. A standard fish survey was also completed in 2015 and found that common carp abundance/biomass declined significantly (71 lbs/trap net in 2008 to 25 lbs/ trap net in 2015). Bluegill and black crappie populations were at record-high levels. Other gamefish species sampled included largemouth bass, walleye, and yellow perch.

3.4.4 Shallow Lake Ecology

A generally accepted theory related to the ecology of shallow lakes is that there are alternative stable states, that include macrophyte dominance and clear water at one end and algal dominance and turbid water at the other (Moss et al. 1997). This theory is also discussed in Heiskary et al. (2005). The theory states that a shallow lake will switch from macrophyte dominance to algal dominance, or vice versa, when nutrient, chl-*a* and other factors such as fisheries and zooplankton populations change, triggering the switch. For example, Heiskary et al. (2005; Figure 10) shows that for the TP and chl-*a* concentrations observed in Lake Winona in 2008 there would be very severe algal blooms approximately 65% of the time in Lake Winona, with severe and nuisance algal blooms occurring approximately another 10% of the time.

Forward switches, or triggering factors, that resulted in Lake Winona becoming algal dominated include the loss of macrophytes, changes in fisheries, and excess nutrients from wastewater and runoff sources. More recently, the establishment of carp in Lake Winona is a factor that will work to keep Lake Winona in an algal dominated state regardless of further TP reduction. Restoring Lake Winona to a macrophyte-dominated clear water state is a long term effort but can be accomplished, and will need to focus on controlling the forward switches. Long term reductions will be required for all phosphorus loading sources in addition to carp control and possibly whole lake drawdown. Before a stable macrophyte population can be reestablished, there will likely be a significant period when the lake will alternate between clear and turbid water conditions, while factors like TP concentrations in the lake slowly decline.

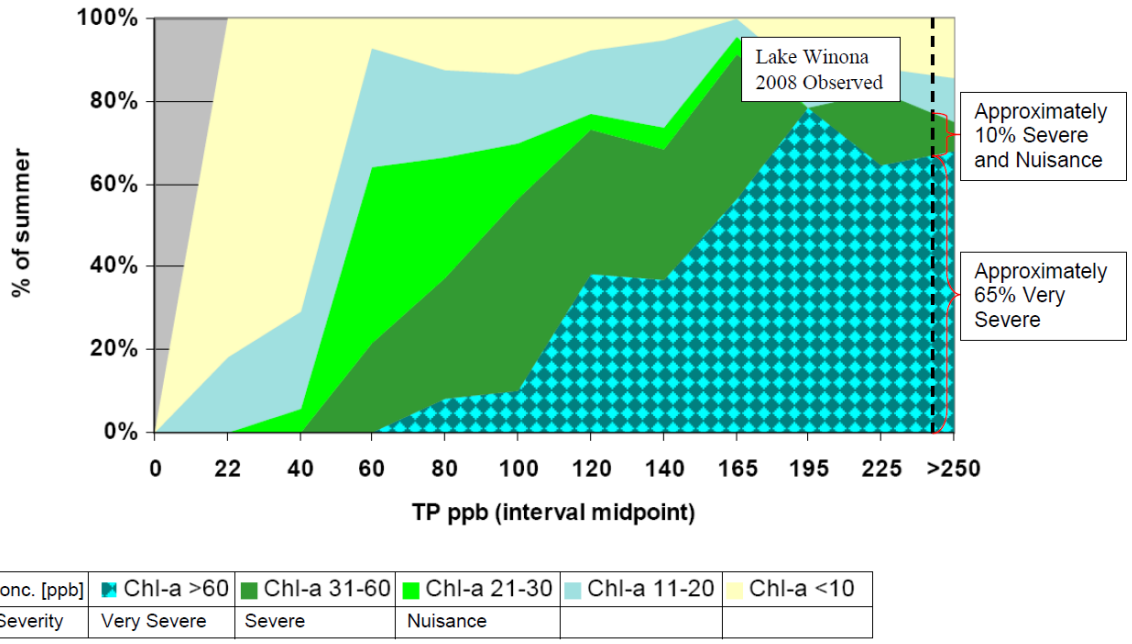

Figure 10. Algae bloom frequency for shallow lakes (Figure 12 in Heiskary and Lindon 2005)

3.5 Pollutant Source Summary

A key component to developing a nutrient TMDL is an understanding of the sources contributing to the impairment. This section provides a brief description of the potential sources in the watershed contributing to excess nutrients in Lake Winona. The following sections discuss the major pollutant sources that have been quantified using collected monitoring data and water quality modeling, to both assess the existing contributions of pollutant sources and target pollutant load reductions.

3.5.1 NPDES Permitted Sources

Point sources are defined as discrete wastewater or stormwater discharge points where the owner has an NPDES permit allowing the discharge. In the Lake Winona Watershed, the point sources are the wastewater discharge from the ALASD POTW, Alexandria Light and Power, stormwater outfalls from the city of Alexandria, which is a regulated municipal separate storm sewer system (MS4), stormwater runoff from construction sites having one or more acre of disturbed land surface, and stormwater runoff from industries within 10 categories of Standard Industrial Codes. Phosphorus loads from NPDES permitted stormwater sources were accounted for using the methods to estimate overland runoff, described in Section 3.5.2.1 below. Alexandria Light & Power operates a backup power generation facility with a non-contact cooling water discharge to Lake Winona. The facility's water source is Lake Winona and no chemical additives are used. Since any phosphorus in the discharge originates from the Lake Winona water intake, no WLAs is required for the discharge.

Phosphorus loads from the ALASD NPDES permitted wastewater facility are summarized in Table 7 based on 2005 through 2014 discharge monitoring records submitted to the MPCA.

Table 7. ALASD WWTP annual average effluent flow and phosphorus concentration

Year	Average effluent flow (mgd)	Average effluent concentration (mg/L)	Annual effluent phosphorus load (kg/yr)
2005	2.718	0.25	937
2006	2.633	0.25	909
2007	2.578	0.31	1,104
2008	2.510	0.28	974
2009	2.500	0.25	864
2010	2.708	0.19	711
2011	3.100	0.20	858
2012	2.615	0.16	580
2013	2.692	0.14	521
2014	2.896	0.15	599
2005–2014 average	**2.695**	**0.22**	**820**

3.5.2 Non-NPDES Permitted Sources

Phosphorus in lakes often originates on land. Phosphorus from sources such as phosphorus-containing fertilizer, manure, and the decay of organic matter can adsorb to soil particles. Wind and water action erode the soil, detaching particles and conveying them in stormwater runoff to nearby waterbodies where the phosphorus becomes available for algal growth. Organic material such as leaves and grass clippings can leach dissolved phosphorus into standing water and runoff, or be conveyed directly to waterbodies where biological action breaks down the organic matter and releases phosphorus. The following sources of phosphorus not requiring NPDES permit coverage were evaluated:

- Overland runoff
- Atmospheric deposition
- Internal loading

3.5.2.1 Overland Runoff

One of the impacts of both historical and recent development in the Lake Winona Watershed is that the natural hydrology of Lake Winona has been significantly altered by a variety of human actions. Construction of the local road network disconnected several areas from discharging into the lake. For instance, Winona Drive West prevents a 366-acre area west of Lake Winona from discharging to the lake. Another hydrologic alteration to the lake occurred via the construction of storm sewers by the City to provide drainage into the lake. Storm sewered watersheds include areas that naturally were not in the Lake Winona Watershed, such as some areas of the City east of State Highway 29. Runoff entering Lake Winona from storm sewered areas exhibits stormwater discharge characteristics typical of urbanization. For instance, there are greater peak flow rates and pollutant concentrations than pre-development conditions. Furthermore, impervious areas and hydraulically efficient storm sewer systems

reduce the percentage of rainfall recharging groundwater, resulting in an increase in runoff volume. A final hydrologic modification to Lake Winona, the addition of the ALASD wastewater discharge to the lake, has significantly increased the volume of water entering and flowing through the lake versus natural conditions.

A water balance for Lake Winona was prepared based on environmental data, discharge monitoring results, and modeled runoff rates. Evaporation data used to estimate evaporation rates from Lake Winona was obtained from the climate station at the Alexandria Airport. A coefficient of 0.7 was used to adjust the measured pan evaporation rates to actual lake evaporation rates, because evaporation rates from a pan are generally higher than evaporation rates from a lake surface. For direct precipitation in the watershed and on Lake Winona, rainfall data was obtained from the climate stations at the Alexandria and Saint Cloud airports. It was necessary to obtain the precipitation data from two climate stations because the Alexandria climate data base does not include rainfall for the entire period of interest. ALASD annual discharge volumes were obtained from applicable NPDES permit discharge monitoring reports.

The TP loads in runoff discharging to Lake Winona were predicted using the computer model WinSLAMM (Microsoft Windows version of the Source Loading and Management Model), which is a combination urban hydrology and water quality model applicable to the project area. WinSLAMM was developed to provide an understanding between sources of urban runoff pollutants and runoff quality. The application of WinSLAMM for the prediction of pollutant loads was based on identification of source areas of urban runoff pollutants within a watershed. Example source areas are highways, streets, sidewalks, lawns and roof tops. Long term monitoring studies in many states, including Minnesota, have been used to calibrate unit rates of pollutant loads for urban source areas modeled by WinSLAMM. The conditions within the Lake Winona Watershed are well represented by the long term monitoring studies used to calibrate WinSLAMM parameter files used in the analysis. It has been continually expanded since the late 1970s and now includes a wide variety of source areas generating runoff born pollutants, as well as a large number of best management practices (BMPs) used to manage stormwater. Urban area point and nonpoint sources of pollutants to Lake Winona are accurately modeled by WinSLAMM. Implementation of WinSLAMM for the Lake Winona TMDL involved obtaining watershed data such as area and land use, information on existing BMPs, and rainfall data, which were input to the model to compute runoff rates and pollutant loading rates. WinSLAMM uses hourly precipitation records to model runoff based on historic storm sequences (continuous modeling) for accurate runoff rate prediction.

Hourly precipitation data was available from the Alexandria Airport climate station for the years 2003 to 2006 and 2008 to 2009. For the years 2000 to 2002 and 2007 hourly precipitation data was not available for the Alexandria Airport, so it was obtained from the St. Cloud airport rain gage. To complete the runoff computations, the recorded hourly rainfall records were used as input to WinSLAMM with runoff rates and volumes being computed for the Lake Winona Watershed for each year from 2000 to 2009.

GIS files provided by the City were used to identify land use and pollutant source areas within the Lake Winona Watershed, with the land use areas identified for each watershed and tabulated in Appendix A. An important feature regarding the watershed is the dominance of urban land uses (near 100%). Soils throughout the Lake Winona Watershed are sandy, which naturally infiltrate more rain and produce less runoff than silt or clay dominated soils.

Five subwatersheds were used for the runoff modeling, with three of the subwatersheds located within the City MS4 boundary, and two subwatersheds located within unsewered areas of LaGrand Township. One subwatershed includes existing stormwater BMPs and discharges to the lake adjacent to the Alexandria Airport via a relatively large diameter storm sewer. Information on City storm sewer systems and a field reconnaissance of the watershed were used to identify and characterize existing stormwater BMPs.

Parameter files for WinSLAMM such as runoff coefficients, pollutant concentration, and particulate particle size input data were selected from calibrations obtained from multiple stormwater monitoring programs completed by the US Geological Survey or the Wisconsin Department of Natural Resources for a variety of municipalities in Wisconsin, Michigan, and Minnesota (Steuer et al. 1995; Steuer et al. 1997; Bannerman et al. 1996; Bannerman et al. 1993 for example). AECOM reviewed watershed conditions within the City and found no reason to believe that the runoff volume and quality discharged from the City was significantly different than that represented in the extensive data set used for WinSLAMM calibrations. The WinSLAMM input files were implemented using a continuous simulation approach to obtain annual runoff volumes for the 2000 through 2009 period.

As part of implementing WinSLAMM for the Lake Winona Watershed, a validation process was completed. To validate the predicted urban runoff load rates for TP, predicted TP concentrations from WinSLAMM were compared to stormwater monitoring results from the Clean Lakes Project (WSN 1994), as shown in Table 8. The TP concentration predictions bracket the average flow weighted composite sample result from the Clean Lakes Project and nearly match the combined flow weighted and grab sample average result from the Clean Lakes Project. For this TMDL, this comparison of WinSLAMM model output for the Lake Winona Watershed and Clean Lakes Project monitoring results is interpreted as strongly showing that the WinSLAMM results accurately represent Lake Winona Watershed conditions.

Table 8. Comparison of WinSLAMM model total phosphorus predictions with Clean Lakes Project monitoring results for Lake Winona watersheds

WinSLAMM Model Total Phosphorus Predictions (mg/l)		Clean Lakes Project[1] Total Phosphorus Monitoring Results (mg/l)	
Watershed	**Range of Annual Average Predicted Total Phosphorus Concentrations (2000-08)**	**Average Flow Weighted Sample Result**	**Average Combined Flow Weighted and Grab Sample Result**
South Alexandria	0.359 – 0.387 (.374 Ave)	0.390	0.425
Storm Water Basin	0.303 – 0.350 (.332 Ave)		
South La Grand	0.420 – 0.572 (.510 Ave)		
Northeast Alexandria	0.361 – 0.472 (.428 Ave)		
Northwest La Grand	0.409 – 0.561 (.499 Ave)		
Combined Average	0.424		

[1] WSN (1994)

Table 9. Subwatershed flow, phosphorus concentrations and phosphorus loads (WinSLAMM 2000–2009)

Parameter	Year	South Alexandria**	Stormwater Basin**	South LaGrand	Northeast Alexandria**	Northwest LaGrand
Flow Rate [ac-ft/yr]	2005	118.0	558.5	60.5	431.1	43.8
	2006	55.5	263.9	29.4	211.6	21.7
	2007	80.1	377.6	41.8	302.2	30.9
	2008	74.7	348.4	38.9	281.3	28.7
	2009	56.8	259.5	24.3	202.8	24.3
	2005–2009 average*	**73.0**	**365.0**	**40.6**	**283.9**	**32.4**
P Conc [µg/L]	2005	373	311	443	379	432
	2006	382	350	571	472	560
	2007	387	350	557	464	546
	2008	376	335	526	437	515
	2009	360	320	498	413	487
	2005–2009 average*	**376**	**333**	**519**	**433**	**508**
P Load [kg/yr]	2005	54.3	214.2	33.1	201.4	23.3
	2006	26.1	113.9	20.7	123.2	15.0
	2007	38.2	162.9	28.7	172.9	20.8
	2008	34.6	143.9	25.2	151.6	18.2
	2009	25.2	102.4	14.9	103.3	14.6
P Load [kg/yr]* **	**2005–2009 average***	**33.8**	**149.9**	**26.0**	**151.6**	**20.3**

* 2005–2009 average value used to calibrate the existing conditions BATHTUB model (see Section 4.1.1)

** Subwatersheds within the MS4 boundary (see Section 4.3.3)

*** Phosphorus loads presented in this table may be slightly different than those shown in the BATHTUB model outputs (see Appendix B) due to rounding

3.5.2.2 Atmospheric Deposition

Atmospheric deposition represents the phosphorus that is bound to particulates in the atmosphere and is deposited directly onto surface waters. A phosphorus atmospheric deposition loading rate of ~0.27 lb/ac of TP per year was applied to the lake surface area to determine the total atmospheric deposition load per year.

Atmospheric deposition contributes 30.2 lb/yr (13.7 kg/yr) to South Lake Winona and 18.7 lb/yr (8.5 kg/yr) to North Lake Winona.

3.5.2.3 Internal Loading

Internal loading in lakes refers to the phosphorus load that is released into the water column from the bottom sediments or macrophytes. The ultimate source of internal load in lakes is nutrients from the watershed that are stored in lake sediments and macrophytes and recycled into the water column via:

1. *Physical disturbance of the sediments*

Physical disturbance of the sediments is caused by bottom-feeding fish behaviors (e.g., carp), motorized boat activity, and wind mixing. This is more common in shallow lakes than in deeper lakes. Carp will be a factor in the restoration of Lake Winona because they are bottom feeders and resuspend sediments and phosphorus into the water column. The amount of internal loading due to physical disturbance of the sediments is difficult to quantify as there is no direct means of measuring these sources of phosphorus. **As such, it is challenging to predict the impact the removal of carp will have on the water quality of Lake Winona, but has been identified as the first step of addressing this source of internal loading.**

2. Biological and chemical release from the sediments

Biological and chemical processes at the sediment water interface in a lake, collectively known as biogeochemical activity, can be a significant source or sink of a variety of pollutants entering or being removed from the water column. For instance, phosphorus can be released from sediments into the water column of a lake through the action of biogeochemical activity. One study completed during Phase 2 of the Lake Winona TMDL Project was measurement of biogeochemical phosphorus release by the collection of sediment cores and measurement of phosphorus release rates in a laboratory (Wang et al. 2009). The phosphorus release rate testing was completed for both aerobic and anaerobic conditions. Records of the DNR related to the fishery of the lake show that winter fish kills caused by low oxygen were regular events in the 1950s and 1960s. More recently, however, it is believed the steady discharge by ALASD of wastewater relatively high in oxygen and low in biological oxygen demanding materials keeps the lake oxygenated throughout the winter. This belief is supported by field data collected for the TMDL project. Dissolved oxygen profiles of Lake Winona show that aerobic conditions prevailed in 2008, including the winter of 2008–2009. Therefore, aerobic conditions are assumed to occur in Lake Winona throughout the year. Because of these factors, only the results for aerobic conditions at the sediment-water interface have been used for analysis of the phosphorus budget of Lake Winona, an assumption that is important because biogeochemical activities differ for aerobic and anaerobic conditions.

The geometry of Lake Winona can be described as a relatively wide southern basin, then a narrows section, which is relatively shallow going from southwest to northeast, then the lake widens gradually and deepens as the north end is approached. Flow direction in the lake is from south to north, so the discharge begins in the larger southern basin and then converges through the narrow central portion of the lake before expanding into the northern basin. Prevailing winds are from the southwest, and are aligned with the southwest to northeast orientation of the lake basin. Flow patterns and the prevailing wind directly affect sediment deposition rates and locations.

Sediment core sample locations relative to location in the lake are shown on Figure 2. Little or no biogeochemical release under aerobic conditions was measured for the samples from the southern open area (sample 1) and the northern most area (sample 5). However, biogeochemical release of phosphorus from sediments was measured for samples obtained from the narrower central portion of the lake (samples 2–4), with release rates ranging from 3.7 to 14.7 mg/m^2-day. The highest release rate was measured for sample point 3, taken in the narrowest and shallowest part of the lake. Overall, the biogeochemical release rate testing indicates that phosphorus release from this mechanism is absent from portions of the lake, but occurs in others. A variation in biogeochemical phosphorus release rates with location within a lake has been found elsewhere, for example in Upper St. Croix Lake (University of Wisconsin, Stevens Point 2007).

Chemical testing of Lake Winona sediments revealed that the iron, aluminum, and calcium content of the sediments is low compared to other lakes (Wang et al. 2009). The low content of these elements indicates that Lake Winona sediments have a relatively low binding capacity for phosphorus, with phosphorus release rates from the sediments being less responsive to changes in redox conditions at the sediment-water interface than other lakes.

Phosphorus release from this mechanism occurs primarily in the central, relatively shallow, narrower portion of Lake Winona. Biogeochemical phosphorus release rates for Lake Winona were measured in the laboratory at a temperature of 20°C, nearly the same temperature as the summer season average temperature of Lake Winona (21.5°C). Using the laboratory values as representative of summer conditions in Lake Winona, an area weighted basis for the portion of lake bottom represented by each sample was computed. The resulting area-weighted average biogeochemical phosphorus release rate of approximately 3 mg/m^2-day was found.

Decomposition of dead algae, wind driven resuspension of bottom sediments, and bioturbation are other mechanisms that could release phosphorus from particulate matter and lake sediment into the water column. Based on observations made during collection of sediment samples, the upper most layer of the bottom sediments are fine-grained and would be easily resuspended by wind action and bioturbation. Given the shallowness of the lake, winds of the magnitude found at the site, which average over nine miles per hour during the summer months, are capable of resuspending bottom sediments into the water column much of the time. Given that the sediment TP concentrations average 5.6 parts per million (AECOM, July 2009), a significant quantity of phosphorus can potentially be added to the water column by the resuspension of sediment.

It is interesting to note that the 1990 Clean Lakes Project (WSN 1994) found that the sediments of Lake Winona to be mostly sandy or stony, but by 2008 the surface sediments were muck. None of the sediment cores taken in 2008 found sand as the surficial material. Sand was found two to eight inches below the surface at core sample locations one and five of the phosphorus release study. The macrophyte survey completed in 2008 found what was termed muck by the biologists doing the work at all locations away from the shoreline. The macrophyte survey did find sand at the surface of the sediment at a number of locations along the shoreline.

Because some amount of internal loading can be accounted for explicitly in the BATHTUB lake water quality model, and uncertainty exists around the amount of internal loading estimated by sediment release experiments, the estimated total sediment phosphorus release rates per day were used as a reference point for calibrating the lake BATHTUB model to observed in-lake phosphorus concentrations (see Section 4.1.1.5). Moreover, the internal loading rates estimated by sediment release experiments represent the total potential sediment release rate, while the calibrated internal loading rates from the BATHTUB model represent the excess sediment release rate beyond the average background release rate accounted for by the model development lake dataset.

Table 10. Phosphorus load from sediment release assumptions

Sediment Parameter	Sampling Location (see Figure 2)				
	Sed 1	Sed 2	Sed 3	Sed 4	Sed 5
Sediment P concentration (mg/kg dry)	4.69 – 7.49				
Aerobic estimated release rate of phosphorus from sediments at 20 °C (mg/m^2-day)	0.1	4.4	14.7	3.7	ND
Anaerobic estimated release rate of phosphorus from sediments at 20 °C (mg/m^2-day)	0.1	1.4	NA	NA	1.8
Area-weighted estimated release rate of phosphorus from sediments at 20 °C (mg/m^2-day)	3.0				
BATHTUB calibrated excess release rate of phosphorus from sediments (mg/m^2- day)*	2.65				
BATHTUB calibrated excess internal load (kg/yr)	441.4			273.9	

* See Section 4.1.1.5: Model Calibration for a description of how this value was determined

4. TMDL Development

4.1 Loading Capacity

4.1.1 Lake Response Model

The publicly available computer model BATHTUB, developed by William W. Walker for the U.S. Army Corps of Engineers (Walker 1999), was used to compute the nutrient budget for Lake Winona. It has been used successfully in many lake studies in Minnesota and throughout the United States. BATHTUB is a computer program that facilitates the application of empirical eutrophication models to morphometrically complex lakes and reservoirs. The program is capable of calculating nutrient balances in a steady state, spatially segmented hydraulic network that accounts for advective (load associated with flows) and diffusive (load associated with nutrient diffusion) transport, along with nutrient sedimentation. BATHTUB predicts eutrophication-related water quality characteristics of lakes using empirical relationships developed for lake and reservoir applications (Walker 1985). The predictions produced by BATHTUB are expressed in terms of nutrient related pollutants and characteristics such as TP and chl-*a*. BATHTUB is directly applicable to Lake Winona because the impairment of the lake is excess nutrients, the class of pollutants and characteristics for which BATHTUB was specifically created to model. BATHTUB's time-scales are appropriate because watershed phosphorus loads are determined on an annual or seasonal basis, and the summer season is critical for lake use and ecological health. BATHTUB has built-in statistical calculations that account for data variability and provide a means for estimating confidence in model predictions.

4.1.1.1 Linking Models and Data

A feature of BATHTUB is that data is entered into the program on the basis of the averaging period, which is one year as applied to this TMDL. Therefore runoff flow rates and loads predicted by WinSLAMM are summed on an annual basis and then entered into BATHTUB. The same data entry is made for the other sources of water and pollutant loads, including the ALASD discharge and rainfall. The water quality of Lake Winona is then modeled using BATHTUB. The BATHTUB models were calibrated to

existing in-lake water quality data and were then used to identify the phosphorus load reductions needed to meet the in-lake SSS.

The TMDL modeling period for Lake Winona was 2005 through 2014, during which time carp were present in the lake. Carp resuspension of reactive phosphorus from the sediments alters the typical response of chl-*a* concentration and Secchi transparency to in-lake phosphorus concentrations; however, BATHTUB was used to model phosphorus, and not the response of chl-*a* and Secchi transparency.

4.1.1.2 System Representation in Model

In typical applications of BATHTUB, lake and reservoir systems are represented by a set of segments and tributaries. Segments are the basins (lakes, reservoirs, etc.) or portions of basins for which water quality parameters are being estimated, and tributaries are the defined inputs of flow and pollutant loading to a particular segment. For this study, the five subwatersheds from the WinSLAMM model, the ALASD discharge, and outflow from an upstream lake (or basin) for which TP concentration is known were defined as separate tributaries to each lake segment. For the purpose of modeling Lake Winona, the lake was split into two segments, south and north. This is consistent with the slight decrease in phosphorus concentrations that occurs from the south to north sample sites.

4.1.1.3 Model Inputs

Water and phosphorus balance inputs for the BATHTUB model were described in Section 3.5. Annual phosphorus loadings for the ALASD wastewater discharge were obtained from NPDES discharge monitoring records. Phosphorus loading from direct precipitation on the lake was based on rates estimated by the MPCA for Minnesota. Water quality of Lake Winona was represented using summer seasonal averages for TP, chl-*a*, and Secchi depth over the TMDL modeling period of 2005 through 2014. Lake morphometry was measured using the bathymetric map for Lake Winona found in the Lake Winona TMDL Phase 2 Report (AECOM, October 2009; Figure 2). These data were directly input to BATHTUB as annual average values for use in modeling the quality of the lake. Lake segment input data for South and North Winona are listed in Table 11.

Table 11. BATHTUB segment input data

Impaired Lake	South Winona	North Winona
Surface area (sq km)	0.456	0.283
Lake fetch* (km)	1.18	1.45
Mean depth (m)	1.37	1.32
Total phosphorus (µg/L)	204	183

*Lake fetch is the longest distance that wave-generating winds blow across the lake surface

4.1.1.4 Model Equations

BATHTUB allows a choice among several different phosphorus sedimentation models. The Canfield-Bachmann phosphorus sedimentation model (Canfield and Bachmann 1981) best represents the lake water quality response of Minnesota lakes and is the model used by the majority of lake TMDLs in Minnesota. However, the Canfield-Bachmann phosphorus sedimentation model tends to under-predict the amount of internal loading in shallow, frequently mixing lakes. Therefore, an explicit internal load is

added to shallow lake models to improve the lake water quality response of the Canfield-Bachmann phosphorus sedimentation model.

4.1.1.5 Model Calibration

The Lake Winona two-segment model (south and north basins) was calibrated to water quality data of both basins (Table 12), and then was used to determine the phosphorus loading capacity (TMDL) for the lake as a whole. Because the predicted in-lake TP concentration was *lower* than the average observed (monitored) concentration, an explicit additional internal load was added to each basin to calibrate the model. It is widely recognized that Minnesota lakes in agricultural and urban regions have histories of high phosphorus loading and/or very poor water quality. For this reason, it is reasonable that internal loading may be higher than that of the lakes in the data set used to derive the Canfield-Bachmann lakes formulation. It is also possible that the watershed model loading estimates do not account for certain hot spots of phosphorus loading, such as above average application of lawn fertilizer runoff and/or pet waste.

The 1990 Clean Lakes Project (WSN 1994) and Wang et al. (2009) both predicted there would be internal phosphorus loading in Lake Winona. The data set used to develop the BATHTUB model does include effects of internal loading, particularly for deeper lakes. However, shallow lakes are somewhat underrepresented in this data set, indicating that BATHTUB underestimates internal phosphorus loads in shallow lakes because of their unique characteristics. Therefore, the internal load feature of BATHTUB was used to obtain a phosphorus balance, such that predicted concentrations matched observed. This was accomplished using increments of 0.01 mg/m^2-day phosphorus release to the south and north segments of Lake Winona, until the predicted area-weighted in-lake phosphorus concentration for both basins matched the observed. The added internal load of 2.65 mg/m^2-day needed to calibrate the BATHTUB model was considered a reasonable estimate of excess internal load in Lake Winona, because the added internal load was similar to the internal load estimated from sediment cores (see Section 3.5.2.3).

It is not possible to completely differentiate among the various sources of internal loading, such as biogeochemical phosphorus release, degradation of algae cells, and the action of wind and bioturbation. Biogeochemical phosphorus release rates measured in the lab by Wang et al. (2009) indicate that this mechanism is the predominant source of internal phosphorus loading, particularly considering that the mean summer water temperature of Lake Winona is favorable to the growth of bacteria responsible for biogeochemical phosphorus release.

Table 12. Model calibration summary for the impaired lakes

Model Selections	Calibration Factors	Calibration Value
Canfield-Bachmann, Lakes	Added Internal Load	2.65 mg/m^2-day
Fischer-Numeric Longitudinal Dispersion		

4.1.1.6 Determination of Lake Loading Capacity (TMDL)

Using the calibrated (existing conditions) model as a starting point, the phosphorus concentrations associated with tributaries and internal loading rates were reduced until the model indicated that the phosphorus SSS was met in the Lake Winona south basin, to the nearest tenth of a whole number.

First, the MS4 regulated and non-MS4 regulated watershed runoff flow weighted mean TP concentration was reduced to ~100 µg/L. A flow weighted mean concentration goal of ~100 µg/L was chosen to represent reasonable loading conditions from the mostly urban watershed based on typical event mean concentrations from undisturbed watersheds. Next, the ALASD effluent phosphorus concentration was reduced to 105 µg/L. And finally, any added internal loads were reduced to 0.05 mg/m^2-day so that the in-lake phosphorus concentration of the south basin met the SSS of 75 µg/L.

The SSS TP standard was developed such that Lake Winona would achieve the existing chl-*a* and Secchi standards (i.e., ≤ 20 chl-*a*, ≥ 1.0 m Secchi depth) (see *Section 2 Applicable Water Quality Standards*). Therefore, a model was developed that included a level of phosphorus loading predicted to achieve the SSS TP standard, or the TMDL goal.

4.2 Load Allocation Methodology

The LA includes all sources of phosphorus that do not require NPDES permit coverage: watershed runoff, internal loading, atmospheric deposition, and any other identified loads described in Section 3.5.1. The atmospheric deposition component of the LA was set at the existing load, and the internal loading component of the LA is based on an internal loading rate of 0.05 mg/m2-day (see Section 4.1.1.6). The non-NPDES permitted watershed runoff component of the LA was calculated as the existing flows (see Table 9 in Section 3.5.2.1) multiplied by a phosphorus concentration of 90 µg/L (see Section 4.1.1.6). The 90 µg/L TP target for watershed runoff differs from the initial watershed runoff target of 100 µg/L (described in Section 4.1.1.6) because it was lowered to accommodate the MOS.

4.3 Wasteload Allocation Methodology

4.3.1 Regulated Construction Stormwater

Construction stormwater is regulated by NPDES permits for any construction activity disturbing a) one acre or more of soil, b) less than one acre of soil if that activity is part of a "larger common plan of development or sale" that is greater than one acre, or c) less than one acre of soil, but the MPCA determines that the activity poses a risk to water resources. The WLA for stormwater discharges from sites where there is construction activities reflects the number of construction sites $\geq$ 1 acre expected to be active in the impaired lake subwatershed at any one time. See Section 7.1.2 for more information regarding the NPDES construction stormwater permit.

A categorical WLA was assigned to all construction activity in the Lake Winona Watershed. First, an estimate of the median annual fraction of the impaired lake subwatershed area under construction activity over a five-year period was calculated based on MPCA Construction Stormwater Permit data from January 1, 2007 to October 6, 2012 (Table 13), area-weighted based on the fraction of the subwatershed located in each county. This percentage was multiplied by the allocated watershed runoff load, which is equal to the total TMDL (loading capacity) minus the sum of the wastewater treatment plant (WWTP) WLA, atmospheric LA, internal LA, and MOS to determine the construction stormwater WLA.

Table 13. Average annual NPDES/SDS construction stormwater permit activity by county (1/1/2007–10/6/2012)

County	Total Area (ac)	Median Annual Construction Activity (% Total Area)
Douglas	460,946	2.04%

4.3.2 Regulated Industrial Stormwater

Industrial stormwater is regulated by NPDES permits if the industrial activity has the potential for significant materials and activities to be exposed to stormwater discharges. The WLA for stormwater discharges from sites where there is industrial activity reflects the number of sites in an impaired lake subwatershed for which NPDES industrial stormwater permit coverage is required. See Section 7.1.3 for more information regarding the NPDES industrial stormwater permit.

A categorical WLA was assigned for all permitted industrial stormwater in the Lake Winona Watershed. The industrial stormwater WLA was set equal to the construction stormwater WLA because industrial activities make up a very small fraction of the watershed area.

4.3.3 MS4 Regulated Stormwater

MS4 permits for state Minnesota Department of Transportation (MnDOT) and county road authorities apply to roads within the U.S. Census Bureau Urban Area. Because the Winona Lake Watershed is not located within the U.S. Census Bureau Urban Area, no roads are currently under permit coverage and WLAs were not assigned to the corresponding road authorities. If, in the future, the U.S. Census Bureau Urban Area extends into the Lake Winona Watershed and these roads come under permit coverage, a portion of the LA will be shifted to the WLA (see Section 5.1).

The City of Alexandria (permit #MS400264) is a regulated MS4 stormwater community, a portion of which discharges to Lake Winona. The regulated areas of the Lake Winona subwatersheds include the Northeast Alexandria, Stormwater Basin, and South Alexandria WinSLAMM watersheds (See Figure 3 in Section 3.2). The MS4 WLA was determined based on the existing flows multiplied (see Table 9 in Section 3.5.2.1) by a phosphorus concentration of 90 µg/L (see Section 4.1.1.6). The 90 µg/L TP target for watershed runoff differs from the initial watershed runoff target of 100 µg/L (described in Section 4.1.1.6) because it was lowered to accommodate the MOS.

4.3.4 Municipal and Industrial Wastewater Treatment Systems

An individual WLA was provided for the NPDES-permitted ALASD WWTP which discharges to the south end of Lake Winona. The WLA was calculated as an annual load derived from the permitted facility average wet weather design flow (4.7 mgd) multiplied by the phosphorus concentration (0.105 mg/L) needed to achieve the TMDL (see Section 4.1.1.6). The NPDES permit's monthly TP effluent limit (0.157 mg/L) was calculated from the TMDL-derived phosphorus concentration times a 1.5 multiplier, to allow for annual variability in effluent concentration pursuant to EPA's Technical Support Document for Water Quality-based Toxics Control (EPA 1991). ALASD is required to achieve compliance with the permit's monthly TP effluent limit which is described in detail in Appendix D.

NPDES-permitted significant industrial users contributing to ALASD WWTP influent are listed in Table 15.

Table 14. NPDES permitted wastewater

Facility Name	NPDES Permit #	Average Wet Weather Design Flow	Annual Average Concentration needed to meet the TMDL	Total Phosphorus Annual Mass Limit
Alexandria Lakes Area Sanitary District	MN0040738	4.7 mgd	0.105 mg/L	665 kg/yr
Alexandria Light & Power	MNG250004	0.048 mgd	N/A*	N/A*

* *Alexandria Light & Power operates a backup power generation facility with a non-contact cooling water discharge to Lake Winona. The facility's water source is Lake Winona and no chemical additives are used. Since any phosphorus in the discharge originates from the Lake Winona water intake, no wasteload allocation is required for the discharge.*

Table 15. Significant industrial users to WWTP

NPDES Permit #	Facility Name
SIU000123	3M - Alexandria - SIU
SIU000122	Alexandria Extrusion Co - SIU
SIU000121	Douglas Machine Inc - SIU
SIU000095	Northern Food & Dairy - SIU
SIU000135	SunOpta Aspetic Inc - SIU
SIU000124	SunOpta Inc - Northern - SIU
SIU000136	TWF Industries Inc - Alexandria - SIU

4.4 Margin of Safety

An explicit MOS was assigned in the TMDL by reducing the MS4 regulated and non-MS4 regulated watershed runoff flow weighted mean TP concentration goals from 100 µg/L to 90 µg/L (see Section 4.1.1.6 and 4.3.3). This MOS is sufficient to account for uncertainties in predicting watershed phosphorus loads to lakes and predicting how lakes respond to changes in watershed phosphorus loading. See Section 4.1.1.5 and Table 12 for a description of the BATHTUB model and calibration. This explicit MOS is considered to be appropriate based on the generally good agreement between the water quality models' predicted and observed values, and the large proportion (>97%) of the TP load to Lake Winona that is regulated under an NPDES permit. ALASD is required to follow the requirements outlined in their permit (MN0040738) issued November 15, 2020. Should the ALASD's Adaptive Lake Management Plan fail to achieve water quality standards, the permit requires compliance with the final TP effluent limit as soon as possible, and no later than December 31, 2032. For more information see the summary of the permit's Internal Loading Implementation Management Plan in Section 6.1.

4.5 Seasonal Variation

In-lake water quality varies seasonally. In Minnesota lakes, the majority of the watershed phosphorus load often enters the lake during the spring. During the growing season months (June through September), phosphorus concentrations may not change drastically if major runoff events do not occur. However, chl-*a* concentration may still increase throughout the growing season due to warmer temperatures fostering higher algal growth rates. In shallow lakes, the phosphorus concentration more

frequently increases throughout the growing season due to the additional phosphorus load from internal sources. This can lead to even greater increases in chl-*a,* since not only is there more phosphorus, but temperatures are also higher. This seasonal variation is taken into account in the TMDL by using the eutrophication standards (which are based on growing season averages) as the TMDL goals. The eutrophication standards were set with seasonal variability in mind. The load reductions are designed so that the lakes will meet the water quality standards over the course of the growing season (June through September).

Critical conditions in these lakes occur during the growing season, which is when the lakes are used for aquatic recreation. Similar to the manner in which the standards take into account seasonal variation, since the TMDL is based on growing season averages, the critical condition is covered by the TMDL.

4.6 TMDL Summary

As described in detail in Section 3.5 of this report, existing phosphorus loads, both external and internal, were examined to determine the feasibility of restoration efforts to meet water quality goals. Total existing phosphorus loads need to be reduced by 50% to the south basin and by 51% to the north basin to meet the Lake Winona SSS. The analysis showed that Lake Winona presently exists in an algae-dominated turbid steady state condition, and that a reverse switch to a macrophyte-dominated clear water condition will need to occur for the nutrient standards to be met. An adaptive management approach will need to be taken to meet TMDL goals (see Section 8), given the large nutrient load reduction needed and the significant improvement in water quality and ecological conditions that will occur.

BATHTUB is an excellent model to use for the analysis of lake water quality conditions for lake nutrient TMDL projects. It allows analysis of key nutrients and expected responses to management practices at a reasonable level of effort. Like all models, BATHTUB model limitations should be mentioned when discussing modeling conditions and scenarios involving large changes in water quality or flow. BATHTUB is a steady state model; however, the large changes in water quality needed to meet TMDL goals are not steady state conditions. This means model predictions in this report involving large changes in water quality should be considered first generation estimates that need to be periodically updated based on new information, and not be considered absolute predictions of future conditions. Even very complex models requiring extensive model development and application efforts would have a high degree of uncertainty when predicting large load reductions such as that needed for the Lake Winona TMDL, and would also need periodic updating. Uncertainty in load reduction scenarios and predictions such as those required for Lake Winona, regardless of model complexity, is managed by periodic updates of model results using new data collected by ongoing monitoring efforts, to evaluate changing conditions in the lake that are occurring because of management practices that have been implemented.

The BATHTUB output files associated with these reductions are found in Appendix A.

Table 16. Lake Winona (21-0081-00) phosphorus TMDL summary

- Listing year: 2002
- Baseline year(s): 2009
- Numeric standard used to calculate TMDL: 75 µg/L TP
- TMDL and allocations apply Jan–Dec

Load Component		Existing TP load	TMDL TP load		Estimated load reduction	
		(kg/yr)	(kg/yr)	(kg/day)	(kg/yr)	(%)
Wasteload Allocations	Construction stormwater (MNR100001)	1.7	1.7	0.005	0.0	0%
	Industrial stormwater (MNR50000)	1.7	1.7	0.005	0.0	0%
	City of Alexandria stormwater (MS400264)	331.9	76.7	0.207	255.2	77%
	ALASD (MN0040738)	819.6	665.0	1.821	154.6	19%
	Total WLA	**1,154.9**	**745.1**	**2.038**	**409.8**	**35%**
Load Allocations*	LaGrand Township watershed runoff	46.3	8.1	0.022	38.2	83%
	Internal Load	715.3	13.5	0.033	701.8	98%
	Atmospheric	22.2	22.2	0.058	0.0	0%
	Total LA	**783.8**	**43.8**	**0.113**	**740.0**	**94%**
MOS**			**9.8**	**0.026**		
TOTAL		**1,938.7**	**798.7**	**2.177**	**1149.8**	**59%**

*LA components are broken down for guidance in implementation planning; loading goals for these components may change through the adaptive implementation process, but the total LA for each lake will not be modified from the total listed in the table above.

** The 10% MOS is based on an additional 10% reduction from watershed runoff components only (construction stormwater, industrial stormwater, City of Alexandria MS4, and LaGrand Township) given the already large reductions needed from internal load.

4.7 TMDL Baseline Year

The TMDLs are based on average water quality data between 2005 and 2014. Any activities implemented during or after the 10-year period mid-point of 2009 that lead to a reduction in phosphorus loads to the lake, or an improvement in lake water quality, may be considered as progress towards meeting a WLA or LA.

5. Future Growth Considerations

Potential changes in population and land use over time in the Lake Winona Watershed could result in changing sources of pollutants. How these changes may impact TMDL allocations are discussed below.

5.1 New or Expanding Permitted MS4 WLA Transfer Process

Future transfer of watershed runoff loads in this TMDL may be necessary if any of the following scenarios occur within the project watershed boundaries:

1. New development occurs within a regulated MS4. Newly developed areas that are not already included in the WLA must be transferred from the LA to the WLA to account for the growth.
2. One regulated MS4 acquires land from another regulated MS4. Examples include annexation or highway expansions. In these cases, the transfer is WLA to WLA.
3. One or more non-regulated MS4s become regulated. If this has not been accounted for in the WLA, then a transfer must occur from the LA.
4. Expansion of a U.S. Census Bureau Urban Area encompasses new regulated areas for existing permittees. An example is existing state highways that were outside an urban area at the time the TMDL was completed, but are now inside a newly expanded urban area. This will require either a WLA to WLA transfer or a LA to WLA transfer.
5. A new MS4 or other stormwater-related point source is identified and is covered under an NPDES permit. In this situation, a transfer must occur from the LA.

Load transfers will be based on methods consistent with those used in setting the allocations in this TMDL (see Section 4.2 and Section 4.3). One transfer rate was defined for Lake Winona as the total LA (kg/day) divided by the non-NPDES permitted watershed area downstream of any upstream impaired waterbody (acres). In the case of a load transfer, the amount transferred from LA to WLA will be based on the area (acres) of land coming under permit coverage multiplied by the transfer rate (kg/day). The MPCA will make these allocation shifts. In cases where a WLA is transferred from or to a regulated MS4, the permittees will be notified of the transfer and have an opportunity to comment.

6. Reasonable Assurance

Management of Lake Winona at the local level involves Douglas County, the lead sponsor of the 1990 Agnes-Henry-Winona Clean Lakes Project (Clean Lakes Project). It has also involved the city of Alexandria, LaGrand Township, and ALASD. There are presently lake associations in existence that provide oversight of management of several nearby lakes such as Lake Le Homme Dieu. There is also a lake association for Lake Winona, but it does not have management authority for the lake. While the Clean Lakes Project report had many good recommendations, it does not appear many were implemented, or that any one local agency had lead oversight authority for management of Lake Winona. ALASD, however, completed all the Clean Lake Project recommendations related to the POTW operation.

Public education will be a key part of this TMDL. Technical Advisory Committee (TAC) participants will inform their constituents about the TMDL and necessary improvements that need to be made, including land owner management practices that will support the TMDL. The MS4 stormwater permit the City holds requires a public education program be developed and implemented.

6.1 Adaptive Lake Management to Reduce Non-Permitted Sources

The LA in this TMDL includes an allocation for reducing internal loading of phosphorus and includes at a minimum, management of the fisheries (particularly carp), restoration of macrophytes, and management of phosphorus releases from bottom sediments. Reasonable assurance will be achieved, in part, through the requirement in the ALASD NPDES permit for an Internal Loading Implementation

Management Plan outlined as follows in sections 5.13.41 and 5.13.42 of the November 16, 2020, permit found in Appendix D.

6.2 Regulatory

6.2.1 Regulated Construction Stormwater

Regulated construction stormwater was given a categorical WLA is this study. Construction activities disturbing one acre or more are required to obtain NPDES permit coverage through the MPCA. Compliance with TMDL requirements are assumed when a construction site owner/operator meets the conditions of the Construction General Permit and properly selects, installs, and maintains all BMPs required under the permit, including any applicable additional BMPs required in Section 23 of the Construction General Permit for discharges to impaired waters, or compliance with local construction stormwater requirements if they are more restrictive than those in the State General Permit.

6.2.2 Regulated Industrial Stormwater

Industrial stormwater was given a categorical WLA in this study. Industrial activities require permit coverage under the state's NPDES/SDS Industrial Stormwater Multi-Sector General Permit (MNR050000) or NPDES/SDS Nonmetallic Mining/Associated Activities General Permit (MNG490000). If a facility owner/operator obtains stormwater coverage under the appropriate NPDES/SDS permit and properly selects, installs, and maintains BMPs sufficient to meet the benchmark values in the permit, the stormwater discharges would be expected to be consistent with the WLA in this TMDL report.

6.2.3 Municipal Separate Storm Sewer System Permits

The MPCA is responsible for applying federal and state regulations to protect and enhance water quality in Minnesota. The MPCA oversees stormwater management accounting activities for all MS4 entities listed in this TMDL report. The Small MS4 General Permit requires regulated municipalities to implement BMPs that reduce pollutants in stormwater to the maximum extent practicable. A critical component of permit compliance is the requirement for the owners or operators of a regulated MS4 conveyance to develop a Stormwater Pollution Prevention Plan (SWPPP). The SWPPP addresses all permit requirements, including the following six measures:

- Public education and outreach
- Public participation
- Illicit Discharge Detection and Elimination (IDDE) program
- Construction site runoff controls
- Post-construction runoff controls
- Pollution prevention and municipal good housekeeping measures

A SWPPP is a management plan that describes the MS4 permittee’s activities for managing stormwater within their regulated area. In the event of a completed TMDL study, MS4 permittees must document the WLA in their future NPDES/SDS permit application and provide an outline of the BMPs to be implemented that address needed reductions. The MPCA requires MS4 owners or operators to submit their application and corresponding SWPPP document to the MPCA for review. Once the application and

SWPPP are deemed adequate by the MPCA, all application materials are placed on 30-day public notice, allowing the public an opportunity to review and comment on the prospective program. Once NPDES/SDS permit coverage is granted, permittees must implement the activities described within their SWPPP and submit an annual report to the MPCA documenting the implementation activities completed within the previous year, along with an estimate of the cumulative pollutant reduction achieved by those activities. For information on all requirements for annual reporting, please see the *Minnesota Stormwater Manual* (Minnesota Stormwater Manual contributors 2019): *Guidance for completing the TMDL reporting form*.

This TMDL report assigns WLAs to permitted MS4s in the study area. The Small MS4 General Permit requires permittees to develop compliance schedules for EPA approved TMDL WLAs not already being met at the time of permit application. A compliance schedule includes BMPs that will be implemented over the permit term, a timeline for their implementation, and a long-term strategy for continuing progress towards assigned WLAs. For WLAs being met at the time of permit application, the same level of treatment must be maintained in the future. Regardless of WLA attainment, all permitted MS4s are still required to reduce pollutant loadings to the maximum extent practicable.

The MPCA's stormwater program and its NPDES permit program are regulatory activities providing reasonable assurance that implementation activities are initiated, maintained, and consistent with WLAs assigned in this study. Additionally, the City of Alexandria has participated in the TMDL process and is committed to aggressive stormwater treatment, including advanced street sweeping, increasing infiltration, and source reduction practices. See additional information in Section 6.3.

6.2.4 Wastewater

ALASD's permit requirements are outlined in the National Pollutant Discharge Elimination System (NPDES)/State Disposal System (SDS) Permit (MN0040738) issued November 15, 2020. All municipal and industrial wastewater NPDES/SDS permits in the watershed will reflect limits consistent with WLAs described herein. Discharge monitoring is conducted by permittees and routinely submitted to the MPCA for review.

In lieu of constructing to meet the TP effluent limit, ALASD has agreed and obtained funding to perform Adaptive Lake Management Plan activities which are intended to control the carp population and achieve water quality targets for chl-*a* and transparency in Lake Winona and downstream in Lake Agnes. Adaptive Lake Management Plan activities include the tracking, tagging, and removal of common carp from Lake Winona and, if necessary, a drawdown of Lake Winona to promote the re-establishment of rooted aquatic vegetation. If re-vegetation is not occurring naturally and/or if carp bioturbation remains excessive, ALASD plans to hold a public meeting during this permit cycle to vote on a drawdown of Lake Winona in order to promote the growth of rooted aquatic vegetation, with the ultimate goal of achieving in-lake attainment of chl-*a* and transparency water quality standards. Should the Lake Winona lakeshore property owners approve of a drawdown of Lake Winona, drawdown work would begin during the next permit cycle. Should the Lake Winona lakeshore property owners not approve of a drawdown of Lake Winona, ALASD shall either begin construction of a new facility or perform capital improvements to the existing facility during the next permit cycle. Adaptive Lake Management Plan activities proposed for Lake Agnes also include funding and performing an alum treatment. As of March 2021, tracking and tagging of carp has been completed, as well as an alum treatment in Lake Agnes.

If all lake management activities are unsuccessful and/or a determination of construction is needed, or desired by ALASD, the final limits must be met as soon as possible, but no later than December 31, 2032. Depending on actions taken by ALASD, the permit will be modified or reissued to remove or replace interim or final limits as described below. Upon permit issuance, ALASD is required to meet an interim TP effluent limit of 0.25 mg/L as a calendar month average and 1087 kg/yr. The interim limit was calculated to ensure there is not an increase in TP concentrations during the term of the schedule of compliance.

NPDES/SDS permits for discharges that may cause or have reasonable potential to cause or contribute to an exceedance of a water quality standard are required to contain water quality-based effluent limits (WQBELs) consistent with the assumptions and requirements of the WLAs in this TMDL report. Attaining the WLAs, as developed and presented in this TMDL report, is assumed to ensure meeting the water quality standards for the relevant impaired waters listings. During the permit issuance or reissuance process, wastewater discharges will be evaluated for the potential to cause or contribute to violations of water quality standards. WQBELs will be developed for facilities whose discharges are found to have a reasonable potential to cause or contribute to water quality impairments. The WQBELs will be calculated based on low flow conditions, may vary slightly from the TMDL WLAs, and will include concentration based effluent limitations.

6.3 Summary of local plans

Minnesota has a long history of water management by local government, which included developing water management plans along county boundaries since the 1980s. The Board of Water and Soil Resources (BWSR)-led 1W1P program is rooted in work initiated by the Local Government Water Roundtable (Association of Minnesota Counties, Minnesota Association of Watershed Districts, and Minnesota Association of Soil and Water Conservation Districts). The Roundtable recommended that local governments organize to develop focused implementation plans based on watershed boundaries. That recommendation was followed by the legislation (Minn. Stat. § 103B.801) that would establish the 1W1P program, which provides policy, guidance, and support for developing comprehensive watershed management plans that:

- Align local water planning purposes and procedures on watershed boundaries to create a systematic, watershed-wide, science-based approach to watershed management.
- Acknowledge and build off existing local government structure, water plan services, and local capacity.
- Incorporate and make use of data and information, including TMDLs and WRAPS.
- Solicit input and engage experts from agencies, citizens, and stakeholder groups; focus on implementation of prioritized and targeted actions capable of achieving measurable progress.
- Serve as a substitute for a comprehensive plan, local water management plan, or watershed management plan developed or amended, approved, and adopted.

The SWCDs and Counties within the Long Prairie Watershed have started the 1W1P planning effort as of 2020.

Until the completion of a comprehensive watershed management plan in the Long Prairie Watershed, county water plans remain in effect per the Comprehensive Local Water Management Act (Minn. Stat. § 103B.301). Those plans may be updated with new information, or their expiration dates may be extended pending future participation in the 1W1P program. Local water plans incorporate implementation strategies aligned with or called for in TMDLs and WRAPS and are implemented by SWCDs, counties, state and federal agencies, and other partners.

The Douglas County Comprehensive Local Water Management Plan, updated in 2017, includes the following priority concerns and goals that apply to Lake Winona:

- Assist landowners with identifying priority sites to implement and promote BMPs to reduce soil erosion and sedimentation;
- Sustainable balance of social, economic and environmental objectives for existing and future development;
- Protect or enhance existing natural habitat areas by encouraging the establishment of healthy and diverse native vegetation;
- Restore previously impacted natural habitat which provide crucial habitat for aquatic and terrestrial plants and animals;
- Improve Stormwater runoff quality by increasing utilization of BMPs;
- Revise Stormwater zoning ordinance to incorporate low impact design standards; and
- Implement actions outlined in WRAPS for each Watershed
    - Specific actions for Lake Le Homme Dieu Subwatershed (which includes lakes Winona, Agnes, Henry, Le Homme Dieu, and Geneva) are to implement three stormwater BMPs, and five agricultural BMPs.

In September 2008, the City of Alexandria initiated a Comprehensive Stormwater Management Plan (SWMP). Since the comprehensive SWMP was completed, numerous projects and activities have been implemented to protect the lake. Two major stormwater BMPs have been installed to protect Lake Winona. The first project was the Thomas Drive drainage improvement project. The second project was a city stormwater pond at the airport that treats stormwater from a major urban watershed that discharges into Lake Winona.

The City also follows the MS4 requirements by:

- conducting annual training for City staff on storm water management,
- updating and maintaining the City's website with storm water management information,
- sweeping streets at least twice annually,
- cleaning out sump catch basins and manholes annually,
- updating and maintaining the GIS database and storm sewer map,
- updating the hydrologic/ hydraulic model, enforcing the erosion control ordinance,
- inspecting 20% of storm water ponds and outfalls every year,

- annually reviewing erosion control, illicit discharge, floodplain, shoreland, wetland and storm water ordinances and making updates as needed,
- annually inspecting and maintaining exposed stockpiles and storage areas on City property maintaining and submitting annual inspection reports, maintenance records, and other documentation in conformance with the NPDES permit,
- hosting public education programs on LID and sustainable BMPs such as rain gardens and rain barrels,
- and annually reviewing mowing, road salt application, fertilizing, and herbicide practices within the City and updating practices as feasible to protect water quality.

The City has also completed or is in the process of completing several stormwater management studies, including working with stakeholders on the Lake Winona TMDL study, adopting an illicit discharge ordinance and conducting illicit discharge inspections, developing a TMDL implementation plan and incorporating into the SWPPP once TMDLs are complete, evaluating options to address erosion issues on the west side of Lake Victoria, completing a BMP/pond inventory, ownership, and maintenance analysis, completing a study to address flooding at 8th Avenue and Irving Street, annually reviewing and updating stormwater utility fee, and updating regional locations and develop CIP for implementing BMPs to meet new policy requirements. Once completed, the SWMP will provide the city, contractors, residents and businesses concise guidelines, education, capital improvements and programs to address the current and future challenges of protecting the City's water and natural resources through stormwater management.

6.4 Reasonable assurance conclusion

In summary, significant time and resources have been devoted to identifying the best BMPs, providing means of focusing them in Lake Winona, and supporting their implementation via state initiatives and dedicated funding. The Lake Winona TMDL process engaged partners to arrive at reasonable examples of BMP combinations that attain pollutant reduction goals. Minnesota is a leader in watershed planning as well as monitoring and tracking progress toward water quality goals and pollutant load reductions.

7. Monitoring Plan

Multiple monitoring activities, such as the collection of water quality samples or the tracking of the installation of BMPs needed to meet load reduction goals, are recommended by this TMDL. On-going monitoring will be an important part of implementing this TMDL including tracking of the large load reductions necessary over the relatively long period of time that will be necessary for the TMDL goals to be met. An adaptive management approach is required, where periodic adjustments based on ongoing monitoring results will be made to the TMDL and restoration plan for Lake Winona. All entities responsible for meeting phosphorus load reduction requirements have recommended monitoring activities.

ALASD will continue to provide lake sampling results to MPCA for inclusion in the MPCA online water quality database. The City of Alexandria will report monitoring results and progress in the installation of new BMPs in the annual stormwater permit report submitted to MPCA.

The Lake Winona TAC will meet at a minimum of every two years to review results, affirm the next steps to be taken, and determine strategic changes in the plan, if monitoring results indicate changes are necessary.

7.1 Lake Monitoring

ALASD has been sampling Lake Winona during the summer season every year since 1980. This sampling will continue as part of the ALASD NPDES permit requirements, including collection of monthly samples from June through September, for the same parameters ALASD has historically completed. A reporting limit of 10 µg/L or less should be used for orthophosphate samples because of the relatively low concentrations of orthophosphate that have been found in Lake Winona.

The DNR is scheduled to conduct periodic fish surveys of the lake every seven years (tentatively set at 2021 and 2028, coinciding with the "start" and "end" dates of the DNR permit for fish barrier installation and potential removal). DNR will also survey the staff gage for monitoring of the water level of Lake Winona. The City of Alexandria is required to follow monitoring requirements outlined in the Public Works Permit for the Lake Agnes carp barrier project. It is recommended that the MPCA continue to monitor the outflow from Lake Henry through the use of a recording stream gage.

Water monitoring will be conducted by a combination of volunteer monitors and county/SWCD technicians as part of the ongoing watershed approach. The monitoring level of effort will vary among the watershed entities, as staffing and budgets vary. Annual reporting by the watershed partners will provide benchmarks for measuring the progress of the implemented TMDLs and for adaptive management. Details of the monitoring were specified in the Long Prairie River Watershed WRAPS process, including the 10-year cycle of Intensive Watershed Monitoring overseen by the MPCA. The next round of watershed monitoring is tentatively scheduled to begin in 2022.

Monitoring of macrophyte restoration efforts will be included in the monitoring plan when those restoration efforts begin.

7.2 BMP Monitoring

On-site monitoring of implementation practices should also take place in order to better assess BMP effectiveness. It is recommended that the City of Alexandria lead stormwater monitoring of existing and new BMPs. BMP monitoring should be completed for at least three storms per year, and include estimation of inflow and outflow rates, and collection of inflow and outflow grab samples. In addition, storms sampled should have at least 0.1 inch of rainfall, with at least one storm being greater than 0.5 inches. Flow measurements should also include simultaneous measurements of flow at the inlet and outlet.

8. Implementation Strategy Summary

Implementation of the Lake Winona TMDL will focus on reducing phosphorus loads entering the lake and internal phosphorus cycling within the lake. The recommended goals of the implementation strategy will include efforts to shift ecological interactions within Lake Winona to decrease algal production, to increase the grazing of algae by zooplankton, to increase the number and diversity of macrophytes, and improve the transparency of the water. An adaptive management approach is part of

the implementation strategy, where periodic assessments of the impacts of management actions and new data are used to update and refine ongoing TMDL implementation efforts. The implementation will follow the permit requirements discussed in Section 6. Identification of a lead management agency with authority and responsibility for directing the restoration of Lake Winona is recommended.

8.1 Permitted Sources

8.1.1 Construction Stormwater

The WLA for stormwater discharges from sites where there is construction activity reflects the number of construction sites greater than one acre expected to be active in the watershed at any one time, and the BMPs and other stormwater control measures that should be implemented at the sites to limit the discharge of pollutants of concern. The BMPs and other stormwater control measures that should be implemented at construction sites are defined in Minnesota's NPDES/SDS General Stormwater Permit for Construction Activity (MNR100001). If a construction site owner/operator obtains coverage under the NPDES/SDS General Stormwater Permit and properly selects, installs, and maintains all BMPs required under the permit, including those related to impaired waters discharges and any applicable additional requirements found in Section 23 of the Construction General Permit, the stormwater discharges would be expected to be consistent with the WLA in this TMDL. Construction activity must also meet all local government construction stormwater requirements.

8.1.2 Industrial Stormwater

The WLA for stormwater discharges from sites where there is industrial activity reflects the number of sites in the watershed for which NPDES industrial stormwater permit coverage is required, and the BMPs and other stormwater control measures that should be implemented at the sites to limit the discharge of pollutants of concern. Minnesota's NPDES/SDS Industrial Stormwater Multi-Sector General Permit (MNR050000) and NPDES/SDS Nonmetallic Mining/Associated Activities General Permit (MNG490000) establish benchmark concentrations for pollutants in industrial stormwater discharges. If a facility owner/operator obtains stormwater coverage under the appropriate NPDES/SDS Permit and properly selects, installs, and maintains BMPs sufficient to meet the benchmark values in the permit, the stormwater discharges would be expected to be consistent with the WLA in this TMDL report. Industrial activity must also meet all local government stormwater requirements.

8.1.3 MS4

The MPCA oversees all regulated MS4 entities in stormwater management accounting activities. All regulated MS4s in the watershed fall under the category of Phase II. MS4 NPDES/SDS permits require regulated municipalities to implement BMPs to reduce pollutants in stormwater runoff to the maximum extent practicable.

All owners or operators of regulated MS4s (also referred to as "permittees") are required to satisfy the requirements of the MS4 general permit. The MS4 general permit requires the permittee to develop a SWPPP that addresses all permit requirements, including the following six minimum control measures:

- Public education and outreach
- Public participation

- IDDE Program
- Construction-site runoff controls
- Post-construction runoff controls
- Pollution prevention and municipal good housekeeping measures

A SWPPP is a management plan that describes the MS4 permittee's activities for managing stormwater within their jurisdiction or regulated area. In the event a TMDL study has been completed, approved by EPA prior to the effective date of the general permit, and assigns a WLA to an MS4 permittee, that permittee must document the WLA in their application and provide an outline of the BMPs to be implemented in the current permit term to address any needed reduction in loading from the MS4.

The MPCA requires applicants submit their application materials and SWPPP document to MPCA for review. Prior to extension of coverage under the general permit, all application materials are placed on 30-day public notice by the MPCA, to ensure adequate opportunity for the public to comment on each permittee's stormwater management program. Upon extension of coverage by the MPCA, the permittees are to implement the activities described within their SWPPP, and submit annual reports to MPCA by June 30 of each year. These reports document the implementation activities that have been completed within the previous year, analyze implementation activities already installed, and outline any changes within the SWPPP from the previous year.

The MPCA has assigned TP loads to the regulated MS4, the City of Alexandria. The pollutant LAs are outlined in Section 4.0 of the TMDL. The MS4 General Permit, which was issued November 16, 2020, requires permittees to submit information at the time of application on applicable WLAs and document how they will make progress on performance-based WLAs (bacteria, chloride, temperature), demonstrate they are currently meeting their numerical WLAs (oxygen demand, nitrate, TP, or total suspended solids [TSS]), or develop a compliance schedule for those numerical WLAs that are not being met. Because this TMDL will be approved after the issuance date of the General Permit, MS4s will not be required to report on WLAs contained in this TMDL until the issuance of the next General Permit, expected in 2025.

Stormwater BMPs to reduce phosphorus concentrations would to a large extent involve infiltration and filtration practices, though they could also involve the use of stormwater ponds where suitable locations could be identified. Approximately half the runoff entering Lake Winona enters from storm sewer systems, most of which have no management practices for controlling phosphorus concentrations. The Stormwater Basin Watershed, which discharges into the south end of Lake Winona, has an infiltration basin which will reduce phosphorus loads being discharged to Lake Winona and captures a substantial portion of the city's stormwater and significantly reduces the amount of stormwater discharged to Lake Winona. This reduction has not been accounted for in the setting of allocations and the City will be given credit toward its interim and/or final reductions during the implementation planning process. Infiltration on the east side of Lake Winona would likely increase groundwater inflows to the lake because of the southeast to northwest flowing shallow aquifer believed to occur at Lake Winona (WSN 1994). For areas without storm sewers, overland flow paths will need to be identified and appropriate BMPs for controlling phosphorus implemented.

In the initial five year implementation period of the Lake Winona TMDL, the following activities should be considered by the City of Alexandria:

1. During wet weather investigate all areas of the Lake Winona Watershed within the city of Alexandria, including the airport, and identified flow pathways and points other than storm sewers where runoff concentrates and enters the lake.
2. For each storm sewer outfall and concentrated flow point, identify appropriate phosphorus removal BMPs to be implemented along with a schedule for implementation.
3. Investigate the alternative of redirecting stormwater outfalls to locations outside the Lake Winona Watershed.
4. Implement a public education program aimed at reducing sources of phosphorus within the Lake Winona Watershed.

8.1.4 Wastewater

ALASD is required to follow the permit requirements outlined in the NPDES/SDS Permit (MN0040738) issued November 15, 2020. Should the ALASD's Adaptive Lake Management Plan fail to achieve water quality standards, the permit requires compliance with the final TP effluent limit as soon as possible, but in any case no later than December 31, 2032. Permit effluent limits are derived from the Lake Winona SSS and are consistent with the assumptions and requirements of this TMDL.

8.2 Non-Permitted Sources

8.2.1 LaGrand Township

The following implementation activities within LaGrand Township could be conducted to better understand nutrient sources and address problem areas:

1. During wet weather, investigate all areas of the Lake Winona Watershed within LaGrand Township and identified flow pathways where runoff concentrates and enters the lake.
2. For each concentrated flow point, identify appropriate phosphorus removal BMPs to be implemented.
3. Implement a public education program aimed at reducing sources of phosphorus within the Lake Winona Watershed.

8.2.2 Internal Loading

Addressing internal loading includes at a minimum, management of the fisheries (particularly carp), restoration of macrophytes, and management of phosphorus releases from bottom sediments. These Adaptive Lake Management Plan activities are addressed in detail in Section 6.2.4. This adaptive lake management approach follows recent work in other shallow lakes, where the completion of carp removal results in the establishment submerged aquatic vegetation that will flip the lake to the clear lake state needed to achieve water quality standards. Aquatic macrophytes play a significant role in maintaining water quality and ecosystem health by providing habitat for zooplankton, which feed on algae, thus providing increased water clarity. Aquatic macrophytes also play a crucial role in decreasing sediment and phosphorus re-suspension. The combination of directly reducing re-suspension of nutrient

laden sediment, competing with algae for the uptake of suspended nutrients, and providing structure for epiphytes and zooplankton creates a positive feedback loop to help maintain water clarity. The common carp stir up sediment and uproot vegetation. Sediment re-suspension increases turbidity and releases sediment bound nutrients, which in turn feed algae blooms. Also, increase in suspended sediment and algae decreases the water clarity and available light for rooted vegetation, further increasing the turbid water state. Reducing the carp population in turbid lakes with very high abundance of common carp can be a means of restoring the aquatic macrophytes and improving water quality, because the removal will reduce the uprooting and likely lead to an increase in water clarity and aquatic macrophytes. Once high populations of carp are removed from the lake sediment re-suspension should decrease and water clarity should improve (Knopik 2014).

However, if carp management fails to result in achievement of water quality standards, the next step in the lake management sequence is to pursue a whole-lake drawdown. Ducks Unlimited and the DNR routinely conduct whole lake drawdowns in Minnesota to establish submerged aquatic vegetation, and most of the examples for shallow lake restoration in the Upper Midwest include combined management techniques of carp removal and whole-lake drawdown. These projects have demonstrated good success in invigorating the existing seed bed resulting in plant establishment without any need for transplanting.

8.3 Cost

The Clean Water Legacy Act requires that a TMDL include an overall approximation of the cost to implement a TMDL [Minn. Stat. 2007, § 114D.25]. A detailed analysis of the cost to implement the TP TMDLs was not conducted, but it is estimated the total cost of implementing the Lake Winona TMDL will run into the millions of dollars. As a rough approximation one can use some general results from BMP cost studies across the U.S. For example, an EPA summary of several studies of predominantly developed urban landscapes showed a median cost of approximately $2,200 per pound TP removed per year (Foraste et al. 2012). Multiplying that by the needed 2,535 pound reduction for both lake basins provides a total cost of approximately $5.6M. Estimated annual costs associated with phosphorus removal are more than $500,000/year for the first five years assuming continued advanced WWTP operation and adaptive lake management plan implementation (the lake management project is assumed to be completed within the next five years). Long Term annual costs for TP removal are estimated at $1,350,000/year over the next 20 years assuming WWTP upgrade (i.e. this does not include other WWTF upgrades necessary due to aging infrastructure or other pollutants such as chlorides).

8.4 Adaptive Management

This list of implementation elements focuses on adaptive management (Figure 11). Continued monitoring and “course corrections” responding to monitoring results are the most appropriate strategy for attaining the water quality goals established in this TMDL. Management activities will be changed or refined to efficiently meet the TMDL and lay the groundwork for de-listing the impaired water bodies.

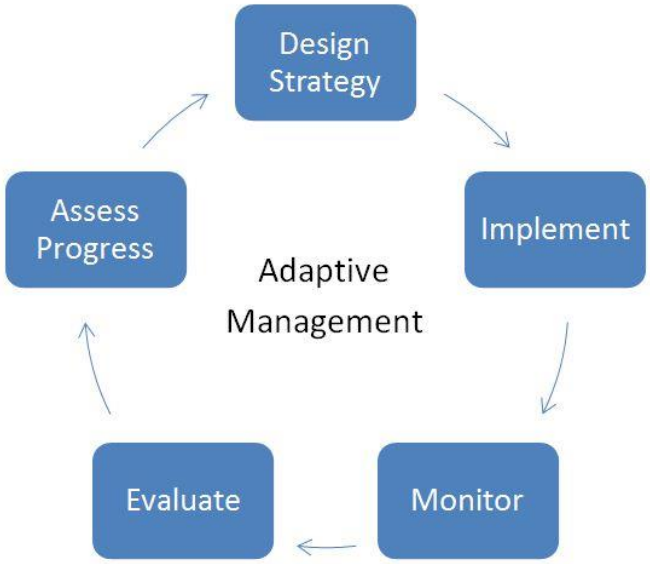

Figure 11. Adaptive management

9. Public Participation

9.1 Steering Committee

The Lake Winona TMDL Project includes public participation through a TAC established in 2006 by the MPCA (see Table 17). Members of the committee include representatives from state and local agencies, as well as citizens interested in the project. Agencies typically represented at the Advisory Committee meetings are MPCA, DNR, Douglas County, City of Alexandria, and ALASD. The Lake Le Homme Dieu Association has been regularly represented.

The MPCA leads the Advisory committee meetings, including setting meeting dates, preparing agenda, preparing meeting notes, and distribution of meeting notes after a meeting was held. Much of the communication by MPCA relative to the TAC has been via email.

9.2 Public Meetings

Public participation for this TMDL project began in 2006 with multiple meetings over several years. The draft TMDL was on public notice in 2011 and also 2016. The TMDL was again revised and an opportunity for public comment on the draft TMDL report was provided via a public notice in the State Register from April 26, 2021 through May 26, 2021. Three comment letters were received and responded to as a result of the public comment period.

Table 17. Lake Winona TMDL project meetings

Meeting Date	Meeting Location	Type of Meeting
3/29/06	Alexandria City Hall	Advisory Committee Meeting
11/15/06	Alexandria City Hall	Advisory Committee Meeting
1/17/07	Alexandria City Hall	Advisory Committee Meeting
9/19/07	Alexandria City Hall	Advisory Committee Meeting
10/17/07	Alexandria City Hall	Advisory Committee Meeting
11/28/07	Alexandria City Hall	Advisory Committee Meeting
2/20/08	Alexandria City Hall	Advisory Committee Meeting
5/14/08	Alexandria City Hall	Advisory Committee Meeting
10/22/08	Alexandria City Hall	Advisory Committee Meeting
9/30/09	Alexandria City Hall	Advisory Committee Meeting
11/25/09	Alexandria City Hall	Advisory Committee Meeting
4/7/10	Alexandria City Hall	Advisory Committee Meeting
7/14/10	Alexandria City Hall	Advisory Committee Meeting
9/22/10	Alexandria City Hall	Advisory Committee Meeting
2/23/11	Alexandria City Hall	Advisory Committee Meeting
5/30/11-7/14/11 Draft Site Specific Standard (SSS) and TMDL public noticed		
8/25/11	Alexandria City Hall	Advisory Committee Meeting
6/12/14 SSS approved by EPA and TMDL draft was updated		
12/5/2016-2/3/2017 Public Notice Period* due to concerns raised during the public notice period, the TMDL was on hold until the ALASD permit was updated.		
12/16/16	Alexandria City Hall	Public Meeting
12/10/2020	Skype Meeting	ALASD, DNR, MPCA discussion regarding the updated permit and next steps to update the TMDL

10. Literature Cited

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Appendix A: WinSLAMM Supporting Information

Table 18. Northeast Alexandria Watershed land use inputs

		Source Areas														
Land Use	**Total Area [acre]**	**Roofs [%]**	**Roofs [acre]**	**Roof Type**	**Drive/ Parking [%]**	**Drive/ Parking [acre]**	**Landscape [%]**	**Landscape [acre]**	**Road [%]**	**Road [acre]**	**Sidewalk [%]**	**Sidewalk [acre]**	**Road Width [ft]**		
Airport/Rail	0.00	0.70	0.00	Flat	15.00	0.00	83.40	0.00	0.90	0.00	0.00	0.00	40.00		
CBD Commercial	4.64	45.00	2.09	Flat	45.00	2.09	2.50	0.12	5.00	0.23	2.50	0.12	40.00		
Commercial	20.00	20.00	4.00	Flat	60.00	12.00	2.50	0.50	15.00	3.00	2.50	0.50	40.00		
High Density Residential	11.82	37.00	4.37	Pitched	40.50	4.79	10.00	1.18	10.00	1.18	2.50	0.30	40.00		
Industrial	0.00	0.00	0.00	Flat	0.00	0.00	94.00	0.00	6.00	0.00	0.00	0.00	40.00		
Institutional - Hospital/College	4.14	20.00	0.83	Flat	60.00	2.48	12.50	0.52	5.00	0.21	2.50	0.10	40.00		
Institutional - School	15.48	7.50	1.16	Flat	65.00	10.06	27.50	4.26	0.00	0.00	0.00	0.00	40.00		
Institutional - Nursing Home	5.49	25.00	1.37	Pitched	25.00	1.37	36.00	1.98	12.00	0.66	2.00	0.11	40.00		
Lakes/Wetlands	1.90	0.00	0.00		0.00	0.00	100.00	1.90	0.00	0.00	0.00	0.00	40.00		
Low to Medium Density Residential	227.55	20.00	45.51	Pitched	1.00	2.28	49.00	111.50	25.00	56.89	5.00	11.38	40.00		
Private Parks/Open Space/Natural Amenities	0.00	0.00	0.00		7.50	0.00	80.00	0.00	10.00	0.00	2.50	0.00	40.00		
Public Park	1.44	0.00	0.00		2.50	0.04	92.50	1.33	2.50	0.04	2.50	0.04	40.00		
Public/Governmental Facilities - ALASD WWTP	0.00	1.00	0.00	Flat	4.00	0.00	90.00	0.00	5.00	0.00	0.00	0.00	40.00		
Public/Governmental Facilities - Courthouse/Library	13.78	40.00	5.51	Flat	40.00	5.51	10.00	1.38	7.50	1.03	2.50	0.34	40.00	**Freeway length [mi]**	**ADT**
Highway - Rural	0.00	0.00	0.00		0.00	0.00	44.00	0.00	56.00	0.00	0.00	0.00	80.00	0.00	33200
Highway - Curb and Gutter	6.54	0.00	0.00		0.00	0.00	0.00	0.00	86.00	5.62	14.00	0.92	80.00	0.56	
Rural Residential	0.00	0.00	0.00		0.00	0.00	85.00	0.00	15.00	0.00	0.00	0.00	40.00		
Vacant/Agricultural	9.45	0.00	0.00		0.00	0.00	92.00	8.69	8.00	0.76	0.00	0.00	40.00		
Total Land Surface Area	**322.23**		**64.84**			**40.62**		**133.35**		**69.62**		**13.80**			

Table 19. South Alexandria Watershed land use inputs

		Source Areas											
Land Use	**Total Area [acre]**	**Roofs [%]**	**Roofs [acre]**	**Roof Type**	**Drive/ Parking [%]**	**Drive/ Parking [acre]**	**Landscape [%]**	**Landscape [acre]**	**Road [%]**	**Road [acre]**	**Sidewalk [%]**	**Sidewalk [acre]**	**Road Width [ft]**
Airport/Rail	212.36	0.70	1.49	Flat	15.00	31.85	83.40	177.11	0.90	1.91	0.00	0.00	40.00
CBD Commercial	0.00	45.00	0.00	Flat	45.00	0.00	2.50	0.00	5.00	0.00	2.50	0.00	40.00
Commercial	0.00	20.00	0.00	Flat	60.00	0.00	2.50	0.00	15.00	0.00	2.50	0.00	40.00
High Density Residential	0.00	37.00	0.00	Pitched	40.50	0.00	10.00	0.00	10.00	0.00	2.50	0.00	40.00
Industrial	0.00	0.00	0.00	Flat	0.00	0.00	94.00	0.00	6.00	0.00	0.00	0.00	40.00
Institutional - Hospital/College	0.00	20.00	0.00	Flat	60.00	0.00	12.50	0.00	5.00	0.00	2.50	0.00	40.00
Institutional - School	0.00	7.50	0.00	Flat	65.00	0.00	27.50	0.00	0.00	0.00	0.00	0.00	40.00
Institutional - Nursing Home	0.00	25.00	0.00	Pitched	25.00	0.00	36.00	0.00	12.00	0.00	2.00	0.00	40.00
Lakes/Wetlands	5.09	0.00	0.00		0.00	0.00	100.00	5.09	0.00	0.00	0.00	0.00	40.00
Low to Medium Density Residential	13.00	20.00	2.60	Pitched	1.00	0.13	49.00	6.37	25.00	3.25	5.00	0.65	40.00
Private Parks/Open Space/Natural Amenities	0.00	0.00	0.00		7.50	0.00	80.00	0.00	10.00	0.00	2.50	0.00	40.00
Public Park	0.31	0.00	0.00		2.50	0.01	92.50	0.29	2.50	0.01	2.50	0.01	40.00
Public/Governmental Facilities - ALASD WWTP	75.95	1.00	0.76	Flat	4.00	3.04	90.00	68.36	5.00	3.80	0.00	0.00	40.00
Public/Governmental Facilities - Courthouse/Library	0.00	40.00	0.00	Flat	40.00	0.00	10.00	0.00	7.50	0.00	2.50	0.00	40.00
Highway - Rural	0.00	0.00	0.00		0.00	0.00	44.00	0.00	56.00	0.00	0.00	0.00	80.00
Highway - Curb and Gutter	0.00	0.00	0.00		0.00	0.00	0.00	0.00	86.00	0.00	14.00	0.00	80.00
Rural Residential	3.26	0.00	0.00		0.00	0.00	85.00	2.77	15.00	0.49	0.00	0.00	40.00
Vacant/Agricultural	9.15	0.00	0.00		0.00	0.00	92.00	8.42	8.00	0.73	0.00	0.00	40.00
Total Land Surface Area	**319.12**		**4.85**			**35.03**		**268.40**		**10.19**		**0.66**	

Table 20. Stormwater Basin Watershed land use inputs

		Source Areas													
Land Use	**Total Area [acre]**	**Roofs [%]**	**Roofs [acre]**	**Roof Type**	**Pavement/ Parking [%]**	**Pavement/ Parking [acre]**	**Landscape [%]**	**Landscape [acre]**	**Road [%]**	**Road [acre]**	**Sidewalk [%]**	**Sidewalk [acre]**	**Road Width [ft]**		
Airport/Rail	204.34	0.70	1.43	Flat	15.00	30.65	83.40	170.42	0.90	1.84	0.00	0.00	40.00		
CBD Commercial	0.00	45.00	0.00	Flat	45.00	0.00	2.50	0.00	5.00	0.00	2.50	0.00	40.00		
Commercial	115.34	20.00	23.07	Flat	60.00	69.20	2.50	2.88	15.00	17.30	2.50	2.88	40.00		
High Density Residential	19.74	37.00	7.30	Pitched	40.50	7.99	10.00	1.97	10.00	1.97	2.50	0.49	40.00		
Industrial	8.98	0.00	0.00	Flat	0.00	0.00	94.00	8.44	6.00	0.54	0.00	0.00	40.00		
Institutional - Hospital/College	36.65	20.00	7.33	Flat	60.00	21.99	12.50	4.58	5.00	1.83	2.50	0.92	40.00		
Institutional - School	0.00	7.50	0.00	Flat	65.00	0.00	27.50	0.00	0.00	0.00	0.00	0.00	40.00		
Institutional - Nursing Home	0.00	25.00	0.00	Pitched	25.00	0.00	36.00	0.00	12.00	0.00	2.00	0.00	40.00		
Lakes/Wetlands	2.20	0.00	0.00		0.00	0.00	100.00	2.20	0.00	0.00	0.00	0.00	40.00		
Low to Medium Density Residential	79.06	20.00	15.81	Pitched	1.00	0.79	49.00	38.74	25.00	19.77	5.00	3.95	40.00		
Private Parks/Open Space/Natural Amenities	0.00	0.00	0.00		7.50	0.00	80.00	0.00	10.00	0.00	2.50	0.00	40.00		
Public Park	32.48	0.00	0.00		2.50	0.81	92.50	30.04	2.50	0.81	2.50	0.81	40.00		
Public/Governmental Facilities - ALASD WWTP	0.00	1.00	0.00		4.00	0.00	90.00	0.00	5.00	0.00	0.00	0.00	40.00		
Public/Governmental Facilities - Courthouse/Library	0.00	40.00	0.00		40.00	0.00	10.00	0.00	7.50	0.00	2.50	0.00	40.00	**Freeway length [mi]**	**ADT**
Highway - Rural	6.65	0.00	0.00		0.00	0.00	44.00	2.93	56.00	3.72	0.00	0.00	80.00	0.38	33200
Highway - Curb and Gutter	8.73	0.00	0.00		0.00	0.00	0.00	0.00	86.00	7.51	14.00	1.22	80.00	0.71	
Rural Residential	0.00	0.00	0.00		0.00	0.00	85.00	0.00	15.00	0.00	0.00	0.00	40.00		
Vacant/Agricultural	20.18	0.00	0.00		0.00	0.00	92.00	18.57	8.00	1.61	0.00	0.00	40.00		
Total Land Surface Area	**534.35**		**54.94**			**131.44**		**280.77**		**56.91**		**10.28**			

Table 21. Northwest LaGrand Watershed land use inputs

		Source Areas											
Land Use	**Total Area [acre]**	**Roofs [%]**	**Roofs [acre]**	**Roof Type**	**Drive/ Parking [%]**	**Drive/ Parking [acre]**	**Landscape [%]**	**Landscape [acre]**	**Road [%]**	**Road [acre]**	**Sidewalk [%]**	**Sidewalk [acre]**	**Road Width [ft]**
Institutional - School	1.64	0.00	0.00	Flat	0.00	0.00	95.00	1.56	5.00	0.08	0.00	0.00	40.00
Low to Medium Density Residential	37.05	20.00	7.41	Pitched	1.00	0.37	49.00	18.15	25.00	9.26	5.00	1.85	40.00
Total Land Surface Area	**38.69**		**7.41**			**0.37**		**19.71**		**9.34**		**1.85**	

Table 22. South LaGrand Watershed land use inputs

		Source Areas											
Land Use	**Total Area [acre]**	**Roofs [%]**	**Roofs [acre]**	**Roof Type**	**Drive/ Parking [%]**	**Drive/ Parking [acre]**	**Landscape [%]**	**Landscape [acre]**	**Road [%]**	**Road [acre]**	**Sidewalk [%]**	**Sidewalk [acre]**	**Road Width [ft]**
Low to Medium Density Residential	48.05	20.00	9.61	Pitched	1.00	0.48	49.00	23.54	25.00	12.01	5.00	2.40	40.00
Private Parks/Open Space/Natural Amenities	4.14	0.00	0.00		7.50	0.31	80.00	3.31	10.00	0.41	2.50	0.10	40.00
Public Park	1.60	0.00	0.00		2.50	0.04	92.50	1.48	2.50	0.04	2.50	0.04	40.00
Vacant/Agricultural	2.41	0.00	0.00		0.00	0.00	92.00	2.22	8.00	0.19	0.00	0.00	40.00
Total Land Surface Area	**56.20**		**9.61**			**0.83**		**30.55**		**12.66**		**2.55**	

Appendix B: BATHTUB Model Supporting Information

Table 23. Lake Winona calibrated existing conditions observed and predicted total phosphorus

File: X:\Clients_State\172_MPCA\0088_Lake_Winona_TMDL\07_Modeling\BATHTUB models\Winona_2005-2014_existing.btb

Predicted & Observed Values Ranked Against CE Model Development Dataset

Segment: 3 Area-Wtd Mean

		Predicted Values--->			Observed Values--->		
Variable		**Mean**	**CV**	**Rank**	**Mean**	**CV**	**Rank**
TOTAL P	MG/M3	196.1	0.45	94.1%	196.0	0.05	94.1%

Segment: 1 South Winona

		Predicted Values--->			Observed Values--->		
Variable		**Mean**	**CV**	**Rank**	**Mean**	**CV**	**Rank**
TOTAL P	MG/M3	196.2	0.45	94.1%	204.0	0.05	94.6%

Segment: 2 North Winona

		Predicted Values--->			Observed Values--->		
Variable		**Mean**	**CV**	**Rank**	**Mean**	**CV**	**Rank**
TOTAL P	MG/M3	196.1	0.45	94.1%	183.0	0.05	93.2%

Table 24. Lake Winona calibrated existing conditions flow and phosphorus mass balance

File: X:\Clients_State\172_MPCA\0088_Lake_Winona_TMDL\07_Modeling\BATHTUB models\Winona_2005-2014_existing.btb

Segment Mass Balance Based Upon Predicted Concentrations

Component: TOTAL P **Segment: 1 South Winona**

Trib	Type	Location	Flow hm^3/yr	Flow %Total	Load kg/yr	Load %Total	Conc mg/m^3
1	3	ALASD	3.7	81.3%	819.6	55.2%	220
2	1	South Alexandria	0.1	2.0%	33.8	2.3%	376
3	1	Stormwater Basin	0.4	9.8%	149.8	10.1%	333
4	1	South LaGrand	0.1	1.1%	26.0	1.7%	519
PRECIPITATION			0.3	5.8%	13.7	0.9%	51
INTERNAL LOAD			0.0	0.0%	441.4	29.7%	
TRIBUTARY INFLOW			0.6	12.9%	209.6	14.1%	355
POINT-SOURCE INFLOW			3.7	81.3%	819.6	55.2%	220
***TOTAL INFLOW			4.6	100.0%	1484.3	100.0%	324
ADVECTIVE OUTFLOW			4.3	94.1%	845.7	57.0%	196
NET DIFFUSIVE OUTFLOW			0.0	0.0%	2.0	0.1%	
***TOTAL OUTFLOW			4.3	94.1%	847.7	57.1%	197
***EVAPORATION			0.3	5.9%	0.0	0.0%	
***RETENTION			0.0	0.0%	636.5	42.9%	

Hyd. Residence Time = 0.1449 yrs
Overflow Rate = 9.5 m/yr
Mean Depth = 1.4 m

Component: TOTAL P **Segment: 2 North Winona**

Trib	Type	Location	Flow hm^3/yr	Flow %Total	Load kg/yr	Load %Total	Conc mg/m^3
5	1	North Stormwater	0.3	7.2%	151.6	11.6%	433
6	1	Northwest LaGrand	0.0	0.8%	20.3	1.6%	508
PRECIPITATION			0.2	3.4%	8.5	0.7%	51
INTERNAL LOAD			0.0	0.0%	273.9	21.0%	
TRIBUTARY INFLOW			0.4	8.0%	171.9	13.2%	441
ADVECTIVE INFLOW			4.3	88.6%	845.7	65.0%	196
NET DIFFUSIVE INFLOW			0.0	0.0%	2.0	0.2%	
***TOTAL INFLOW			4.9	100.0%	1302.0	100.0%	267
ADVECTIVE OUTFLOW			4.7	96.5%	921.5	70.8%	196
***TOTAL OUTFLOW			4.7	96.5%	921.5	70.8%	196
***EVAPORATION			0.2	3.5%	0.0	0.0%	
***RETENTION			0.0	0.0%	380.5	29.2%	

Hyd. Residence Time = 0.0795 yrs
Overflow Rate = 16.6 m/yr
Mean Depth = 1.3 m

Table 25. Lake Winona TMDL scenario predicted total phosphorus

File: X:\Clients_State\172_MPCA\0088_Lake_Winona_TMDL\07_Modeling\BATHTUB models\Winona_2005-2014_goal.btb

Predicted & Observed Values Ranked Against CE Model Development Dataset

Segment: 3 Area-Wtd Mean

		Predicted Values--->			Observed Values--->		
Variable		**Mean**	**CV**	**Rank**	**Mean**	**CV**	**Rank**
TOTAL P	MG/M3	74.6	0.45	68.9%	196.0	0.05	94.1%

Segment: 1 South Winona

		Predicted Values--->			Observed Values--->		
Variable		**Mean**	**CV**	**Rank**	**Mean**	**CV**	**Rank**
TOTAL P	MG/M3	75.0	0.45	69.1%	204.0	0.05	94.6%

Segment: 2 North Winona

		Predicted Values--->			Observed Values--->		
Variable		**Mean**	**CV**	**Rank**	**Mean**	**CV**	**Rank**
TOTAL P	MG/M3	74.0	0.45	68.6%	183.0	0.05	93.2%

Table 26. Lake Winona TMDL scenario flow and phosphorus mass balance

File: X:\Clients_State\172_MPCA\0088_Lake_Winona_TMDL\07_Modeling\BATHTUB models\Winona_2005-2014_goal.btb

Segment Mass Balance Based Upon Predicted Concentrations

Component: TOTAL P **Segment: 1 South Winona**

Trib	Type	Location	Flow hm^3/yr	Flow %Total	Load kg/yr	Load %Total	Conc mg/m^3
1	3	ALASD	6.3	88.1%	665.0	89.1%	105
2	1	South Alexandria	0.1	1.3%	9.0	1.2%	100
3	1	Stormwater Basin	0.4	6.3%	45.0	6.0%	100
4	1	South LaGrand	0.1	0.7%	5.0	0.7%	100
PRECIPITATION			0.3	3.7%	13.7	1.8%	51
INTERNAL LOAD			0.0	0.0%	8.3	1.1%	
TRIBUTARY INFLOW			0.6	8.2%	59.0	7.9%	100
POINT-SOURCE INFLOW			6.3	88.1%	665.0	89.1%	105
***TOTAL INFLOW			7.2	100.0%	746.0	100.0%	104
ADVECTIVE OUTFLOW			6.9	96.2%	519.1	69.6%	75
NET DIFFUSIVE OUTFLOW			0.0	0.0%	64.7	8.7%	
***TOTAL OUTFLOW			6.9	96.2%	583.8	78.3%	84
***EVAPORATION			0.3	3.8%	0.0	0.0%	
***RETENTION			0.0	0.0%	162.2	21.7%	

Hyd. Residence Time = 0.0903 yrs
Overflow Rate = 15.2 m/yr
Mean Depth = 1.4 m

Component: TOTAL P **Segment: 2 North Winona**

Trib	Type	Location	Flow hm^3/yr	Flow %Total	Load kg/yr	Load %Total	Conc mg/m^3
5	1	North Stormwater	0.3	4.7%	35.0	5.5%	100
6	1	Northwest LaGrand	0.0	0.5%	4.0	0.6%	100
PRECIPITATION			0.2	2.2%	8.5	1.3%	51
INTERNAL LOAD			0.0	0.0%	5.2	0.8%	
TRIBUTARY INFLOW			0.4	5.2%	39.0	6.1%	100
ADVECTIVE INFLOW			6.9	92.6%	519.1	81.6%	75
NET DIFFUSIVE INFLOW			0.0	0.0%	64.7	10.2%	
***TOTAL INFLOW			7.5	100.0%	636.5	100.0%	85
ADVECTIVE OUTFLOW			7.3	97.7%	540.8	85.0%	74
***TOTAL OUTFLOW			7.3	97.7%	540.8	85.0%	74
***EVAPORATION			0.2	2.3%	0.0	0.0%	
***RETENTION			0.0	0.0%	95.7	15.0%	

Hyd. Residence Time = 0.0511 yrs
Overflow Rate = 25.8 m/yr
Mean Depth = 1.3 m

Appendix C. Lake Winona water quality update

The following graphs present water quality data for Lake Winona. Because of the extended time line of this TMDL report's review, four additional years of data were collected after the TMDL was developed and the report was written. Table 27 and Figure 12 through Figure 14 summarize data at sites 102 and 103. Data were averaged by day at each site before annual growing season means were calculated. In Figure 12 to Figure 14, the mean values for the two sites are offset for ease of comparison.

Table 27. 10-year growing season means for Lake Winona, 2005–2014 compared to 2009–2018
The averages were calculated as the average of the annual growing season means; the 2005–2014 averages differ slightly from those presented in Table 6.

Basin (Monitoring station)	Parameter	Growing Season (June–September) Average	
		2005–2014	2009–2018
South Basin (21-0081-00-102)	Total phosphorus (µg/L)	212	172
	Chlorophyll-*a* (µg/L)	179	136
	Secchi transparency (m)	0.46	0.48
North Basin (21-0081-00-103)	Total phosphorus (µg/L)	190	158
	Chlorophyll-*a* (µg/L)	165	129
	Secchi transparency (m)	0.41	0.44

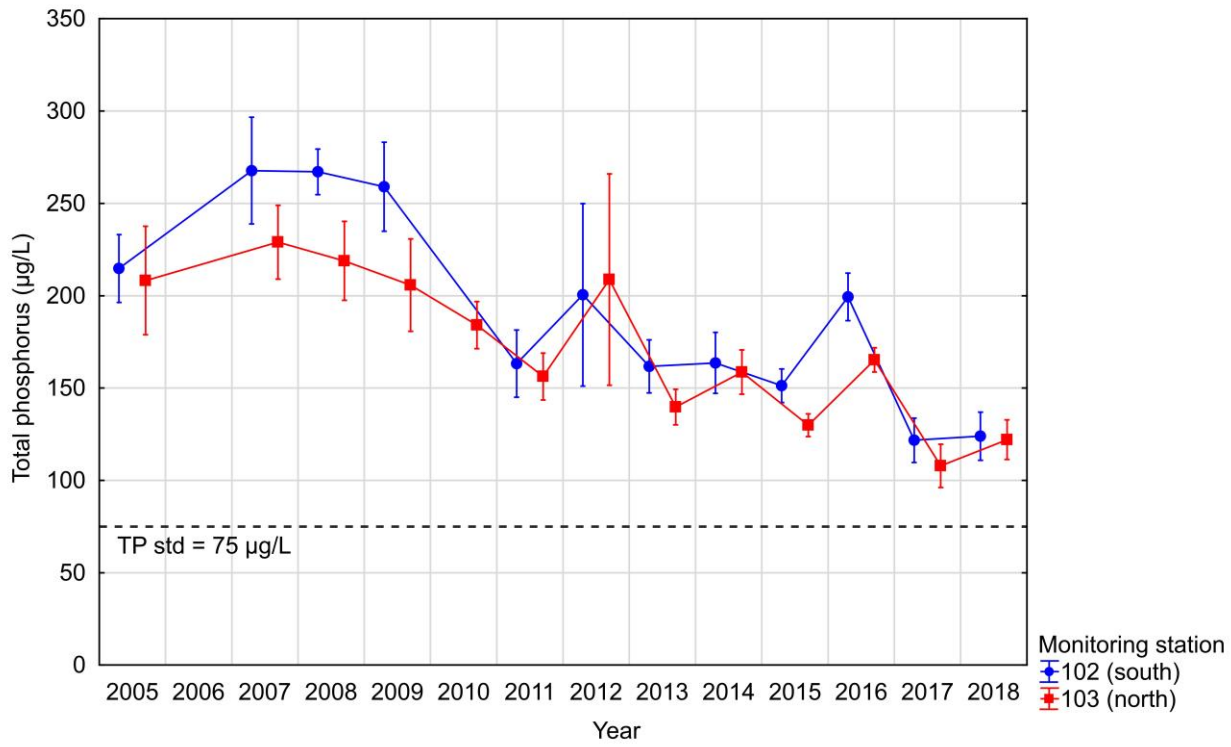

Figure 12. Growing season average phosphorus concentration, Lake Winona station 102 vs. 103, 2005–2018

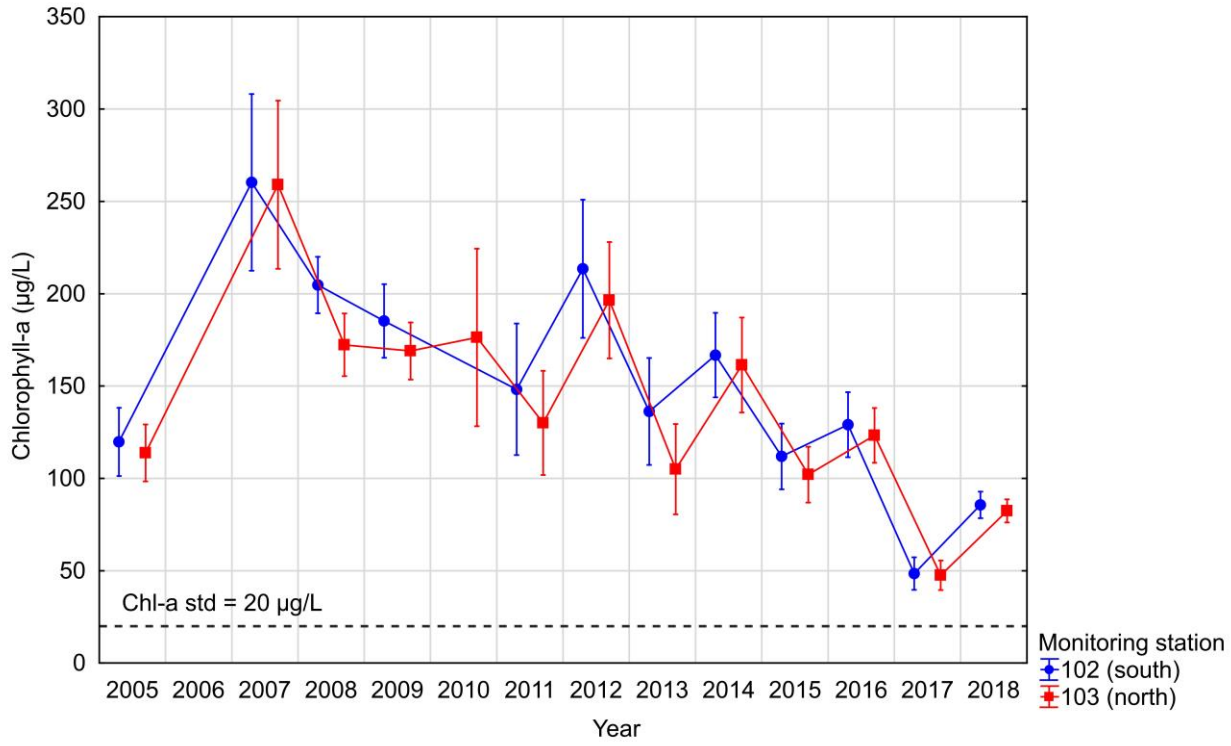

Figure 13. Growing season average chlorophyll-a concentration, Lake Winona station 102 vs. 103, 2005–2018

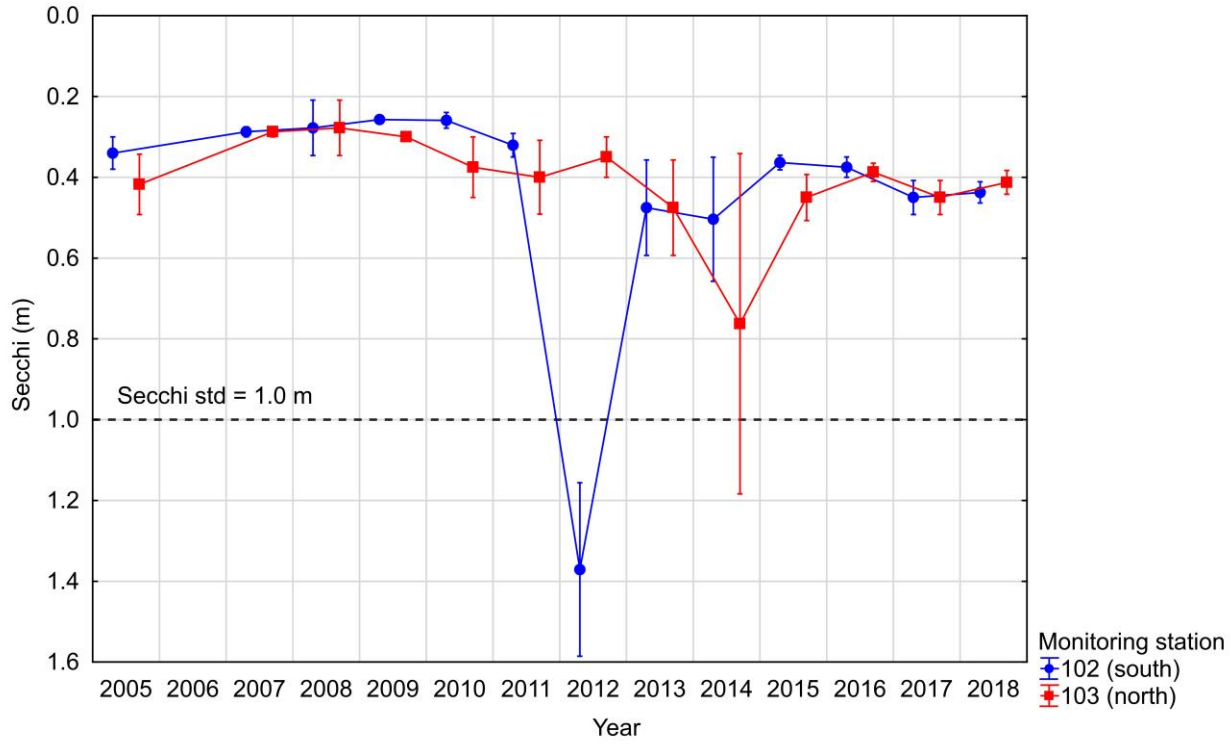

Figure 14. Growing season average Secchi depth, Lake Winona station 102 vs. 103, 2005–2018

Appendix D. Alexandria Lake Area Sanitary District NPDES Permit

MINNESOTA POLLUTION CONTROL AGENCY

National Pollutant Discharge Elimination System/State Disposal System

MN0040738

Permittee:	Alexandria Lake Area Sanitary District
Facility name:	Alexandria Lakes Area Sanitary District Wastewater Treatment Facility
Receiving water:	Lake Winona - Class 2B, 3C, 4A, 4B, 5, 6 water
City:	Alexandria **County:** Douglas
Issuance date:	November 15, 2020
Expiration date:	October 31, 2025

The state of Minnesota, on behalf of its citizens through the Minnesota Pollution Control Agency (MPCA), authorizes the Permittee to operate a disposal system at the facility named above and to discharge from this facility to the receiving water named above, in accordance with the requirements of this permit.

The goal of this permit is to reduce pollutant levels in point source discharges and protect water quality in accordance with the U.S. Clean Water Act, Minnesota statutes and rules, and federal laws and regulations.

Although this permit is effective on the issuance date identified above, the limits and monitoring requirements are not effective until December 01, 2020. This permit expires at midnight on the expiration date identified above.

Signature: Paul C. Scheirer

This document has been electronically signed.

Paul C. Scheirer

Supervisor

Northeast/Northwest Regional Unit

Municipal Division

for the Minnesota Pollution Control Agency

Submit eDMRs

Submit via the MPCA e-Services at

https://rsp.pca.state.mn.us/TEMPO_RSP/Orchestrate.do?initiate=true

Submit WQ reports to:

Electronically: wq.submittals.mpca@state.mn.us
Include *Water quality submittals form*:
https://www.pca.state.mn.us/sites/default/files/wq-wwprm7-71.docx

Questions on this permit?

For eDMR and other permit reporting issues, use the directory listed at the bottom of the DMR page: https://www.pca.state.mn.us/water/discharge-monitoring-reports

Or, by mail:

Attention: WQ Submittals Center

Minnesota Pollution Control Agency

520 Lafayette Road North

St. Paul, MN 55155-4194

Whole Effluent Testing (WET) and Pretreatment Annual Reports must be mailed to the WQ Submittals Center

For specific permit requirements, contact your compliance staff: https://www.pca.state.mn.us/water/wastewater-compliance-and-enforcement-staff-contacts

Wastewater Permit Program general questions, contact: MPCA, 651-282-6143 or 1-800-657-3938.

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1. Permitted facility description

The Alexandria Lake Area Sanitary District Facility (Facility) is located at 2201 Nevada St SW, Alexandria, Minnesota 56308-9152, Douglas County.

The existing Facility consists of a main lift station, force main, influent screening, screenings washing and compaction, vortex grit removal and grit washing, two primary settling tanks, three fine pore ceramic diffuser aeration tanks, three secondary clarifiers, cloth media tertiary filtration, chlorination tanks, dissolved air flotation thickening of waste activated sludge, four aerobic digesters, centrifuge dewatering, and outfall pipeline. There are no known bypass points for the wastewater collection/treatment system. This is a Class A Facility.

The Facility has a continuous discharge (SD 001) to Lake Winona (Class 2B, 3C, 4A, 4B, 5, 6 water), and has an average wet weather design flow of 4,700,000 gallons per day (gpd), with a five-day carbonaceous biochemical oxygen demand strength of 7,100 pounds per day (lbs/d). The system is also designed to treat up to 6,000 lbs/d of TSS, 210 lbs/d of TP, and 470 lbs/d of ammonia nitrogen.

The collection system has 222 miles of gravity sewer, 52 miles of force main sewer, 119 lift stations, 48 grinder stations and 124 grinder residential systems.

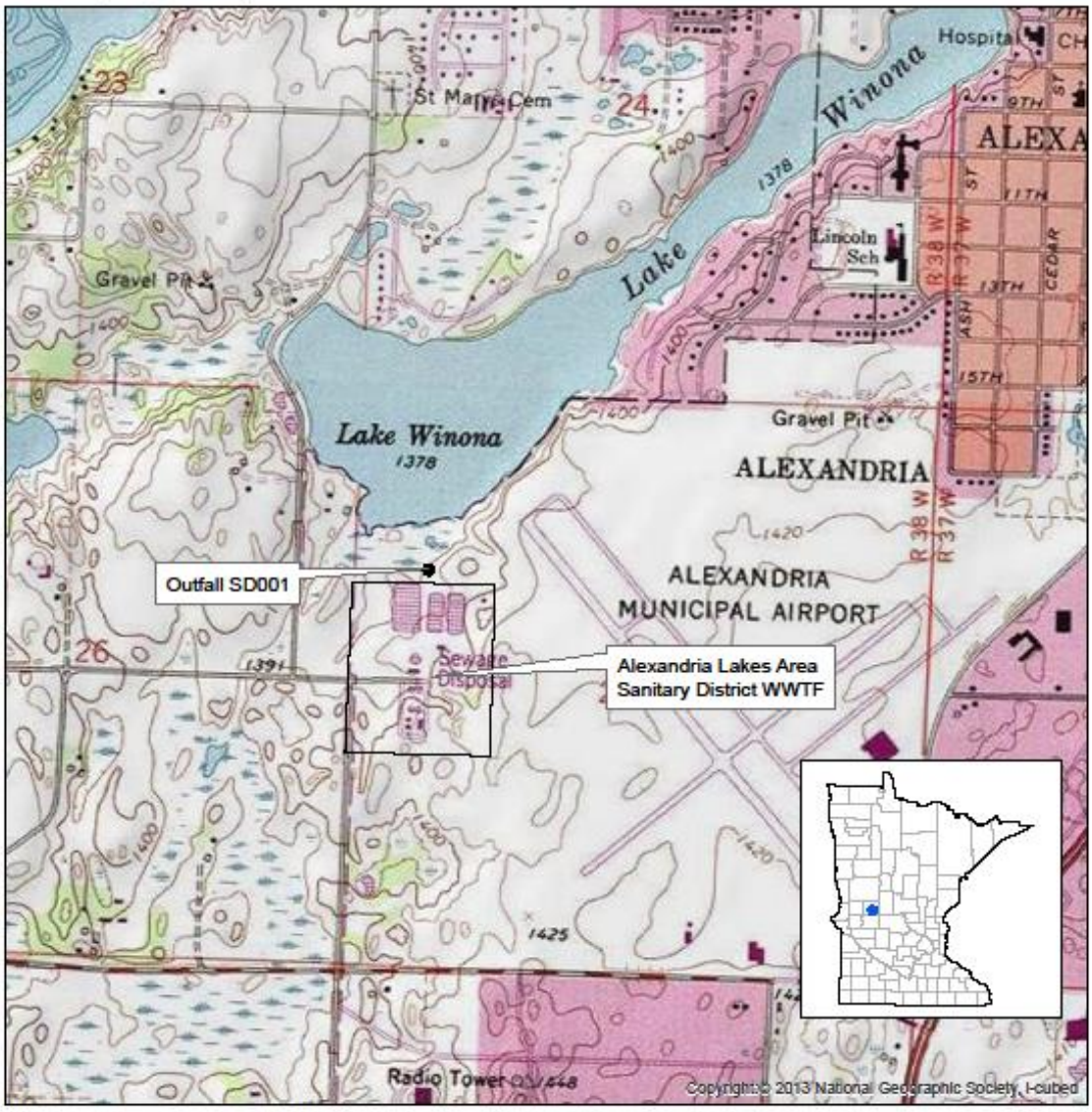
Changes to the facility may result in an increase in pollutant loading to surface waters or other causes of degradation to surface waters. If a change to the facility will result in a net increase in pollutant loading or other causes of degradation that exceed the maximum loading authorized through conditions specified in the existing permit, the changes to the facility are subject to antidegradation requirements found in Minn. R. 7050.0250 to 7050.0335.

This Permit also complies with Minn. R. 7053.0275 regarding anti-backsliding.

Any point source discharger of sewage, industrial, or other wastes for which a NPDES permit has been issued by the MPCA that contains effluent limits more stringent than those that would be established by Minn. R. 7053.0215 to 7053.0265 shall continue to meet the effluent limits established by the permit, unless the permittee establishes that less stringent effluent limits are allowable pursuant to federal law, under section 402(o) of the Clean Water Act, United States Code, title 33, section 1342.]

2. Location map of permitted facility

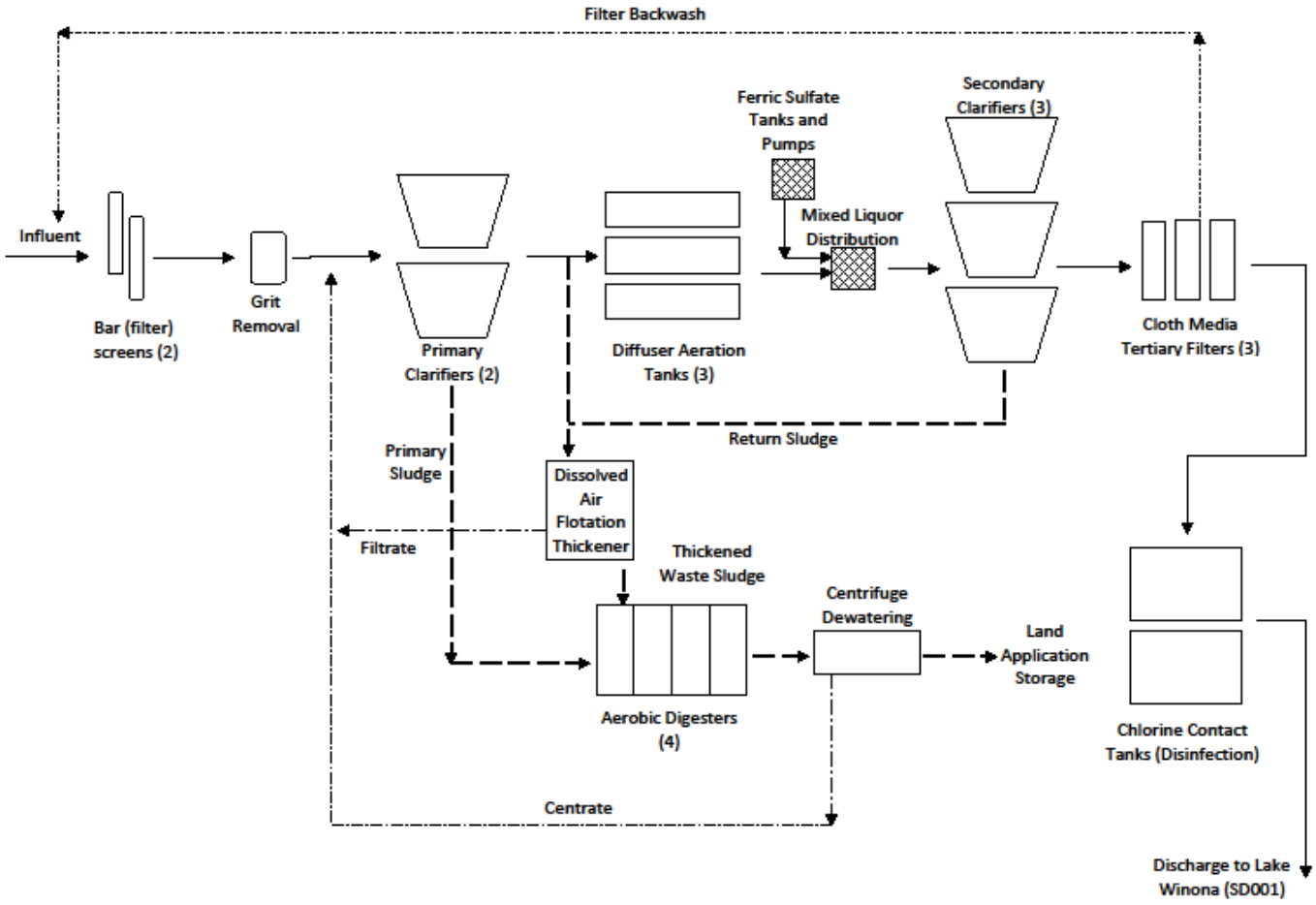
Topographic Map of Permitted Facility
MN0040738: ALASD Wastewater Treatment Facility
T128N, R38W, Section 25
Alexandria, Douglas County, Minnesota



Map produced by: MPCA Staff, 1/17/2018
Scale: 1:15,854

0 0.15 0.3 0.6 Miles

3. Flow diagram



4. Summary of stations and station locations

Station	Type of station	Local name	PLS location
SD 001	Effluent To Surface Water	Surface Water Discharge	T128N, R38W, S25, NW Quarter
SW 001	Lake/Reservoir	Lake Winona - Northeast Site	T128N, R38W, S24
SW 002	Lake/Reservoir	Lake Winona - Southwest Site	T128N, R38W, S25
SW 003	Lake/Reservoir	Lake Agnes	T128N, R38W, S25
WS 001	Influent Waste	Influent Waste Stream	T128N, R38W, S25, NE Quarter of the SW Quarter

5. Permit requirements

SD 001	Effluent To Surface Water	
		Surface Discharge: Class A Major Facility Effluent Requirements
	5.1.1	The Permittee shall submit a monthly DMR : Due by 21 days after the end of each calendar month following permit issuance. [Minn. R. 7001.0150, Subp. 2(B)]
	5.1.2	Sampling Location. [Minn. R. 7001.0150, Subp. 2(B)]
	5.1.3	Samples for Station SD 001 shall be collected from the outlet control structure prior to mixing with the receiving water. [Minn. R. 7001.0150, Subp. 2(B)]
	5.1.4	The Permittee shall submit monitoring results in accordance with the limits and monitoring requirements for this station. If conditions are such that no sample can be acquired, the Permittee shall report "No Flow" or "No Discharge" on Discharge Monitoring Report (DMR) and shall add a Comments attachment to the DMR detailing why the sample was not collected. [Minn. R. 7001.0150, Subp. 2(B)]
		Priority Pollutant Requirements
	5.2.5	The Permittee shall monitor the effluent three times in the life of the permit for the following specified priority pollutants. Sampling events shall occur before the second, third, and fourth year following permit issuance and shall not be less than one year apart. Monitoring shall be for the organic priority pollutants identified under the volatile, acid, base/neutral, and pesticide fractions using EPA methods 624, 625 and 608 (40 CFR Part 136, October 25, 1984) as listed in Table II of 40 CFR Part 122, Appendix D or any updates to those methods. The following priority pollutant total metals shall also be monitored using EPA methods found in Table IB of the current version of 40 CFR Part 136: antimony, arsenic, beryllium, cadmium, chromium, copper, lead, nickel, selenium, silver, thallium, and zinc. In addition, the Permittee shall monitor for total cyanide, total phenolic compounds, and hardness (total as CaCO3) using methods approved in the most recent update of 40 CFR part 136. Total Mercury shall be monitored by EPA method 1631E or the most recent update to this method, if not already required by the permit. Reporting limits for Priority Pollutant analyses shall be as close as analytically possible to the Class 2B chronic water quality standards. Total cyanide shall be monitored to the free cyanide water quality standard. The chromium reporting limit shall meet the chromium +6 water quality standard. [Minn. R. 7001]
	5.2.6	The Permittee shall submit the first priority pollutant monitoring report : Due 1095 calendar days before Permit Expiration Date. (By two years after permit issuance date). [Minn. R. 7001]

	5.2.7	The Permittee shall submit the second priority pollutant monitoring report : Due 730 calendar days before Permit Expiration Date. (By three years after permit issuance date). [Minn. R. 7001]
	5.2.8	The Permittee shall submit the third priority pollutant monitoring report : Due 365 calendar days before Permit Expiration Date. (By four years after permit issuance date). [Minn. R. 7001]
		Chronic Toxicity Requirements
	5.3.9	General Requirements. [Minn. R. 7001]
	5.3.10	This permit does not include a chronic whole effluent toxicity limit; however the facility has a whole effluent toxicity testing monitoring requirement is required to conduct chronic toxicity tests for Surface Discharge Station SD 001. Results of chronic toxicity tests will be evaluated against a monitoring threshold value of 1.0 TUc. [Minn. R. 7001]
	5.3.11	The Permittee shall submit annual chronic test battery results, the first test is due 6 months after Permit issuance and annually thereafter. The Permittee shall submit annual chronic toxicity test battery results : Due 180 calendar days after Permit Issuance Date annually. [Minn. R. 7001]
	5.3.12	Any test that exceeds 1.0 TUc shall be re-tested according to the Positive Toxicity Results requirement(s) that follow to determine if toxicity is still present above 1.0 TUc (RWC< 100). [Minn. R. 7001]
	5.3.13	Species and Procedural Requirements. [Minn. R. 7001]
	5.3.14	Any test that is begun with an effluent sample that exceeds a total ammonia concentration of 5 mg/l may use the carbon dioxide-controlled atmosphere technique to control pH drift. [Minn. R. 7001]
	5.3.15	Test organisms for each test battery shall include the fathead minnow (Pimephales promelas)-Method 1000.0 and Ceriodaphnia dubia-Method 1002.0. [Minn. R. 7001]
	5.3.16	Static renewal chronic serial dilution tests of the effluent shall consist of a control 6, 12, 25, 50 and 100% effluent. A 100% Receiving Water Concentration (RWC) may be substituted for the 100% effluent concentration or provided in addition to the above dilution series. [Minn. R. 7001]
	5.3.17	All effluent samples shall be flow proportioned 24-hour composite samples. Test solutions shall be renewed daily. Testing of the effluent shall begin within 36 hours of sample collection. Receiving water collected outside of the influence of discharge shall be used for dilution and controls. Chronic toxicity tests shall be conducted in accordance with procedures outlined in EPA-821-R-02-013 "Short-term Methods for Measuring the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms" - Fourth Edition (Chronic Manual) and any revisions to the Manual. [Minn. R. 7001]
	5.3.18	Any other circumstances not addressed in the previous requirements or that require deviation from that specified in the previous requirements shall first be approved by the MPCA. [Minn. R. 7001]
	5.3.19	Quality Control and Report Submittals. [Minn. R. 7001]
	5.3.20	Any test that does not meet quality control measures, or results which the Permittee believes reflect an artifact of testing shall be repeated within two (2) weeks. These reports shall contain information consistent with the report preparation section of the

		Chronic Manual. The MPCA shall make the final determination regarding test validity. [Minn. R. 7001]
	5.3.21	Positive Toxicity Result for WET. [Minn. R. 7001]
	5.3.22	Should a test exceed 1.0 TUc for whole effluent toxicity based on results from the most sensitive test species, the Permittee shall conduct two repeat test batteries on all species. The repeat tests are to be completed within forty-five (45) days after completion of the positive test. These tests will be used to determine if toxicity exceeding 1.0 TUc remains present for any test species. For both retests, if no toxicity is present above 1.0 TUc for any test species, the Permittee shall return to the test frequency specified by the permit. If either of the repeat test batteries indicate toxicity above 1.0 TUc for any test species, the Permittee shall submit for MPCA review and approval a plan for conducting a Toxicity Reduction Evaluation (TRE), including the Facility Performance Review within 60 days after toxicity discovery date. Upon approval of the TRE Plan, the Permittee shall implement the plan or subsequent amendments in its entirety. Any violations of the plan are violations of this permit. In addition, the Permittee shall provide quarterly reports, starting from the date of the TRE plan submittal. The quarterly reports shall include but not be limited to, a complete description of all progress made towards the identification of the source(s) of toxicity, and the Permittee's plans for the removal of the toxicity. The TRE shall be consistent with EPA guidance or subsequent procedures approved by the MPCA in attempting to identify and remove the source of the toxicity. Routinely scheduled chronic toxicity test batteries required in this permit section shall be suspended for the duration of the TRE. At the conclusion of the TRE process, the Permittee must submit a request to the MPCA to discontinue the TRE. The MPCA shall review the request and decide whether or not the TRE will be discontinued. If the MPCA discontinues a TRE, the MPCA may set conditions to be met by the Permittee based on the TRE results. [Minn. R. 7001]
	5.3.23	Following successful completion of the TRE the Permittee shall conduct biannual testing for the next five year permit cycle. [Minn. R. 7001]
	5.3.24	WET Data and Test Acceptability Criteria (TAC) Submittal. [Minn. R. 7001]
	5.3.25	All WET test data and TAC must be submitted to the MPCA by the dates required by this section of the permit using both the Minnesota Pollution Control Agency Ceriodaphnia dubia Chronic Toxicity Test Report and the Minnesota Pollution Control Agency Fathead Minnow Chronic Toxicity Test Report and associated instruction forms. Data not submitted on the correct form(s), or submitted incomplete, will be returned to the permittee and deemed incomplete until adequately submitted on the designated form (identified above). These are legal forms and must be signed and dated by the Permittee. Data should be submitted to: MPCA Attn: WQ Submittals Center 520 Lafayette Road North St. Paul, Minnesota 55155-4194. [Minn. R. 7001]
	5.3.26	Permit Re-opening for WET. [Minn. R. 7001]
	5.3.27	Based on the results of the testing, the permit may be modified to include additional toxicity testing and a whole effluent toxicity limit. [Minn. R. 7001]

	5.3.28	Whole Effluent Toxicity Requirement Definitions. [Minn. R. 7001]
	5.3.29	"Chronic Whole Effluent Toxicity (WET) Test is a static renewal test conducted on an exponentially diluted series of effluent. The purpose is to calculate appropriate biological effect endpoints (NOEC or IC25), specified in the referenced chronic manual. A statistical effect level less than the Receiving Water Concentration (RWC) constitutes a positive test for chronic toxicity. The RWC equals the 100% effluent concentration or 1.0 TUc. [Minn. R. 7001]
	5.3.30	"Chronic toxic unit (TUc)" is the reciprocal of the effluent dilution that causes no unacceptable effect on the test organisms by the end of the chronic exposure period. For example, a TUc equals [7Q10flow (mgd) + effluent average dry weather flow (mgd)]/[effluent average dry weather flow (mgd)]. [Minn. R. 7001]
	5.3.31	"Test" refers to an individual species. [Minn. R. 7001]
	5.3.32	"Test Battery" consists of WET testing of all test species for the specified test. For chronic WET testing, all test species includes fathead minnows and Ceriodaphnia Dubia. [Minn. R. 7001]
		Facility Specific Requirements
	5.4.33	The mass limits for BOD, carbonaceous 05 day (20 Deg C) and solids, total suspended (TSS) are based on the 1988 design flow of 2.987 million gallons per day (mgd). These limits are subject to antidegradation requirements found in Minn. R. 7050.0250 to Minn. R. 7050.0335. [Minn. R. 7001]
	5.4.34	Parameters that have a monitoring frequency of once per quarter and an effective period of Mar, Jun, Sep, Dec may be taken any time during that calendar quarter but must be reported on the designated month's eDMR (e.g. the sample for the first calendar quarter of Jan-Mar will be reported on the March eDMR). The interim and final total phosphorus limits as well as the alternate and final total chloride limits have been assigned phases in the limits and monitoring table. These phases are assigned to trigger and turn off the effective start and end dates of the interim/alternate and final effluent limits for eDMR reporting purposes. Because there are multiple date possibilities associated with the total phosphorus limits, combined with the alternate and final chloride limit effective dates, multiple phases have been assigned. [Minn. R. 7001]
	5.4.35	**Salty Discharge Monitoring Requirements** Industrial and municipal facilities that have a stream to effluent dilution ratio of less than 5:1 or that have salty waste streams from concentrated treatment technologies (e.g. reverse osmosis, ion exchange, membrane filtration, cooling tower blowdown, etc.) or that have food processing industries using density based (saline) sorting processes are required to complete the analyses for the following salty discharge parameters: chloride, calcium and magnesium hardness as $CaCO_3$, specific conductance, total dissolved salts (solids), sulfates as SO_4 , bicarbonates (HCO_3), sodium, calcium, magnesium, and potassium. The Facility receives process wastewater from six significant industrial users of which the principal product or raw materials being used triggers the requirement to monitor

		for salty discharge parameters. A reasonable potential analysis was completed as part of this permit reissuance process and determined that the Facility's effluent has reasonable potential to exceed water quality standards for total chloride, total dissolved solids (TDS), specific conductance, and bicarbonates (HCO_3). The data review concluded that the Facility is a good candidate for chloride linkage; by using chloride linkage, the Facility will receive alternate and final effluent limits for total chloride only. Compliance with total chloride effluent limits will be protective of all other salty parameter final effluent limits. A variance schedule addressing the total chloride limits is included below in the permit. Continued monitoring for the remaining parameters, excluding sulfate, has been included in the permit at a frequency of once per quarter (previous monitoring was required on a monthly basis). Monitoring for sulfate has been discontinued. [Minn. R. 7001]
	5.4.36	The total residual chlorine limit is applicable whenever chlorine is added. Samples shall be analyzed immediately (within 15 minutes or less of sample collection). [Minn. R. 7001]
SW 001	Lake/Reservoir	
		Facility Specific Limit and Monitoring Requirements
	5.5.1	The Permittee shall submit a monthly DMR : Due by 21 days after the end of each calendar month following permit issuance. [Minn. R. 7001.0150, Subp. 2(B)]
	5.5.2	Sampling Location. [Minn. R. 7001.0150, Subp. 2(B)]
	5.5.3	Samples for Station SW 001 shall be collected at the Northeast Site of Lake Winona. [Minn. R. 7001.0150, Subp. 2(B)]
	5.5.4	The Permittee shall submit monitoring results in accordance with the limits and monitoring requirements for this station. If conditions are such that no sample can be acquired, the Permittee shall report "No Flow" or "No Discharge" on Discharge Monitoring Report (DMR) and shall add a Comments attachment to the DMR detailing why the sample was not collected. [Minn. R. 7001.0150, Subp. 2(B)]
SW 002	Lake/Reservoir	
		Facility Specific Limit and Monitoring Requirements
	5.6.1	The Permittee shall submit a monthly DMR : Due by 21 days after the end of each calendar month following permit issuance. [Minn. R. 7001.0150, Subp. 2(B)]
	5.6.2	Sampling Location. [Minn. R. 7001.0150, Subp. 2(B)]
	5.6.3	Samples for Station SW 002 shall be collected at the Southwest Site of Lake Winona. [Minn. R. 7001.0150, Subp. 2(B)]
	5.6.4	The Permittee shall submit monitoring results in accordance with the limits and monitoring requirements for this station. If conditions are such that no sample can be acquired, the Permittee shall report "No Flow" or "No Discharge" on Discharge Monitoring Report (DMR) and shall add a Comments attachment to the DMR detailing why the sample was not collected. [Minn. R. 7001.0150, Subp. 2(B)]
SW 003	Lake/Reservoir	
		Facility Specific Limit and Monitoring Requirements
	5.7.1	The Permittee shall submit a monthly DMR : Due by 21 days after the end of each calendar month following permit issuance. [Minn. R. 7001.0150, Subp. 2(B)]

	5.7.2	Sampling Location. [Minn. R. 7001.0150, Subp. 2(B)]
	5.7.3	Samples for Station SW 003 shall be collected from the center of Lake Agnes. [Minn. R. 7001.0150, Subp. 2(B)]
	5.7.4	The Permittee shall submit monitoring results in accordance with the limits and monitoring requirements for this station. If conditions are such that no sample can be acquired, the Permittee shall report "No Flow" or "No Discharge" on Discharge Monitoring Report (DMR) and shall add a Comments attachment to the DMR detailing why the sample was not collected. [Minn. R. 7001.0150, Subp. 2(B)]
WS 001	Influent Waste	
		Waste Stream: Class A Major Facility Influent Requirements
	5.8.1	The Permittee shall submit a monthly DMR : Due by 21 days after the end of each calendar month following permit issuance. [Minn. R. 7001.0150, Subp. 2(B)]
	5.8.2	Sampling Location. [Minn. R. 7001.0150, Subp. 2(B)]
	5.8.3	Samples for Station WS 001 shall be collected at a point representative of total influent flow to the system. [Minn. R. 7001.0150, Subp. 2(B)]
	5.8.4	The Permittee shall submit monitoring results in accordance with the limits and monitoring requirements for this station. If conditions are such that no sample can be acquired, the Permittee shall report "No Flow" or "No Discharge" on Discharge Monitoring Report (DMR) and shall add a Comments attachment to the DMR detailing why the sample was not collected. [Minn. R. 7001.0150, Subp. 2(B)]
		Facility Specific Requirements
	5.9.5	Parameters that have a monitoring frequency of once per quarter and an effective period of Mar, Jun, Sep, Dec may be taken any time during that calendar quarter but must be reported on the designated month's eDMR (e.g. the sample for the first calendar quarter of Jan-Mar will be reported on the March eDMR). [Minn. R. 7001]
MN0040738	Alexandria Lake Area Sanitary District	
		Surface Discharge Station General Requirements
	5.10.1	Analysis Requirements. [Minn. R. 7001]
	5.10.2	If the Permittee is required to monitor for the following parameters, dissolved oxygen, pH, temperature and total residual chlorine, the analyses shall be conducted within 15 minutes of sample collection. [Minn. R. 7053]
	5.10.3	Representative Samples. [Minn. R. 7001]
	5.10.4	Samples and measurements required by this permit shall be representative of the monitored activity. [Minn. R. 7001]
	5.10.5	Surface Discharge Prohibitions. [Minn. R. 7001]
	5.10.6	Floating solids or visible foam shall not be discharged in other than trace amounts. [Minn. R. 7001]
	5.10.7	Oil or other substances shall not be discharged in amounts that create a visible color film. [Minn. R. 7001]
	5.10.8	The Permittee shall install and maintain outlet protection measures at the discharge stations to prevent erosion. [Minn. R. 7001]

	5.10.9	Winter Sampling Conditions. [Minn. R. 7001]
	5.10.10	The Permittee shall sample flows at the designated monitoring stations including when this requires removing ice to sample the water. If the station is completely frozen throughout a designated sampling month, the Permittee shall check the "No Discharge" box on the Discharge Monitoring Report (DMR) and note the ice conditions in Comments on the DMR. [Minn. R. 7001]
	5.10.11	Chlorine Addition Requirements. [Minn. R. 7001]
	5.10.12	If chlorine is added for any purpose, the Permittee shall monitor the discharge for Total Residual Chlorine once per day during chlorine usage. The Permittee shall report the monitoring data as a comment on the next submitted Discharge Monitoring Report for the affected station. The discharge shall not exceed a 0.038 mg/L Total Residual Chlorine limit. [Minn. R. 7001]
	5.10.13	Phosphorus Limits and Monitoring Requirements. [Minn. R. 7001]
	5.10.14	Phosphorus Calculation Definitions. [Minn. R. 7001]
	5.10.15	"12-Month Moving Total" is a rolling total. To calculate, for each month multiply the total volume of effluent flow (MG) by the monthly average concentration and by a 3.785 conversion factor to get kg/month. Then add all of the monthly values (kg/mo) during the last twelve months, starting with the monthly total for the month of the current reporting period. [Minn. R. 7001]
	5.10.16	Mercury Limits and Monitoring Requirements. [Minn. R. 7001]
	5.10.17	Permittees are required to sample for TSS (grab sample) at the same time that Total/Dissolved Mercury samples are taken. Total Mercury, Dissolved Mercury, and TSS (grab sample) samples shall be collected via grab samples. All results shall be recorded on DMRs. [Minn. R. 7001]
	5.10.18	Total and Dissolved Mercury samples shall be analyzed using the most current versions of EPA Method 1631 with clean techniques method 1669. Should another mercury analytical method that has a reportable quantitation level of <0.5 ng/L that allows for low-level sample characterization be approved by the EPA and certified by an MPCA recognized accreditation body, the method may be used in place of 1631/1669. [Minn. R. 7001]
	5.10.19	Mercury monitoring with a frequency of once per month and an effective period of May, Sep, are to be taken once during the month of May and once during the month of September for a total of two samples per year. [Minn. R. 7001]
	5.10.20	Nitrogen Limits and Monitoring Requirements. [Minn. R. 7001]
	5.10.21	"Total Nitrogen" is to be reported as the summation of the Total Kjeldahl Nitrogen and Total Nitrite plus Nitrate Nitrogen values. [Minn. R. 7001]
		Surface Water Station General Requirements
	5.11.22	Analysis Requirements. [Minn. R. 7001]
	5.11.23	If the Permittee is required to monitor for the following parameters, dissolved oxygen, pH, temperature and total residual chlorine, the analyses shall be conducted within 15 minutes of sample collection. [Minn. R. 7053]
	5.11.24	Sampling Protocol. [Minn. R. 7001]
	5.11.25	Samples shall be taken at mid-stream, mid-depth. Record location, date, time and results for each sample on the supplemental Discharge Monitoring Report form. [Minn. R. 7001]

	5.11.26	All instruments used for field measurements shall be maintained and calibrated to insure accuracy of measurements. [Minn. R. 7001]
	5.11.27	Sample water shall be preserved according to lab instructions and delivered to a certified lab within the maximum holding times. [Minn. R. 7001]
	5.11.28	Winter Sampling Conditions. [Minn. R. 7001]
	5.11.29	The Permittee shall sample flows at the designated monitoring stations including when this requires removing ice to sample the water. If the station is completely frozen throughout a designated sampling month, the Permittee shall check the "No Flow" box on the Discharge Monitoring Report (DMR) and note the ice conditions in Comments on the DMR. [Minn. R. 7001]
		Waste Stream Station General Requirements
	5.12.30	Analysis Requirements. [Minn. R. 7001]
	5.12.31	If the Permittee is required to monitor for the following parameters, dissolved oxygen, pH, temperature and total residual chlorine, the analyses shall be conducted within 15 minutes of sample collection. [Minn. R. 7053]
	5.12.32	Representative Samples. [Minn. R. 7001]
	5.12.33	Grab and composite samples shall be collected at a point representative of total influent flow to the system. [Minn. R. 7001]
	5.12.34	Nitrogen Limits and Monitoring Requirements. [Minn. R. 7001]
	5.12.35	"Total Nitrogen" is to be reported as the summation of the Total Kjeldahl Nitrogen and Total Nitrite plus Nitrate Nitrogen values. [Minn. R. 7001]
		Compliance Construction Schedule
	5.13.36	Definitions. [Minn. R. 7001]
	5.13.37	"Initiation of operation" means the date that MPCA determines all components of the wastewater treatment system are complete and functioning and the project begins operating for the purposes for which it was planned, designed, and built. [State Definitions]
	5.13.38	"Completion of construction" means all the construction is complete except for minor weather-related components and conforms to the approved plans and specifications and change orders. [State Definitions]
	5.13.39	"Notice to proceed" means a written notice given by the Permittee to the contractor that affixes the contract effective date and the date that the contractor begins performing the work specified in the contract documents. [State Definitions]
	5.13.40	**Background Information: Water Quality Based Effluent Limit (WQBEL) for Total Phosphorus.** [Minn. R. 7001]
	5.13.41	The MPCA previously calculated the effluent limits for total phosphorus (TP) for this Facility based on the existing state water quality standard for shallow lakes under Minn. R. 7050.0222, subp. 3. As a result, the final total phosphorus effluent limits established in the previous permit were 0.121 milligrams per liter (mg/L) and 526 kilograms per year (kg/yr). Following the U.S. Environmental Protection Agency's (EPA) June 12, 2014, approval of a new Site Specific Standard (SSS) for Lake Winona, the final total phosphorus effluent limits have been updated to 0.157 mg/L and 665 kg/yr. If all lake management activities are unsuccessful and/or a determination of construction is needed, or desired by the Permittee, the final limits must be met as soon as possible,

		but no later than December 31, 2032. Depending on actions taken by the Permittee, the permit will be modified or reissued to remove or replace interim or final limits as described below. Upon permit issuance, the Permittee is required to meet an interim total phosphorus effluent limit of 0.25 mg/L as a calendar month average and 1087 kg/yr. The interim limit was calculated to ensure there is not an increase in total phosphorus concentrations during the term of the schedule of compliance. In lieu of constructing to meet the total phosphorus effluent limit, the Permittee has agreed, and obtained funding through the 2018 Minnesota Legislative Session to perform Adaptive Lake Management Plan activities which are intended to control the carp population and achieve water quality targets for Chlorophyll-a and transparency in Lake Winona and downstream in Lake Agnes. Adaptive Lake Management Plan activities include the tracking, tagging, and removal of common carp from Lake Winona and, if necessary, a drawdown of Lake Winona to promote the re-establishment of rooted aquatic vegetation. If re-vegetation is not occurring naturally and/or if carp bioturbation remains excessive, the Permittee plans to hold a public meeting during this permit cycle to vote on a drawdown of Lake Winona in order to promote the growth of rooted aquatic vegetation, with the ultimate goal of achieving in-lake attainment of chlorophyll-a and transparency water quality standards. Should the Lake Winona lakeshore property owners approve of a drawdown of Lake Winona, drawdown work would begin during the next permit cycle. Should the Lake Winona lakeshore property owners not approve of a drawdown of Lake Winona, the Permittee shall either begin construction of a new Facility or perform capital improvements to the existing Facility during the next permit cycle. Adaptive Lake Management Plan activities proposed for Lake Agnes include funding and performing an alum treatment. [Minn. R. 7001]
	5.13.42	During the first five-year permit cycle, the Permittee is required to concurrently continue the steps necessary to implement the Adaptive Lake Management Plan activities as well as prepare for a Facility upgrade as identified in the steps below. This will ensure that the Permittee is ready to proceed with and complete construction as soon as possible if it is found that the Adaptive Lake Management Plan activities will not result in the attainment of water quality standards in Lake Winona. If Adaptive Lake Management Plan activities are successful and there is confirmation that Lake Winona is meeting applicable water quality standards in a manner consistent with applicable regulations, the MPCA shall modify or reissue the permit to remove the limits and schedule of compliance established to comply with the draft Lake Winona Total Maximum Daily Load (TMDL) study (0.157 mg/L and 665 kg/yr) and instead make the interim total phosphorus effluent limits (0.25 mg/L and 1087 kg/yr) the final total phosphorus limit. The final total phosphorus effluent limits of 0.157 mg/L as a calendar month average and 665 kg/yr limit as a 12-month moving total will become effective as soon as possible, but in any case no later than December 31, 2032. The final phosphorus limits will become effective before December 31, 2032 if any of the following items occur: 1) if, after the first compliance schedule term, the Adaptive Lake Management activities

		are completed but water quality standards in Lake Winona are not met, the vote on a lake drawdown results in a "no", and the Permittee is required to either construct a new Facility or perform capital improvements to the existing Facility; OR if the Permittee chooses to bypass a public vote, thus not performing the drawdown and be required to either construct a new Facility or perform capital improvements to the existing Facility; then the final total phosphorus effluent limits shall be met by no later than December 31, 2030; or, 2) if the vote on a lake drawdown results in a "yes" and the Adaptive Lake Management activities are completed but water quality standards in Lake Winona are not met, then the final total phosphorus effluent limits shall be met by no later than December 31, 2032 by either construction of a new facility or capital improvements to the existing Facility. 3) should future water quality conditions in Lake Winona decline and the lake is no longer meeting applicable water quality standards, total phosphorus effluent limits may be re-evaluated and placed in a future reissued permit. In any case of items 1), 2), or 3), the permit will be modified or reissued to reflect the final effluent limits of 0.157 mg/L and 665 kg/yr or potentially in the case of 3) re-evaluated phosphorus limits. [Minn. R. 7001]
	5.13.43	**Schedule of Compliance.** [Minn. R. 7001]
	5.13.44	According to this schedule of compliance, the Permittee shall implement the Adaptive Lake Management Plan (Plan) submitted to MPCA on March 28, 2018. The Plan, for both Lake Winona and Lake Agnes, includes but is not limited to: 1) locations of monitoring, frequency, and parameters; and 2) a list of best management practices (BMPs) reviewed and approved by the MPCA; and 3) an operations and maintenance (O&M) manual for the BMPs with identification of who will be responsible for long-term monitoring and upkeep of the BMPs; and 4) an O&M budget for the adaptive management work upkeep for the next five, ten, and fifteen years after the lake management work is completed. The BMP monitoring records shall be kept on site for a minimum of three (3) years and be available upon request. BMPs being implemented for the purpose of the Plan are specific to the required phosphorus reductions needed to comply with this NPDES/SDS permit and are not available to generate potential phosphorus credits for any other environmental offset program. BMPs that have the potential to generate credits for other environmental services program such as carbon sequestration or wildlife habitat markets, may, subject to applicable policies and regulations, generate non-phosphorus credits. [Minn. R. 7001]
	5.13.45	Any BMPs not identified in the initial Plan submittal shall be incorporated into a Plan update and submitted to the MPCA for review prior to implementation and will be required to receive continual monitoring, maintenance, and record keeping. [Minn. R. 7001]

	5.13.46	The Permittee shall begin common carp population work which includes but may not be limited to capturing, tagging, and starting population estimates by December 1, 2019. [Minn. R. 7001]
	5.13.47	The Permittee shall initiate an alum treatment on Lake Agnes by December 1, 2020. [Minn. R. 7001]
	5.13.48	The Permittee shall submit to the MPCA a report on carp population estimates by December 1, 2020. [Minn. R. 7001]
	5.13.49	The Permittee shall design carp barriers for Lake Winona as soon as possible but no later than December 1, 2021. [Minn. R. 7001]
	5.13.50	The Permittee shall install carp barriers for Lake Winona as soon as possible but no later than December 1, 2022. [Minn. R. 7001]
	5.13.51	The Permittee shall complete the alum treatment on Lake Agnes as soon as possible but no later than December 1, 2023. [Minn. R. 7001]
	5.13.52	The Permittee shall complete planned removal of common carp from Lake Winona as soon as possible, but no later than March 31, 2023. Removal of carp may also occur in Lake Agnes depending on the locations of the carp during the winter months. [Minn. R. 7001]
	5.13.53	The Permittee shall begin vegetation monitoring in Lake Winona as soon as early spring ice-out of 2023. [Minn. R. 7001]
	5.13.54	The Permittee shall request placement on the Priority Project List for a potential facility upgrade as soon as possible, but no later than July 31, 2024. [Minn. R. 7001]
	5.13.55	If re-vegetation is not occurring naturally and/or if carp populations are still at an elevated level and a lake drawdown is necessary, the Permittee is to hold a public meeting with a vote on the drawdown of Lake Winona by the permit expiration date. The Permittee shall hold a meeting : Due by permit expiration. [Minn. R. 7001]
	5.13.56	The Permittee shall request placement on the Intended Use Plan (IUP) with the submittal of an amended Facility Plan per Minn. R. 7077, if seeking public funding, no later than March 1, 2025. If the Permittee is seeking public funding through other sources, a copy of any preliminary engineer report similar to a Facility Plan shall be submitted by the same time frame. Facility Plan amendment shall include a proposed schedule for construction for MPCA review and approval. This schedule for completion of plans and specifications and construction will be included in the future permit (2nd permit cycle). [Minn. R. 7001]
	5.13.57	The Permittee shall submit water quality monitoring data to determine compliance with the draft TMDL for Lake Winona as soon as possible, but no later than October 31, 2025. Water quality monitoring data should indicate whether the lake has met applicable water quality standards. If the lake has not met applicable water quality standards, the Permittee shall continue with the Route 2 construction work. The Permittee shall submit monitoring reports : Due by permit expiration. [Minn. R. 7001]
	5.13.58	The Permittee shall amend the previously submitted permit application for reissuance (that was submitted 180 days prior to permit expiration) with information identifying the selected route for compliance with the water quality standard, and submit by the permit expiration date. If at any time the Permittee selects either construction of a new Facility or capital improvements to the existing Facility as the chosen alternative, the Permittee can submit a permit application for a major modification to reflect a construction schedule and the previously required Adaptive Lake Management activity

		requirements will no longer be applicable and removed as permit requirements. If the Permittee elects to either construct a new Facility or perform capital improvements to the existing Facility to achieve the draft Lake Winona TMDL wasteload allocations (WLA), any lake management activities and related requirements previously imposed via the permit or related plans, including any previously agreed to long-term monitoring, upkeep for BMPs or other lake management related activities identified and/or undertaken by the Permittee, will no longer be required or enforced through the Permit. The permit application documents shall identify the new facility components, if possible. If facility components are not known at the time of application submittal, an application for a major permit modification will be required six months prior to construction. If it has been determined that applicable water quality standards have been achieved without the need for a lake drawdown, the MPCA shall modify or reissue the permit to remove the 0.157 mg/L and 665 kg/yr to comply with the draft Lake Winona TMDL WLAs, and make the total phosphorus limits of 0.25 mg/L and 1087 kg/yr the new final total phosphorus limits. By successfully completing the Adaptive Lake Management Plan and Lake Winona meeting the applicable water quality standards, the total phosphorus limits outlined in the draft Lake Winona TMDL will no longer be reflective of the current water quality state resulting in the continuation of the 0.25 mg/L and 1087 kg/yr total phosphorus limits. A major modification will be completed to remove the proposed final limits outlined in the draft Lake Winona TMDL and the permit will reflect the final limits of 0.25 mg/L and 1087 kg/yr. The Permittee shall submit permit application revisions : Due by permit expiration. [Minn. R. 7001]
	5.13.59	**Route 1: (2nd permit cycle) - If Lake Winona has not met applicable WQS the Permittee may proceed with this route:** If the result of the lake drawdown vote [requirement 5.13.55 above] is a "yes", the Permittee shall submit an update to the feasibility and cost analysis study, originally submitted on November 9, 2013, for the drawdown operation of Lake Winona, as soon as possible, but no later than one year after the permit issuance date. [Minn. R. 7001]
	5.13.60	If the result of the lake drawdown majority vote [completed as part of requirement 5.13.55 of this permit] is "yes" and determination of the need for a drawdown is justified, the Permittee shall complete installation of drawdown infrastructure and have obtained appropriate local, state, and federal permits as soon as possible, but no later than December 31, 2026. [Minn. R. 7001]
	5.13.61	The Permittee shall conduct the lake drawdown of Lake Winona no later than December 31, 2027. If documented conditions do not allow for a lake drawdown, the Permittee shall submit a report to the MPCA with a detailed explanation of why conditions did not support the drawdown no later than December 31, 2027. [Minn. R. 7001]
	5.13.62	If necessary, the Permittee shall conduct a second attempt at a drawdown no later than December 31, 2028. [Minn. R. 7001]
	5.13.63	If documented conditions for the first attempt at drawdown are successful, the Permittee shall submit annual drawdown and Adaptive Lake Management Plan progress reports within six (6) months following completion and again by June 30, 2029. If the second attempt is necessary, the Permittee shall submit annual drawdown

		and Adaptive Lake Management Plan progress reports within six (6) months following completion of the second drawdown effort. [Minn. R. 7001]
	5.13.64	The Permittee shall notify the MPCA by 6 months prior to permit expiration if the SSS for Lake Winona cannot be met and construction may be required. [Minn. R. 7001]
	5.13.65	If the Permittee demonstrates with data in a manner consistent with applicable regulations that the SSS for Lake Winona has been met, as soon as possible, but no later than December 31, 2030, then the MPCA shall modify or reissue the permit in the second permit cycle to remove the limits of 0.157 mg/L and 665 kg/yr associated with the draft Lake Winona TMDL and the total phosphorus limits of 0.25 mg/L and 1087 kg/yr will become the new final total phosphorus limit. Verification of this achievement shall be demonstrated in the form of a report submitted for review and approval by the MPCA by December 31, 2030. By successfully completing the Adaptive Lake Management Plan and Lake Winona meeting the applicable water quality standards, the total phosphorus limits outlined in the draft Lake Winona TMDL will no longer be reflective of the current water quality state resulting in the continuation of the 0.25 mg/L total phosphorus limit. [Minn. R. 7001]
	5.13.66	Note: If at any time the Permittee selects to either perform capital improvements to the existing Facility or construct a new Facility as the chosen compliance alternative, the Permittee shall submit a permit application for a major modification. The permit may then be modified to include a construction schedule and the previously permitted Adaptive Lake Management Activity requirements will no longer be applicable and removed as permit requirements. If the Permittee elects to either perform capital improvements to the existing Facility or construct a new Facility to achieve the SSS, any lake management activities and related requirements previously imposed via the permit or related plans, including any previously agreed to long-term monitoring, upkeep for BMPs or other lake management related activities and/or undertaken by the Permittee, will no longer be required or enforced through the permit. [Minn. R. 7001]
	5.13.67	**Route 2: Construction Option (2nd permit cycle)** If the result of the lake drawdown majority vote [completed as part of requirement 5.13.55 of this permit] is "no" or Adaptive Lake Management Activities cannot be completed or do not meet applicable water quality standards, the Permittee shall proceed per the MPCA approved Facility Plan amendment schedule for construction as identified in Section 5.13.56 of this Permit. Plans and specifications shall be submitted to the MPCA for the selected alternative 180 days after a final Intended Use Plan is available during the first year of the second permit cycle, or March 30, 2027. [Minn. R. 7001]
	5.13.68	If, at any time during the course of Route 2, it is found that water quality in Lake Winona is improving and the improvement is holding stable, the Permittee may opt out of the planned construction work and continue the Adaptive Lake Management Plan activities and maintenance work (described below in the Special Requirements section). A report summarizing the water quality improvement and lake stability shall be submitted to the MPCA for review and approval within 14 days after the reassessment. Ongoing monitoring of Lake Winona is necessary to evaluate continued improvement and stability of the lake; if at any point the water quality in the lake declines to a point

		MPCA staff determine the Adaptive Lake Management Plan work is unsuccessful, the Permittee must continue with previously planned construction work. An application for a permit modification to extend interim compliance schedule dates related to construction work may be necessary. [Minn. R. 7001]
	5.13.69	The Permittee shall begin construction of the chosen alternative as soon as possible but no later than March 30, 2028. Construction shall proceed for the selected alternative per the MPCA approved Facility Plan and schedule. Written notification shall be submitted to the MPCA within 14 days after the start of construction. [Minn. R. 7001]
	5.13.70	The Permittee shall submit a construction progress report by March 30, 2029, one year after construction begins. [Minn. R. 7001]
	5.13.71	The Permittee shall initiate operation of the upgraded Facility as soon as possible but no later than two years after the start of construction work. Written notification shall be submitted to the MPCA within 14 days of initiation of operation. [Minn. R. 7001]
	5.13.72	If the Permittee takes Route 2 for construction at the beginning of the second permit cycle, the Permittee shall attain compliance with the final total phosphorus effluent limits of 0.157 mg/L calendar month average and 665 kg/yr, 12-month moving total as identified in the draft Lake Winona TMDL as soon as possible but no later than December 31, 2030. Because the Permittee shall complete construction and initiate operation of the upgraded Facility by March 30, 2030, the Permittee should be complying with the effluent limits sooner than December 31, 2030. The permit will be modified or reissued to reflect the final limit of 0.157 mg/L. [Minn. R. 7001]
	5.13.73	**Special Requirements relating to the Adaptive Lake Management Plan and Total Phosphorus WQBEL.** [Minn. R. 7001]
	5.13.74	**Long-term Lake Winona Maintenance** A condition of the Adaptive Lake Management Plan is continued long-term maintenance of the adaptive lake management work. The Permittee shall retain responsibility for and documentation of the proper long-term maintenance of Lake Winona including but not limited to: 1) description of the conditions of Lake Winona noting any improvements or decline in lake water quality; 2) photographic documentation of any listed improvements or declines; 3) list of active BMPs in place; 4) conditions and effectiveness of current BMPs; 5) improvements made to existing BMPs and the need for any additional or different BMPs; 6) continued surface water monitoring and reporting of Lake Winona ensuring the lake continues to comply with the applicable water quality standards; 7) continued monitoring of lake vegetation to ensure vegetation remains established, and; 8) the common carp population remains sufficiently low such that resulting water quality complies with applicable water quality standards. The ultimate target density of carp will be based on an analysis of water quality and carp monitoring data. Literature based values indicate densities ranging from 40 to 100 kilograms per hectare (kg/ha) will be needed to achieve water quality standards. Summaries and monitoring results of the above listed items shall be combined into a

		Lake Winona Long-term Maintenance Plan that shall be submitted to the MPCA upon completion of the Adaptive Lake Management Plan activities identified in the permit as soon as possible but no later than December 31, 2030. Additionally, the Lake Winona Long-term Maintenance Plan must include a budget for the continued maintenance work for the next five, ten, and fifteen years to ensure adequate resources are available for the long-term maintenance work. Updates to the budget shall be submitted to the MPCA in the next annual report submittal following the conclusion of each of the Permittee's normal budgeting cycle. If the Adaptive Lake Management Plan activities described in the schedule above are not successful or are not completed, resulting in required construction to the Facility, the Permittee is not required to provide long-term maintenance of Lake Winona. [Minn. R. 7001]
	5.13.75	If the Permittee chooses to enter into a contractual agreement with a designated local unit of government for the long-term maintenance work described above, the Permittee shall submit a copy of the contract to the MPCA by 60 days prior to the planned contract start date. The contract should be for a time period sufficient to cover the long-term maintenance activities. The Permittee shall retain responsibility for ensuring the long-term maintenance activities are completed even if the Permittee enters into a contractual agreement with another local unit of government. [Minn. R. 7001]
	5.13.76	The Permittee is required to ensure Lake Winona maintains applicable water quality standards upon completion of the Adaptive Lake Management Plan activities and through the long-term maintenance work. If upon review of the annual report or site inspections, the MPCA finds that the water quality of Lake Winona has not been maintained, the MPCA may open the permit and make adjustments to the limits and/or monitoring requirements to ensure the applicable water quality standards are being met. [Minn. R. 7001]
	5.13.77	Notification of any modifications to the conditions or contents of the Adaptive Lake Management Plan, the Lake Winona Long-term Maintenance Plan, or the contractual agreement (if applicable) shall be submitted to the MPCA no later than 30 days before completion of the modification. The permit may be modified based on MPCA review of the changes. [Minn. R. 7001]
	5.13.78	**Surface Water Monitoring Stations** The Permittee shall conduct surface water monitoring to provide data regarding the effects of total phosphorus reductions that have been achieved to date as affected by changes required under this permit. Monitoring will be for total phosphorus, chlorophyll-a, and transparency at a frequency of once per month in the months of May and October and twice per month for the months of June through September each year. Surface water monitoring stations SW 001 and SW 002 will continue to monitor the northeast and southwest sites, respectively, on Lake Winona. A new surface water

		monitoring station, SW 003, has been added to the permit to monitor Lake Agnes. Monitoring on Lake Agnes will be for the same parameters as Lake Winona and at the same frequency. [Minn. R. 7001]
		Special Requirements
	5.14.79	**Total Chloride Water Quality Based Effluent Limit Variance General Requirements**. [Minn. R. 7001]
	5.14.80	The Alexandria Lake Area Sanitary District Wastewater Treatment Facility (Facility) (MN0040738) has applied for a variance from the chloride water quality standard in Minnesota Rule 7050, designed to protect the Class 2 beneficial use of the receiving water. EPA authorizes States and Tribes to include variance provisions in their water quality standards (40 CFR 131.14). In accordance with Minn. R. 7000.7000, permitted facilities are authorized to apply for a variance from standards. A variance is a temporary change in the applicable water quality standards. During the term of the variance the Facility is required to comply with the highest attainable condition (HAC) for the pollutant which the variance is granted (40 CFR 131.14(b)(ii)(A)(3)). To ensure this is met, an alternate effluent limit is developed and becomes effective at permit issuance as outlined in requirement 5.14.83. In addition, the Permittee is required to complete chloride source investigation and minimization, as well as an evaluation of the feasibility of water treatment (which must include the evaluation of lime softening) or other applicable treatment technologies in an effort to control sources of chloride. Upon expiration of the variance, the Permittee is required to comply with the final effluent limits outlined in requirement 5.14.84. As applied for by the Permittee, the basis of the variance is 'controls more stringent than those required by sections 301(b) and 306 of the Clean Water Act (CWA) would result in substantial and widespread economic and social impact' (Minn. R. 7050.0191, subp.4(6)). The MPCA has determined that the Permittee has satisfied the conditions necessary to grant a variance and as a result supports the inclusion of the variance in the permit. [Minn. R. 7001]
	5.14.81	During the reasonable potential analysis it was determined the Facility has reasonable potential to exceed water quality standards for chloride, total dissolved solids (TDS), specific conductance, and total bicarbonates (HCO_3). When reasonable potential is indicated for a particular pollutant, the permit must contain a WQBEL for that pollutant. While reviewing the Facility's salty parameter monitoring data, MPCA staff determined the Facility is a good candidate for chloride linkage to meet the salty parameter WQBELs needed for the reissued permit. By using the chloride linkage, the Facility will receive alternate and final effluent limitations for total chloride only. Compliance with the chloride effluent limit will be protective of all the other salty parameter final effluent limits. In the July 16, 2013 reissued permit for the Facility, a final total chloride WQBEL of 252 mg/L was included with a final attainment date of March 30, 2021. This final limit was based on the existing state standard of 230 mg/L under Minn. R. 7050.0222, subp. 3. [Minn. R. 7001]

	5.14.82	This variance is approved for an 8-year term; an explanation of the term is provided in the chloride preliminary determination on file with the MPCA. The variance effective date is November 15, 2020, upon receiving EPA approval, and the expiration date is November 15, 2028. [Minn. R. 7001]
	5.14.83	An alternate effluent limit for total chloride of 839 mg/L, daily maximum, (identified as Phases 1, 2, and 3 in the limits and monitoring table) was assigned to the Facility (SD 001) and becomes effective upon permit issuance after EPA approval. The alternate effluent limit was calculated and intended to result in a discharge of the highest quality wastewater, or HAC, throughout the variance term. The alternate limit will be re-evaluated after five years in accordance with Minn. R. 7050.0190, subp. 8 and adjusted accordingly to ensure that the highest quality wastewater is required to be achieved throughout the term of the variance. [Minn. R. 7001]
	5.14.84	The Permittee is required to meet the final effluent limits for total chloride of 230 mg/L calendar month average, and 252 mg/L daily maximum (identified as Phase 4 in the limits and monitoring table) at variance expiration. The final effluent limits are sufficient to meet the underlying water quality standard. The action tree (found at https://www.pca.state.mn.us/sites/default/files/wq-wwprm2-88.pdf) is the PMP and the Facility will be completing the Plan below to sequence and define the specific activities. The Permittee shall use the MPCA's *"Streamlined Chloride Variance Action Tree"* and implement that Plan as described in section 5.14.88 below. [Minn. R. 7001]
	5.14.85	The Permittee shall maintain compliance with the conditions of the variance as outlined in this permit and Minn. R. 7000.7000 & 7050.0190. The MPCA reserves the right to review and terminate the variance if the Permittee demonstrates noncompliance with any of the conditions of the variance. [Minn. R. 7001]
	5.14.86	The MPCA may reopen and modify the permit based on MPCA triennial water quality standards revisions applicable to the chloride variance. [Minn. R. 7001]
	5.14.87	**Chloride Investigation & Minimization Plan.** [Minn. R. 7001]
	5.14.88	Previously, the Permittee submitted a Chloride Management Plan on July 16, 2014 (approved by the MPCA on August 27, 2014) and a subsequent progress report dated July 16, 2016. Until a new plan is developed, the current plan (as updated through July 16, 2016) is the effective pollutant management plan (PMP). Due to the length of time since the last progress report was submitted to the MPCA, and as required by the Chloride Variance process, to implement the PMP, the Permittee is required to complete, submit, and implement a Chloride Investigation and Minimization Plan (Plan) as detailed in sections 5.14.90 and 5.19.91 below. The Plan shall incorporate information from the previously submitted Chloride Management Plan and associated progress report into this new Plan but must also include all specific source reductions and other activities necessary to reduce chloride to the maximum extent possible during this 8-year variance term and a schedule for implementing the activities. The Permittee shall also consider any relevant information from the development of the Long Prairie Watershed Restoration and Protection report in the updated plan. The Permittee will be required to submit annual progress reports, in accordance with 5.14.93 below, to report on actions taken, chloride reductions made, and to update the

		Plan as more information on the sources, source reduction, and centralized water treatment plant options are known. When updating the Plan, the Permittee shall consider the results of previous actions taken and reductions made in order to evaluate and plan for future chloride minimization efforts. Because the Permittee is in a unique situation in that it operates outside of City of Alexandria (City) jurisdiction and therefore does not have authority to regulate activity within the City or the City entity, Alexandria Light and Power (the municipal water supplier for residents of the City), or to make process changes to their water treatment plant, the Permittee shall make good faith efforts to collaborate with the City and Alexandria Light and Power officials throughout the development and implementation of the Plan to ensure all requirements are satisfied to the maximum extent possible. [Minn. R. 7001]
	5.14.89	The Permittee shall submit a plan : Due by 180 days after permit issuance. This Plan corresponds to the initial phase of the *Streamlined Chloride Variance Action Tree*. [Minn. R. 7001]
	5.14.90	At a minimum, the Plan must include, but is not limited to (items a through d in the next two requirements): a) Acknowledgement that chloride influent and effluent concentrations have been reviewed, using the most recent five years of monitoring data, and identify trends and relationships between actions taken, if applicable. i) In the July 2014 Chloride Management Plan, reference to a preliminary chloride mass balance was developed by Wenck and Associates to estimate the sources and levels of chloride present in the wastewater influent. In the July 2016 progress report, it was indicated that the updates to this mass balance were made. This mass balance can be used in the Plan; however, as stated above, the most recent five years of data shall be used. b) A summary of any chloride source reduction activities implemented and a schedule of chloride source reduction activities that will be completed to identify, evaluate, and complete chloride reduction, elimination, and prevention activities. These source reduction activities shall begin immediately unless the Plan is disapproved by the MPCA and shall include, but are not limited to: 1) Identification and quantification of existing and potential sources of chloride concentrations and/or loading to the Facility. Investigate the following categories of sources, at a minimum: i. Industrial; ii. Institutional; iii. Municipal; iv. Commercial; and v. Residential For each source of a chloride identified, the Permittee shall propose a control strategy by working with the source to develop an implementation plan and schedule for reducing the chloride concentrations from that source. Any sources identified and

		control strategies developed shall be included in future progress reports; and all progress reports must update the information required under the Plan; 2) Reduction activities must include actions focused on residential sources, if applicable. This may include continued education and working with homeowners using methods shown to be effective on the impact of chloride from residential softeners, making contact with the local water softening businesses regarding opportunities for chloride reduction within the community, and options available for increasing softener salt efficiency, which may include water softener tune-ups or replacement; i. In the July 2014 Chloride Management Plan, it was noted that a Chloride Reduction Citizen's Advisory Committee (Advisory Committee) to represent affected stakeholders was established in November of 2014 to discuss chloride issues and work towards developing an Attainment Plan for chloride reduction. In the July 2016 progress report it was noted that three meetings of the Advisory Committee were held before a March 11, 2015 decision was made to end the meetings and to continue developing and implementing public outreach and education plans. Due to the Permittee operating separately from the City and needing to collaborate with the City on several factors pertaining to chloride education, investigation, and reduction; the re-establishment and continued actions of the Advisory Committee may be used to satisfy this requirement. [Minn. R. 7001]
	5.14.91	3) Within three years of Plan development, the Permittee shall reduce nonpoint source discharges of chloride that the Permittee can control, such as road salt application and the use of de-icing products on the Permittee's property. One option is to utilize MPCA's Smart Salting Assessment tool (https://www.wintermaintenancetool.com). This web-based tool will help winter maintenance organizations assess operations, identify opportunities to reduce salt using proven best management practices (BMPs), and track progress. Along with this tool are Smart Salting training opportunities. i) The Permittee shall work with and provide funding for one City of Alexandria staff member to attend at least one of these trainings and submit documentation of completion to the MPCA. The preferred City staff to attend should be a staff member whom is considered a decision-maker in road maintenance. This will satisfy the requirement that Permittees with a variance will implement cost-effective and reasonable BMPs for nonpoint source control (Minn. R. 7050.0190 subp 1(B)). c) The Permittee shall identify the appropriate quantifiable sampling and reporting methods necessary to determine if the chloride source reduction activities are resulting in a reduction, or if changes are needed. As an example, the Permittee could use qualitative field equipment to measure specific conductance in specific areas throughout the collection system where known sources are being targeted, or utilize questionnaires to determine the age of residential water softeners. The goal is to gather data that will show what actions have led to reductions and to target future activities. The Permittee shall use the data to summarize effectiveness, re-evaluate next year's schedule, and modify the Plan as needed. If the monitoring does not indicate progress the Permittee must identify the barriers to achieving reductions, actions that will be taken to overcome them and supplemental actions that will be completed to ensure future progress.

		d) A summary of how the Permittee and City will evaluate centralized water treatment (which must include the evaluation of lime softening) or other applicable treatment technology options to reduce chloride concentrations, along with feasibility and associated costs. The Permittee shall use this information to complete the 5-year re-evaluation as outlined in section 5.14.96 below. [Minn. R. 7001]
	5.14.92	Unless the Plan is disapproved by the MPCA, the Permittee must complete the activities in accordance with the schedule outlined in the Plan. Updates on completion of the activities and the resulting reductions of chloride shall be submitted with the annual progress reports, as well as interim actions (i.e. the number of water softeners adjusted). As more information is known through completion of the investigation and reduction work, the activities and schedule shall be updated in the annual progress reports throughout the term of the variance in sufficient detail for MPCA to determine progress. [Minn. R. 7001]
	5.14.93	The Permittee shall submit an annual progress report to the MPCA for review and approval by January 31 of each calendar year following submittal of the Plan. The annual progress report shall include, but is not limited to: a) All chloride influent and effluent monitoring results for the previous year and a summary of any chloride reductions made; b) A list of potential sources of chloride found and any implementation plans and source reduction schedules developed; c) An update on the completion of source reduction activities based on the associated metrics; d) An evaluation of reductions achieved or not achieved through activities. If not achieved, explain the barriers to achievement; e) All sampling and reporting results collected to determine if activities are resulting in a chloride reduction; f) Any updates to the Plan's activities and schedule; and g) The schedule of activities that the Permittee plans to complete within the next 12-month period, as well as the metrics and associated sampling and reporting to record reductions. In the event that the permit is administratively continued, the Permittee shall continue to submit an annual progress report each year until the permit is reissued. The Permittee shall submit an annual progress report : Due annually, by the 31st of January. [Minn. R. 7001]
	5.14.94	**Variance 5-year Re-evaluation Requirements.** [Minn. R. 7001]
	5.14.95	Although the approved variance is for an 8-year term, variances are subject to re-evaluation every five years in accordance with Minn. R. 7050.0190, subp. 8. One year prior to permit expiration, the Permittee shall, in concert with the MPCA, determine if exhaustive implementation of the Chloride Investigation and Minimization Plan activities will lead to compliance with the final effluent limitation sufficient to meet the underlying water quality standard by permit expiration. If it is determined that compliance is not feasible, the Permittee shall submit a written request for re-evaluation of the variance no later than 180 days prior to permit expiration. The re-

		evaluation shall be part of the permit reissuance and shall be available for public comment. [Minn. R. 7001]
	5.14.96	If applicable, the Permittee shall submit a request for re-evaluation of the variance 180 days prior to permit expiration (or five years from approval of the variance). This request shall include: a) A re-evaluation of the HAC achieved during the previous five years; b) A re-evaluation of the Chloride Investigation and Minimization Plan; c) An evaluation of the feasibility of centralized water treatment (which must include the evaluation of lime softening) or other applicable treatment technologies to reduce chloride concentrations, and the associated costs to the Permittee; d) An evaluation of the economic basis of the variance (controls more stringent than those required by sections 301(b) and 306 of review and determine if continuance of the variance for the remainder of the variance term is appropriate. e) If determined by the Permittee that compliance with final effluent limits are known and economically feasible, the Permittee shall submit necessary actions to comply. The variance will be terminated and a schedule of compliance will be included in the reissued permit. (Permittee must include the schedule details at the time of re-evaluation); OR, if the re-evaluation of available treatment technologies demonstrates that compliance with the final limit remains a social and economic hardship, the Permittee shall indicate such in the re-evaluation request. f) If continuation of the variance is determined to be appropriate, the alternate limit (or HAC) will be re-calculated using the most recent five years of data. The limit will be adjusted down to ensure that the chloride reductions achieved over the previous five years are factored in and that the alternate effluent limit included in the reissued permit continues to result in a discharge of the highest quality wastewater throughout the remainder of the variance term. [Minn. R. 7001]
	5.14.97	If a variance re-evaluation request is submitted, the alternate limit shall continue until MPCA takes final action on the request. If a re-evaluation is not requested, the variance will expire and the final effluent limit will become effective at permit expiration. In accordance with permit requirement 5.14.87, the MPCA reserves the right to terminate the variance if it is found that the Permittee does not complete the required actions. [Minn. R. 7001]
		Mercury Minimization Plan
	5.15.98	The Permittee is required to complete and submit a Mercury Pollutant Minimization Plan (MMP) to the MPCA as detailed in this section. If the Permittee has previously submitted a MMP, it shall update its MMP and submit the updated MMP to the MPCA. The purpose of the MMP is to evaluate collection and treatment systems to determine possible sources of mercury as well as potential mercury reduction options. Guidelines for developing a MMP are detailed in this section. [Minn. R. 7001]
	5.15.99	The specific mercury monitoring requirements are detailed in the limits and monitoring section of this permit. Information gained through the MMP process can be used to reduce mercury concentrations. As part of its mercury control strategy, the Permittee

		should consider selecting activities based on the potential of those activities to reduce mercury loadings to the wastewater treatment facility. [Minn. R. 7001]
	5.15.100	The Permittee shall submit a mercury pollutant minimization plan : Due by 180 days after permit issuance. [Minn. R. 7001]
	5.15.101	At a minimum, the MMP shall include the following: a. A summary of mercury influent and effluent concentrations and biosolids monitoring data using the most recent five years of monitoring data, if available. b. Identification of existing and potential sources of mercury concentrations and/or loading to the facility. As appropriate for your facility, you should consider residential, institutional, municipal, and commercial sources (such as dental clinics, hospitals, medical clinics, nursing homes, schools, laundries, and industries with potential for mercury contributions). You should also consider other influent mercury sources, such as stormwater inputs, ground water (inflow & infiltration) inputs, lift station components, and waste streams or sewer tributaries to the wastewater treatment facility. c. An evaluation of past and present WWTF operations to determine those operating procedures that maximize mercury removal. d. A summary of any mercury reduction activities implemented during the last five years. e. A plan to implement mercury management and reduction measures during the next five years. [Minn. R. 7001]
		Mechanical System
	5.16.102	Bypass Structures. [Minn. R. 7001]
	5.16.103	All structures capable of bypassing the treatment system shall be manually controlled and kept locked at all times. [Minn. R. 7001.0030]
	5.16.104	Sanitary Sewer Extension Permit. [Minn. R. 7001]
	5.16.105	The Permittee may be required to obtain a Sanitary Sewer Extension Permit from the MPCA for any addition, extension or replacement to the sanitary sewer. If a sewer extension permit is required, construction may not begin until plans and specifications have been submitted and a written permit is granted except as allowed in Minn. Stat. 115.07, Subd. 3(b). [Minn. R. 7001.0020, D]
	5.16.106	Operator Certification. [Minn. R. 7001]
	5.16.107	The Permittee shall provide a Class A state certified operator who is in direct responsible charge of the operation, maintenance and testing functions required to ensure compliance with the terms and conditions of this permit. [Minn. R. 9400]
	5.16.108	The Permittee shall provide the appropriate number of operators with a Type IV certification to be responsible for the land application of biosolids or semisolids from commercial or industrial operations. [Minn. R. 7001]
	5.16.109	If the Permittee chooses to meet operator certification requirements through a contractual agreement, the Permittee shall provide a copy of the contract to the MPCA, WQ Submittals Center. The contract shall include the certified operator's name, certificate number, company name if appropriate, the period covered by the contract and provisions for renewal; the duties and responsibilities of the certified operator; the duties and responsibilities of the permittee; and provisions for notifying the MPCA 30

		days in advance of termination if the contract is terminated prior to the expiration date. [Minn. R. 9400]
	5.16.110	The Permittee shall notify the MPCA within 30 days of a change in operator certification or contract status. [Minn. R. 9400]
		Pretreatment: Undelegated Requirements
	5.17.111	Pretreatment - Definitions. [Minn. R. 7049]
	5.17.112	An "Individual Control Mechanism" is a document, such as an agreement or permit, that imposes limitations or requirements on an individual industrial user of the POTW. [Minn. R. 7049]
	5.17.113	"Significant Industrial User" (SIU) means any industrial user that: a. discharges 25,000 gallons per day or more of process wastewater; b. contributes a load of five (5) % or more of the capacity of the POTW; or c. is designated as significant by the Permittee or the MPCA on the basis that the SIU has a reasonable potential to adversely impact the POTW, or the quality of its effluent or residuals. [Minn. R. 7049]
	5.17.114	Pretreatment - Permittee Responsibility to Control Users. [Minn. R. 7049]
	5.17.115	It is the Permittee's responsibility to regulate the discharge from users of its wastewater treatment facility. The Permittee shall prevent any pass through of pollutants or any inhibition or disruption of the Permittee's facility, its treatment processes, or its sludge processes or disposal that contribute to the violation of the conditions of this permit or any federal or state law or regulation limiting the release of pollutants from the POTW. [Minn. R. 7049]
	5.17.116	The Permittee shall prohibit the discharge of the following to its wastewater treatment facility: a. pollutants which create a fire or explosion hazard, including any discharge with a flash point less than 60 degrees C (140 degrees F); b. pollutants which would cause corrosive structural damage to the POTW, including any waste stream with a pH of less than 5.0; c. solid or viscous pollutants which would obstruct flow; d. heat that would inhibit biological activity, including any discharge that would cause the temperature of the waste stream at the POTW treatment plant headwork's to exceed 40 degrees C (104 degrees F); e. pollutants which produce toxic gases, vapors, or fumes that may endanger the health or safety of workers; or f. any pollutant, including oxygen demanding pollutants such as biochemical oxygen demand, released at a flow rate or pollutant concentration that will cause interference or pass through. [Minn. R. 7049]
	5.17.117	The Permittee shall prohibit new discharges of non-contact cooling waters unless there is no cost effective alternative. Existing discharges of non-contact cooling water to the Permittee's wastewater treatment facility shall be eliminated, where elimination is cost-effective, or where an infiltration/inflow analysis and sewer system evaluation survey indicates the need for such removal. [Minn. R. 7049]

	5.17.118	If the Permittee accepts trucked-in wastes, the Permittee shall evaluate the trucked in wastes prior to acceptance in the same manner as it monitors sewered wastes. The Permittee shall accept trucked-in wastes only at specifically designated points. [Minn. R. 7049]
	5.17.119	Pollutant of concern means a pollutant that is or may be discharged by an industrial user that is, or reasonably should be of concern on the basis that it may cause the permittee to violate any permit limits on the release of pollutants. The following pollutants shall be evaluated to determine if they should be pollutants of concern: pollutants limited in this permit, pollutants for which monitoring is required in this permit, pollutants that are likely to cause inhibition of the Permittee's POTW, pollutants which may interfere with sludge disposal, and pollutants for which the Permittee's treatment facility has limited capacity. [Minn. R. 7049]
	5.17.120	Control of Significant Industrial Users. [Minn. R. 7049]
	5.17.121	The Permittee shall impose pretreatment requirements on SIUs which will ensure compliance with all applicable effluent limitations and other requirements set forth in this permit or any federal or state law or regulation limiting the release of pollutants from the POTW. These requirements shall be applied to SIUs by means of an individual control mechanism. [Minn. R. 7049]
	5.17.122	The Permittee shall not knowingly enter into an individual control mechanism with any user that would allow the user to contribute an amount or strength of wastewater that would cause violation of any limitation or requirement in the permit, or any applicable federal, state or local law or regulation. [Minn. R. 7049]
	5.17.123	Monitoring of Significant Industrial Users. [Minn. R. 7049]
	5.17.124	The Permittee shall obtain from SIUs specific information on the quality and quantity of the SIU's discharges to the Permittee's POTW. Except where specifically requested by the Permittee and approved by the MPCA, this information shall be obtained by means of representative monitoring conducted by the Permittee or by the SIU under requirements imposed by the Permittee in the SIU's individual control mechanism. Monitoring performed to comply with this requirement shall include all pollutants for which the SIU is significant and shall be done at a frequency commensurate with the significance of the SIU. [Minn. R. 7049]
	5.17.125	Reporting and Notification. [Minn. R. 7049]
	5.17.126	The Permittee shall submit a pretreatment annual report : Due by 31 days after the end of each calendar year following permit issuance if a SIU discharges to the POTW during a given calendar year. [Minn. R. 7049]
	5.17.127	The Pretreatment Annual Report shall be submitted on forms provided by the agency or shall provide equivalent information. The Permittee shall submit the pre-treatment report to the following address: MPCA Attn: WQ Submittals Center 520 Lafayette Road North St. Paul, Minnesota 55155-4194. [Minn. R. 7049]
	5.17.128	The Permittee shall notify the MPCA in writing of any:

		a. SIU of the Permittee's POTW which has not been previously disclosed to the MPCA; b. anticipated or actual changes in the volume or quality of discharge by an industrial user that could result in the industrial user becoming an SIU as defined in this chapter; or c. anticipated or actual changes in the volume or quality of discharges by a SIU that would require changes to the SIU's required local limits. This notification shall be submitted within 30 days of identifying the IU as a SIU. Where changes are proposed, they shall be submitted prior to changes being made. [Minn. R. 7049]
	5.17.129	Upon notifying the MPCA of a SIU or change in a SIU discharge as required above, the Permittee shall submit the following information on forms provided by the agency or in a comparable format: a. the identity of the SIU and a description of the SIU's operation and process; b. a characterization of the SIU's discharge; c. the required local limits that will be imposed on the SIU; d. a technical justification of the required local limits; and e. a plan for monitoring the SIU which is consistent with monitoring requirements in this chapter. [Minn. R. 7049]
	5.17.130	In addition, the Permittee shall, upon request, submit the following to the MPCA for approval: a. additional information on the SIU, its processes and discharge; b. a copy of the individual control mechanism used to control the SIU; c. the Permittee's legal authority to be used for regulating the SIU; and d. the Permittee's procedures for enforcing the requirements imposed on the SIU. [Minn. R. 7049]
	5.17.131	The permittee shall notify MPCA of any of its industrial users that may be subject to national categorical pretreatment standards. [Minn. R. 7049]
	5.17.132	This permit may be modified in accordance with Minnesota Rules, ch. 7001 to require development of a pretreatment program approvable under the Federal General Pretreatment Regulation (40 CFR 403). [Minn. R. 7049]
		Biosolids: Land Application
	5.18.133	Authorization. [Minn. R. 7041]
	5.18.134	This permit authorizes the Permittee to store and land apply domestic wastewater treatment biosolids in accordance with the provisions in this chapter and Minnesota Rules, ch. 7041. [Minn. R. 7041]
	5.18.135	Permittees who prepare bulk biosolids shall obtain approval of the sites on which bulk biosolids are applied before they are applied unless they are Exceptional Quality Biosolids. Site application procedures are set forth in Minn. R. ch. 7041.0800. [Minn. R. 7041.0800]
	5.18.136	Compliance Responsibility. [Minn. R. 7041]

	5.18.137	The Permittee is responsible for ensuring that the applicable requirements in this chapter and Minn. R. ch. 7041 are met when biosolids are prepared, distributed, or applied to the land. [Minn. R. 7041]
	5.18.138	Notification Requirements. [Minn. R. 7041]
	5.18.139	The Permittee shall provide information needed to comply with the biosolids requirements of Minn. R. ch. 7041 to others who prepare or use the biosolids. [Minn. R. 7041]
	5.18.140	Pollutant Limits. [Minn. R. 7041]
	5.18.141	Biosolids which are applied to the land shall not exceed the ceiling concentrations in Table 1 and shall not be applied so that the cumulative amounts of pollutant in Table 2 are exceeded. Table 1 Ceiling Concentrations (dry weight basis) Parameter in units mg/kg Arsenic 75 Cadmium 85 Copper 4300 Lead 840 Mercury 57 Molybdenum 75 Nickel 420 Selenium 100 Zinc 7500 Table 2 Cumulative Loading Limits Parameter in units lbs/acre Arsenic 37 Cadmium 35 Copper 1339 Lead 268 Mercury 15 Molybdenum not established* Nickel 375 Selenium 89 Zinc 2500 *The cumulative limit for molybdenum has not been established at the time of permit issuance. [Minn. R. 7041.1100]
	5.18.142	Pathogen and Vector Attraction Reduction. [Minn. R. 7041]
	5.18.143	Biosolids shall be processed, treated, or be incorporated or injected into the soil to meet one of the vector attraction reduction requirements in Minnesota Rules, pt. 7041.1400. [Minn. R. 7041.1400]
	5.18.144	Biosolids shall be processed or treated by one of the alternatives in Minnesota Rules, pt. 7041.1300 to meet the Class A or Class B standards for the reduction of pathogens. When Class B biosolids are applied to the land, the site restrictions in Minnesota Rules, pt. 7041.1300 shall also be met. [Minn. R. 7041.1300]
	5.18.145	The minimum duration between application and harvest, grazing or public access to areas where Class B biosolids have been applied to the land is as follows:

		a. 14 months for food crops whose harvested parts may touch the soil/biosolids mixture (such as melons, squash, tomatoes, etc.), when biosolids are surface applied, incorporated or injected. b. 20 months or 38 months depending on the application method for food crops whose harvested parts grow in the soil (such as potatoes, carrots, onions, etc.). The 20 month time period is required when biosolids are surface applied or surface applied and incorporated after they have been on the soil surface for at least four (4) months. The 38 month time period is required when the biosolids are injected or surface applied and incorporated within four (4) months of application. c. 30 days for feed crops, other food crops (such as field corn, sweet corn, etc.), hay or fiber crops when biosolids are surface applied, incorporated or injected. d. 30 days for grazing of animals when biosolids are surface applied, incorporated or injected. e. One year where there is a high potential for public contact with the site, (such as a reclamation site located in populated areas, a construction site located in a city, turf farms, plant nurseries, etc.) and 30 days where there is low potential for public contact (such as agricultural land, forest, a reclamation site located in an unpopulated area, etc.) when biosolids are surface applied, incorporated, or injected. [Minn. R. 7041]
	5.18.146	Management Practices. [Minn. R. 7041]
	5.18.147	The management practices for the land application of biosolids are described in detail in Minn. R. ch. 7041.1200 and shall be followed unless specified otherwise in a site approval letter or a permit issued by the MPCA. [Minn. R. 7041.1200]
	5.18.148	Overall management requirements: a. Biosolids shall not be applied to the land if it is likely to adversely affect a threatened or endangered species listed under Section 4 of the Endangered Species Act or its designated critical habitat. b. Biosolids shall not be applied to flooded, frozen or snow covered ground so that the biosolids enter wetlands or other waters of the state. c. Biosolids shall be applied at an agronomic rate unless specified otherwise by the MPCA in a permit. d. Biosolids shall not be applied within 33 feet of a wetland or waters of the state unless specified otherwise by the MPCA in a permit. [Minn. R. 7041]
	5.18.149	Monitoring Requirements. [Minn. R. 7041]
	5.18.150	Representative samples of biosolids applied to the land shall be analyzed by methods specified in Minnesota Rule pt. 7041.3200 for the following parameters: arsenic, cadmium, copper, lead, mercury, molybdenum, nickel, selenium, zinc, Kjeldahl nitrogen, ammonia nitrogen, total solids, volatile solids, phosphorus, potassium and pH. [Minn. R. 7041.3200]
	5.18.151	At a minimum, biosolids shall be monitored at the frequencies specified in Table 3 for the parameters listed above, and any pathogen or vector attraction reduction requirements in Minnesota Rules, pts. 7041.1300 and 7041.1400 if used to determine compliance with those parts. Table 3 Minimum Sampling Frequencies

		Biosolids Applied* (metric tons/365-day period) / Biosolids Applied* (tons/365-day period) / Frequency (times/365-day period) >0 but <290 / >0 but <320 / 1 >=290 but <1,500 / >=320 but <1,650 / 4 >=1,500 but <15,000 / >=1,650 but <16,500 / 6 >=15,000 / >=16,500 / 12 * Either the amount of bulk biosolids applied to the land or the amount of biosolids received by a person who prepares biosolids that are sold or given away in a bag or other container for application to the land (dry weight basis). [Minn. R. 7041.1300, Minn. R. 7041.1400]
	5.18.152	Representative samples of biosolids that are transferred to storage units and are stored for more than two years shall be analyzed by methods specified in Minnesota Rule pt. 7041.3200 for each cropping year they are stored for the following parameters: arsenic, cadmium, copper, lead, molybdenum, nickel, selenium, and zinc. Mercury is specifically NOT included in the stored biosolids analysis because of the short holding time [28 days] required between sampling and analysis. [Minn. R. 7041.3200]
	5.18.153	Increased sampling frequencies are specified for the parameters listed in Table 4. Sampling at a frequency at twice the minimum frequencies in Table 3 is required if concentrations listed in Table 4 are exceeded (based on the average of all analyses made during the previous cropping year). Table 4 Increased Frequency of Sampling Parameter (mg/kg dry weight basis) Arsenic 38 Cadmium 43 Copper 2150 Lead 420 Mercury 28 Molybdenum 38 Nickel 210 Selenium 50 Zinc 3750. [Minn. R. 7041]
	5.18.154	Records. [Minn. R. 7041]
	5.18.155	The Permittee shall keep records of the information necessary to show compliance with pollutant concentrations and loadings, pathogen reduction requirements, vector attraction reduction requirements and management practices as specified in Minnesota Rules, pt. 7041.1600, as applicable to the quality of biosolids produced. [Minn. R. 7041.1600]
	5.18.156	Reporting Requirements. [Minn. R. 7041]

	5.18.157	The Permittee shall submit a biosolids annual report : Due annually, by the 31st of December on a form provided by or approved by the MPCA. The report shall include the requirements in Minnesota Rules, part 7041.1700. [Minn. R. 7041.1700]
	5.18.158	The permittee shall submit a Biosolids Annual Report by December 31 of each year for biosolids storage and/or transfer activities occurring during the cropping year previous to December 31. The report shall indicate whether or not biosolids were transferred and/or stored. If biosolids were transferred, the report shall describe how much was transferred, where it was transferred to, the name of the facility that accepted the transfer and the contact person at that facility. "Cropping year" means a year beginning on September 1 of the year prior to the growing season and ending August 31 the year the crop is harvested. For example, the 2012 cropping year began September 1, 2011, and ended August 31, 2012. [Minn. R. 7041]
	5.18.159	For biosolids that are stored for more than two years, the Biosolids Annual Report shall also include the analytical data from the representative sample of the biosolids generated during the cropping year. [Minn. R. 7041]
	5.18.160	The Permittee shall submit the Biosolids Annual Report to: MPCA Submittals Center, Minnesota Pollution Control Agency, 520 Lafayette Road North, St Paul Minnesota 551554194. [Minn. R. 7041]
	5.18.161	The Permittee shall notify the MPCA in writing when 90% or more of any of the cumulative pollutant loading rates listed for any Land Application Sites has been reached for a site. [Minn. R. 7041]
		Industrial Stormwater No Exposure Exclusion
	5.19.162	Conditional Exclusion for No Exposure. [Minn. R. 7001]
	5.19.163	No exposure means all industrial materials and activities are protected by a storm resistant shelter to prevent exposure to rain, snow, snow melt, and/or runoff. Industrial activities or materials include, but are not limited to, material handling equipment or activities, industrial machinery, raw materials, intermediate products, by-products, final products, or waste products. [Minn. R. 7090]
	5.19.164	The conditional exclusion for No Exposure is available on a facility-wide basis in accordance with Minn. R. 7090.3060, subp. 5(B). [Minn. R. 7090]
	5.19.165	The no exposure certification is non-transferrable in accordance with Minn. R. 7090.3060, subp. 5(D). In the event that the facility operator changes, then the new operator shall submit written notification of the change to the MPCA, Attn: WQ Submittal Center, 520 Lafayette Road North, St Paul, Minnesota 55155-4194. [Minn. R. 7090]
	5.19.166	The MPCA retains the authority to require the facility operator to apply for a permit modification to this permit for stormwater coverage or to apply for coverage under the Industrial Stormwater General Permit (MNR050000), even when an industrial operator certifies No Exposure, if the MPCA has determined that the discharge is contributing to the violation of, or interfering with the attainment or maintenance of water quality standards, including designated uses. [Minn. R. 7090]
	5.19.167	Any facility that has previously obtained a conditional exclusion for No Exposure shall recertify for the exclusion no later than five years from the effective date of the most recent No Exposure certificate issued to the facility by the Agency. [Minn. R. 7090]

	5.19.168	The No Exposure exclusion is conditional. The facility shall maintain a condition of No Exposure at the facility in order for the No Exposure exclusion to remain applicable. In the event of any change or circumstance that causes exposure of industrial activities or materials to stormwater, the facility shall comply with the stormwater requirements of this chapter. [Minn. R. 7090]
	5.19.169	Based on the information submitted with the permit application, the Agency has determined the Permittee meets the exclusion criteria for "No Exposure" in accordance with Minnesota Rules Chapter 7090.3060. [Minn. R. 7090]
		Total Residual Oxidants
	5.20.170	General Requirements. [Minn. R. 7001]
	5.20.171	"Daily Maximum" for Total Residual Chlorine (TRC) concentration limits means: a. The value of a single sample in a 24-hour period if the concentration of TRC in that sample is 0.038 mg/L or less. b. If the concentration of TRC in the first sample is greater than 0.038 mg/L reporting the average of two to twelve samples analyzed in a 24-hour period is allowed. The second sample shall be taken two hours after the first sample and subsequent samples are to be taken at one-hour intervals thereafter, not to exceed a total of twelve samples in a 24-hour period. Values below the Reportable Limit for TRC are assumed to be zero for averaging purposes only. c. The average value of multiple daily TRC effluent sample analyses shall meet the 0.038 mg/L limit to be in compliance. [State Definitions]
	5.20.172	Total Residual Chlorine shall be analyzed immediately. This means within 15 minutes or less of sample collection. [Minn. R. 7001]
	5.20.173	A Method Detection Limit (MDL) shall be established for this parameter. [Minn. R. 7001]
	5.20.174	The Reportable Limit shall be established for this parameter. This should be based on the Method Detection Limit and laboratory, analyst, and equipment used in the analysis. The Reportable Limit cannot be greater than 0.1 mg/L. [Minn. R. 7001]
	5.20.175	The Method Detection Limit and Reportable Limit should be reassessed when the method, equipment, laboratory, or analyst changes. [Minn. R. 7001]
	5.20.176	Monitoring results below the Reportable Limit should be reported as "<" the Reportable Limit. For example, if the Reportable Limit is 0.01 mg/L and a parameter is not detected at a value of 0.01 mg/L or greater, the concentration shall be reported as "<0.01 mg/L." The symbol "<" means "less than.". [Minn. R. 7001]
	5.20.177	The equipment should be checked against a known standard at least quarterly. [Minn. R. 7001]
		Total Facility Requirements (NPDES/SDS)
	5.21.178	Definitions. Refer to the 'Permit Users Manual' found on the MPCA website (www.pca.state.mn.us) for standard definitions. [Minn. R. 7001.]
	5.21.179	Incorporation by Reference. The following applicable federal and state laws are incorporated by reference in this permit, are applicable to the Permittee, and are enforceable parts of this permit: 40 CFR pts. 122.41, 122.42, 136, 403 and 503; Minn. R. pts. 7001, 7041, 7045, 7050, 7052, 7053, 7060, and 7080; and Minn. Stat. ch. 115 and 116. [Minn. R. 7001]

	5.21.180	Permittee Responsibility. The Permittee shall perform the actions or conduct the activity authorized by the permit in compliance with the conditions of the permit and, if required, in accordance with the plans and specifications approved by the Agency. [Minn. R. 7001.0150, subp. 3(E)]
	5.21.181	Toxic Discharges Prohibited. Whether or not this permit includes effluent limitations for toxic pollutants, the Permittee shall not discharge a toxic pollutant except according to Code of Federal Regulations, Title 40, sections 400 to 460 and Minnesota Rules 7050, 7052, 7053 and any other applicable MPCA rules. [Minn. R. 7001.1090, subp. 1(A)]
	5.21.182	Nuisance Conditions Prohibited. The Permittee's discharge shall not cause any nuisance conditions including, but not limited to: floating solids, scum and visible oil film, acutely toxic conditions to aquatic life, or other adverse impact on the receiving water. [Minn. R. 7050.0210, subp. 2]
	5.21.183	Property Rights. This permit does not convey a property right or an exclusive privilege. [Minn. R. 7001.0150, subp. 3(C)]
	5.21.184	Liability Exemption. In issuing this permit, the state and the MPCA assume no responsibility for damage to persons, property, or the environment caused by the activities of the Permittee in the conduct of its actions, including those activities authorized, directed, or undertaken under this permit. To the extent the state and the MPCA may be liable for the activities of its employees, that liability is explicitly limited to that provided in the Tort Claims Act. [Minn. R. 7001.0150, subp. 3(O)]
	5.21.185	The MPCA's issuance of this permit does not obligate the MPCA to enforce local laws, rules, or plans beyond what is authorized by Minnesota Statutes. [Minn. R. 7001.0150, subp. 3(D)]
	5.21.186	Liabilities. The MPCA's issuance of this permit does not release the Permittee from any liability, penalty or duty imposed by Minnesota or federal statutes or rules or local ordinances, except the obligation to obtain the permit. [Minn. R. 7001.0150, subp. 3(A)]
	5.21.187	The issuance of this permit does not prevent the future adoption by the MPCA of pollution control rules, standards, or orders more stringent than those now in existence and does not prevent the enforcement of these rules, standards, or orders against the Permittee. [Minn. R. 7001.0150, subp. 3(B)]
	5.21.188	Severability. The provisions of this permit are severable and, if any provisions of this permit or the application of any provision of this permit to any circumstance are held invalid, the application of such provision to other circumstances and the remainder of this permit shall not be affected thereby. [Minn. R. 7001]
	5.21.189	Compliance with Other Rules and Statutes. The Permittee shall comply with all applicable air quality, solid waste, and hazardous waste statutes and rules in the operation and maintenance of the facility. [Minn. R. 7001]
	5.21.190	Inspection and Entry. When authorized by Minn. Stat. ch. 115.04; 115B.17, subd. 4; and 116.091, and upon presentation of proper credentials, the agency, or an authorized employee or agent of the agency, shall be allowed by the Permittee to enter at reasonable times upon the property of the Permittee to examine and copy books, papers, records, or memoranda pertaining to the construction, modification, or operation of the facility covered by the permit or pertaining to the activity covered by the permit; and to conduct surveys and investigations, including sampling or monitoring, pertaining to the construction, modification, or operation of the facility

		covered by the permit or pertaining to the activity covered by the permit. [Minn. R. 7001.0150, subp. 3(I)]
	5.21.191	Control Users. The Permittee shall regulate the users of its wastewater treatment facility so as to prevent the introduction of pollutants or materials that may result in the inhibition or disruption of the conveyance system, treatment facility or processes, or disposal system that would contribute to the violation of the conditions of this permit or any federal, state or local law or regulation. [Minn. R. 7001.0150, subp. 3(F)]
	5.21.192	Sampling. [Minn. R. 7001]
	5.21.193	Representative Sampling. Samples and measurements required by this permit shall be conducted as specified in this permit and shall be representative of the discharge or monitored activity. [40 CFR 122.41(j)(1)]
	5.21.194	Additional Sampling. If the Permittee monitors more frequently than required, the results and the frequency of monitoring shall be reported on the Discharge Monitoring Report (DMR) or another MPCA-approved form for that reporting period. [Minn. R. 7001.1090, subp. 1(E)]
	5.21.195	Certified Laboratory. A laboratory certified by the Minnesota Department of Health and/or registered by the MPCA shall conduct analyses required by this permit. Analyses of dissolved oxygen, pH, temperature, specific conductance, and total residual oxidants (chlorine, bromine) do not need to be completed by a certified laboratory but shall comply with manufacturers specifications for equipment calibration and use. [Minn. R. 4740.2010, Minn. R. 4740.2050 through 2120]
	5.21.196	Sample Preservation and Procedure. Sample preservation and test procedures for the analysis of pollutants shall conform to 40 CFR Part 136 and Minn. R. 7041.3200. [40 CFR 136, Minn. R. 7041.3200]
	5.21.197	Equipment Calibration: Flow meters, pumps, flumes, lift stations or other flow monitoring equipment used for purposes of determining compliance with permit shall be checked and/or calibrated for accuracy at least twice annually. [Minn. R. 7001.0150, 2(B and C)]
	5.21.198	Maintain Records. The Permittee shall keep the records required by this permit for at least three years, including any calculations, original recordings from automatic monitoring instruments, and laboratory sheets. The Permittee shall extend these record retention periods upon request of the MPCA. The Permittee shall maintain records for each sample and measurement. The records shall include the following information: a. the exact place, date, and time of the sample or measurement; b. the date of analysis; c. the name of the person who performed the sample collection, measurement, analysis, or calculation; d. the analytical techniques, procedures and methods used; and e. the results of the analysis. [Minn. R. 7001.0150, 2(C)]
	5.21.199	Completing Reports. The Permittee shall submit the results of the required sampling and monitoring activities on the forms provided, specified, or approved by the MPCA. The information shall be recorded in the specified areas on those forms and in the units specified.

		Required forms may include DMR Supplemental/Sample Value Form Individual values for each sample and measurement shall be recorded on the DMR Supplemental/Sample Value Form which, if required, will be provided by the MPCA. DMR Supplemental/Sample Value Forms shall be submitted with the appropriate DMRs. You may design and use your own supplemental form; however it shall be approved by the MPCA. Note: Required summary information shall also be recorded on the DMR. Summary information that is submitted ONLY on the DMR Supplemental/Sample Value Form does not comply with the reporting requirements. [Minn. R. 7001.1090, 1(D), Minn. R. 7001.150, 2(B)]
	5.21.200	Submitting Reports. DMRs, DMR supplemental forms and related attachments must be electronically submitted via MPCA e-Services after authorization is approved. DMRs and DMR Supplemental Forms shall be electronically submitted by the 21st day of the month following the sampling period or otherwise as specified in this permit. Electronic DMR submittal shall be complete on or before 11:59 PM of the 21st day of the month following the sampling period or as otherwise specified in this permit. A DMR shall be submitted for each required station even if no discharge occurred during the reporting period. Other reports required by this permit shall be postmarked by the date specified in the permit to: MPCA, Attn: WQ Submittals Center, 520 Lafayette Road North, St Paul Minnesota 551554194. [Minn. R. 7001.0150, 2(B), Minn. R. 7001.0150, 3(H)]
	5.21.201	Incomplete or Incorrect Reports. The Permittee shall immediately submit an electronically amended report or DMR to the MPCA upon discovery by the Permittee or notification by the MPCA that it has submitted an incomplete or incorrect report or DMR. The amended report or DMR shall contain the missing or corrected data along with a cover letter explaining the circumstances of the incomplete or incorrect report. If it is impossible to electronically amend the report or DMR, the Permittee shall immediately notify the MPCA and the MPCA will provide direction for the amendment submittals. [Minn. R. 7001.0150, 3(G)]
	5.21.202	Required Signatures. All DMRs, forms, reports, and other documents submitted to the MPCA shall be signed by the Permittee or the duly authorized representative of the Permittee. Minn. R. 7001.0150, subp. 2, item D. The person or persons that sign the DMRs, forms, reports or other documents shall certify that he or she understands and complies with the certification requirements of Minn. R. 7001.0070 and 7001.0540, including the penalties for submitting false information. Technical documents, such as design drawings and specifications and engineering studies required to be submitted as part of a permit application or by permit conditions, shall be certified by a registered professional engineer. [Minn. R. 7001.0540]
	5.21.203	Detection Level. The Permittee shall report monitoring results below the reporting limit (RL) of a particular instrument as "<" the value of the RL. For example, if an instrument has a RL of 0.1 mg/L and a parameter is not detected at a value of 0.1 mg/L or greater, the concentration shall be reported as "<0.1 mg/L." "Non-detected," "undetected," "below detection limit," and "zero" are unacceptable reporting results, and are permit reporting violations.

		Where sample values are less than the level of detection and the permit requires reporting of an average, the Permittee shall calculate the average as follows: a. If one or more values are greater than the level of detection, substitute zero for all nondetectable values to use in the average calculation. b. If all values are below the level of detection, report the averages as "<" the corresponding level of detection. c. Where one or more sample values are less than the level of detection, and the permit requires reporting of a mass, usually expressed as kg/day, the Permittee shall substitute zero for all nondetectable values. [Minn. R. 7001.0150, 2(B)]
	5.21.204	Records. The Permittee shall, when requested by the Agency, submit within a reasonable time the information and reports that are relevant to the control of pollution regarding the construction, modification, or operation of the facility covered by the permit or regarding the conduct of the activity covered by the permit. [Minn. R. 7001.0150, 3(H)]
	5.21.205	Confidential Information. Except for data determined to be confidential according to Minn. Stat. ch. 116.075, subd. 2, all reports required by this permit shall be available for public inspection. Effluent data shall not be considered confidential. To request the Agency maintain data as confidential, the Permittee shall follow Minn. R. 7000.1300. [Minn. R. 7000.1300]
	5.21.206	Noncompliance and Enforcement. [Minn. R. 7001]
	5.21.207	Subject to Enforcement Action and Penalties. Noncompliance with a term or condition of this permit subjects the Permittee to penalties provided by federal and state law set forth in section 309 of the Clean Water Act; United States Code, title 33, section 1319, as amended; and in Minn. Stat. ch. 115.071 and 116.072, including monetary penalties, imprisonment, or both. [Minn. R. 7001.1090, 1(B)]
	5.21.208	Criminal Activity. The Permittee may not knowingly make a false statement, representation, or certification in a record or other document submitted to the Agency. A person who falsifies a report or document submitted to the Agency, or tampers with, or knowingly renders inaccurate a monitoring device or method required to be maintained under this permit is subject to criminal and civil penalties provided by federal and state law. [Minn. R. 7001.0150, 3(G), Minn. R. 7001.1090, 1(G and H), Minn. Stat. ch. 609.671, 1]
	5.21.209	Noncompliance Defense. It shall not be a defense for the Permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit. [40 CFR 122.41(c)]
	5.21.210	Effluent Violations. If sampling by the Permittee indicates a violation of any discharge limitation specified in this permit, the Permittee shall immediately make every effort to verify the violation by collecting additional samples, if appropriate, investigate the cause of the violation, and take action to prevent future violations. If the permittee discovers that noncompliance with a condition of the permit has occurred which could endanger human health, public drinking water supplies, or the environment, the Permittee shall within 24 hours of the discovery of the noncompliance, orally notify the commissioner and submit a written description of the noncompliance within 5 days of the discovery. The written description shall include items a. through e., as listed below. If the Permittee discovers other non-compliance that does not explicitly endanger

		human health, public drinking water supplies, or the environment, the non-compliance shall be reported during the next reporting period to the MPCA with its Discharge Monitoring Report (DMR). If no DMR is required within 30 days, the Permittee shall submit a written report within 30 days of the discovery of the noncompliance. This description shall include the following information: a. a description of the event including volume, duration, monitoring results and receiving waters; b. the cause of the event; c. the steps taken to reduce, eliminate and prevent reoccurrence of the event; d. the exact dates and times of the event; and e. steps taken to reduce any adverse impact resulting from the event. [Minn. R. 7001.150, 3(K)]
	5.21.211	Upset Defense. In the event of temporary noncompliance by the Permittee with an applicable effluent limitation resulting from an upset at the Permittee's facility due to factors beyond the control of the Permittee, the Permittee has an affirmative defense to an enforcement action brought by the Agency as a result of the noncompliance if the Permittee demonstrates by a preponderance of competent evidence: a. the specific cause of the upset; b. that the upset was unintentional; c. that the upset resulted from factors beyond the reasonable control of the Permittee and did not result from operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventative maintenance, or increases in production which are beyond the design capability of the treatment facilities; d. that at the time of the upset the facility was being properly operated; e. that the Permittee properly notified the Commissioner of the upset in accordance with Minn. R. 7001.1090, subp. 1, item I; and f. that the Permittee implemented the remedial measures required by Minn. R. 7001.0150, subp. 3, item J. [Minn. R. 7001.1090]
	5.21.212	Release. [Minn. R. 7001]
	5.21.213	Unauthorized Releases of Wastewater Prohibited. Except for discharges from outfalls specifically authorized by this permit, overflows, discharges, spills, or other releases of wastewater or materials to the environment, whether intentional or not, are prohibited. However, the MPCA will consider the Permittee's compliance with permit requirements, frequency of release, quantity, type, location, and other relevant factors when determining appropriate action. [40 CFR 122.41, Minn. Stat. ch. 115.061]
	5.21.214	Discovery of a release. Upon discovery of a release, the Permittee shall: a. Take all reasonable steps to immediately end the release. b. Notify the Minnesota Department of Public Safety Duty Officer at 1(800)422-0798 or (651)649-5451 (metro area) immediately upon discovery of the release. You may contact the MPCA during business hours at 1(800)657-3864 or (651)296-6300 (metro area). c. Recover as rapidly and as thoroughly as possible all substances and materials released or immediately take other action as may be reasonably possible to minimize

		or abate pollution to waters of the state or potential impacts to human health caused thereby. If the released materials or substances cannot be immediately or completely recovered, the Permittee shall contact the MPCA. If directed by the MPCA, the Permittee shall consult with other local, state or federal agencies (such as the Minnesota Department of Natural Resources and/or the Wetland Conservation Act authority) for implementation of additional clean-up or remediation activities in wetland or other sensitive areas. [Minn. R. 7001.1090]
	5.21.215	Sampling of a release. Upon discovery of a release, the Permittee shall: a. Collect representative samples of the release. The Permittee shall sample the release for parameters of concern immediately following discovery of the release. The Permittee may contact the MPCA during business hours to discuss the sampling parameters and protocol. In addition, Fecal Coliform Bacteria samples shall be collected where it is determined by the Permittee that the release contains or may contain sewage. If the release cannot be immediately stopped, the Permittee shall consult with MPCA regarding additional sampling requirements. Samples shall be collected at least, but not limited to, two times per week for as long as the release continues. b. Submit the sampling results on the Release Sampling Form (http://www.pca.state.mn.us/index.php/view-document.html?gid=18867). The Release Sampling Form shall be submitted to the MPCA with the next DMR or within 30 days whichever is sooner. [Minn. R. 7001.1090]
	5.21.216	Bypass. [Minn. R. 7001]
	5.21.217	Anticipated bypass. The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if the bypass is for essential maintenance to assure efficient operation of the facility. The permittee shall submit prior notice, if possible at least ten days before the date of the bypass to the MPCA. The notice of the need for an anticipated bypass shall include the following information: a. the proposed date and estimated duration of the bypass; b. the alternatives to bypassing; and c. a proposal for effluent sampling during the bypass. Any bypass wastewater shall enter waters of the state from outfalls specifically authorized by this permit. Therefore, samples shall be collected at the frequency and location identified in this permit or two times per week for as long as the bypass continues, whichever is more frequent. [40 CFR 122.41(m)(2 and 3), Minn. R. 7001.1090, 1(J)]
	5.21.218	All other bypasses are prohibited. The MPCA may take enforcement action against the Permittee for a bypass, unless the specific conditions described in Minn. R. Ch. 7001.1090 subp. 1, K and 122.41(m)(4)(i) are met. In the event of an unanticipated bypass, the permittee shall: a. Take all reasonable steps to immediately end the bypass. b. Notify the Minnesota Department of Public Safety Duty Officer at 1(800)422-0798 or (651)649-5451 (metro area) immediately upon commencement of the bypass. You may

		contact the MPCA during business hours at 1(800)657-3864 or (651)296-6300 (metro area). c. Immediately take action as may be reasonably possible to minimize or abate pollution to waters of the state or potential impacts to human health caused thereby. If directed by the MPCA, the Permittee shall consult with other local, state or federal agencies for implementation of abatement, clean-up, or remediation activities. d. Only allow bypass wastewater as specified in this section to enter waters of the state from outfalls specifically authorized by this permit. Samples shall be collected at the frequency and location identified in this permit or two times per week for as long as the bypass continues, whichever is more frequent. The permittee shall also follow the reporting requirements for effluent violations as specified in this permit. [40 CFR 122.41(m)(4)(i), Minn. R. 7001.1090, 1(K), Minn. Stat. ch. 115.061]
	5.21.219	Operation and Maintenance. [Minn. R. 7001]
	5.21.220	The Permittee shall at all times properly operate and maintain the facilities and systems of treatment and control, and the appurtenances related to them which are installed or used by the Permittee to achieve compliance with the conditions of the permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance procedures. The Permittee shall install and maintain appropriate backup or auxiliary facilities if they are necessary to achieve compliance with the conditions of the permit and, for all permits other than hazardous waste facility permits, if these backup or auxiliary facilities are technically and economically feasible Minn. R. 7001.0150. subp. 3, item F. [Minn. R. 7001.0150, 3(F)]
	5.21.221	In the event of a reduction or loss of effective treatment of wastewater at the facility, the Permittee shall control production or curtail its discharges to the extent necessary to maintain compliance with the terms and conditions of this permit. The Permittee shall continue this control or curtailment until the wastewater treatment facility has been restored or until an alternative method of treatment is provided. [Minn. R. 7001.1090, 1(C)]
	5.21.222	Solids Management. The Permittee shall properly store, transport, and dispose of biosolids, septage, sediments, residual solids, filter backwash, screenings, oil, grease, and other substances so that pollutants do not enter surface waters or ground waters of the state. Solids should be disposed of in accordance with local, state and federal requirements. [40 CFR 503, Minn. R. 7041]
	5.21.223	Scheduled Maintenance. The Permittee shall schedule maintenance of the treatment works during non-critical water quality periods to prevent degradation of water quality, except where emergency maintenance is required to prevent a condition that would be detrimental to water quality or human health. [Minn. R. 7001.0150, 3(F), Minn. R. 7001.150, 2(B)]
	5.21.224	Control Tests. In-plant control tests shall be conducted at a frequency adequate to ensure compliance with the conditions of this permit. [Minn. R. 7001.0150, 3(F), Minn. R. 7001.150, 2(B)]
	5.21.225	Changes to the Facility or Permit. [Minn. R. 7001]
	5.21.226	Permit Modifications. Except as provided under Minnesota Statutes, section 115.07, subdivisions 1 and 3, no person required by statute or rule to obtain a permit may construct, install, modify, or operate the facility to be permitted, nor shall a person

		commence an activity for which a permit is required by statute or rule until the agency has issued a written permit for the facility or activity. Permittees that propose to make a change to the facility or discharge that requires a permit modification shall follow Minn. R. 7001.0190. If the Permittee cannot determine whether a permit modification is needed, the Permittee shall contact the MPCA prior to any action. It is recommended that the application for permit modification be submitted to the MPCA at least 180 days prior to the planned change. [Minn. R. 7001.0030]
	5.21.227	Plans, specifications and MPCA approval are not necessary when maintenance dictates the need for installation of new equipment, provided the equipment is the same design size and has the same design intent. For instance, a broken pipe, lift station pump, aerator, or blower can be replaced with the same design-sized equipment without MPCA approval. If the proposed construction is not expressly authorized by this permit, it may require a permit modification. If the construction project requires an Environmental Assessment Worksheet under Minn. R. 4410, no construction shall begin until a negative declaration is issued and all approvals are received or implemented. [Minn. R. 7001.0030]
	5.21.228	Report Changes. The Permittee shall give advance notice as soon as possible to the MPCA of any substantial changes in operational procedures, activities that may alter the nature or frequency of the discharge, and/or material factors that may affect compliance with the conditions of this permit. [Minn. R. 7001.0150, 3(M)]
	5.21.229	Chemical Additives. The Permittee shall receive prior written approval from the MPCA before increasing the use of a chemical additive authorized by this permit, or using a chemical additive not authorized by this permit, in quantities or concentrations that have the potential to change the characteristics, nature and/or quality of the discharge. The Permittee shall request approval for an increased or new use of a chemical additive at least 60 days, or as soon as possible, before the proposed increased or new use. This written request shall include at least the following information for the proposed additive: a. The process for which the additive will be used; b. Safety Data Sheet (SDS) which shall include aquatic toxicity, human health, and environmental fate information for the proposed additive. The aquatic toxicity information shall include at minimum the results of: a) a 48-hour LC50 or EC50 acute study for a North American freshwater planktonic crustacean (either Ceriodaphnia or Daphnia sp.) and b) a 96-hour LC50 acute study for rainbow trout, bluegill or fathead minnow or another North American freshwater aquatic species other than a planktonic crustacean; c. a complete product use and instruction label; d. the commercial and chemical names and Chemical Abstract Survey (CAS) number for all ingredients in the additive (If the MSDS does not include information on chemical composition, including percentages for each ingredient totaling to 100%, the Permittee

		shall contact the supplier to have this information provided); and e. The proposed method of application, application frequency, concentration, and daily average and maximum rates of use. Upon review of the information submitted regarding the proposed chemical additive, the MPCA may require additional information be submitted for consideration. This permit may be modified to restrict the use or discharge of a chemical additive and include additional influent and effluent monitoring requirements. Approval for the use of an additive shall not justify the exceedance of any effluent limitation nor shall it be used as a defense against pollutant levels in the discharge causing or contributing to the violation of a water quality standard. [Minn. R. 7001.0170]
	5.21.230	MPCA Initiated Permit Modification, Suspension, or Revocation. The MPCA may modify or revoke and reissue this permit pursuant to Minn. R. 7001.0170. The MPCA may revoke without reissuance this permit pursuant to Minn. R. 7001.0180. [Minn. R. 7001.0170, Minn. R. 7001.0180]
	5.21.231	TMDL Impacts. Facilities that discharge to an impaired surface water, watershed or drainage basin may be required to comply with additional permits or permit requirements, including additional restriction or relaxation of limits and monitoring as authorized by the CWA 303(d)(4)(A) and 40 CFR 122.44.l.2.i., necessary to ensure consistency with the assumptions and requirements of any applicable US EPA approved wasteload allocations resulting from Total Maximum Daily Load (TMDL) studies. [40 CFR 122.44(l)(2)(i)]
	5.21.232	Permit Transfer. The permit is not transferable to any person without the express written approval of the Agency after compliance with the requirements of Minn. R. 7001.0190. A person to whom the permit has been transferred shall comply with the conditions of the permit. [Minn. R. 7001.0150, 3(N)]
	5.21.233	Facility Closure. The Permittee is responsible for closure and post-closure care of the facility. The Permittee shall notify the MPCA of a significant reduction or cessation of the activities described in this permit at least 180 days before the reduction or cessation. The MPCA may require the Permittee to provide to the MPCA a facility Closure Plan for approval. Facility closure that could result in a potential long-term water quality concern, such as the ongoing discharge of wastewater to surface or ground water, may require a permit modification or reissuance. The MPCA may require the Permittee to establish and maintain financial assurance to ensure performance of certain obligations under this permit, including closure, post-closure care and remedial action at the facility. If financial assurance is required, the amount and type of financial assurance, and proposed modifications to previously MPCA-approved financial assurance, shall be approved by the MPCA. [Minn. Stat. ch. 116.07, 4]
	5.21.234	Permit Reissuance. If the Permittee desires to continue permit coverage beyond the date of permit expiration, the Permittee shall submit an application for permit reissuance : Due by 180 days prior to permit expiration. If the Permittee does not intend to continue the activities authorized by this permit after the expiration date of

		this permit, the Permittee shall notify the MPCA in writing at least 180 days before permit expiration. If the Permittee has submitted a timely application for permit reissuance, the Permittee may continue to conduct the activities authorized by this permit, in compliance with the requirements of this permit, until the MPCA takes final action on the application, unless the MPCA determines any of the following (Minn. R. 7001.0040 and 7001.0160): a. The Permittee is not in substantial compliance with the requirements of this permit, or with a stipulation agreement or compliance schedule designed to bring the Permittee into compliance with this permit; b. The MPCA, as a result of an action or failure to act by the Permittee, has been unable to take final action on the application on or before the expiration date of the permit; c. The Permittee has submitted an application with major deficiencies or has failed to properly supplement the application in a timely manner after being informed of deficiencies. [Minn. R. 7001.0160]

6. Submittal action summary

SD 001	**Effluent To Surface Water**	
		Surface Discharge: Class A Major Facility Effluent Requirements
	6.1.1	The Permittee shall submit a monthly DMR : Due by 21 days after the end of each calendar month following permit issuance. [Minn. R. 7001.0150, Subp. 2(B)]
		Priority Pollutant Requirements
	6.2.2	The Permittee shall submit the first priority pollutant monitoring report : Due 1095 calendar days before Permit Expiration Date. (By two years after permit issuance date). [Minn. R. 7001]
	6.2.3	The Permittee shall submit the second priority pollutant monitoring report : Due 730 calendar days before Permit Expiration Date. (By three years after permit issuance date). [Minn. R. 7001]
	6.2.4	The Permittee shall submit the third priority pollutant monitoring report : Due 365 calendar days before Permit Expiration Date. (By four years after permit issuance date). [Minn. R. 7001]
		Chronic Toxicity Requirements
	6.3.5	The Permittee shall submit annual chronic test battery results, the first test is due 6 months after Permit issuance and annually thereafter. The Permittee shall submit annual chronic toxicity test battery results : Due 180 calendar days after Permit Issuance Date annually. [Minn. R. 7001]
SW 001	**Lake/Reservoir**	
		Facility Specific Limit and Monitoring Requirements
	6.4.1	The Permittee shall submit a monthly DMR : Due by 21 days after the end of each calendar month following permit issuance. [Minn. R. 7001.0150, Subp. 2(B)]
SW 002	**Lake/Reservoir**	
		Facility Specific Limit and Monitoring Requirements
	6.5.1	The Permittee shall submit a monthly DMR : Due by 21 days after the end of each calendar month following permit issuance. [Minn. R. 7001.0150, Subp. 2(B)]
SW 003	**Lake/Reservoir**	
		Facility Specific Limit and Monitoring Requirements
	6.6.1	The Permittee shall submit a monthly DMR : Due by 21 days after the end of each calendar month following permit issuance. [Minn. R. 7001.0150, Subp. 2(B)]
WS 001	**Influent Waste**	
		Waste Stream: Class A Major Facility Influent Requirements
	6.7.1	The Permittee shall submit a monthly DMR : Due by 21 days after the end of each calendar month following permit issuance. [Minn. R. 7001.0150, Subp. 2(B)]

MN0040738	Alexandria Lake Area Sanitary District	
		Compliance Construction Schedule
	6.8.1	If re-vegetation is not occurring naturally and/or if carp populations are still at an elevated level and a lake drawdown is necessary, the Permittee is to hold a public meeting with a vote on the drawdown of Lake Winona by the permit expiration date. The Permittee shall hold a meeting : Due by permit expiration. [Minn. R. 7001]
	6.8.2	The Permittee shall submit water quality monitoring data to determine compliance with the draft TMDL for Lake Winona as soon as possible, but no later than (permit expiration - insert hard date after public notice) . Water quality monitoring data should indicate whether the lake has met applicable water quality standards. If the lake has not met applicable water quality standards, the Permittee shall continue with the Route 2 construction work. The Permittee shall submit monitoring reports : Due by permit expiration. [Minn. R. 7001]
	6.8.3	The Permittee shall amend the previously submitted permit application for reissuance (that was submitted 180 days prior to permit expiration) with information identifying the selected route for compliance with the water quality standard, and submit by the permit expiration date. If at any time the Permittee selects either construction of a new Facility or capital improvements to the existing Facility as the chosen alternative, the Permittee can submit a permit application for a major modification to reflect a construction schedule and the previously required Adaptive Lake Management activity requirements will no longer be applicable and removed as permit requirements. If the Permittee elects to either construct a new Facility or perform capital improvements to the existing Facility to achieve the draft Lake Winona TMDL waste load allocations (WLA), any lake management activities and related requirements previously imposed via the permit or related plans, including any previously agreed to long-term monitoring, upkeep for BMPs or other lake management related activities identified and/or undertaken by the Permittee, will no longer be required or enforced through the Permit. The permit application documents shall identify the new facility components, if possible. If facility components are not known at the time of application submittal, an application for a major permit modification will be required six months prior to construction. The Permittee shall submit permit application revisions : Due by permit expiration. [Minn. R. 7001]
		Special Requirements
	6.9.4	The Permittee shall submit a plan : Due by 180 days after permit issuance. This Plan corresponds to the initial phase of the *Streamlined Chloride Variance Action Tree*. [Minn. R. 7001]

	6.9.5	The Permittee shall submit an annual progress report to the MPCA for review and approval by January 31 of each calendar year following submittal of the Plan. The annual progress report shall include, but is not limited to: a) All chloride influent and effluent monitoring results for the previous year and a summary of any chloride reductions made; b) A list of potential sources of chloride found and any implementation plans and source reduction schedules developed; c) An update on the completion of source reduction activities based on the associated metrics; d) An evaluation of reductions achieved or not achieved through activities. If not achieved, explain the barriers to achievement; e) All sampling and reporting results collected to determine if activities are resulting in a chloride reduction; f) Any updates to the Plan's activities and schedule; and g) The schedule of activities that the Permittee plans to complete within the next 12-month period, as well as the metrics and associated sampling and reporting to record reductions. In the event that the permit is administratively continued, the Permittee shall continue to submit an annual progress report each year until the permit is reissued. The Permittee shall submit an annual progress report : Due annually, by the 31st of January. [Minn. R. 7001]
		Mercury Minimization Plan
	6.10.6	The Permittee shall submit a mercury pollutant minimization plan : Due by 180 days after permit issuance. [Minn. R. 7001]
		Pretreatment: Undelegated Requirements
	6.11.7	The Permittee shall submit a pretreatment annual report : Due by 31 days after the end of each calendar year following permit issuance if a SIU discharges to the POTW during a given calendar year. [Minn. R. 7049]
		Biosolids: Land Application
	6.12.8	The Permittee shall submit a biosolids annual report : Due annually, by the 31st of December on a form provided by or approved by the MPCA. The report shall include the requirements in Minnesota Rules, part 7041.1700. [Minn. R. 7041.1700]
		Total Facility Requirements (NPDES/SDS)

	6.13.9	Permit Reissuance. If the Permittee desires to continue permit coverage beyond the date of permit expiration, the Permittee shall submit an application for permit reissuance : Due by 180 days prior to permit expiration. If the Permittee does not intend to continue the activities authorized by this permit after the expiration date of this permit, the Permittee shall notify the MPCA in writing at least 180 days before permit expiration. If the Permittee has submitted a timely application for permit reissuance, the Permittee may continue to conduct the activities authorized by this permit, in compliance with the requirements of this permit, until the MPCA takes final action on the application, unless the MPCA determines any of the following (Minn. R. 7001.0040 and 7001.0160): a. The Permittee is not in substantial compliance with the requirements of this permit, or with a stipulation agreement or compliance schedule designed to bring the Permittee into compliance with this permit; b. The MPCA, as a result of an action or failure to act by the Permittee, has been unable to take final action on the application on or before the expiration date of the permit; c. The Permittee has submitted an application with major deficiencies or has failed to properly supplement the application in a timely manner after being informed of deficiencies. [Minn. R. 7001.0160]

7. Limits and monitoring

		Discharge limitations							Monitoring requirements			
Subject item	Parameter	Quantity /Loading avg.	Quantity /Loading max.	Quantity /Loading units	Quality /Conc. min.	Quality /Conc. avg.	Quality /Conc. max.	Quality/ Conc. units	Frequency	Sample type	Effective period	Notes
SD 001 Surface Water Discharge	Bicarbonates (HCO3)						Monitor only. calendar quarter maximum	milligrams per liter	once per quarter	24-Hour Flow Composite	Mar, Jun, Sep, Dec	
SD 001 Surface Water Discharge	BOD, Carbonaceous 05 Day (20 Deg C)	282 calendar month average	452 maximum calendar week average	kilograms per day		25 calendar month average	40 maximum calendar week average	milligrams per liter	3 times per week	24-Hour Flow Composite	Jan-Dec	
SD 001 Surface Water Discharge	BOD, Carbonaceous 05 Day (20 Deg C) Percent Removal				85 minimum calendar month average			percent	once per month	Calculation	Jan-Dec	
SD 001 Surface Water Discharge	Calcium, Total (as Ca)						Monitor only. calendar quarter maximum	milligrams per liter	once per quarter	24-Hour Flow Composite	Mar, Jun, Sep, Dec	
SD 001 Surface Water Discharge Phase 1, Phase 2, Phase 3	Chloride, Total						839 daily maximum	milligrams per liter	twice per month	24-Hour Flow Composite	Jan-Dec	
SD 001 Surface Water Discharge Phase 4	Chloride, Total					230 calendar month average	252 daily maximum	milligrams per liter	twice per month	24-Hour Flow Composite	Jan-Dec	
SD 001 Surface Water Discharge	Chlorine, Total Residual						0.038 daily maximum	milligrams per liter	once per day	Grab	Jan-Dec	

		Discharge limitations							Monitoring requirements			
Subject item	Parameter	Quantity /Loading avg.	Quantity /Loading max.	Quantity /Loading units	Quality /Conc. min.	Quality /Conc. avg.	Quality /Conc. max.	Quality/ Conc. units	Frequency	Sample type	Effective period	Notes
SD 001 Surface Water Discharge	Copper, Total (as Cu)						Monitor only. calendar quarter maximum	milligrams per liter	once per quarter	24-Hour Flow Composite	Mar, Jun, Sep, Dec	
SD 001 Surface Water Discharge	Fecal Coliform, MPN or Membrane Filter 44.5C					200 calendar month geometric mean		organisms per 100 milliliter	3 times per week	Grab	Apr-Oct	
SD 001 Surface Water Discharge	Flow		Monitor only. calendar month total	million gallons		Monitor only. calendar month average	Monitor only. calendar month maximum	million gallons per day	once per day	Measurement, Continuous	Jan-Dec	
SD 001 Surface Water Discharge	Hardness, Calcium & Magnesium, Calculated (as CaCO3)						Monitor only. calendar quarter maximum	milligrams per liter	once per quarter	24-Hour Flow Composite	Mar, Jun, Sep, Dec	
SD 001 Surface Water Discharge	Magnesium, Total (as Mg)						Monitor only. calendar quarter maximum	milligrams per liter	once per quarter	24-Hour Flow Composite	Mar, Jun, Sep, Dec	
SD 001 Surface Water Discharge	Mercury, Dissolved (as Hg)						Monitor only. calendar month maximum	nanograms per liter	once per month	Grab	May, Sep	
SD 001 Surface Water Discharge	Mercury, Total (as Hg)						Monitor only. calendar month maximum	nanograms per liter	once per month	Grab	May, Sep	
SD 001 Surface Water Discharge	Nitrite Plus Nitrate, Total (as N)					Monitor only. calendar month average		milligrams per liter	once per month	24-Hour Flow Composite	Jan-Dec	

		Discharge limitations							Monitoring requirements			
Subject item	Parameter	Quantity /Loading avg.	Quantity /Loading max.	Quantity /Loading units	Quality /Conc. min.	Quality /Conc. avg.	Quality /Conc. max.	Quality/ Conc. units	Frequency	Sample type	Effective period	Notes
SD 001 Surface Water Discharge	Nitrogen, Ammonia, Total (as N)					Monitor only. calendar month average		milligrams per liter	once per month	24-Hour Flow Composite	Jan-Dec	
SD 001 Surface Water Discharge	Nitrogen, Kjeldahl, Total					Monitor only. calendar month average		milligrams per liter	once per month	24-Hour Flow Composite	Jan-Dec	
SD 001 Surface Water Discharge	Nitrogen, Total (as N)					Monitor only. calendar month average		milligrams per liter	once per month	Calculation	Jan-Dec	
SD 001 Surface Water Discharge	Oxygen, Dissolved				Monitor only. calendar month minimum			milligrams per liter	once per day	Grab	Jan-Dec	
SD 001 Surface Water Discharge	pH				6.0 calendar month minimum		9.0 calendar month maximum	standard units	once per day	Grab	Jan-Dec	
SD 001 Surface Water Discharge Phase 1, Phase 2	Phosphorus, Total (as P)		1087 12-month moving total	kilograms per year					once per month	Calculation	Jan-Dec	Upon successful completion of Adaptive Lake Management Plan activities and Lake Winona meeting the applicable water quality standards, the total phosphorus effluent limit of 1087 kg/yr will become the final effluent limit.

		Discharge limitations							Monitoring requirements			
Subject item	**Parameter**	**Quantity /Loading avg.**	**Quantity /Loading max.**	**Quantity /Loading units**	**Quality /Conc. min.**	**Quality /Conc. avg.**	**Quality /Conc. max.**	**Quality/ Conc. units**	**Frequency**	**Sample type**	**Effective period**	**Notes**
SD 001 Surface Water Discharge Phase 1, Phase 2	Phosphorus, Total (as P)	Monitor only. calendar month average		kilograms per day		0.25 calendar month average		milligrams per liter	once per week	24-Hour Flow Composite	Jan-Dec	Upon successful completion of Adaptive Lake Management Plan activities and Lake Winona meeting the applicable water quality standards, the total phosphorus effluent limit of 0.25 mg/L will become the final effluent limit.

		Discharge limitations							Monitoring requirements			
Subject item	**Parameter**	**Quantity /Loading avg.**	**Quantity /Loading max.**	**Quantity /Loading units**	**Quality /Conc. min.**	**Quality /Conc. avg.**	**Quality /Conc. max.**	**Quality/ Conc. units**	**Frequency**	**Sample type**	**Effective period**	**Notes**
SD 001 Surface Water Discharge Phase 3, Phase 4	Phosphorus, Total (as P)		665 12-month moving total	kilograms per year					once per month	Calculation	Jan-Dec	Upon conclusion of the second compliance schedule term, should either the Permittee perform capital improvements to the existing Facility or construct a new Facility OR should Lake Winona not meet applicable water quality standards, the 665 kg/yr total phosphorus limit will be the final effluent limit.

		Discharge limitations							Monitoring requirements			
Subject item	Parameter	Quantity /Loading avg.	Quantity /Loading max.	Quantity /Loading units	Quality /Conc. min.	Quality /Conc. avg.	Quality /Conc. max.	Quality/ Conc. units	Frequency	Sample type	Effective period	Notes
SD 001 Surface Water Discharge Phase 3, Phase 4	Phosphorus, Total (as P)	Monitor only. calendar month average		kilograms per day		0.157 calendar month average		milligrams per liter	once per week	24-Hour Flow Composite	Jan-Dec	Upon conclusion of the second compliance schedule term, should either the Permittee perform capital improvements to the existing Facility or construct a new Facility OR should Lake Winona not meet applicable water quality standards, the 0.157 mg/L total phosphorus limit will be the final effluent limit.
SD 001 Surface Water Discharge	Potassium, Total (as K)						Monitor only. calendar quarter maximum	milligrams per liter	once per quarter	24-Hour Flow Composite	Mar, Jun, Sep, Dec	
SD 001 Surface Water Discharge	Sodium, Total (as Na)						Monitor only. calendar quarter maximum	milligrams per liter	once per quarter	24-Hour Flow Composite	Mar, Jun, Sep, Dec	
SD 001 Surface Water Discharge	Solids, Total Dissolved (TDS)						Monitor only. calendar quarter maximum	milligrams per liter	once per quarter	24-Hour Flow Composite	Mar, Jun, Sep, Dec	

		Discharge limitations							Monitoring requirements			
Subject item	Parameter	Quantity /Loading avg.	Quantity /Loading max.	Quantity /Loading units	Quality /Conc. min.	Quality /Conc. avg.	Quality /Conc. max.	Quality/ Conc. units	Frequency	Sample type	Effective period	Notes
SD 001 Surface Water Discharge	Solids, Total Suspended (TSS)	339 calendar month average	508 maximum calendar week average	kilograms per day		30 calendar month average	45 maximum calendar week average	milligrams per liter	3 times per week	24-Hour Flow Composite	Jan-Dec	
SD 001 Surface Water Discharge	Solids, Total Suspended (TSS) Percent Removal				85 minimum calendar month average			percent	once per month	Calculation	Jan-Dec	
SD 001 Surface Water Discharge	Solids, Total Suspended (TSS), grab (Mercury)						Monitor only. calendar month maximum	milligrams per liter	once per month	Grab	May, Sep	
SD 001 Surface Water Discharge	Specific Conductance						Monitor only. calendar quarter maximum	micromhos per cm	once per quarter	Measurement	Mar, Jun, Sep, Dec	
SD 001 Surface Water Discharge	Zinc, Total (as Zn)					Monitor only. calendar quarter average		milligrams per liter	once per quarter	24-Hour Flow Composite	Mar, Jun, Sep, Dec	
SW 001 Lake Winona - Northeast Site	Chlorophyll a, corrected					Monitor only. calendar month average		milligrams per liter	twice per month	Grab	Jun-Sep	
SW 001 Lake Winona - Northeast Site	Chlorophyll a, corrected					Monitor only. calendar month average		milligrams per liter	once per month	Grab	May, Oct	
SW 001 Lake Winona - Northeast Site	Phosphorus, Total (as P)					Monitor only. calendar month average		milligrams per liter	twice per month	Grab	Jun-Sep	

		Discharge limitations							Monitoring requirements			
Subject item	Parameter	Quantity /Loading avg.	Quantity /Loading max.	Quantity /Loading units	Quality /Conc. min.	Quality /Conc. avg.	Quality /Conc. max.	Quality/ Conc. units	Frequency	Sample type	Effective period	Notes
SW 001 Lake Winona - Northeast Site	Phosphorus, Total (as P)					Monitor only. calendar month average		milligrams per liter	once per month	Grab	May, Oct	
SW 001 Lake Winona - Northeast Site	Transparency, Secchi Disc	Monitor only. calendar month average		meters					once per month	Grab	May, Oct	
SW 001 Lake Winona - Northeast Site	Transparency, Secchi Disc	Monitor only. calendar month average		meters					twice per month	Grab	Jun-Sep	
SW 002 Lake Winona - Southwest Site	Chlorophyll a, corrected					Monitor only. calendar month average		milligrams per liter	once per month	Grab	May, Oct	
SW 002 Lake Winona - Southwest Site	Chlorophyll a, corrected					Monitor only. calendar month average		milligrams per liter	twice per month	Grab	Jun-Sep	
SW 002 Lake Winona - Southwest Site	Phosphorus, Total (as P)					Monitor only. calendar month average		milligrams per liter	twice per month	Grab	Jun-Sep	
SW 002 Lake Winona - Southwest Site	Phosphorus, Total (as P)					Monitor only. calendar month average		milligrams per liter	once per month	Grab	May, Oct	
SW 002 Lake Winona - Southwest Site	Transparency, Secchi Disc	Monitor only. calendar month average		meters					once per month	Grab	May, Oct	

		Discharge limitations							Monitoring requirements			
Subject item	Parameter	Quantity /Loading avg.	Quantity /Loading max.	Quantity /Loading units	Quality /Conc. min.	Quality /Conc. avg.	Quality /Conc. max.	Quality/ Conc. units	Frequency	Sample type	Effective period	Notes
SW 002 Lake Winona - Southwest Site	Transparency, Secchi Disc	Monitor only. calendar month average		meters					twice per month	Grab	Jun-Sep	
SW 003 Lake Agnes	Chlorophyll a, corrected					Monitor only. calendar month average		milligrams per liter	once per month	Grab	May, Oct	
SW 003 Lake Agnes	Chlorophyll a, corrected					Monitor only. calendar month average		milligrams per liter	twice per month	Grab	Jun-Sep	
SW 003 Lake Agnes	Phosphorus, Total (as P)					Monitor only. calendar month average		milligrams per liter	twice per month	Grab	Jun-Sep	
SW 003 Lake Agnes	Phosphorus, Total (as P)					Monitor only. calendar month average		milligrams per liter	once per month	Grab	May, Oct	
SW 003 Lake Agnes	Transparency, Secchi Disc	Monitor only. calendar month average		meters					once per month	Grab	May, Oct	
SW 003 Lake Agnes	Transparency, Secchi Disc	Monitor only. calendar month average		meters					twice per month	Grab	Jun-Sep	

		Discharge limitations							Monitoring requirements			
Subject item	Parameter	Quantity /Loading avg.	Quantity /Loading max.	Quantity /Loading units	Quality /Conc. min.	Quality /Conc. avg.	Quality /Conc. max.	Quality/ Conc. units	Frequency	Sample type	Effective period	Notes
WS 001 Influent Waste Stream	BOD, Carbonaceous 05 Day (20 Deg C)					Monitor only. calendar month average	Monitor only. calendar month maximum	milligrams per liter	3 times per week	24-Hour Flow Composite	Jan-Dec	
WS 001 Influent Waste Stream	Copper, Total (as Cu)					Monitor only. calendar quarter average		milligrams per liter	once per quarter	24-Hour Flow Composite	Mar, Jun, Sep, Dec	
WS 001 Influent Waste Stream	Flow		Monitor only. calendar month total	million gallons		Monitor only. calendar month average	Monitor only. calendar month maximum	million gallons per day	once per day	Measurement, Continuous	Jan-Dec	
WS 001 Influent Waste Stream	Nitrite Plus Nitrate, Total (as N)					Monitor only. calendar month average		milligrams per liter	once per month	24-Hour Flow Composite	Jan-Dec	
WS 001 Influent Waste Stream	Nitrogen, Kjeldahl, Total					Monitor only. calendar month average		milligrams per liter	once per month	24-Hour Flow Composite	Jan-Dec	
WS 001 Influent Waste Stream	Nitrogen, Total (as N)					Monitor only. calendar month average		milligrams per liter	once per month	Calculation	Jan-Dec	
WS 001 Influent Waste Stream	pH				Monitor only. calendar month minimum		Monitor only. calendar month maximum	standard units	once per day	Grab	Jan-Dec	
WS 001 Influent Waste Stream	Phosphorus, Total (as P)					Monitor only. calendar month average		milligrams per liter	once per week	24-Hour Flow Composite	Jan-Dec	

		Discharge limitations							Monitoring requirements			
Subject item	**Parameter**	**Quantity /Loading avg.**	**Quantity /Loading max.**	**Quantity /Loading units**	**Quality /Conc. min.**	**Quality /Conc. avg.**	**Quality /Conc. max.**	**Quality/ Conc. units**	**Frequency**	**Sample type**	**Effective period**	**Notes**
WS 001 Influent Waste Stream	Precipitation		Monitor only. calendar month total	inches					once per day	Measurement	Jan-Dec	
WS 001 Influent Waste Stream	Solids, Total Suspended (TSS)					Monitor only. calendar month average	Monitor only. calendar month maximum	milligrams per liter	3 times per week	24-Hour Flow Composite	Jan-Dec	