

STORMWATER QUALITY MANAGEMENT PLAN



PREPARED FOR THE
TOWN OF ALGOMA
WINNEBAGO COUNTY, WISCONSIN

DECEMBER 3, 2025



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STORMWATER QUALITY MANAGEMENT PLAN

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I. INTRODUCTION

At the request of the Town of Algoma, McMahon Associates, Inc (McMahon) prepared the following Stormwater Quality Management Plan. The Town obtained an Urban Non-point Source and Stormwater Planning (UNPS&SW) Grant (USP-USP70002Y24) from the Wisconsin Department of Natural Resources (DNR) to assist with preparation of this plan.

The purpose of this Stormwater Quality Management Plan is to provide the Town with the long-term guidance necessary to comply with Wisconsin Administrative Code NR 216 stormwater regulations, the Town's WPDES Municipal Stormwater Discharge Permit and improve water quality in receiving surface waters. Pursuant to NR 216, the Town obtained a WPDES Municipal Stormwater Discharge Permit from the Wisconsin DNR in 2006. The Town renewed their WPDES Municipal Stormwater Discharge Permit in 2014 and 2019. The 2019 WPDES Municipal Stormwater Discharge Permit expired on April 30, 2024 and has not been re-issued at the time of the writing of this report. A copy of the WDNR Municipal Stormwater Discharge Permit and corresponding guidance documents are included in Appendix A for reference. The purpose of the permit is to regulate discharges from municipal separate storm sewer systems (MS4) and reduce urban non-point source pollution.

Relationship to Other Plans

This Stormwater Quality Management Plan compliments and is part of efforts to implement recommendations contained in several other stormwater management or Total Maximum Daily Load (TMDL) reports. These related plans and reports include the following:

- In 2009, the Town developed a Stormwater Management Plan in order to comply with their WPDES Municipal Stormwater Discharge Permit and NR 216 stormwater regulations. The 2008 Stormwater Management Plan included goals and recommendations for the six minimum control measures including Public Education and Outreach, Public Involvement and Participation, Illicit Discharge Detection and Elimination, Construction Site Pollutant Control, Post-Construction Site Stormwater Management and Municipal Pollution Prevention. The 2009 Stormwater Management Plan also included a water quality analysis to outline compliance with the 20 and 40 percent Total Suspended Solids (TSS) reduction requirement within NR 151.

- The Town’s Comprehensive Plan contains several recommendations related to natural resource and stormwater management: (1) Surface water, stream corridors, floodplains and wetlands are highly regulated resources. Local, state and federal regulations and ordinance need to be thoroughly reviewed when development is proposed for property that is in or near any of these resources; (2) Addressing water quality through the management of stormwater is a priority of federal and state regulators. Consideration should be given to developing a stormwater management plan and possibly forming a stormwater utility; (3) The Town should retain the services of an engineer having expertise in stormwater management to review all new development plans for compliance with the Town of Algoma stormwater management standards; (4) The Town needs to consider preserving adequate space to construct regional detention basins to minimize the effects of future development on peak flows.
- The Wisconsin DNR approved the Upper Fox and Wolf River Basins (UFW) TMDL on February 27, 2020. A TMDL is the maximum amount of a pollutant that a water body can receive and still meet water quality standards. The UFW Basin TMDL identifies TSS and TP allocations for urban stormwater, wastewater, and agricultural sources located within the Upper Fox River & Wolf River Basins. The UFW TMDL identifies pollutant load allocations and percent reductions for urban stormwater in the Lake Butte des Morts and Sawyer Creek Sub-Watersheds for the Town of Algoma.
- In 2018, the Town updated their 2009 Stormwater Management Plan with a new Stormwater Quality Management Plan. The 2018 Stormwater Quality Management Plan included a NR 151 and TMDL pollutant load analysis based on WDNR MS4 guidance at that time. The 2018 Stormwater Quality Management Plan verified the Town still satisfied NR 151 pollutant load reduction requirements and provided 3 TMDL alternatives that would satisfy UFW TMDL pollutant load reduction requirements.

This Stormwater Quality Management Plan is intended to update and replace the 2018 Stormwater Quality Management Plan based on new or updated WDNR stormwater regulations, permit conditions, and guidance documents. For reference, current WDNR Guidance documents are provided in Appendix A. It will also incorporate the pollutant load reductions provided by several stormwater Best Management Practices (BMPs) constructed by the Town since 2018. This Stormwater Quality Management Plan will include a TMDL Plan of Action, which will identify future BMP’s that the Town will need to construct to satisfy the required UFW TMDL pollutant load reductions. This Plan of Action will include a preliminary compliance schedule and cost estimates to assist with long-term planning and implementation.

II. OVERVIEW OF STUDY AREA

The Town of Algoma is located in Winnebago County, Wisconsin. The study area for this Stormwater Quality Management Plan is depicted in Figure 1. The study area contains approximately 2,523 acres of area and is considered the urban planning boundary. The urban planning boundary was defined using the 2010 US Census Bureau developed urban area maps, plus any contiguous developed urban areas. The Town of Algoma is part of the Oshkosh Urbanized Area as determined by the US Census Bureau. As shown in Figure 2, several Municipal Separate Storm Sewer System (MS4) jurisdictions are located within and directly adjacent to the Town.

It should be noted that the Town of Algoma has a boundary agreement with the City of Oshkosh that protects the green portion of the Town as depicted in Exhibit 2-1. Areas in blue and red were annexed in 2018 and 2023, respectively. The orange areas are planned to be annexed in 2043. As such, the Town excluded the blue, red and orange areas from the study area for purposes of this Stormwater Quality Management Plan.

Subbasins

The Wisconsin DNR divided the state into 24 subbasins or Water Management Units (WMU). The WDNR subbasin boundaries are also identified as the federally designated 8-digit Hydrologic Unit Code (HUC) boundaries. The Town’s study area is located in one of these subbasins - the Upper Fox River (UFR) Basin as depicted in Exhibit 2-2.

Watersheds

The Wisconsin DNR divided the UFR Subbasin into 15 watersheds. The study area is located in one of these watersheds: Lake Butte Des Morts (UF04) as depicted in Exhibit 2-3.

Sub-Watersheds

Sub-watersheds are depicted in Figure 3 and summarized in Table 2-1. The sub-watersheds were delineated after considering local drainage systems, Winnebago County 1-foot contours, federally designated 12-digit HUC boundaries, and state designated TMDL sub-basin boundaries.

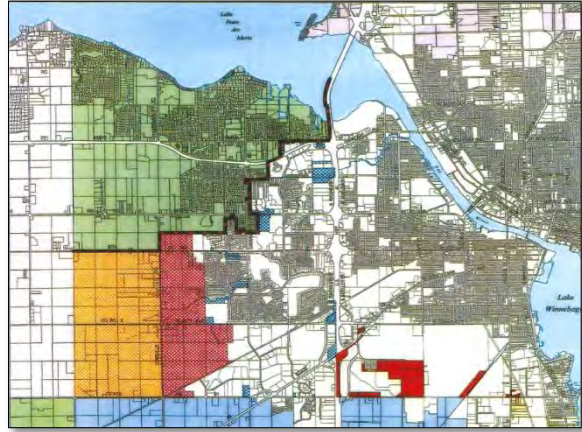


Exhibit 2-1: Boundary Agreement Areas

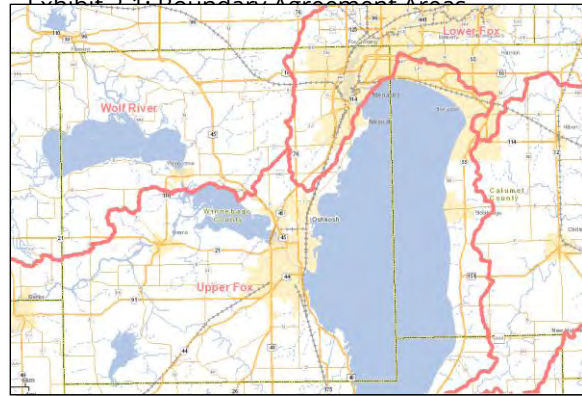


Exhibit 2-2: Upper Fox Subbasin

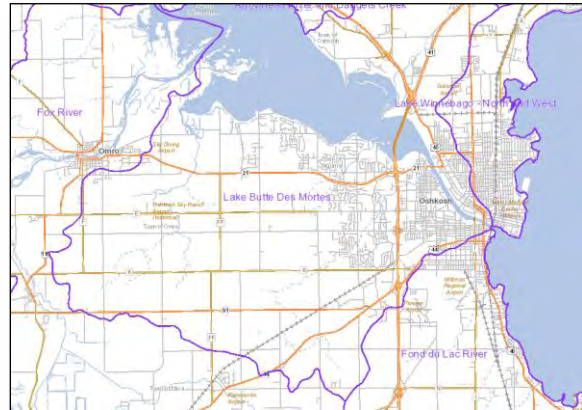


Exhibit 2-3: Lake Butte Des Morts Watershed

Table 2-1

SUB-WATERSHEDS

Sub-Watershed	HUC-12	TMDL Sub-Basin
Lake Butte des Morts	Lake Butte des Morts-Fox River (040302011205)	UFW TMDL- Lake Butte des Morts
Sawyer Creek	Sawyer Creek (040302011204)	UFW TMDL- Sawyer Creek

Natural Resources

Natural resources include features such as surface waters (lakes, rivers, streams), wetlands, and endangered or threatened resources. Natural resource features located in the study area are depicted in Figure 4. Some of these natural resource features are protected with a special regulatory designation such as outstanding resource water, exceptional resource water, 303(d) impaired water, endangered species, and threatened species. Natural resource features located in the study area with one of these special regulatory designations are identified below.

Outstanding and exceptional resource waters are pristine surface waters which are not significantly impacted by human activities and provide valuable fisheries, unique hydrological or geological features, outstanding recreational opportunities, or unique environmental settings. For example, cold water trout streams and natural waterfalls are typically classified as outstanding or exceptional resource waters. The Town does not discharge stormwater runoff into any outstanding resource waters or exceptional resource waters.

Impaired water bodies are degraded surface waters which do not meet water quality standards or their potential uses, such as fishing and swimming, due to pollutants and poor water quality. The US EPA requires each state to update its 303(d) impaired waters list every two years, including Wisconsin. The Town’s study area discharges stormwater runoff into one 303(d) impaired water body:

- LAKE BUTTE DES MORTS: Lake Butte des Morts is a 303(d) impaired water body due to non-point source pollution. Pollutants of concern include PCBs, total phosphorus, sediment/total suspended solids and Mercury. Impairments include low DO, eutrophication, mercury contaminated fish tissue, excess algal growth and PCBs contaminated fish tissue. The attainable use for Lake Butte des Morts is fish and aquatic life. Currently, Lake Butte des Morts is not supporting its attainable use.

Endangered and threatened resources are wild animal and plant species which are either in danger of extinction throughout all or a significant portion of its range or likely to become endangered in the foreseeable future. Typically, the location of an endangered or threatened species is tracked in Wisconsin’s Natural Heritage Inventory and is only identified by township. Sensitive species that are particularly vulnerable to collection or disturbance are only identified by county. The Natural Heritage Inventory maps and species lists are routinely updated by Wisconsin DNR. To prevent collection or disturbance of sensitive species, endangered and threatened resources are not depicted in Figure 4.

Cultural Resources

Cultural resources are places of cultural significance. Some cultural resources are protected with special regulatory designation such as archeological sites and historical sites. The State of Wisconsin maintains maps and a computer database on the location and nature of archaeological sites. Special permission is required to view these maps and databases. The location of archaeological sites is exempt from public disclosure to prevent collection or disturbance of valuable artifacts. Archeological sites may be located within the study area but cannot be disclosed by law. The Wisconsin Historical Society's State Register indicates there are no historical sites located within the study area.

The Wisconsin Historical Society also maintains the Architecture & History Inventory (AHI), which is a list of historic buildings, structures and objects throughout Wisconsin that have no special status, rights or benefits. Most properties became part of the AHI as a result of architectural, archaeological or historical surveys. In many cases, the information may be outdated, and some properties may be altered or no longer exist. The inventory is continually changing and should be accessed on the Wisconsin Historical Society's website to find the most updated version. Historical sites currently on the AHI within the Town's study area are depicted in Figure 4.

Remediation & Waste Disposal Sites

Remediation sites are places where cleanup of environmental soil or groundwater contamination is ongoing or completed. Remediation sites may involve hazardous wastes, underground storage tanks, or other contaminant sources. Waste disposal sites are places where solid waste is stored. Understanding the location of remediation and waste disposal sites is an important consideration when evaluating potential stormwater retrofit locations. The approximate location of Wisconsin DNR identified remediation sites (open and closed sites) and waste disposal sites (not archived) are depicted in Figure 4.

Soils

Soil information is from the Natural Resource Conservation Service / U.S. Department of Agriculture web soil survey. The U.S. Department of Agriculture has classified soil types into four Hydrologic Soil Groups (HSG). The four hydrologic soil groups (i.e. A, B, C and D) are classified according to the minimum infiltration rate of the soil column. Group A soils have the highest permeability rate or lowest runoff potential, whereas Group D soils have the lowest permeability rate or highest runoff potential. Hydrologic soil groups are depicted in Figure 5.

Depth to Groundwater

Depth to groundwater information is from the Natural Resource Conservation Service / U.S. Department of Agriculture web soil survey. The U.S. Department of Agriculture identifies depth to the water table, which refers to a saturated zone in the soil. Estimates of the upper limit are based mainly on observations of the water table at selected sites and on evidence of a saturated zone. Depth to groundwater information is useful when considering potential Best Management Practices (BMP) retrofit sites. Depth to groundwater information is depicted in Figure 6.

MS4 System

The municipal separate storm sewer system (MS4) consists of publicly owned or operated conveyance systems including streets, curbs, gutters, catch basins, storm sewers, swales, channels, culverts, and occasionally bridges. The MS4 system is depicted in Figure 7. The MS4 system contains 65 known stormwater outfalls. The outfall locations are depicted in Figure 8. An inventory of the stormwater outfalls is provided in Appendix B. An outfall is the point at which stormwater is discharged to a lake, rivers, navigable stream or adjacent MS4 system. Each of the 65 outfalls may contain several pipes, ditches or other conveyance systems discharging to the same point. Of the 65 outfalls, 11 are classified as major outfalls and 54 are classified as minor outfalls. Major outfalls include the following:

- A MS4 pipe with a 36-inch diameter or larger.
- A MS4 conveyance with a cross-sectional area of 1,018 square inches or larger which is associated with a drainage area of 50 acres or larger.
- A MS4 conveyance with 2 acres or larger of industrial land use

The MS4 system contains several structural BMPs. The structural BMPs are depicted in Figure 9 and summarized in Table 2-2. Structural BMPs include wet detention ponds and dry detention ponds. Some of these structural BMPs are publicly owned and others are privately owned. As part of their stormwater program, the Town typically obtains maintenance authority for privately owned BMP's through maintenance agreements or notes on final plats or CSM's. Table 2-2 identifies the private BMP's the Town has maintenance authority over. For purposes of this plan, only Town owned BMP's or private BMP's with maintenance authority were considered for the water quality analysis.

Table 2-2

STRUCTURAL BMPS

BMP ID	BMP Name	Type of BMP	BMP Owner	Maintenance Authority
1	4th Addition to Bellhaven	Dry Pond	Private	Yes
2	Bellhaven Ln IE Sand Filter	IE Sand Filter	Town	Yes
3	1st Addition to Bellhaven	Dry Pond	Private	Yes
4	3rd Addition to Bellhaven	Dry Pond	Private	Yes
5	Bell Ridge Pond C	Wet Pond	Private	Yes
6	Bell Ridge Pond B	Wet Pond	Private	Yes
7	Bell Ridge Pond A	Wet Pond	Private	Yes
8	Hunters Court	Wet Pond	Private	Yes
9	Rogge STH 21	Wet Pond	Private	Yes
10	Olde Apple Acres West Pond	Wet Pond	Private	Yes
11	Olde Apple Acres East Pond	Wet Pond	Private	Yes
12	Jones Plat	Dry Pond	Private	Yes
13	Algoma Self-Storage Pond	Wet Pond	Private	Yes
14	Jones Park Pond	Wet Pond	Town	Yes

Table 2-2

STRUCTURAL BMPS

BMP ID	BMP Name	Type of BMP	BMP Owner	Maintenance Authority
15	Lakevista Estates South Pond	Wet Pond	Private	Yes
16	Lakevista Estates North Pond	Wet Pond	Private	Yes
17	Butte Des Morts Meadows Pond	Wet Pond	Town	Yes
18	Butte Des Morts Meadows 1st Addition	Dry Pond	Private	Yes
19	St. Pauls United Church of Christ	Dry Pond	Private	No
20	Apex Center Pond	Wet Pond	Private	No
21	Algoma Storage	Dry Pond	Private	No
22	Jones Pond	Wet Pond	Town	Yes
23	Wyldeewood West	Dry Pond	Town	Yes
24	Eden Meadows Pond	Wet Pond	Private	Yes
25	Wyldeewood Baptist Church	Wet Pond	Private	Yes
26	Kobussen Buses	Dry Pond	Private	No
27	All Saints Lutheran Church North Pond	Dry Pond	Private	No
28	All Saints Lutheran Church South Pond	Dry Pond	Private	No
29	Oak Manor Estates	Dry Pond	Private	Yes
30	Church of Jesus Christ of Latter-Day Saints	Dry Pond	Private	No
31	Irvine Pond	Wet Pond	Town	Yes
32	Red Bird Meadows	Dry Pond	Town	Yes
33	Waldwic Estates	Dry Pond	Private	Yes
34	FKC Oshkosh	Wet Pond	Private	Yes
35	Oakwood Manor SW Pond	Dry Pond	Private	Yes
36	Oakwood Manor North Pond	Dry Pond	Private	Yes
37	Oakwood Manor SW Pond	Wet Pond	Private	Yes
38	Red Bird Meadows	Dry Pond	Private	Yes
39	Coldwell Banker Pond	Wet Pond	Private	Yes
40	Willow Springs	Wet Pond	Private	Yes
41	Tommys Car Wash	Biofilter	Private	Yes
42	OSMS	Dry Pond	Private	Yes
43	OSMS	Isolator Row	Private	Yes
44	OSMS	Upflow Filter	Private	Yes

The MS4 system is based on available records. The MS4 system contains three different types of surface drainage: curb and gutter, grass swales, and areas not served by a control measure (no controls). The types of surface drainage are depicted in Figure 10. Note the Town’s drainage system consists primarily of grass swales.

WPDES Industrial Permits

As shown in Figure 11 and summarized in Table 2-3, there are three industrial operations with coverage under a WPDES Industrial Permit that are currently located within the study area. WPDES

Industrial Permits are regulated by the Wisconsin DNR. Some WPDES Industrial Permits may allow discharges into the MS4 system during dry weather. Understanding the location of the WPDES Industrial Permitted sites is important to effective implementation of the Town’s stormwater program.

Table 2-3

WPDES INDUSTRIAL PERMITS

I.D.	Facility Name	Facility Address	FIN
1	Fox Valley Iron Metal & Auto Salvage	3446 Witzel Avenue	2640
2	Kobussen Buses Limited	3043 Omro Road	40491
3	Wallys U-Pull It Inc	4266 State Road 21	8176

Drinking Water System

The Town of Algoma does have a public drinking water system operated by the Algoma Sanitary District #1 that serves a portion of the Town. Many property owners also obtain drinking water from private wells. The Town of Algoma Sanitary District #1 obtains drinking water from three groundwater wells that feed filtration facilities and supply safe municipal water throughout the study area. The municipal wells are depicted on Figure 11. The municipal wells were dug to provide a public water system because of concerns with groundwater quality due to potential high levels of arsenic in the St. Peter Sandstone. Most of the Town of Algoma lies within a WDNR’s Arsenic Advisory Area, which is a five-mile boundary surrounding the St. Peter Sandstone. Algoma Sanitary District #1 adopted a Water Utility Ordinance on December 11, 2003, which regulates well abandonment and cross connections from existing wells to a public water system. On February 2, 2004, the DNR approved the Sanitary District’s Wellhead Protection Ordinance.

Publicly Owned Property / Land Uses

The location of publicly owned parks, recreational areas, open lands, and municipal facilities are depicted in Figure 11. Understanding the location of publicly owned land is important to effective implementation of the municipal stormwater program.

2025 land uses are depicted in Figure 12 and summarized in Table 2-4 for the study area. The Winnebago County 2025 aerial photographs, site plans, and existing land use maps from the Town’s Comprehensive Plan were used to identify the 2025 land uses. For purposes of the TMDL pollutant analysis, the undeveloped in-fill sites are shown as agriculture, grass, woods, wetland or another undeveloped open space, as appropriate.

Future land uses are depicted in Figure 13 and summarized in Table 2-4 for the study area. For purposes of the TMDL pollutant analysis, the future land uses generally match the 2025 land uses, except the appropriate undeveloped properties are converted to a future land use based on adjoining land uses and information from the Town’s Comprehensive Plan.

Table 2-4

LAND USES

Land Use	2025 Land Use		Future Land Use	
	(acres)	(%)	(acres)	(%)
Residential				
High Density	0	0.0%	9	0.3%
Low Density	663	26.3%	693	27.5%
Med Density	872	34.6%	993	39.3%
Mobile Home	0	0.0%	0	0.0%
Multi-Family	14	0.6%	20	0.8%
Suburban	132	5.2%	117	4.6%
Commercial				
Commercial Strip	43	1.7%	119	4.7%
Commercial Downtown	0	0.0%	0	0.0%
Office Park	3	0.1%	3	0.1%
Shopping Center	0	0.0%	0	0.0%
Institutional				
Hospital	17	0.7%	17	0.7%
Misc. Institutional	24	1.0%	25	1.0%
School	11	0.4%	11	0.4%
Industrial				
Airport	0	0.0%	0	0.0%
Light Industrial	26	1.0%	27	1.1%
Medium Industrial	22	0.9%	22	0.9%
Open Space				
Cemetery	0	0.0%	0	0.0%
¹ Park	76	3.0%	79	3.1%
Quarry	0	0.0%	0	0.0%
Railroad	0	0.0%	0	0.0%
² Undeveloped	553	21.9%	324	12.8%
Highway/Freeway/Rural Rd	66	2.6%	65	2.6%
Total:	2,523	100.0%	2,523	100.0%

¹Includes grass and water associated with stormwater ponds/facilities.

²Undeveloped land includes agriculture, grass, woods, wetlands, and water/ponds.

III. TMDL POLLUTANT ANALYSIS

A TMDL is the maximum amount of a pollutant that a water body can receive and still meet water quality standards. The goal of a TMDL is to improve water quality so the impaired water body meets its loading capacity and is no longer considered impaired. A TMDL for excess TP and TSS pollutants was developed by the Wisconsin DNR for the UFW River Basin and was approved by the EPA in 2020.

The UFW Basin has 43 streams and rivers impaired for excess phosphorus, 19 streams and rivers impaired for excess sediment and 19 lakes / reservoirs impaired for excess phosphorus. Excessive amounts of these pollutants cause poor water clarity, increase algae, impact swimming, and degrade aesthetics. The UFW Basin TMDL was calibrated and developed using stream, river, and lake monitoring data collected by the WDNR and partner groups.

As shown in Figure 7, the Town’s storm sewer system discharges to two water bodies impaired by phosphorus and sediment pollutants: Lake Butte des Morts and Sawyer Creek. The Lake Butte des Morts and Sawyer Creek Sub-Watersheds are included in the UFW River Basin.

Performance Standard

The TMDL Report developed for the UFW Basin expresses the MS4 pollutant allocation as both a load reduction (pounds per year) and a percent reduction. Based on Wisconsin DNR guidance, the TMDL’s percent reduction should be used for MS4 permit compliance, rather than the TMDL’s load reduction (pounds per year). It is of note that the UFW Basins TMDL’s baseline condition assumes the Town is achieving the 20% TSS reduction and a correlating 15% TP reduction. As such, Wisconsin DNR guidance does not require an adjustment to the percent reductions identified in the draft Upper Fox and Wolf Basins TMDL. The TMDL percent reductions in Table 3-1 are used for evaluating alternatives for MS4 permit compliance.

Table 3-1

REQUIRED TMDL PERCENT REDUCTIONS

TMDL Basin	TMDL Sub-Watershed	Required TP Reduction (%)	Required TSS Reduction (%)
Upper Fox & Wolf River	Lake Butte des Morts	83.0%	0.0%
Upper Fox & Wolf River	Sawyer Creek	83.0%	48.0%

Methodology

The TMDL pollutant analysis uses the Source Loading and Management Model for Windows (WinSLAMM version 10.5.0). WinSLAMM is a stormwater quality model that predicts runoff volumes and non-point source pollution loads for urban land uses. WinSLAMM also calculates the amount of pollutant removal provided by BMPs such as street sweeping, catch basin cleaning, grass swales, grass filter strips, biofiltration, wet ponds, proprietary devices, and other BMPs.

The TMDL pollutant analysis uses the series of small rainfall events that occurred between March 29, 1968 and November 25, 1972 in Green Bay, Wisconsin. For purposes of MS4 Permit compliance, this 5-year rainfall series was determined by the Wisconsin DNR to represent an average annual rainfall condition for municipalities located in Northeast Wisconsin.

The TMDL pollutant analysis uses data files developed by the United States Geological Survey (USGS) and Wisconsin DNR for the WinSLAMM model. The data files identify typical runoff volumes, pollutant concentrations, pollutant distributions, pollutant deliveries, and pollutant particle size distributions for typical urban stormwater runoff. The WinSLAMM data files obtained from the USGS and used in the TMDL pollutant analysis are as follows:

- WisReg - Green Bay Five Year Rainfall.ran
- WI_GEO03.ppdX
- WI_SL06 Dec06.rsv
- V10.1 WI_avg01.pscx
- WI_Res and Other Urban Dec06.std
- WI_Com Inst Indust Dec06.std
- Freeway Dec06.std
- Nurp.cpz

The TMDL pollutant analysis is based on the standard land use files developed by the Wisconsin DNR for WinSLAMM. The standard land use files identify the amount of roof, parking lot, driveway, sidewalk, street, and lawn source areas which are typical for each standard land use. The standard land use files also identify the amount of connected imperviousness for each source area. The TMDL pollutant analysis uses the WinSLAMM batch processor to generate baseline (no-controls) pollutant loads for each standard land use file. Baseline pollutant loads for each drainage and BMP catchment area are calculated using batch processor database files and GIS. A WinSLAMM model is developed for each existing and proposed structural BMP to determine the BMP's pollutant reduction. The pollutant reduction provided by each BMP is then applied to each drainage or BMP catchment area, as appropriate.

Analysis Area

The TMDL pollutant analysis uses the study area depicted in Figure 1, the sub-watersheds depicted in Figure 3, and the 2025 land uses depicted in Figure 12. For purposes of the TMDL pollutant analysis, the study area contains 2,523 acres. The TMDL pollutant analysis also uses the developed urban area depicted on the 2010 US Census Bureau Map, including contiguous developed urban areas. Per Wisconsin DNR guidance, the following areas are either prohibited from inclusion or classified as optional for inclusion in the TMDL pollutant analysis.

- **AGRICULTURAL AREAS:** Lands zoned for agricultural use and operating as such are optional to include in the TMDL pollutant analysis. Of the 2,523 acres within the study area, 125 acres are classified as agriculture and consequently, are excluded from the analysis.
- **INTERNALLY DRAINED AREAS:** Internally drained areas with natural infiltration are optional to include in the TMDL pollutant analysis. Of the 2,523 acres within the study area, 0 acres are

classified as internally drained (per Wisconsin DNR guidance) and consequently, are excluded from the analysis.

- **WATERS OF THE STATE:** Waters of the State are optional for inclusion in the TMDL pollutant analysis. Lakes, rivers, streams and mapped wetlands are classified as “waters of the state”. Of the 2,523 acres within the study area, 261 acres are classified as “waters of the state” and consequently, are excluded from the analysis.
- **STATE & COUNTY HIGHWAYS:** State freeways, state truck highways, and county highways are typically excluded from the TMDL pollutant analysis. The Wisconsin Department of Transportation (WisDOT) is responsible for pollutant loads from state freeway and state trunk highway right-of-ways and Winnebago County is responsible for pollutant loads from county highway right-of-ways. The only time the Town is responsible for pollutant loads from a state or county highway right-of-way is if the highway is classified as a “connecting highway” by the WisDOT or if the Town has a bridge structure that allows a Town street to cross over the state or county highway. The State and County highways are depicted in Figure 2. Of the 2,523 acres within the study area, 50 acres are State (WisDOT) MS4 jurisdiction, and 16 acres are County MS4 jurisdiction. The combined 66 acres of state and county highway right-of-way are excluded from the analysis.
- **PRIVATE ROADS:** Private roadways and their corresponding right-of-ways are typically excluded from the TMDL pollutant analysis. There are several private roads within the Town, with most being located along Lake Butte des Morts. Of the 2,523 acres within the study area, 13 acres are considered private roads and their corresponding right-of-ways are excluded from the analysis.
- **RIPARIAN AREAS:** Riparian areas are private properties that do not discharge runoff into the Town’s MS4, but rather discharge directly into a river, stream, or lake. Riparian areas that discharge directly into Lake Butte des Morts, Sawyer Creek or other navigable streams without passing through the Town’s MS4 are depicted in Figure 10. Of the 2,523 acres within the study area, 433 acres are classified as riparian and consequently, are excluded from the analysis.
- **MS4 “A” TO “B”:** Areas that discharge into an adjacent municipality’s MS4 (Municipality B) without passing through the Town’s MS4 (Municipality A) are optional to include in the TMDL pollutant analysis. Many of these areas are located along state and county right-of-ways where runoff from private property drains directly into a State or County MS4 and then discharges directly into a river, stream, or lake. MS4 “A” to “B” areas are depicted in Figure 10. Of the 2,523 acres within the study area, 47 acres are classified as MS4 “A” to “B” and consequently, are excluded from the analysis.
- **WPDES INDUSTRIAL PERMITS:** Industrial facilities permitted under NR 216 are optional to include in the TMDL pollutant analysis. The Town plans to achieve the required TSS and TP reductions for these industrial permitted areas for the following reasons: the Town has legal authority to regulate stormwater runoff; it is difficult to determine which portions of an industrial site are covered by a WPDES Industrial Permit; and the pollutant load is the Town’s responsibility if the WPDES Industrial Permit is terminated or certified “No Exposure” in the future. For purposes of the TMDL pollutant analysis, industrial areas with coverage under a WPDES Industrial Permit are included in the analysis.

Based on the prohibited and optional areas mentioned above, the TMDL pollutant analysis will apply to the remaining 1,578 acres of developed urban areas that exist in 2025.

Baseline Condition

The TMDL baseline loads for the 1,578 acres of developed urban area are summarized in Table 3-2. These baseline or “no control” loads exclude the pollutant reduction benefits of existing BMPs. Per Wisconsin DNR guidance, the “no control” loads are used in conjunction with the adjusted TP and TSS percent reductions to determine the required load reductions.

Table 3-2

TMDL POLLUTANT ANALYSIS – BASELINE CONDITION (WINSLAMM)

Sub-Watershed	Urban Area (acres)	Total Phosphorus			Total Suspended Solids		
		Baseline Load (lbs./yr.)	Required TMDL Load Reduction (%)	Required TMDL Load Reduction (lbs./yr.)	Baseline Load (lbs./yr.)	Required TMDL Load Reduction (%)	Required TMDL Load Reduction (lbs./yr.)
Lake Butte des Morts	1,498.6	1,093	83%	907	283,179	0%	0
Sawyer Creek	79.5	55	83%	46	13,884	48%	6,665

The TMDL baseline loads from WinSLAMM are also summarized by land use in Table 3-3 and Exhibit 3-1. These baseline or “no control” loads exclude the pollutant reduction benefits of existing BMPs. As shown in Table 3-3 and Exhibit 3-1, residential land use comprises the majority of land area, but industrial and street / highway land uses generate a larger portion of the Town’s pollutant loads.

Table 3-3

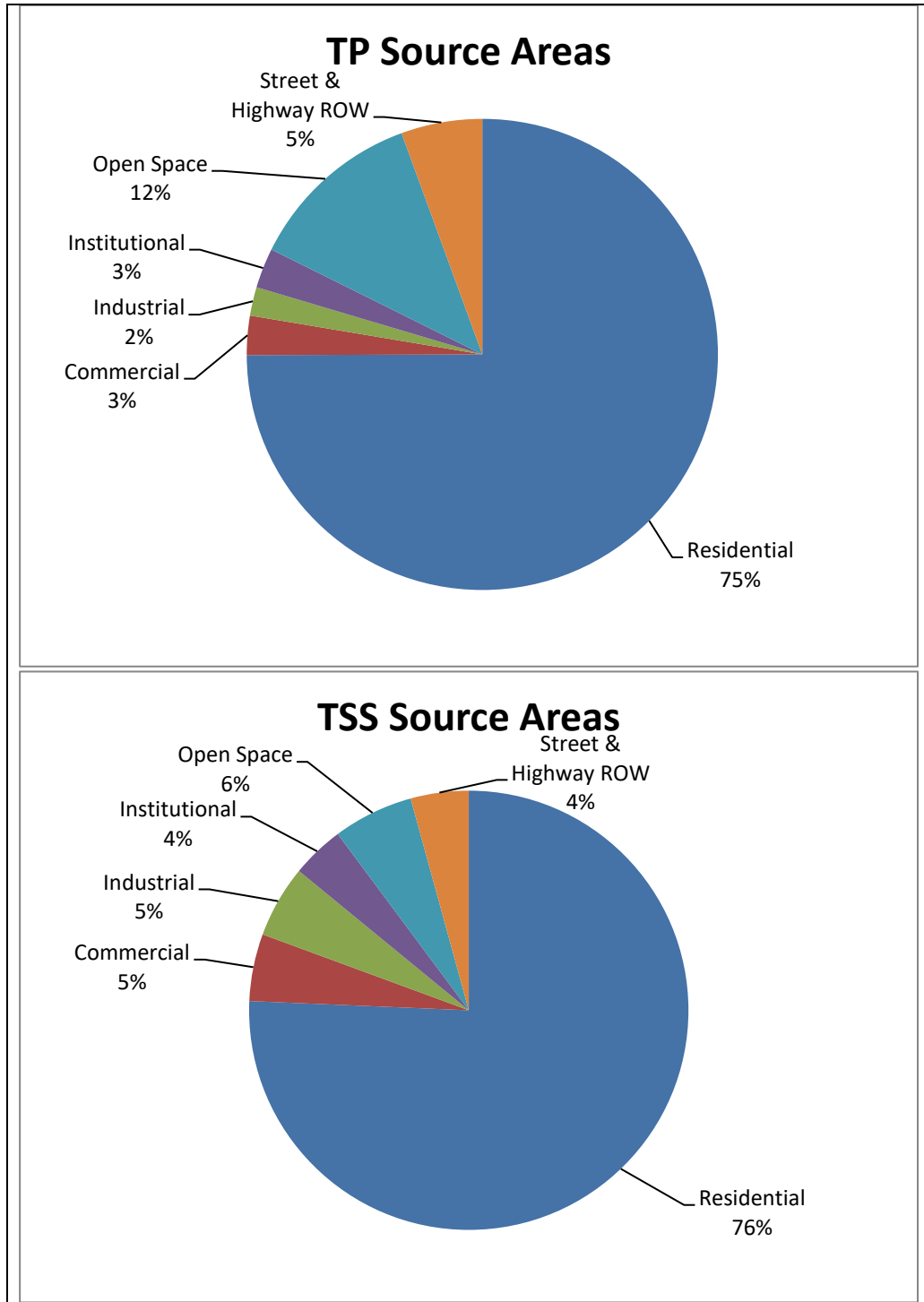
TMDL BASELINE LOADS BY LAND USE (WINSLAMM)

Land Use	Area (acres)	Area (%)	TSS (lbs./yr.)	TSS (%)	TP (lbs./yr.)	TP (%)
Residential	1,681	67%	291,631	76%	1,197	75%
Commercial	46	2%	19,049	5%	43	3%
Industrial	47	2%	20,515	5%	31	2%
Institutional	52	2%	14,991	4%	44	3%
Open Space	630	25%	22,772	6%	193	12%
Street & Highway ROW	66	3%	16,440	4%	89	6%
TOTAL	2,523	100%	385,398	100%	1,597	100%

Appendix B contains a list of TMDL baseline pollutant yields (pounds per acre per year) and baseline loads (pounds per year) from WinSLAMM for total phosphorus and total suspended solids. The baseline pollutant yields and loads are ranked by both drainage area and BMP catchment area from highest to lowest within the Lake Butte des Morts and Sawyer Creek Sub-Watersheds. Figures B1-

B8 in Appendix B depict the TMDL baseline pollutant yields and loads by drainage area and BMP catchment area.

Exhibit 3-1: TMDL Baseline Loads by Land Use (WinSLAMM)



2025 Best Management Practices

Several BMPs qualified for TMDL pollutant reduction credit in 2025: Town’s grass swales and 20 wet detention ponds, 1 iron enhanced sand filter, 1 biofilter, 1 isolator Row and 1 upflow Filter. The 2025 BMPs are depicted in Figure 14. Water quality results for each sub-watershed are summarized below.

- LAKE BUTTE DES MORTS: Table 3-4 indicates the 2025 BMPs provide a 69.3% TP reduction within the Lake Butte des Morts Sub-Watershed, which does not satisfy the 83.0% TP reduction required in Table 3-2. However, Table 3-4 indicates the 2025 BMPs provide an 76.5% TSS reduction within the Lake Butte des Morts Sub-Watershed, which does satisfy the 0% TSS reduction required in Table 3-2. As such, additional BMPs are needed within the Lake Butte des Morts Sub-Watershed to target TP pollutants.
- SAWYER CREEK: Table 3-4 indicates the 2025 BMPs provide a 53.8% TP reduction within the Sawyer Creek Sub-Watershed, which does not satisfy the 83.0% TP reduction required in Table 3-2. Table 3-4 also indicates the 2025 BMPs provide a 47.4% TSS reduction within the Sawyer Creek Sub-Watershed, which does not satisfy the 48.0% TSS reduction required in Table 3-2. As such, additional BMPs are needed within the Sawyer Creek Sub-Watershed to target TP and TSS pollutants.

Table 3-4

TMDL POLLUTANT ANALYSIS - 2025 BMPS (WINSLAMM)

Sub-Watershed	Town MS4 (acres)	Total Phosphorus			Total Suspended Solids		
		Baseline Load (lbs./yr.)	Provided Load Reduction		Baseline Load (lbs./yr.)	Provided Load Reduction	
			(lbs./yr.)	(%)		(lbs./yr.)	(lbs./yr.)
Lake Butte des Morts	1,498.6	1,092.6	756.6	69.3%	283,179	216,547	76.5%
Sawyer Creek	79.5	55.1	26.2	47.4%	13,884	7,466	53.8%

For reference, more detailed water quality results for the TMDL analysis can be found in Appendix C. Figures C1 and C2 within Appendix C depict the Town’s drainage areas and BMP catchment areas, respectively. Figure C3 within Appendix C depicts the Town’s current street sweeping routine. Figures C4a-C4i within Appendix C depict the Town’s grass swale catchment areas. Figure C5 within Appendix C summarizes the TP reductions provided by each grass swale catchment area.

IV. POLLUTANT REDUCTION ANALYSIS

WinSLAMM (version 10.5.0) was used in conjunction with Wisconsin DNR guidance and national literature to analyze the stormwater quality benefits and cost-effectiveness of proposed urban stormwater BMPs such as street sweeping, catch basin cleaning, grass swales, grass filter strips, biofiltration, infiltration basins, wet detention ponds, proprietary devices, and mechanical / biological treatment.

The capital costs contained in Tables 4-1 through 4-13 include the estimated present value capital costs for the BMP. The capital costs include an allowance for construction, land acquisition, engineering, legal, and contingency costs. The 20-year costs provided in the tables are the estimated present value costs per pound of TP removed during a 20-year period. TP was selected for the cost per pound analysis as it is the pollutant of concern for the Town within the Lake Butte des Morts and Sawyer Creek Sub-Watersheds based on the Upper Fox & Wolf Basins TMDL. The 20-year costs include an allowance for capital costs and long-term operation and maintenance costs. The 20-year period was determined to be a reasonable life cycle or planning period for evaluating BMP cost-effectiveness. A longer planning period would improve the cost-effectiveness of structural BMPs (e.g. wet detention pond) as compared to non-structural BMPs (e.g. street sweeping). The results of the pollutant reduction analysis are summarized herein. More detailed water quality results are provided in Appendix C.

Street Sweeping

Street sweeping is effective at collecting large sediment particles (sand sized particles), trash, debris and leaves. Limited pollutant removal occurs for fine-grained particles such as silt, clay, metals and nutrients. Research indicates that street pollutants tend to accumulate within 3 feet of the street's curb and gutter. Wind turbulence from traffic tends to blow pollutants toward the curb. The curb acts as a barrier and traps pollutants. For streets without curb, wind turbulence generated by a passing vehicle tends to blow pollutants onto the adjacent grass area. As such, for street sweeping to be effective, the street must have curb.

The effectiveness of a municipal street sweeping program depends on the type of street sweeper, number of curb-miles, sweeping frequency, traffic volume, time of year, rainfall, and operator knowledge. In addition, the benefits of sweeping are significantly reduced when vehicles are parked along the curb. Whenever a street sweeper needs to maneuver around a parked car, the pollutants under the car are not removed. As such, the more cars parked along a street, the less pollutant removal. Here are two types of street sweeper: mechanical and high efficiency. Mechanical street sweepers use a broom to remove pollutants from the street surface and high efficiency street sweepers use a vacuum system to remove pollutants. Typically, the high efficiency sweeper is more effective at removing pollutants as compared to the mechanical sweeper.

The Town currently contracts for the use of a high efficiency street sweeper. The Town currently sweeps once every four weeks with parking controls. Table 4-1 summarizes the average annual TSS and TP costs per pound for various Town-wide sweeping routines. Table 4-1 identifies the percent reduction for the street corridors only.

Table 4-1: Street Sweeping

Sweeper Type, Frequency & Parking Controls	Pollutant Load Reduction		Avg. Annual TP Cost (\$/lb)
	TSS	TP	
H.E. Sweeper (Every 4 weeks, with parking controls)*	21%	16%	\$760
H.E. Sweeper (Every 2 weeks, with parking controls)	30%	23%	\$1,070
H.E. Sweeper (Every week, with parking controls)	40%	31%	\$1,736
H.E. Sweeper (Every 4 weeks, no parking controls)	9%	7%	\$1,764
H.E. Sweeper (Every 2 weeks, no parking controls)	13%	10%	\$2,227
H.E. Sweeper (Twice each week, with parking controls)	46%	35%	\$3,050
H.E. Sweeper (Every week, no parking controls)	20%	15%	\$3,586

*Towns current sweeper type, frequency & parking controls

As shown in Table 5-1, street sweeping every 4 weeks with a high efficiency street sweeper and parking controls in place is the most cost effective street sweeping alternative for the Town. As such, the Town’s current sweeping routine was used for the TMDL alternatives analysis. The Town may elect to revise their street sweeping routine in the future to provide additional water quality benefits, improving aesthetics, reduce storm inlet clogging, etc.

Catch Basin Cleaning

Catch basin cleaning is effective at collecting large sediment particles (sand sized particles), trash, debris and leaves. Limited pollutant removal occurs for fine-grained particles such as silt, clay, metals and nutrients. Catch basin sumps are effective for parking lots and streets that serve a small drainage area (less than 1 acre). Ideally, a catch basin sump has a minimum 3-foot depth to prevent scouring of previously settled pollutants during a rainfall.

The Town currently does not currently have any known catch basin sumps within Town right-of-way or on Town property within the study area. Although the Town does not currently have catch basin sumps within the study area, they may be added if roads are urbanized with future street reconstruction projects. Private parking lots sometimes have catch basins installed as part of their overall site drainage and stormwater management.

Although catch basin sumps provide some level of TSS (9%-18%) and TP (7%-16%) pollutant reductions, they fall significantly short of the 83% TP reduction required for the Lake Butte des Morts and Sawyer Creek Sub-Watersheds. As such, catch basin cleaning was removed from consideration for the pollutant reduction analysis.

Municipal Leaf Collection

The Wisconsin DNR recently developed guidance on how to calculate TP reduction credits for MS4 communities with leaf collection programs. Based on recent studies, the timing of leaf collection and street cleaning is a critical element. Not all species drop their leaves at the same time, and the timing of rainfalls is unknown, so the general principle is to keep the streets as clear of leaf litter as possible. TP reduction credits of 17% or 25% may be achieved depending on leaf collection frequency, street cleaning timing, and type of street sweeper (mechanical vs. high efficiency). These credits are only available if certain conditions are met, such as residential land uses, curb and gutter streets, high level of tree canopy, ordinances prohibiting leaves in the street and on-street parking, and a policy where leaves must be placed on the terrace in bags or piles for collection.

The Town does not currently have any curb and gutter streets within the study area, so the municipal leaf collection credit is not allowed. Furthermore, the municipal leaf collection credits for TP (17%-25%) reductions fall significantly short of the 83% TP reduction required for the Lake Butte des Morts and Sawyer Creek Sub-Watersheds. As such, municipal leaf collection was removed from consideration for the pollutant reduction analysis.

Grass Swales

Grass swales remove pollutants from concentrated stormwater by filtration through the grass and infiltration into the soil. The filtering capacity depends on the flow depth in the swale as compared to the grass height. Typically, when the flow depth is above the grass, filtering is minimal and scouring of previously settled pollutants is a concern. The water quality benefits of a grass swale are largely determined by the infiltrating capacity of underlying soils and depth to groundwater. For instance, a grass swale located in sandy soil has a much higher pollutant removal as compared to a grass swale located in clay soil. Other factors influencing grass swale performance include longitudinal swale slope, swale cross section, and flow volume. Wisconsin DNR Technical Standard 1005 – Vegetated Infiltration Swale discusses design criteria for grass swales.

Grass swales are typically located along streets. As shown in Figure 10, most streets in the Town are drained via grass swales, rather than curb and gutter. As shown in Figure 5, soils in the Town are predominately clay (HSG C and D). As such, the infiltrating capacity of the underlying soils is limited by the clay soils. As allowed by Wisconsin DNR guidance, the Town has performed double-ring infiltrometer tests along numerous Town swales. Representative dynamic soil infiltration rates determined from the infiltrometer testing were used to evaluate the water quality credits provided by the Town's grass swales. Figures C4a-C4i within Appendix C depict the Town's existing grass swales and associated catchment areas. Figure C5 depicts overall TP percent reductions provided by the Town's grass swales. Detailed water quality results and costs for the Town's existing grass swales can also be found in Appendix C. As shown in Figure C5 and the detailed water quality results, the Town's grass swales provide significant TSS and TP pollutant reductions along Town roadways. The Town's grass swales will greatly assist with satisfying required TMDL pollutant load reductions and should be maintained to ensure functionality.

Grass Filter Strips

Grass filter strips remove pollutants from stormwater by filtration through the grass and infiltration into the soil. The filtering capacity of a grass filter strip depends on its longitudinal slope, length and grass density. The water quality benefits of a grass filter strip are largely determined by the infiltrating capacity of underlying soils. A grass filter strip located in sandy soil has a higher pollutant removal as compared to a grass filter strip located in clay soil.

Grass filter strips are effective for parking lots that serve small drainage areas (less than 1 acre). Typically, grass filter strips need to be a minimum of 20 feet long, but at least as long as the contributing impervious surface length. A 64-foot-wide parking lot would typically require a 64-foot-long grass filter strip. As such, grass filter strips require a significant amount of land area as compared to other BMPs. In order for a grass filter strip to be effective, the stormwater flowing into the filter strip cannot be concentrated within a swale, ditch, channel, gutter, or other similar conveyance system. Rather, the stormwater must be flowing across the surface of a parking lot, lawn or other ground surface in a very thin sheet of dispersed water. As shown in Figure 10, the Town does not currently have any grass filter strips. Table 4-2 summarizes the cost and water quality benefits of a grass filter strip retrofit of a typical commercial parking lot.

Table 4-2

GRASS FILTER STRIPS

BMP	Pollutant Load Reduction		Avg. Annual TP Cost
	TSS (%)	TP (%)	(\$/lb.)
Grass Filter – Retrofit Parking Lot (Clay Soil)	95%	91%	\$3,325

Biofiltration Devices

Biofiltration devices remove pollutants from stormwater by filtration through an engineered soil mixture. Typically, the engineered soil is a minimum of 2 feet deep and consists of a sand and compost mixture. A diverse mix of prairie flowers, grasses, shrubs and/or trees are typically planted in a mulch layer located above the engineered soil. During a rainfall, stormwater is temporarily stored above the mulch layer until it can be filtered through the engineered soil. A perforated underdrain pipe located beneath the engineered soil collects the filtered water and discharges it into an adjacent storm sewer or other conveyance system. Biofiltration devices are effective for small drainage areas (less than 2 acres).

Biofiltration devices are called a “bioretention” device when the native soils located beneath the engineered soil layer are permeable and the majority of stormwater infiltrates into the native soils. In sandy soils, it may be feasible to eliminate the perforated underdrain pipe to further increase infiltration. Bioretention devices are used to recharge groundwater and improve stormwater quality, whereas biofiltration devices are primarily used to improve stormwater quality. Wisconsin DNR Technical Standard 1004 – Bioretention for Infiltration discusses design criteria for bioretention and biofiltration. Biofiltration devices are sometimes called a “bio-swale” if the device contains a longitudinal slope to facilitate flow conveyance. Bio-swales are typically installed within

parking lots or along streets and have a linear configuration. Bio-swales can be used to recharge groundwater and/or improve stormwater quality. As such, a bio-swale may or may not include a perforated underdrain pipe.

Proprietary biofiltration devices are also available to achieve pollutant reductions. The proprietary devices are pre-manufactured structures which are typically placed along a street or within a parking lot island. The structure is filled with engineered soil with an underdrain system for biofiltration. Examples of proprietary biofiltration devices include Filterra®, TreePod™, UrbanGreen™, and many other products.

Per current Wisconsin DNR guidance, biofiltration devices are able to obtain 100% TSS and TP credit for stormwater that is infiltrated into the underlying native soil and an 80% TSS and 0% TP removal credit for stormwater that is filtered through the engineered soil layer and is discharged via an underdrain. Therefore, in clay soils, a biofiltration device is an effective BMP for TSS reduction but is ineffective for TP reduction due to limited native soil infiltration. Biofiltration is much more effective for TP reduction in sandy soils due to higher soil infiltration rates (refer to previous “bioretention” device discussion).

As shown in Figure 5, the study area is comprised of mostly clay soils. Although biofiltration devices provide TSS pollutant reductions, they receive zero percent (0%) TP pollutant reduction credits and would not assist in satisfying the 83% TP reduction required for the Lake Butte des Morts and Sawyer Creek Sub-Watersheds. As such, biofiltration devices were removed from consideration for the pollutant reduction analysis.

Rain Gardens

Bioretention devices are sometimes called a “rain garden” if the device does not contain an engineered soil layer. Although pollutant removal is provided, rain gardens are typically installed for groundwater recharge purposes rather than stormwater pollutant removal. Often, runoff from a residential roof, patio, sidewalk or driveway is directed to a rain garden. These residential source areas have a low pollutant load but generate a significant amount of runoff volume.

Whenever a source area has a high pollutant load (i.e. street or parking lot), an engineered soil layer is recommended to provide a higher capacity filter media. A high capacity filter media reduces the device’s surface area, ponding duration, and clogging potential. If stormwater is allowed to pond on the surface of a rain garden, bioretention device, or biofiltration device for more than 24 hours, the plants may become diseased or die due to wet conditions or poor system hydrology. The costs to retrofit rain gardens on private residential property are summarized in Table 4-3.

Table 4-3

RAIN GARDENS

BMP	Pollutant Load Reduction		Avg. Annual TP Cost
	TSS (%)	TP (%)	(\$/lb.)
Rain Garden – Retrofit Residential Lot	98%	98%	\$16,222

Sand Filters

The Wisconsin DNR is currently developing a Technical Standard (1012) for Storm Water Sand Filter Systems, which is currently out for public comment at the time of the writing of this report. A sand filter is similar to a biofiltration device except the engineered soil consists of 100% sand meeting one of the gradation options specified in Technical Standard 1004. Per Wisconsin DNR guidance, a sand filter may obtain 80% TSS and 35% TP reduction for the filtering component of the devices. Similar to biofiltration devices, sand filters are also able to obtain 100% TSS and TP credit for stormwater that is infiltrated into the underlying native soils. Therefore, in clay soils, a sand filter is an effective BMP for TSS reduction, but may be considered ineffective for TP reduction due to limited soil infiltration. Sand filters are typically much more effective for TP reduction in sandy soils due to higher native soil infiltration rates.

As shown in Figure 5, the study area is comprised of mostly clay soils. Although sand filters provide some level of TSS and TP pollutant reductions in clay soils, the 35% TP reduction filtering credit falls significantly short of the 83% TP reduction required for the Lake Butte des Morts and Sawyer Creek Sub-Watersheds. As such, sand filters are likely not a cost-effective BMP for the Town to consider for the pollutant reduction analysis.

The costs to incorporate sand filters into a street retrofit or reconstruction project are summarized in Table 4-4 for sand and clay soils. The percent reductions provided in Table 4-4 are for clay soils, but the cost per pound provides a range depending on soil type.

Table 4-4

STREET SAND FILTERS

Street Corridor Land Use	Pollutant		Avg. Annual TP Cost (\$/lb.)			
	Load Reduction		Retrofit		Reconstruct	
	TSS (%)	TP (%)	Sand	Clay	Sand	Clay
Commercial Corridors	80%	35%	\$4,361	\$13,200	\$2,383	\$7,835
Industrial Corridors	80%	35%	\$2,316	\$6,915	\$1,194	\$4,006
Institutional Corridors	80%	35%	\$2,962	\$8,661	\$1,527	\$5,018
Residential Corridors	80%	35%	\$3,558	\$9,795	\$1,834	\$5,674
Open Space Corridors	80%	35%	\$3,452	\$9,395	\$1,779	\$5,443

The costs to incorporate sand filters into a parking lot retrofit or reconstruction project are summarized in Table 4-5 for sand and clay soils. The percent reductions provided in Table 4-5 are for clay soils, but the cost per pound provides a range depending on soil type.

Table 4-5

PARKING LOT SAND FILTERS

Parking Lot Land Use	Pollutant		Avg. Annual TP Cost (\$/lb.)			
	Load Reduction		Retrofit		Reconstruct	
	TSS (%)	TP (%)	Sand	Clay	Sand	Clay
Commercial Corridors	80%	35%	\$13,703	\$33,276	\$7,984	\$19,659
Industrial Corridors	80%	35%	\$13,972	\$33,450	\$7,989	\$19,791
Institutional Corridors	80%	35%	\$11,203	\$31,265	\$6,406	\$18,144
Residential Corridors	80%	35%	\$13,843	\$14,461	\$7,915	\$8,896
Open Space Corridors	80%	35%	\$5,008	\$41,012	\$2,864	\$23,450

The Wisconsin DNR is currently developing a Technical Standard (1012) for Storm Water Sand Filter Systems, which is currently out for public comment at the time of the writing of this report. Within this draft Technical Standard, there is also a section that identifies criteria for enhanced sand filter bed media that may be uniformly mixed with the sand to enhance pollutant load reductions provided. One material that has been experimented with and studied includes adding elemental iron shavings to the sand media. An iron enhanced sand filter incorporates iron filings (max 5% by weight) into the sand filtration layer to enhance TSS and TP removals. Since the Wisconsin DNR does not currently have a technical standard for IE sand filters, the water quality analysis also included guidance from the Minnesota Pollution Control Agency (MPCA) Stormwater Manual for IE Sand Filters. The MPCA Stormwater Manual includes guidance on how to calculate TSS and TP credits for IE sand filters. Similar to biofiltration devices, iron enhanced sand filters are able to obtain 100% TSS and TP credit for stormwater that is infiltrated into the underlying soil.

Based on preliminary modeling and guidance, iron enhanced sand filters can provide additional TP pollutant reductions compared to a standard sand filter. Per preliminary guidance and modeling, an iron enhanced sand filter may achieve 85% TSS and 73% TP reduction for the filtering component of the devices. However, when combined with upstream pre-treatment BMP's, modeling has shown iron enhanced sand filters may achieve upwards of 85-90% TP reductions.

The costs to incorporate iron enhanced sand filters into a street retrofit or reconstruction project are summarized in Table 4-6 for sand and clay soils. The percent reductions provided in Table 4-6 are for clay soils, but the cost per pound provides a range depending on soil type.

Table 4-6

IRON ENHANCED STREET SAND FILTERS

Street Corridor Land Use	Pollutant		Avg. Annual TP Cost (\$/lb.)			
	Load Reduction		Retrofit		Reconstruct	
	TSS (%)	TP (%)	Sand	Clay	Sand	Clay
Commercial Corridors	80%	73%	\$2,490	\$7,643	\$1,542	\$5,070
Industrial Corridors	80%	73%	\$1,323	\$4,028	\$785	\$2,633
Institutional Corridors	80%	73%	\$1,692	\$5,045	\$1,004	\$3,298
Residential Corridors	80%	73%	\$2,032	\$5,705	\$1,205	\$3,730
Open Space Corridors	80%	73%	\$1,971	\$5,473	\$1,170	\$3,577

The costs to incorporate iron enhanced sand filters into a parking lot retrofit or reconstruction project are summarized in Table 4-7 for sand and clay soils. The percent reductions provided in Table 4-7 are for clay soils, but the cost per pound provides a range depending on soil type.

Table 4-7

IRON ENHANCED PARKING LOT SAND FILTERS

Parking Lot Land Use	Pollutant		Avg. Annual TP Cost (\$/lb.)			
	Load Reduction		Retrofit		Reconstruct	
	TSS (%)	TP (%)	Sand	Clay	Sand	Clay
Commercial Corridors	80%	73%	\$7,737	\$18,731	\$4,994	\$12,203
Industrial Corridors	80%	73%	\$7,919	\$18,823	\$5,050	\$12,275
Institutional Corridors	80%	73%	\$6,350	\$17,666	\$4,050	\$11,375
Residential Corridors	80%	73%	\$7,846	\$8,068	\$5,004	\$5,400
Open Space Corridors	80%	73%	\$2,839	\$23,245	\$1,810	\$14,825

Infiltration Basins

An infiltration basin is a water impoundment constructed over a highly permeable soil. The purpose of an infiltration basin is to temporarily store stormwater and allow it to infiltrate through the bottom and sides of the infiltration basin. Pollutants are removed by the filtering action of the underlying soil. The primary functions of an infiltration basin are to provide groundwater recharge, reduce runoff volumes, and reduce peak discharge rates. The secondary function of an infiltration basin is water quality. Wisconsin DNR Technical Standard 1003 – Infiltration Basin discusses design criteria for infiltration basins.

Infiltration basins require pretreatment to prevent clogging and failure. Wisconsin DNR Technical Standard 1003 - Infiltration Basin requires a pretreatment system to reduce the TSS load entering an infiltration basin by 60% for a residential land use and 80% for a commercial, industrial, or institutional land use. Typically, a wet detention pond or biofiltration device is used as the pretreatment system. The pretreatment system prevents the infiltration basin from failing and helps reduce the risk of groundwater contamination due to pollutants contained in stormwater. Not all stormwater runoff should be infiltrated due to concern for groundwater contamination.

In order for an infiltration basin to be feasible, the depth to groundwater typically needs to be 5 feet or more and the soil needs to be a loam, silt or sand. As shown in Figure 5, soils in the Town are predominately clay (HSG C and D). Silt soils are found in limited locations in the Town (HSG B). As such, the feasibility of an infiltration basin is very limited within the Town. Finally, a significant amount of the water quality benefit is provided by the infiltration basin’s pretreatment system. Typically, the pretreatment system is a wet detention pond or biofiltration device. From a water quality perspective, an infiltration basin is not cost effective after considering the pretreatment costs. As such, infiltration basin costs are not included in the analysis; rather pretreatment system costs are included in the analysis (i.e. wet detention ponds).

Hydrodynamic Separator Devices

Hydrodynamic separator devices are pre-manufactured underground devices which use cyclonic separation to provide pollutant reduction for stormwater. Hydrodynamic separator devices are typically placed in place of a storm sewer manhole within a storm sewer discharge pipe and are typically used to treat smaller (< 2 acre) drainage areas. Collected pollutants are typically removed with a vacuum truck. Examples of hydrodynamic separators include Vortechs®, CDS™, Aqua-Swirl®, and many other products. The costs to incorporate hydrodynamic separators into a street retrofit or reconstruction project are summarized in Table 4-8.

Table 4-8

STREET HYDRODYNAMIC SEPARATOR DEVICES (HSD)

Street Corridor Land Use	Pollutant Load Reduction		Avg. Annual TSS Cost (\$/lb.)	
	TSS (%)	TP (%)	Retrofit	Reconstruct
Commercial Corridors	21%	18%	\$5,136	\$4,095
Industrial Corridors	23%	13%	\$5,291	\$4,212
Institutional Corridors	23%	20%	\$3,998	\$3,185
Residential Corridors	21%	17%	\$4,645	\$3,712
Open Space Corridors	21%	17%	\$4,339	\$3,449

The costs to incorporate hydrodynamic separators into a parking lot retrofit or reconstruction project are summarized in Table 4-9.

Table 4-9

PARKING LOT HYDRODYNAMIC SEPARATOR DEVICES (HSD)

Parking Lot Land Use	Pollutant Load Reduction		Avg. Annual TSS Cost (\$/lb.)	
	TSS (%)	TP (%)	Retrofit	Reconstruct
Commercial Corridors	19%	16%	\$11,090	\$8,828
Industrial Corridors	20%	16%	\$13,401	\$10,667
Institutional Corridors	20%	15%	\$11,214	\$8,934
Residential Corridors	21%	15%	\$15,672	\$12,551
Open Space Corridors	31%	20%	\$14,540	\$11,560

As shown in Tables 4-8 and 4-9, the TP reductions (13%-20%) provided by hydrodynamic separators fall significantly short of the 83% TP reduction required for the Lake Butte des Morts and Sawyer Creek Sub-Watersheds. As such, hydrodynamic separator devices are likely not cost-effective BMPs for the Town to consider for the pollutant reduction analysis.

Stormwater Filtration Devices

Stormwater filtration devices are pre-manufactured underground stormwater treatment systems that use filters to reduce pollutants in stormwater. The filters are typically media filled cartridges which can be customized to target specific pollutants placed within a pre-cast or cast-in-place underground concrete structure and are typically used to treat smaller (< 2 acre) drainage areas. As clogging occurs within the filters, they can be cleaned underground and/or replaced when clogged. Examples of stormwater filtration include Stormfilter®, Perk Filter™, Aqua-Filter™, and many other products. The costs to incorporate stormwater filtration into a street retrofit project or a street reconstruction project are summarized in Table 4-10.

Table 4-10

STREET STORMWATER FILTRATION DEVICES

Street Corridor Land Use	Pollutant Load Reduction		Avg. Annual TSS Cost (\$/lb.)	
	TSS (%)	TP (%)	Retrofit	Reconstruct
Commercial Corridors	38%	38%	\$5,211	\$4,445
Industrial Corridors	43%	26%	\$5,241	\$4,447
Institutional Corridors	42%	42%	\$3,956	\$3,358
Residential Corridors	39%	35%	\$4,585	\$3,898
Open Space Corridors	39%	35%	\$4,304	\$3,650

The costs to incorporate hydrodynamic separators into a parking lot retrofit or reconstruction project are summarized in Table 4-11.

Table 4-11

PARKING LOT STORMWATER FILTRATION DEVICES

Parking Lot Land Use	Pollutant Load Reduction		Avg. Annual TSS Cost (\$/lb.)	
	TSS (%)	TP (%)	Retrofit	Reconstruct
Commercial Corridors	36%	34%	\$13,878	\$13,069
Industrial Corridors	39%	37%	\$15,992	\$15,025
Institutional Corridors	39%	35%	\$13,365	\$12,558
Residential Corridors	42%	34%	\$18,508	\$17,404
Open Space Corridors	61%	45%	\$17,363	\$16,310

As shown in Tables 4-10 and 4-11, the TP reductions (26%-45%) provided by filtration devices fall significantly short of the 83% TP reduction required for the Lake Butte des Morts and Sawyer Creek Sub-Watersheds. As such, stormwater filtration devices are likely not cost-effective BMPs for the Town to consider for the pollutant reduction analysis.

Permeable Pavement

Permeable pavement is a pavement system which allows stormwater to drain through paved surfaces into the underlying soil or to an underground reservoir for treatment. In addition to pollutant reduction, permeable pavement is also used to reduce peak flow rates and stormwater runoff volumes for development sites. Permeable pavement includes but is not limited to pervious concrete or asphalt, pervious pavers and open jointed blocks. Wisconsin DNR allows for 100% TSS and TP credit for the volume of runoff that infiltrates into the native soil. Any runoff that discharges through an underdrain pipe receives a 65% TSS and 35% TP credit.

As shown in Figure 5, the study area is comprised of mostly clay soils. Although permeable pavement provides some level of TSS and TP pollutant reductions in clay soils, the 35% TP reduction filtering credit falls significantly short of the 83% TP reduction required for the Lake Butte des Morts and Sawyer Creek Sub-Watersheds. As such, permeable pavement is likely not a cost-effective BMP for the Town to consider for the pollutant reduction analysis. The costs to incorporate a permeable pavement into a street retrofit project or a street reconstruction project are summarized in Table 4-12.

Table 4-12

PERMEABLE PAVEMENT

BMP Location	Pollutant		Avg. Annual TP Cost (\$/lb.)			
	Load Reduction		Retrofit		Reconstruct	
	TSS (%)	TP (%)	Sand	Clay	Sand	Clay
Permeable Pavement-Street	65%	35%	\$10,350	\$19,940	\$7,480	\$14,413
Permeable Pavement-Parking Lot	65%	35%	\$34,583	\$41,420	\$23,529	\$28,515

Wet Detention Ponds / Underground Wet Detention Ponds

Wet detention ponds and underground wet pond systems are effective at removing sediment, nutrients, heavy metals, oxygen demanding compounds (BOD), hydrocarbons, and bacteria. Pollutant removal within a wet pond or underground detention pond is primarily due to gravity settling of particulate pollutants and sediment. Wisconsin DNR Technical Standard 1001 – Wet Detention Pond discusses design criteria for wet detention ponds.

Typically, a wet detention pond must contain a minimum water depth of 5 feet within a portion of the permanent pool to minimize re-suspension of pollutants during a rainfall event. The Wisconsin DNR requires that wet detention ponds and wetland systems be sized using the National Urban Runoff Project (NURP) particle size distribution. To achieve an 80% reduction in TSS, a wet detention pond or wetland system typically needs to remove the 3 to 5 micron sediment particle.

Existing dry detention ponds located in the Town were evaluated to determine the feasibility of converting into wet detention ponds. Currently, Wisconsin DNR does not allow water quality credit for dry detention ponds but a new Technical Standard (1011) is expected soon to allow for minimal credits. Existing dry detention ponds located within the Town are depicted in Figure 8 and summarized in Table 2-2. Generally, wet detention ponds are not recommended for small watersheds (less than 15 to 20 acres in clay soil). A wet detention pond located in a small watershed may develop stagnation problems and become a public nuisance. Public acceptance of stormwater BMPs is important to the success of the Town’s stormwater program.

In the 2002 version of the NR 151 rule, BMPs associated with post-construction sites containing new development may not be located in navigable waters to receive credit for meeting any performance standard in Chapter NR 151. This restriction has been retained in the revised rule. Also, in the 2002 version of the rule, BMP’s for existing development, re-development or in-fill development could receive water quality credit for wet detention ponds / wetland systems constructed within both perennial and intermittent streams if all applicable permits are received. As of January 1, 2011, NR 151.003 only allows water quality credit for newly constructed wet detention ponds / wetland systems constructed within intermittent streams for which all applicable permits are received.

A cost analysis was completed to determine the most cost-effective wet detention ponds / wetland system retrofits within the Town. As part of the analysis, aerial photographs were used to identify potential undeveloped properties that could be used for a retrofit. The location of storm sewer pipes and the watershed size in relation to the undeveloped property was also considered. Table 4-13 summarizes the cost and water quality benefits of several wet detention ponds within the Lake Butt des Morts and Sawyer Creek Sub-Watersheds analyzed for the Town (partial list of analyzed ponds). A detailed structural BMP cost analysis can be found in Appendix D and includes the full list of ponds and other BMP's analyzed within the study area. It is of note that the pollutant reductions identified for each of the proposed ponds is based on preliminary WinSLAMM modeling. Concept drawings for all potential wet detention pond retrofits are also provided in Appendix D.

Table 4-13

POTENTIAL WET DETENTION PONDS

Wet Detention Pond / Wetland System	Urban Drainage Area (acres)	Pollutant Reduction*		2025 Estimated Capital Costs	Capital & O&M Costs Over 20 Years	Avg. Annual TP Cost (\$/lb.)
		TSS (%)	TP (%)			
Sheppard Dr Pond	119.7	96.8%	86.4%	\$306,200	\$457,631	\$1,634
Town Hall Pond	40.4	90.6%	76.5%	\$396,300	\$537,568	\$3,231
Oakwood Circle Pond	42.1	95.1%	86.2%	\$258,000	\$397,997	\$3,712
Leonard Point Pond	111.0	91.7%	78.0%	\$1,265,200	\$1,494,027	\$3,837
Sheldon Pond	74.4	96.2%	88.6%	\$431,600	\$600,817	\$3,884
Kewaunee Park Pond	26.9	93.5%	82.4%	\$159,800	\$282,012	\$4,007
Prairie Wood Pond	62.3	94.8%	85.3%	\$482,600	\$639,113	\$4,030
Scarlet Oak Pond	52.9	97.3%	91.3%	\$244,900	\$374,734	\$4,453
Forest View Pond	44.7	93.8%	84.1%	\$537,100	\$675,827	\$4,850
Wyldeewood Pond Alt 2	35.9	94.9%	86.6%	\$258,100	\$419,694	\$4,891
Bellhaven Park Pond	77.2	93.7%	81.4%	\$915,800	\$1,183,734	\$4,893
Wyldeewood Pond Alt 1	98.0	96.7%	90.1%	\$594,500	\$834,115	\$4,899
Our Lady Church Pond	46.1	94.4%	83.6%	\$421,400	\$557,586	\$5,021
Valley Road Pond	14.2	85.7%	67.5%	\$494,500	\$562,491	\$6,143
Red Bird Meadows Pond	23.4	95.2%	86.6%	\$236,500	\$349,819	\$6,346
Trillium Tr Pond Alt 2	85.4	97.7%	92.0%	\$545,800	\$762,491	\$6,482
Lake Breeze Pond	42.9	95.9%	88.4%	\$384,500	\$514,334	\$6,500

*Based on WinSLAMM modeling and trend analysis of grass swale systems upstream of wet detention ponds

In addition to wet detention ponds, underground detention ponds are another alternative to provide similar pollutant reduction, allowing for full build out of a proposed development site. The detention may be provided with a permanent pool of water in an underground piping system allowing for pavement above the stormwater device. The sediment accumulation is typically removed by vacuum truck or other method. The underground detention system is more expensive than wet detention ponds, but maximizes development area of sites.

Enhanced Settling Treatment

The Wisconsin DNR is currently developing a Technical Standard (1013) for Flow-Weighted Coagulant Dosing of Storm Water Wet Detention Ponds, which is currently out for public comment at the time of the writing of this report. This Technical Standard will provide guidance on how to design, install and operate automated enhanced settling systems that inject aluminum-based coagulants on a flow-weighted basis into wet detention ponds. Adding aluminum-based coagulants to wet detention ponds significantly enhances TSS and TP pollutant removal efficiencies.

Based on national research and the draft Technical Standard, enhanced settling can increase TSS and TP removal rates in wet detention ponds to 90%-95%. Polymer or flocculent additions will likely require installation of mechanical injection systems and may require small buildings to store chemicals, pumps and other automated control systems. The draft Wisconsin DNR Technical Standard provides guidance on how to calculate anticipated TSS and TP removal rates for proposed wet detention pond with enhanced settling systems. This guidance was used to calculate approximate TSS and TP load reductions for the proposed wet detention ponds with enhanced settling systems identified as part of this pollutant reduction analysis.

It is of note that adding enhanced settling systems to wet ponds will likely result in more frequent dredging and maintenance operations. As such, future dredging costs should be considered when developing a Plan of Action for TMDL compliance. Table 4-14 summarizes the cost and water quality benefits of several wet detention ponds with enhanced settling within the Lake Butt des Morts and Sawyer Creek Sub-Watersheds analyzed for the Town (partial list of analyzed ponds). A detailed structural BMP cost analysis can be found in Appendix D and includes the full list of ponds and other BMP’s analyzed within the study area.

Table 4-14

**POTENTIAL WET DETENTION PONDS
WITH ENHANCED SETTLING TREATMENT**

Wet Detention Pond with Enhance Settling Treatment	Drainage Area (acres)	Pollutant Reduction		2025 Estimated Capital Costs	Capital & O&M Costs Over 20 Years	Avg. Annual TP Cost (\$/lb.)
		TSS (%)	TP (%)			
Olde Apple Acres East Pond w/Enhanced Settling	105.1	96.3%	90.6%	\$112,520	\$152,701	\$765
Honey Creek Pond w/Enhanced Settling	395.9	96.5%	92.5%	\$1,322,045	\$1,149,789	\$866

Table 4-14

**POTENTIAL WET DETENTION PONDS
WITH ENHANCED SETTLING TREATMENT**

Wet Detention Pond with Enhance Settling Treatment	Drainage Area (acres)	Pollutant Reduction		2025 Estimated Capital Costs	Capital & O&M Costs Over 20 Years	Avg. Annual TP Cost (\$/lb.)
		TSS (%)	TP (%)			
Mercy Hospital North Pond w/Enhanced Settling	26.9	95.8%	90.3%	\$122,164	\$247,707	\$1,269
Sheppard Dr Pond w/Enhanced Settling	119.7	96.3%	91.1%	\$431,385	\$457,631	\$1,271
Town Hall Pond w/Enhanced Settling	40.4	96.5%	92.6%	\$479,729	\$537,568	\$2,076
Lakevista Estates Ponds w/Enhanced Settling	68.2	95.7%	89.9%	\$96,816	\$294,905	\$2,411
Leonard Point Pond w/Enhanced Settling	111.0	96.7%	93.5%	\$1,359,941	\$1,494,027	\$2,440
Irvine Pond w/Enhanced Settling	159.0	96.0%	89.6%	\$158,717	\$413,574	\$2,500
Oakwood Circle Pond w/Enhanced Settling	42.1	96.4%	92.5%	\$339,449	\$397,997	\$2,703
Kewaunee Park Pond w/Enhanced Settling	26.9	96.4%	92.5%	\$235,848	\$282,012	\$2,729
Jones Pond w/Enhanced Settling	21.5	95.9%	86.6%	\$81,463	\$156,513	\$2,771
Prairie Wood Pond w/Enhanced Settling	62.3	96.5%	93.2%	\$566,729	\$639,113	\$2,795
Sheldon Pond w/Enhanced Settling	74.4	96.5%	92.9%	\$522,789	\$600,817	\$2,951
Bellhaven Park Pond w/Enhanced Settling	77.2	96.6%	93.1%	\$1,007,072	\$1,183,734	\$3,232
Our Lady Church Pond w/Enhanced Settling	46.1	96.8%	94.0%	\$499,642	\$557,586	\$3,302
Forest View Pond w/Enhanced Settling	44.7	96.4%	92.3%	\$620,019	\$675,827	\$3,407
Wyldewood Pond Alt 2 w/Enhanced Settling	35.9	96.5%	92.8%	\$336,720	\$419,694	\$3,539

Mechanical / Biological Treatment Facilities

Mechanical / biological treatment facilities are not currently used in Wisconsin, with the exception of combined sewer systems that treat wastewater and stormwater. A mechanical / biological treatment facility would be difficult to implement for stormwater given the number of storm sewer outfalls located within the Town. Significant storm sewer pumping would likely be needed to convey stormwater from each outfall to a regional stormwater treatment facility, similar to a wastewater treatment facility. As a result, stormwater treatment facilities are not typically cost effective BMPs. A mechanical / biological treatment facility and associated pumping systems are

estimated to have an average annual cost that is well above \$75,000 per pound of TP removed. In addition, diverting low flows from all storm sewer outfalls to a regional treatment facility may dry up existing wetlands and streams located near the Town's current storm sewer outfalls.

TMDL Alternatives

As summarized in Table 3-4, the Town is currently satisfying the UFW Basin TMDL TSS (0%) pollutant load reduction required within the Lake Butte des Morts Sub-Watershed. However, the Town is not satisfying the UFW Basin TMDL TSS (48.0%) pollutant load reduction required for the Sawyer Creek Sub-Watershed. Furthermore, the Town is not satisfying the UFW Basin TMDL TP (83.0%) pollutant load reduction required for the Lake Butte des Morts and Sawyer Creek Sub-Watersheds. As such, the Town is required to develop a TMDL Plan of Action for the Lake Butte des Morts and Sawyer Creek Sub-Watersheds. The Plan of Action should identify how the Town plans to achieve compliance with the 83% TP reduction required for the Lake Butte des Morts and Sawyer Creek Sub-Watersheds and the 48% TSS reduction required for the Sawyer Creek Sub-Watershed. The Plan of Action should also include an anticipated implementation schedule and projected costs.

To assist the Town develop their TMDL Plan of Action, four TMDL compliance alternatives were developed for consideration. Each alternative will satisfy the 83% TP reduction required for the Lake Butte des Morts and the 83% TP and 48% TSS reductions required for the Sawyer Creek Sub-Watersheds. The capital costs provided are the estimated present value capital costs for the proposed structural BMPs. The capital costs include an allowance for construction, land acquisition, engineering, legal, and contingency costs. The four TMDL compliance alternatives are summarized below:

- Alternative 1 – As shown in Figure 15, Alternative 1 includes the following:
 - ▶ Existing Town BMP's include grass swales, 20 wet detention ponds, 1 iron enhanced sand filter, 1 biofilter, 1 isolator row and 1 upflow filter.
 - ▶ Within the Lake Butte des Morts Sub-Watershed, construct 1 new wet detention pond (Leonard Point Pond) and secure ownership and/or maintenance authority for the Honey Creek Pond (Private; owned/operated by HOA) to add an enhanced settling system.
 - ▶ Within the Sawyer Creek Sub-Watershed, construct 1 new wet detention pond (Town Hall Pond) and secure an agreement with Mercy Hospital to add an enhanced settling system within the existing Mercy Hospital North Pond (Private; within City of Oshkosh).
 - ▶ Rely on future development to generate additional pollutant loads and reductions within existing or proposed BMP watersheds to achieve final TMDL compliance.
 - ▶ Total Capital Cost: \$3.1 million
- Alternative 2 – As shown in Figure 16, Alternative 2 includes the following:
 - ▶ Existing Town BMP's include grass swales, 20 wet detention ponds, 1 iron enhanced sand filter, 1 biofilter, 1 isolator row and 1 upflow filter.
 - ▶ Within the Lake Butte des Morts Sub-Watershed, construct 5 new wet detention ponds with enhanced settling systems (Bellhaven Park Pond, Leonard Point Pond, Sheppard Dr Pond, Wyldeewood Pond Alt 1, and Trillium Tr Pond Alt 2) and add an enhanced settling

system to the existing Irvine Pond. Furthermore, developers will be responsible for constructing regional wet detention ponds as needed to serve future development generally located south of STH 21. The Town would be responsible for adding enhanced settling systems to these future regional wet detention ponds.

- ▶ Within the Sawyer Creek Sub-Watershed, construct 1 new wet detention pond (Town Hall Pond) and secure an agreement with Mercy Hospital to add an enhanced settling system within the existing Mercy Hospital North Pond (Private; within City of Oshkosh).
 - ▶ Rely on future development to generate additional pollutant loads and reductions within existing or proposed BMP watersheds to achieve final TMDL compliance.
 - ▶ Total Capital Cost: \$5.5 million
- Alternative 3 – As shown in Figure 17, Alternative 3 includes the following:
- ▶ Existing Town BMP's include grass swales, 20 wet detention ponds, 1 iron enhanced sand filter, 1 biofilter, 1 isolator row and 1 upflow filter.
 - ▶ Within the Lake Butte des Morts Sub-Watershed, construct 1 wet detention pond (Oakwood Circle Pond), 9 new wet detention ponds with enhanced settling systems (Bellhaven Park Pond, Leonard Point Pond, Our Lady Church Pond, Sheppard Dr Pond, Wyldewood Pond Alt 2, Trillium Tr Pond Alt 2, Sheldon Pond, Valley Rd Pond, and Prairie Wood Pond) and add enhanced settling systems to the existing Lakevista Estates Ponds and the Irvine Pond.
 - ▶ Develop a post-construction stormwater management ordinance that requires an 85% TP reduction for new development sites located within the Lake Butte des Morts Sub-Watershed. Rely on the additional TP load reductions (85% vs 83%) provided by future development within the Lake Buttes des Morts Sub-Watershed to achieve TMDL compliance over time. It should be noted that it will likely cost a developer more to design and construct a stormwater management system to satisfy an 85% TP reduction requirement. As such, the ordinance may discourage development within the Town, particularly if developers can go to an adjacent community with less stringent ordinance requirements.
 - ▶ Within the Sawyer Creek Sub-Watershed, construct 1 new wet detention pond (Town Hall Pond) and secure an agreement with Mercy Hospital to add an enhanced settling system within the existing Mercy Hospital North Pond (Private; within City of Oshkosh).
 - ▶ Rely on future development to generate additional pollutant loads and reductions within existing or proposed BMP watersheds to achieve final TMDL compliance.
 - ▶ Total Capital Cost: \$7.0 million
- Alternative 4 – As shown in Figure 18, Alternative 4 includes the following:
- ▶ Existing Town BMP's include grass swales, 20 wet detention ponds, 1 iron enhanced sand filter, 1 biofilter, 1 isolator row and 1 upflow filter.
 - ▶ Within the Lake Butte des Morts Sub-Watershed, construct 11 new wet detention ponds with enhanced settling systems (Bellhaven Park Pond, Leonard Point Pond, Our Lady Church Pond, Sheppard Dr Pond, Wyldewood Pond Alt 2, Trillium Tr Pond Alt 2, Forest View Pond, Sheldon Pond, Valley Rd Pond, Oakwood Circle Pond, and Prairie Wood Pond) and

add an enhanced settling system to the existing Lakevista Estates Ponds, Jones Pond, and Irvine Pond.

- ▶ Within the Sawyer Creek Sub-Watershed, construct 1 new wet detention pond (Town Hall Pond) and secure an agreement with Mercy Hospital to add an enhanced settling system within the existing Mercy Hospital North Pond (Private; within City of Oshkosh).
- ▶ Rely on future development to generate additional pollutant loads and reductions within existing or proposed BMP watersheds to achieve final TMDL compliance.
- ▶ Total Capital Cost: \$7.8 million

V. IMPLEMENTATION & RECOMMENDATIONS

Below are various recommendations for the Town to consider when implementing this Stormwater Quality Management Plan and working toward MS4 Permit compliance.

TMDL Plan of Action

The Town of Algoma has selected Alternative 1 (Figure 15) from the TMDL Alternative Analysis as their formal TMDL Plan of Action to satisfy the 83% TP reduction required for the Lake Butte des Morts Sub-Watershed and the 83% TP and 48% TSS reductions required for the Sawyer Creek Sub-Watershed. The Plan of Action utilizes a combination of existing and proposed BMPs to satisfy the required UFW Basin TMDL TSS and TP percent reductions. The Plan of Action includes an anticipated implementation schedule and projected costs. It is of note that the Town's TMDL Plan of Action will likely be a dynamic planning document that will likely be modified as implementation progresses. The Plan of Action's proposed BMPs are depicted in Figure 15 and include the following:

- The Town will perform street sweeping with a high efficiency sweeper and parking controls to improve pollutant reduction benefits. Street sweeping should occur once per month. Weather permitting, street sweeping begins March 29 and ends November 25 of each calendar year.
- Maintain existing Town and private BMP's including grass swales, 20 wet detention ponds, 1 iron enhanced sand filter, 1 biofilter, 1 isolator row and 1 upflow filter.
- Within the Lake Butte des Morts Sub-Watershed, construct 1 new wet detention pond (Leonard Point Pond) and secure ownership and/or maintenance authority for the Honey Creek Pond (Private; owned/operated by HOA). Add an enhanced settling system to the Honey Creek Pond. The Honey Creek Pond will be the "work horse" for the Town, as it will treat the Town's large future growth area located south of STH 21.
- Within the Sawyer Creek Sub-Watershed, construct 1 new wet detention pond (Town Hall Pond) and secure an agreement with Mercy Hospital to add an enhanced settling system within the existing Mercy Hospital North Pond (Private; within City of Oshkosh). Consider a joint project with the City of Oshkosh to cost-share on adding the enhanced settling system.

- Rely on future development within the Lake Butte des Morts and Sawyer Creek Sub-Watersheds to generate additional pollutant loads and reductions within existing or proposed BMP watersheds to achieve final TMDL compliance. Based on anticipated growth, the Town believes the remaining undeveloped property within the Town may take another 50 years or more to fully develop. As such, the 50-year future development timeline will likely drive the TMDL compliance schedule for the Town.

As shown in Table 5-1, the Plan of Action will provide an 83.4% TP and an 89.4% TSS reduction within the Lake Butte des Morts Sub-Watershed and an 83.0% TP and a 77.4% TSS reduction within the Sawyer Creek Sub-Watershed.

Table 5-1: TMDL Pollutant Analysis – Plan of Action (WinSLAMM)

Sub-Watershed	*Urban Area (acres)	Total Phosphorus (TP)			Total Suspended Solids (TSS)		
		*Baseline Load (lbs/yr)	Load Reduction (lbs/yr)	(%)	*Baseline Load (lbs/yr)	Load Reduction (lbs/yr)	(%)
Lake Butte des Morts	2,570	1,923.0	1,603.4	83.4%	525,694	469,939	89.4%
Sawyer Creek	105	75.8	62.9	83.0%	19,234	14,883	77.4%

*Includes projected future development acreage and baseline loads

Capital Improvement Plan

The Town developed a 25-year capital improvement plan (CIP), which is included in Appendix C, to supplement the TMDL Plan of Action and 50-year compliance timeline (future development). The 25-year CIP identifies completing a proposed enhancement / BMP every 7-8 years, which allows time for the Town to maintain a sufficient stormwater fund balance.

The CIP may need to be modified in the future to allow more time for public input, land acquisition, grant applications, BMP design, regulatory permits, financing, and construction. The CIP should also take into consideration other local capital improvement projects, such as street reconstruction projects, utility projects, and private development projects. The proposed enhancements / BMP's are planned to be completed by year 2049, but the Town will still need to rely on future development and pollutant loads to fully comply with the TMDL. It is recommended that the Town manage and update the 25-year CIP as implementation of the Plan of Action progresses.

Future capital costs associated with the initial 25 years of the Plan of Action enhancements / BMPs are provided below in Table 5-2. The future capital costs include an allowance for construction, land, engineering, contingency costs and account for an inflation rate of 3%.

Table 5-2: Plan of Action

Structural BMP	Future Capital Costs*	Construction Year	Apply for UNPS&SW Grant
Leonard Point Pond	\$1,265,200	2027	2026
Town Hall Pond	\$439,500	2035	2034
Honey Creek Pond w/Enhanced Settling	\$1,857,400	2043	2042
Mercy Hospital North Pond w/Enhanced Settling	\$205,000	2049	2048
Total	\$3,582,600	-	-

*Based on 2025 estimated costs and future inflation rate of 3.0%

Financing Plan

It is recommended that the Town develop a financing plan. The financing plan will allow the Town to implement its Plan of Action and CIP. Below is a discussion of various funding sources which may be available to the Town. Depending on the project, funding options may be used individually or in combination.

- **DEBT / BONDS:** General obligation and revenue bonds may be used to secure funding for stormwater projects. Property taxes and revenue fees are used for long-term debt payments.
- **SPECIAL ASSESSMENTS:** Special assessments may be used to generate funds for a specific project. Property owners that benefit from the project pay the assessment fee. Typically, other funding sources are needed to pay for project costs until property owners pay the assessment.
- **IMPACT FEES:** Impact fees may be charged to developers for stormwater projects that benefit the development. Impact fees are usually paid during initial stages of development. Typically, projects include regional stormwater facilities or improvements to deficient downstream infrastructure. Often, other funding sources are needed to pay for project costs until developers and property owners are required to pay the impact fee. Impact fees are recommended as needed to fund the municipal stormwater program.
- **TAX INCREMENTAL FINANCING (TIF) DISTRICT:** TIF Districts may be used by the Town to fund stormwater projects that benefit property located within the District. Property value increases within the TIF District generate additional tax revenue that is used for long-term debt payments.
- **STORMWATER UTILITY:** Stormwater utilities are similar to sanitary and water utilities. Stormwater utilities generate revenue for stormwater related projects by charging property owners an annual service fee. Annual service fees are based upon the amount of runoff generated by a specific property. Properties with more impervious area (i.e. roofs, parking lots, driveways, etc.) are charged a higher fee as compared to properties with less impervious area. All properties, including tax exempt properties, pay the service fee. Rate adjustments are

recommended as needed to fund the municipal stormwater program. The Town plans to conduct a Stormwater Utility Feasibility Study in 2026.

- GRANTS / LOANS: State and federal grant / loans are available for certain stormwater projects. Typically, only a certain percent of the total project cost is eligible for grant / loan money with remaining revenues to be generated by the applicant. Below are a few grant / loan programs which the Town may or may not be familiar with. Grant applications are recommended.
 - ▶ Urban Non-Point Source and Stormwater Construction Grant
 - ▶ Targeted Runoff Management Construction Grant
 - ▶ Great Lakes Basin Program
 - ▶ Community Development Block Grant
 - ▶ Clean Water Fund

Operation & Maintenance

It is recommended that the Town continues to operate and maintain their current stormwater management system. Operation and maintenance is needed in order for the stormwater system to perform as designed. It is recommended that the Town monitor sediment depths within Town-owned ponds. Sediment accumulation rates can be used to predict future dredging activities. This will be particularly important if enhanced settling systems are implemented in the future.

Redevelopment Sites

It is recommended that the Town evaluate public / private partnerships with landowners when developing and implementing its TMDL Plan of Action. As required by NR 151.12, redevelopment sites with 1 acre or more of land disturbance are required to achieve a TSS reduction. Compliance with the TSS reduction is only required when a construction project occurs on the site. As such, these redevelopment sites do not have a specific timeline for achieving a TSS reduction. Nonetheless, when redevelopment occurs on commercial, industrial, institutional and multi-family residential parcels, stormwater quality improvements will be required. Public / private partnerships provide an opportunity to work together such that both the landowner and Town benefit.

For example, redevelopment of a 20-acre shopping center may provide an opportunity to increase the site's TSS reduction to 80% or provide an opportunity to provide water quality treatment for other nearby properties or streets. In some instances, cost sharing can be used as a financial incentive or the Town cost share through of public / private partnership with the landowners. Typically, it is more cost effective to incorporate stormwater quality improvements into an already planned construction project as compared to retrofitting a BMP without considering other construction activities in the watershed.

Inter-Governmental Agreements

It is recommended that the Town evaluate inter-governmental agreements when developing and implementing its TMDL Plan of Action. It may be more cost effective to work together with adjoining municipal jurisdictions, such as the WisDOT or Winnebago County Highway Department. Also, it may be beneficial to work together with the City of Oshkosh to construct a mutually

beneficial stormwater BMP, share equipment, restore a wetland, or improve water quality using other methods.

Stream, Shoreline & Channel Stabilization

It is recommended that the Town undertake high priority stream, shoreline and channel stabilization projects to reduce the discharge of sediment and phosphorus pollutants associated with bed, bank or steep slope erosion. In addition to the water quality benefits, stabilization projects provide an opportunity to improve habitat, remove invasive species, and potentially restore wetland areas. Grant funding is available to assist with stabilization projects.

Water Quality Trading

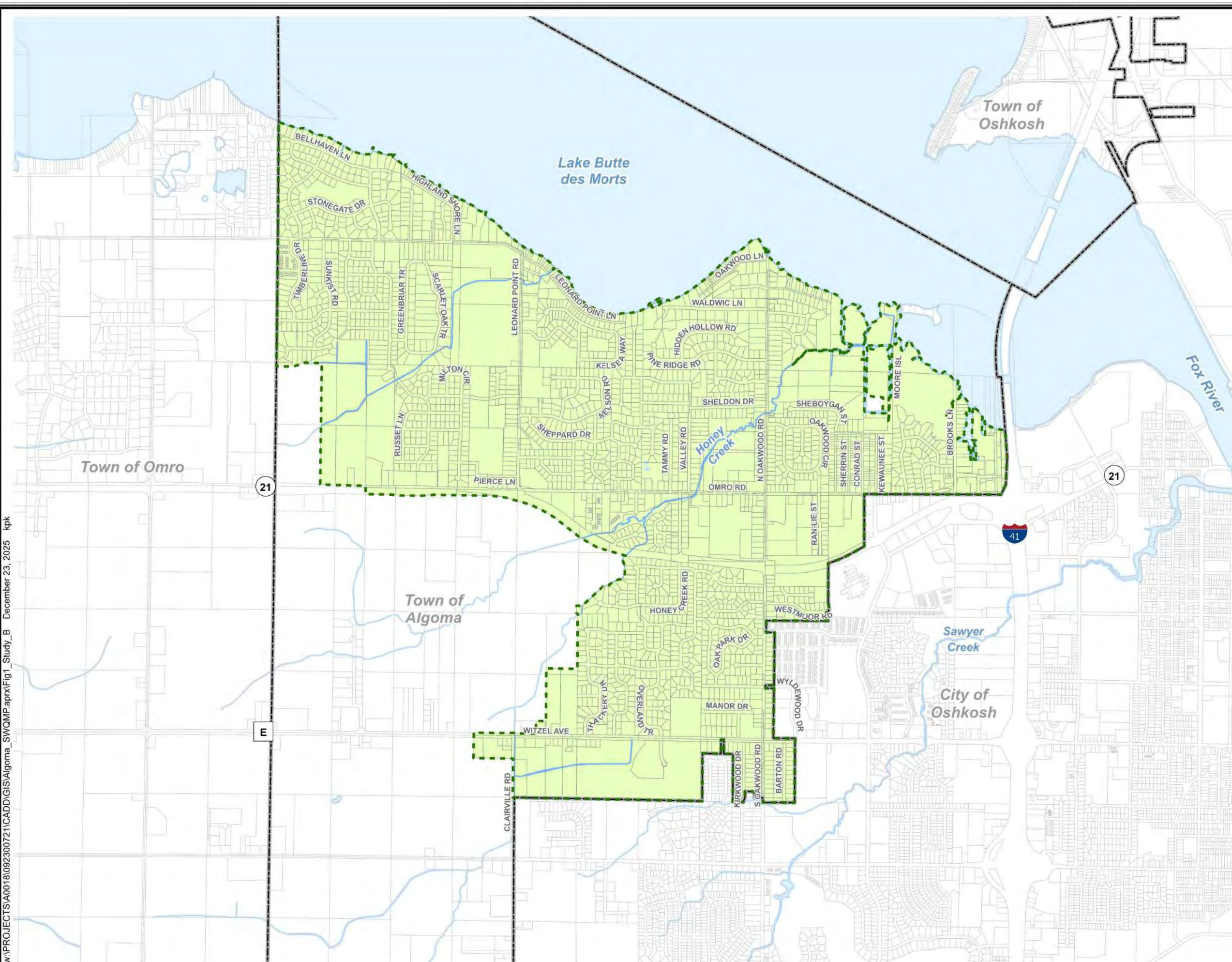
It is recommended that the Town evaluate the feasibility and cost effectiveness of water quality trading when implementing its Plan of Action. The cost for achieving compliance with TMDL allocations is not uniform among dischargers and source areas. As such, compliance with TMDL allocations may be more cost-effectively achieved by trading with other dischargers. Water quality trading is allowed between wastewater treatment facilities, agricultural landowners, and other urban stormwater dischargers. In order to be eligible for water quality trading, specific criteria needs to be satisfied. The Wisconsin DNR has developed a water quality trading framework for Wisconsin. This framework has led to two additional guidance documents for trading implementation. Water quality trading requires purchasing credits on an annual basis, and with no required TMDL compliance schedule included in the WPDES MS4 permit, it can be difficult for water quality trading to be cost-effective for MS4 dischargers.






Watershed Adaptive Management

It is recommended that the Town evaluate the feasibility and cost effectiveness of Watershed Adaptive Management when implementing its Plan of Action. Adaptive management is a watershed approach that focuses on meeting water quality standards within a river, stream or lake in a more cost-effective manner. Watershed Adaptive Management needs to be initiated by a wastewater treatment facility owner, but would likely involve cooperation among other phosphorus dischargers including agricultural, urban stormwater, and wastewater dischargers.

Public Education & Public Involvement

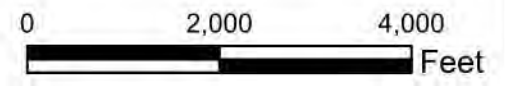
Public education and public involvement are recommended during development and implementation of the Plan of Action. Potential stakeholders include the general public, elected officials, Town Staff, developers, regulatory entities, individual property owners and other regulated entities. Although this stormwater quality management plan includes a cost versus benefit analysis, the plan does not take into consideration intangibles such as public sentiment, public opinion, land availability, etc.



-  Study Area
- Other Mapped Features**
-  Municipal Boundary
-  Parcel Line
-  Stream
-  Surface Water

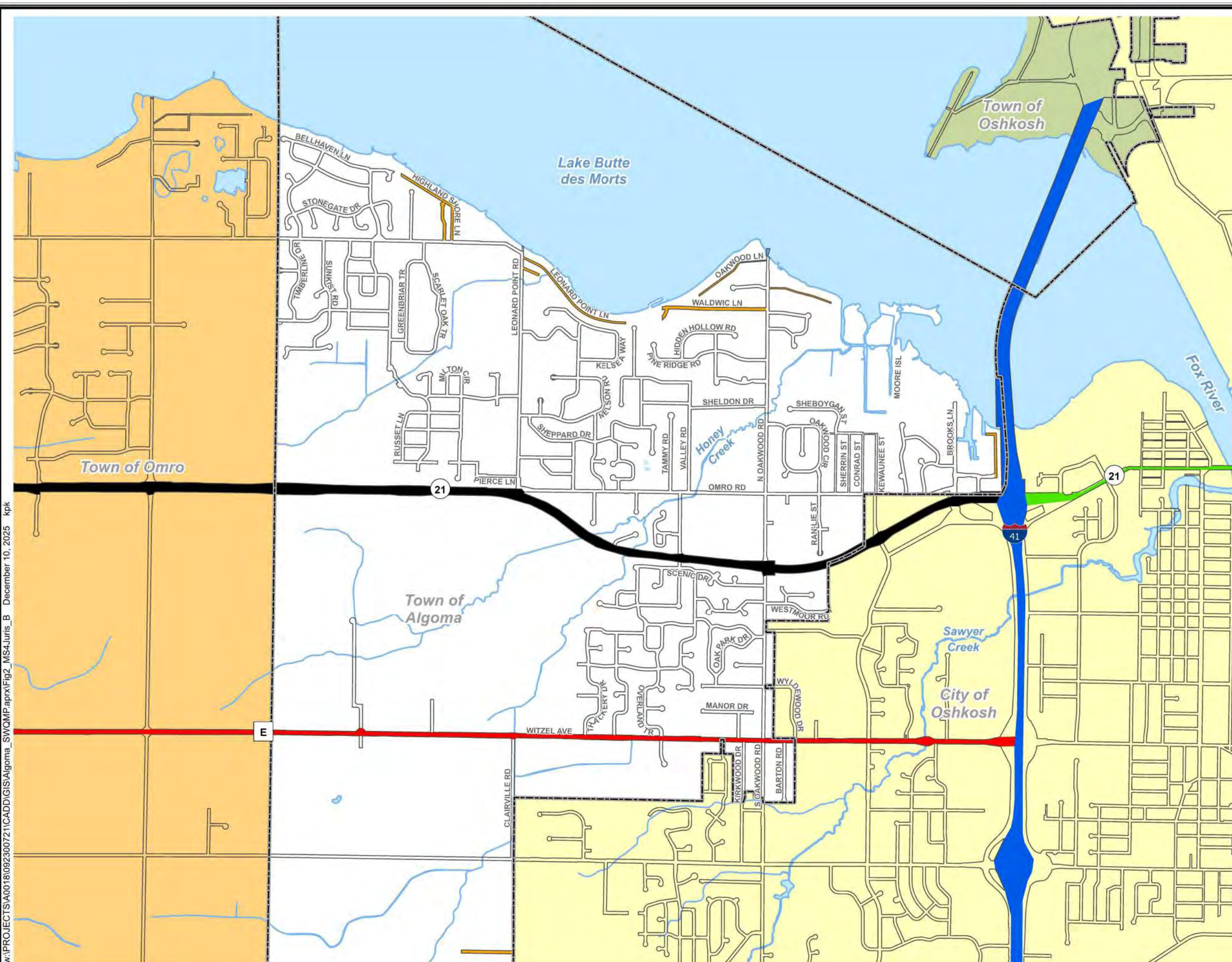
Source: Winnebago County, 2024-25.

Disclaimer: The property lines, right-of-way lines, and other property information on this drawing were developed or obtained as part of the County Geographic Information System or through the County property tax mapping function. McMAHON ASSOCIATES, INC. does not guarantee this information to be correct, current, or complete. The property and right-of-way information are only intended for use as a general reference and are not intended or suitable for site-specific uses. Any use to the contrary of the above stated uses is the responsibility of the user and such use is at the user's own risk.



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FIGURE 1
STUDY AREA
STORMWATER QUALITY
MANAGEMENT PLAN
TOWN OF ALGOMA
WINNEBAGO COUNTY, WISCONSIN



Municipal Jurisdiction

- Town of Algoma
- City of Oshkosh
- Town of Omro
- Town of Oshkosh

Highway Jurisdiction

- Connecting Highway
- County Highway
- State Highway
- Federal Highway
- Private Road
- Right-of-Way Line
- Stream
- Surface Water

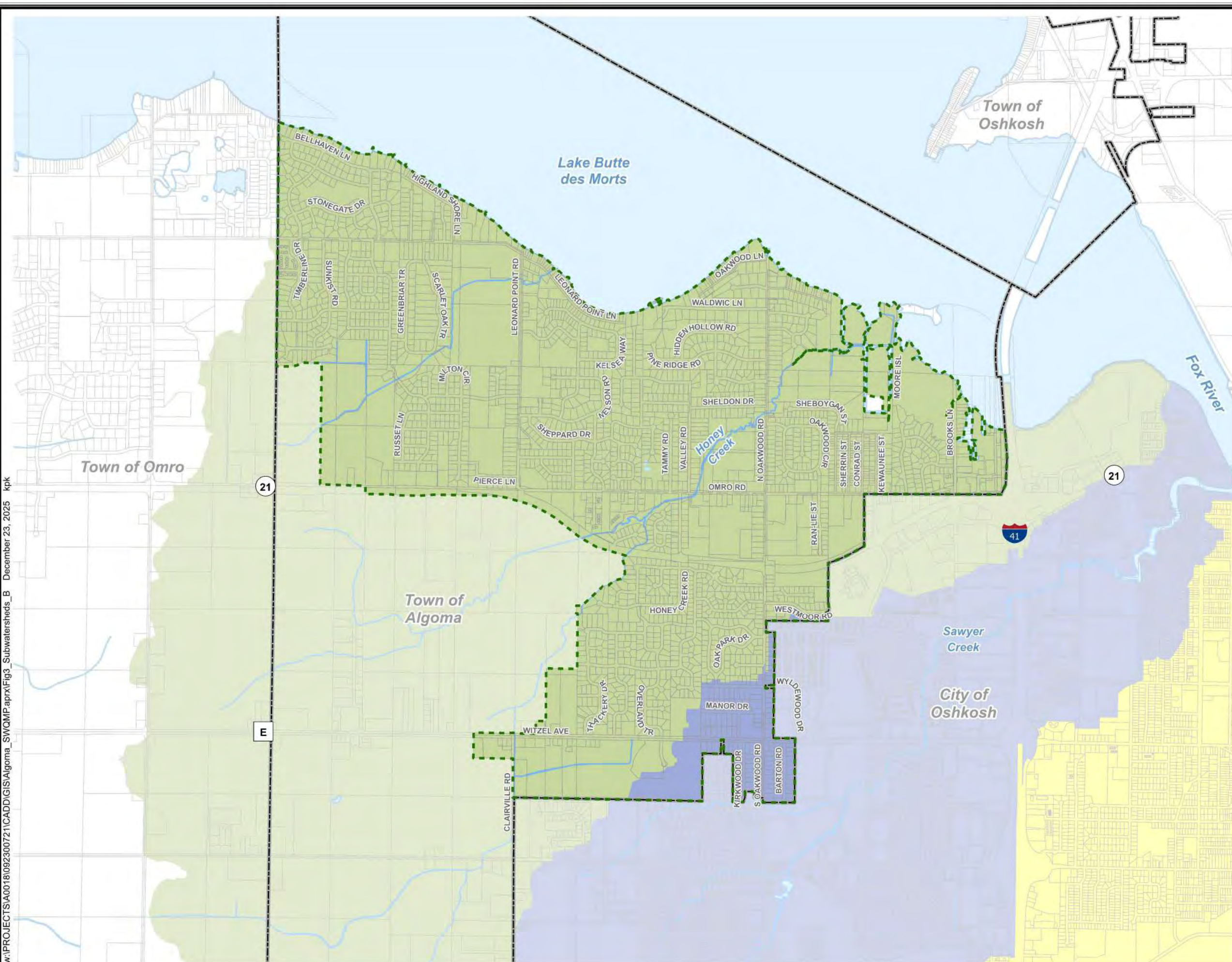
Source: Winnebago County, 2024-25.

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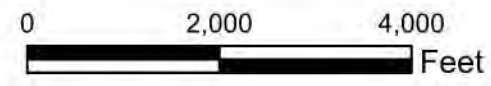
FIGURE 2
MS4 JURISDICTION
STORMWATER QUALITY
MANAGEMENT PLAN
TOWN OF ALGOMA
WINNEBAGO COUNTY, WISCONSIN



- Sub-Watersheds**
- Fox River
 - Lake Butte des Morts
 - Sawyer Creek
- Other Mapped Features**
- Study Area Boundary
 - Municipal Boundary
 - Parcel Line
 - Stream
 - Surface Water

Source: Winnebago County, 2024-25.

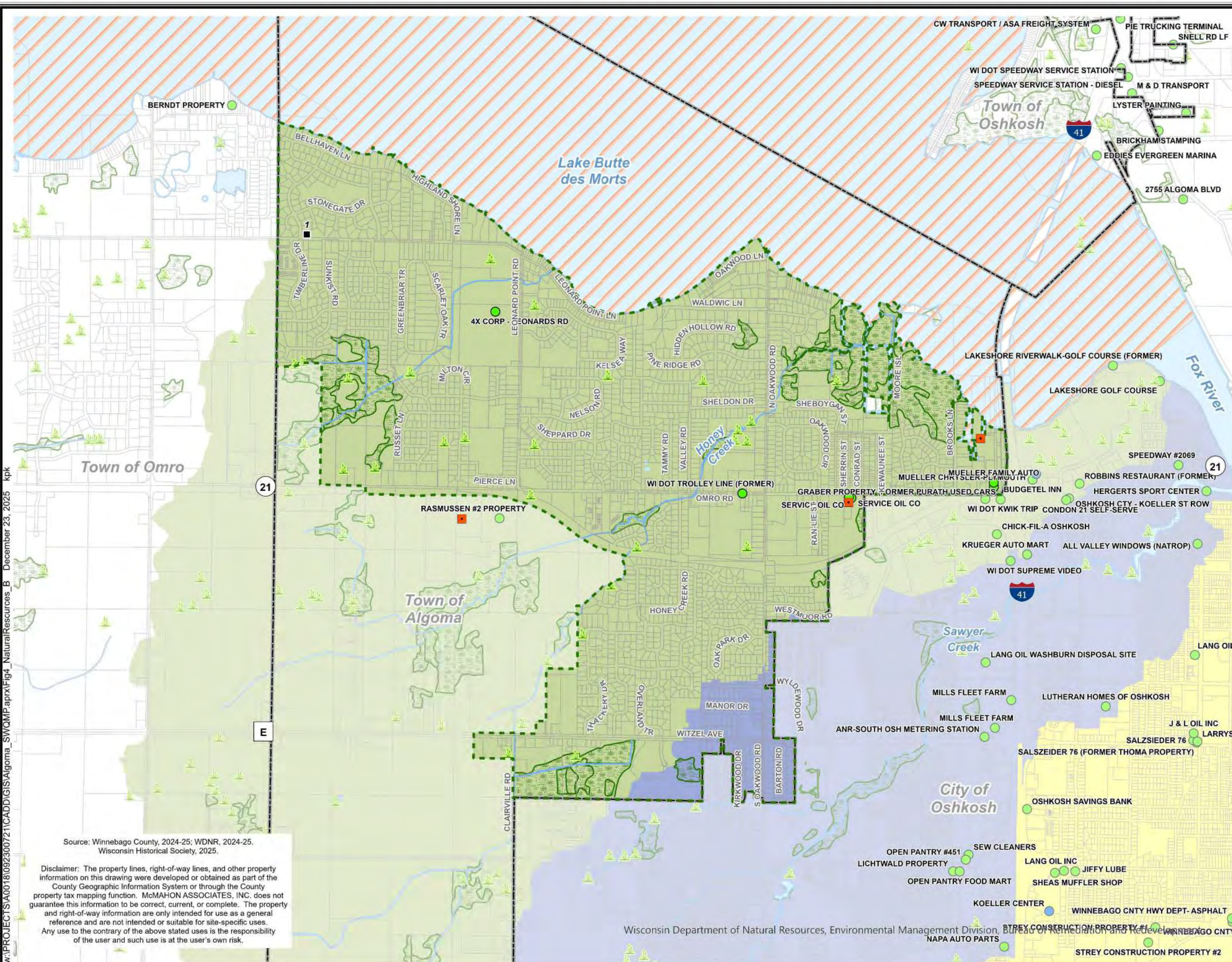
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FIGURE 3
SUB-WATERSHEDS
STORMWATER QUALITY
MANAGEMENT PLAN
TOWN OF ALGOMA
WINNEBAGO COUNTY, WISCONSIN

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- Natural Resources**
- WDNR Wetland Inventory (Less Than 2 Acres)
 - WDNR Wetland Inventory (2 Acres and Greater)
 - 303(d) Impaired Waters
 - Stream
 - Surface Water
- Sub-Watersheds**
- Fox River
 - Lake Butte des Morts
 - Sawyer Creek
- Other Mapped Features**
- Historic Site ID (On National and/or State Register)
 - Historic Waste Disposal Site
 - Open WDNR Remediation Site
 - Closed WDNR Remediation Site
 - Study Area Boundary
 - Municipal Boundary
 - Parcel Line

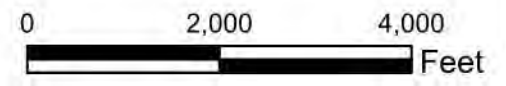


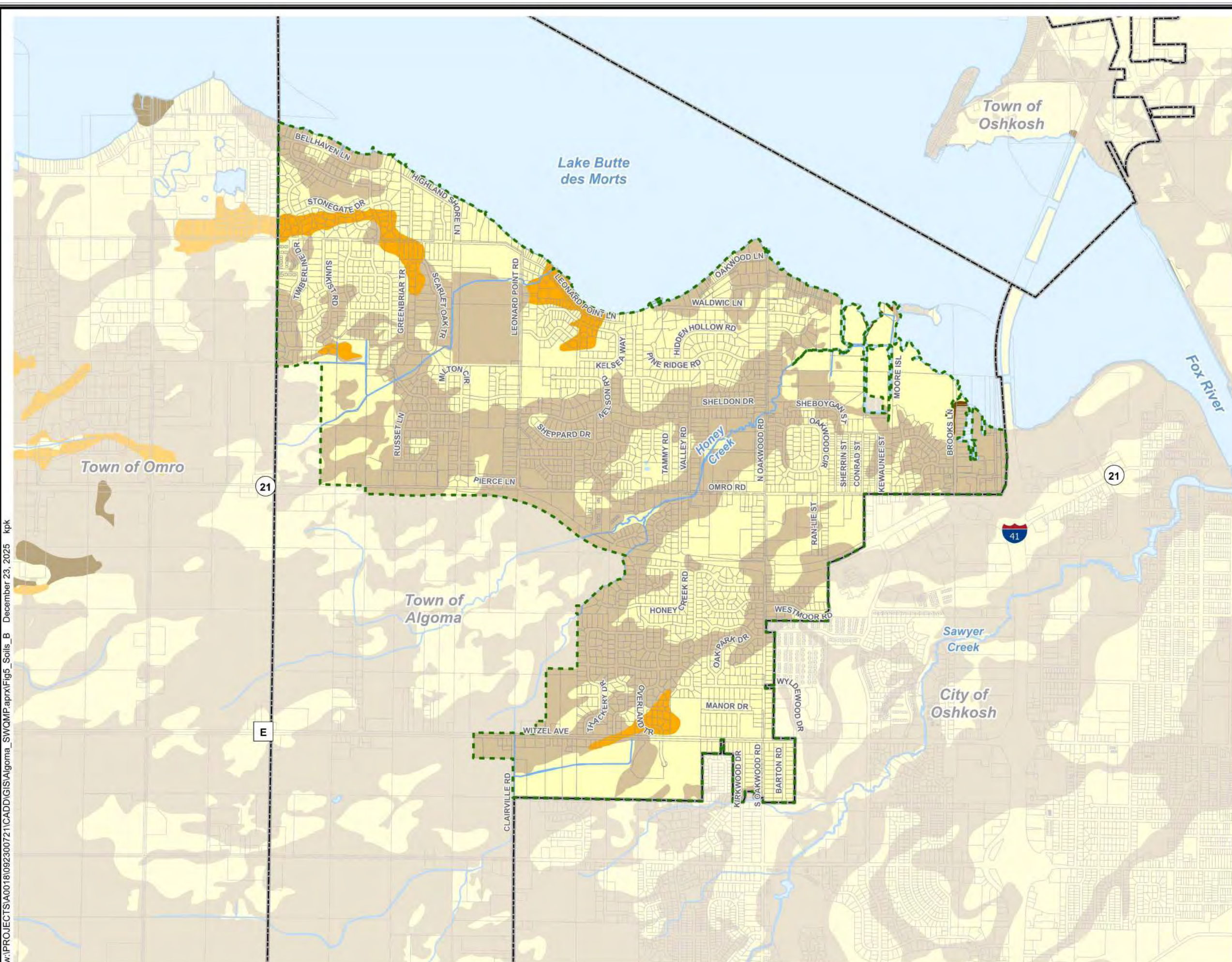
FIGURE 4
NATURAL RESOURCES
STORMWATER QUALITY
MANAGEMENT PLAN
TOWN OF ALGOMA
WINNEBAGO COUNTY, WISCONSIN

Source: Winnebago County, 2024-25; WDNR, 2024-25.
Wisconsin Historical Society, 2025.

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Wisconsin Department of Natural Resources, Environmental Management Division, Bureau of Remediation and Redevelopment



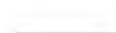


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Hydrologic Soil Group (HSG)

-  HSG A
-  HSG B
-  HSG C
-  HSG D

Other Mapped Features

-  Study Area Boundary
-  Municipal Boundary
-  Parcel Line
-  Stream
-  Surface Water

Source: Winnebago County, 2024-25; USDA, 2025.

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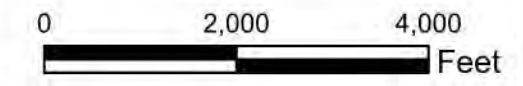







FIGURE 5
SOILS
STORMWATER QUALITY
MANAGEMENT PLAN
TOWN OF ALGOMA
WINNEBAGO COUNTY, WISCONSIN

w:\PROJECTS\A00181092300721\CADD\GIS\Algoma_SWQMP.aprx\Fig5_Soils_B December 23, 2025 kpk

Annual Minimum Depth to Groundwater (Inches)

-  0 - 20
-  20 - 36
-  >36

Other Mapped Features

-  Study Area Boundary
-  Municipal Boundary
-  Parcel Line
-  Stream
-  Surface Water

Source: Winnebago County, 2024-25; USDA, 2025.

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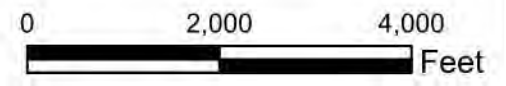
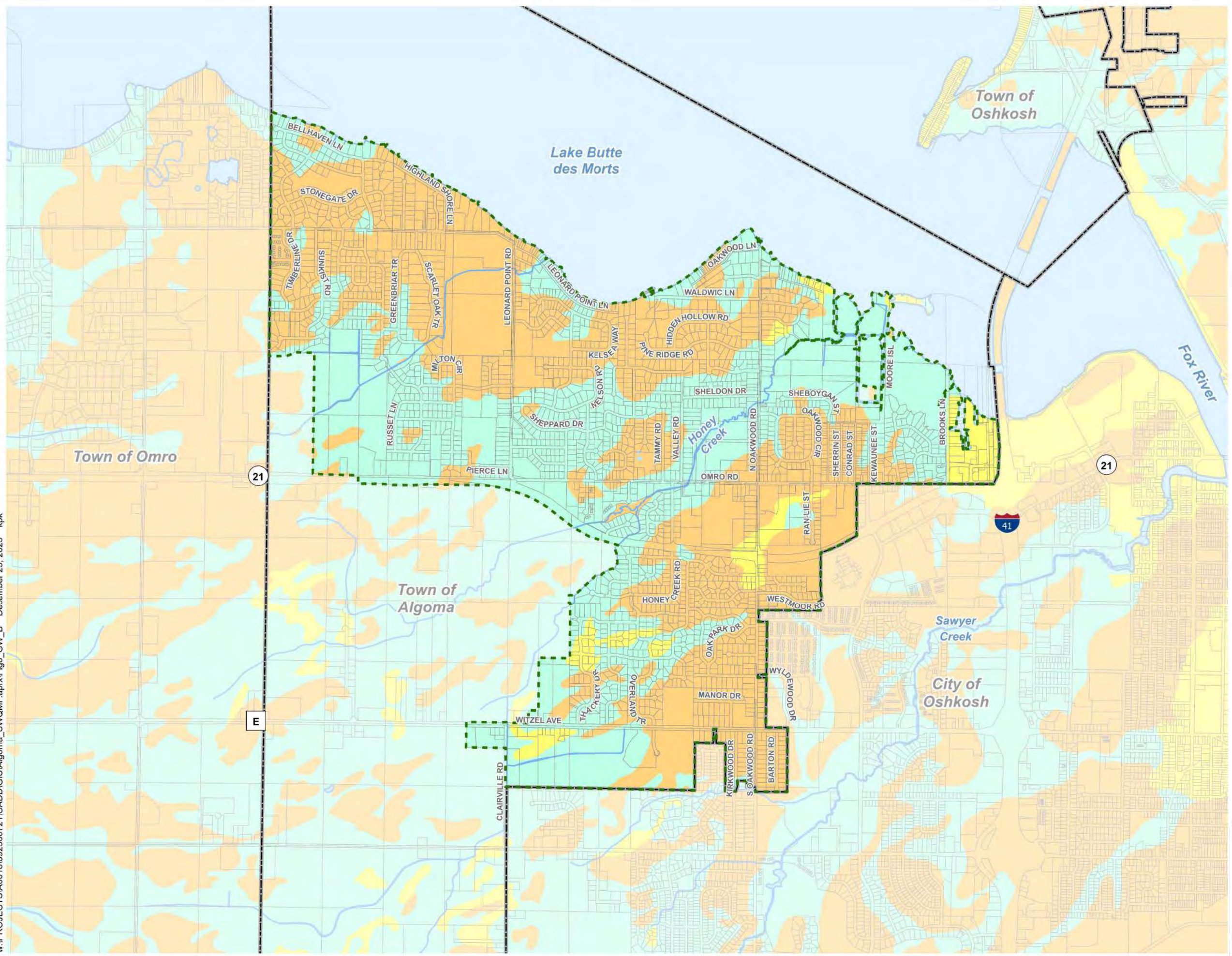
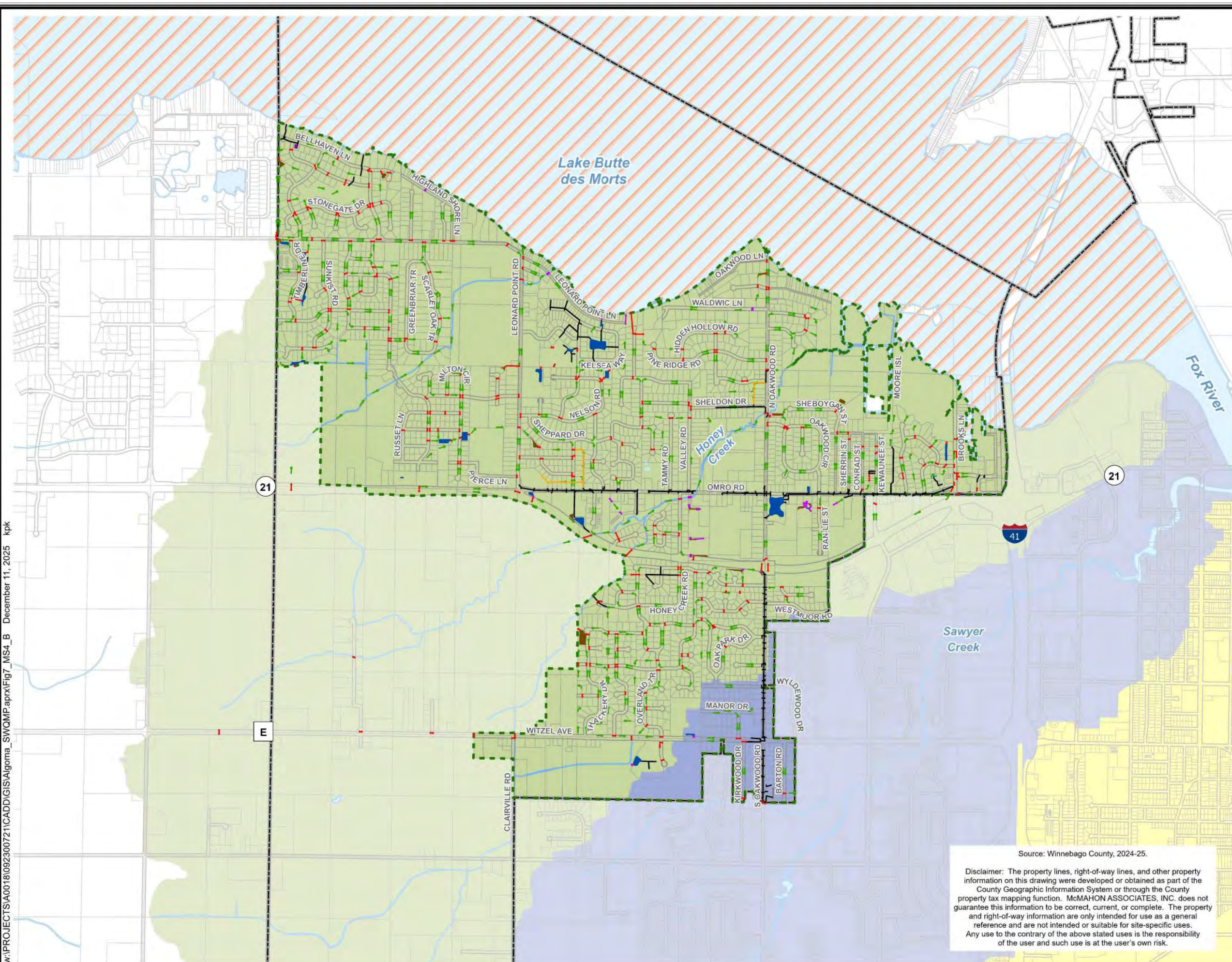


FIGURE 6
DEPTH TO GROUNDWATER
STORMWATER QUALITY
MANAGEMENT PLAN
TOWN OF ALGOMA
WINNEBAGO COUNTY, WISCONSIN

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- MS4 Drainage System**
- Storm Sewer System
 - Culvert
 - Private Culvert
 - Drain Tile
 - Wet Pond
 - Dry Pond
- Sub-Watersheds**
- Fox River
 - Lake Butte des Morts
 - Sawyer Creek
- Other Mapped Features**
- Study Area Boundary
 - Municipal Boundary
 - Parcel Line
 - Stream
 - Surface Water
 - 303(d) Impaired Waters



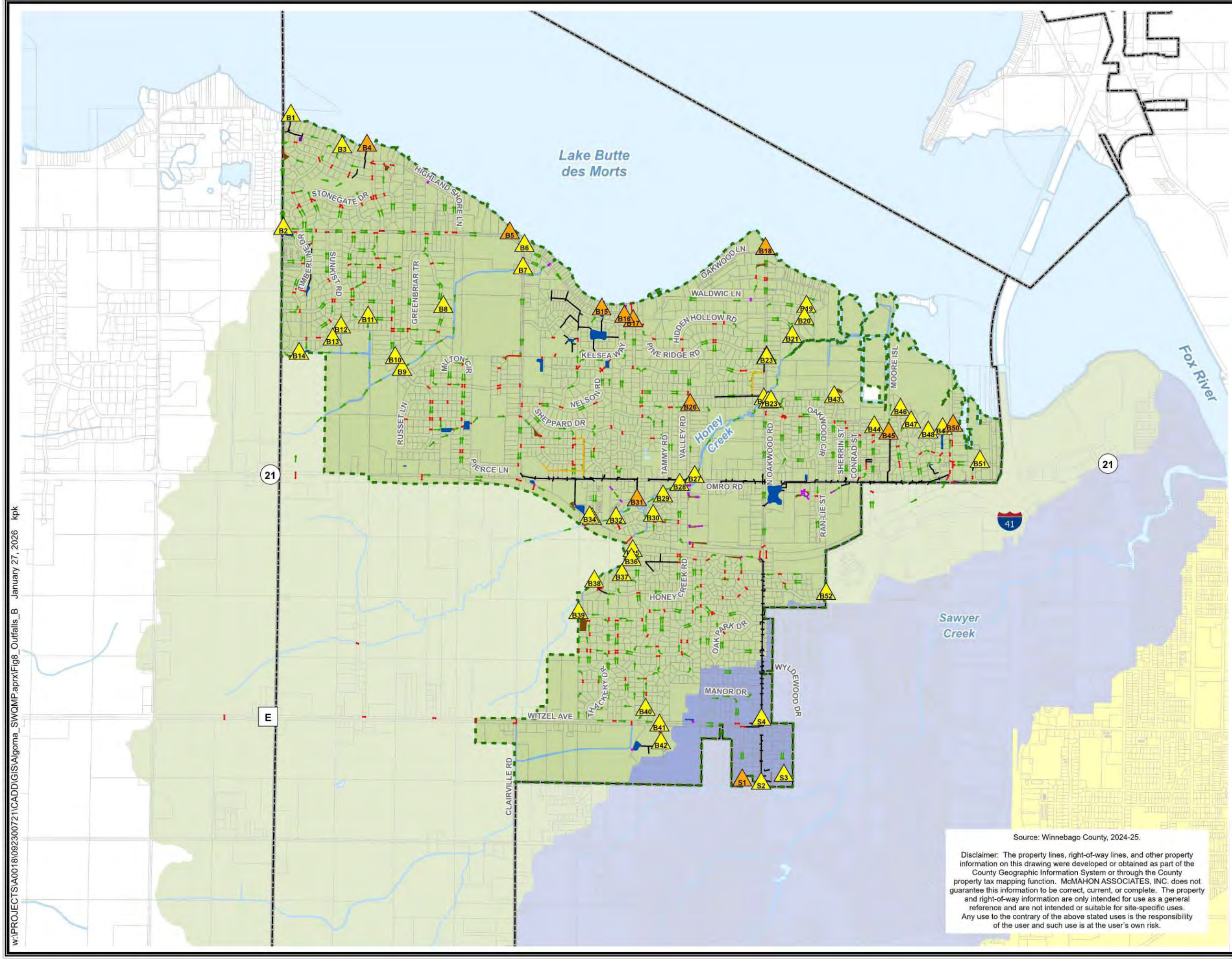
0 2,000 4,000
Feet



Source: Winnebago County, 2024-25.

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FIGURE 7
MS4 SYSTEM
STORMWATER QUALITY
MANAGEMENT PLAN
TOWN OF ALGOMA
WINNEBAGO COUNTY, WISCONSIN



MS4 Drainage System

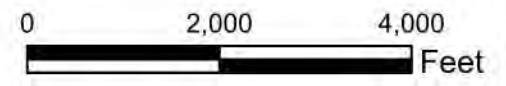
- Major Outfall
- Minor Outfall
- Storm Sewer System
- Culvert
- Private Culvert
- Drain Tile
- Wet Pond
- Dry Pond

Sub-Watersheds

- Fox River
- Lake Butte des Morts
- Sawyer Creek

Other Mapped Features

- Study Area Boundary
- Municipal Boundary
- Parcel Line
- Stream
- Surface Water

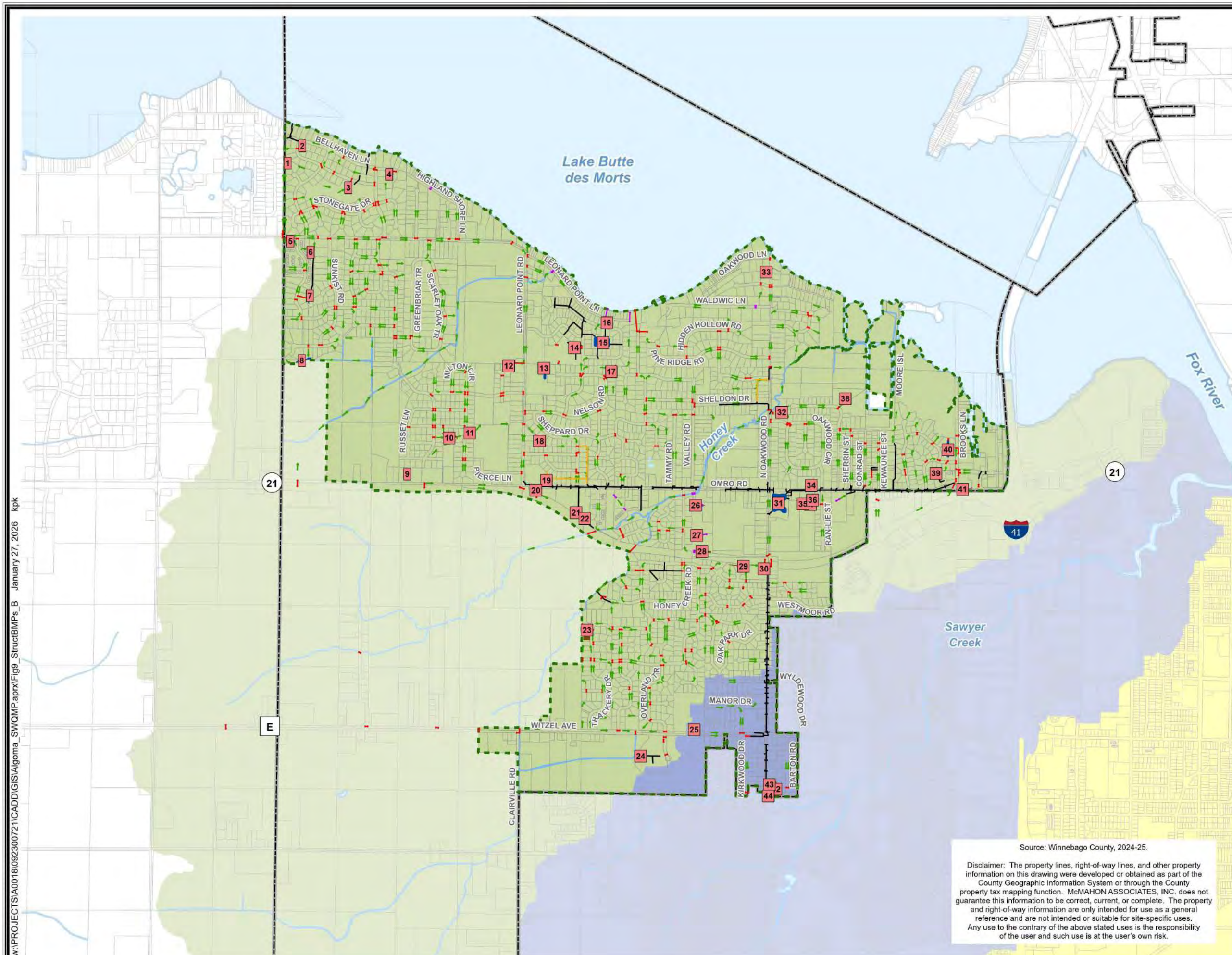


Source: Winnebago County, 2024-25.

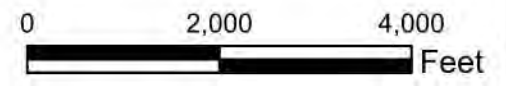
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**FIGURE 8
OUTFALLS
STORMWATER QUALITY
MANAGEMENT PLAN
TOWN OF ALGOMA
WINNEBAGO COUNTY, WISCONSIN**

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- MS4 Drainage System**
- Structural BMP ID
 - Storm Sewer System
 - Culvert
 - Private Culvert
 - Drain Tile
 - Wet Pond
 - Dry Pond
- Sub-Watersheds**
- Fox River
 - Lake Butte des Morts
 - Sawyer Creek
- Other Mapped Features**
- Study Area Boundary
 - Municipal Boundary
 - Parcel Line
 - Stream
 - Surface Water

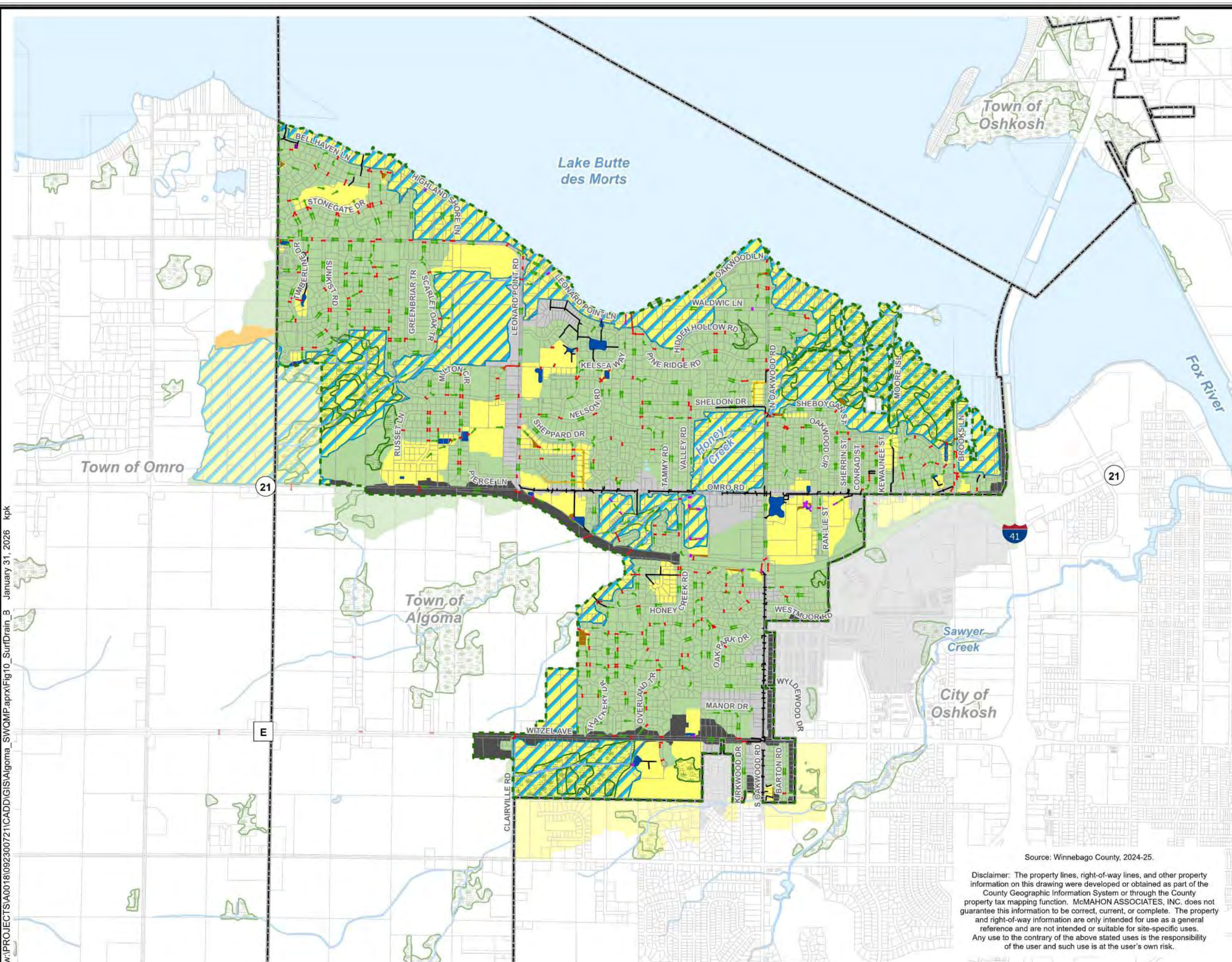


Source: Winnebago County, 2024-25.

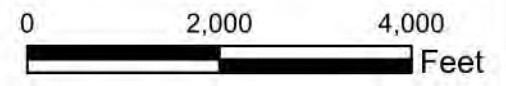
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FIGURE 9
STRUCTURAL BMPs
STORMWATER QUALITY
MANAGEMENT PLAN
TOWN OF ALGOMA
WINNEBAGO COUNTY, WISCONSIN

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- Surface Drainage**
- Curb and Gutter
 - No Controls
 - Grass Swale
 - Internally Drained
- MS4 Drainage System**
- Storm Sewer System
 - Culvert
 - Private Culvert
 - Drain Tile
 - Wet Pond
 - Dry Pond
- Other Mapped Features**
- Study Area Boundary
 - Municipal Boundary
 - Parcel Line
 - Stream
 - Surface Water
 - Riparian Area
 - MS4 'A' to 'B' Area
 - WDNR Wetland Inventory (2 Acres and Greater)

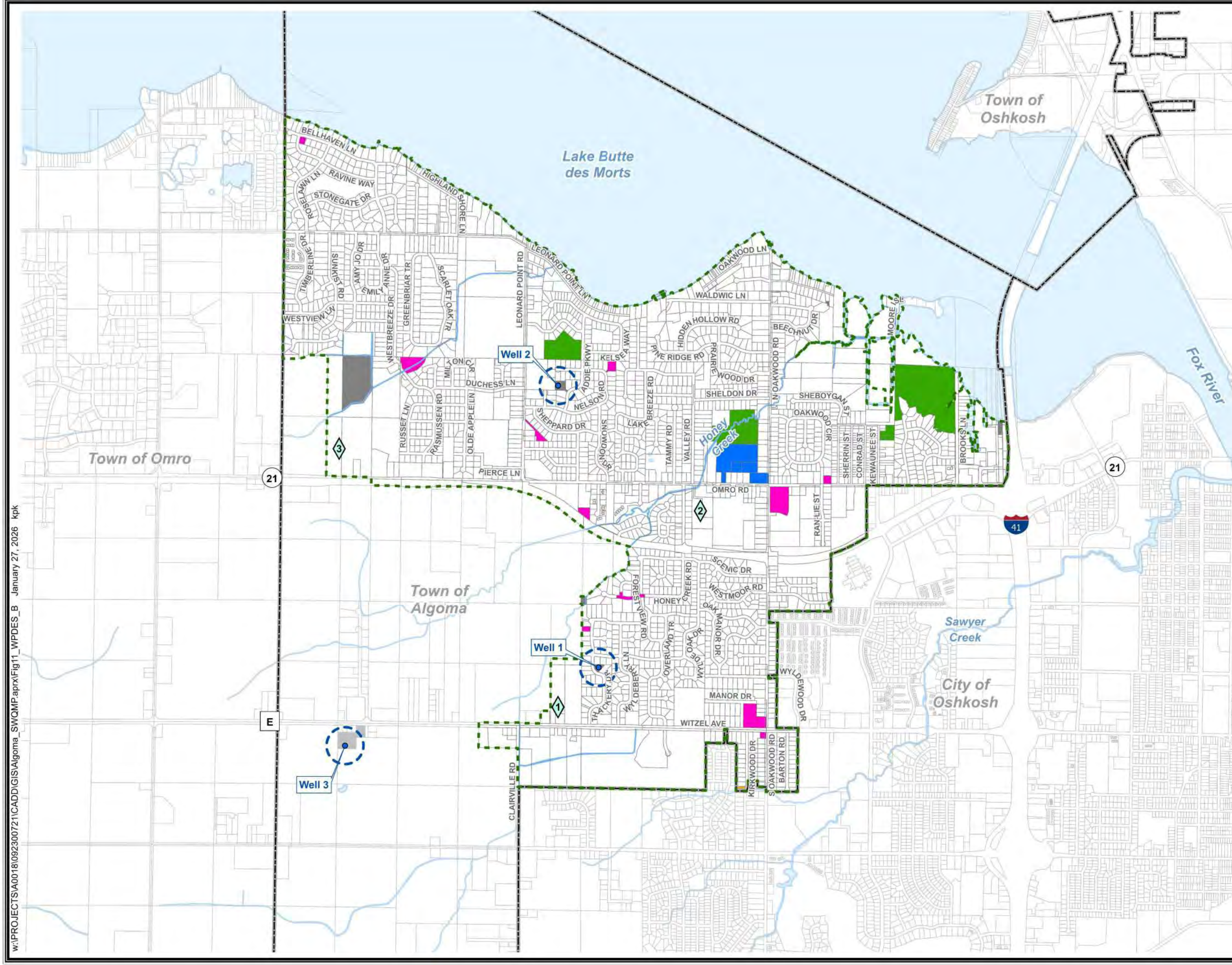


Source: Winnebago County, 2024-25.

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FIGURE 10
SURFACE DRAINAGE
STORMWATER QUALITY
MANAGEMENT PLAN
TOWN OF ALGOMA
WINNEBAGO COUNTY, WISCONSIN

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-  WPDES Industrial Permit ID
- Publicly Owned Lands**
-  Town of Algoma
-  Town of Algoma Sanitary District #1
-  Park and Recreation Area
-  Oshkosh Area School District
-  Winnebago County
-  Municipal Well and 400 Foot Radius Buffer
- Other Mapped Features**
-  Study Area Boundary
-  Municipal Boundary
-  Parcel Line
-  Stream
-  Surface Water

Source: Winnebago County, 2024-25.

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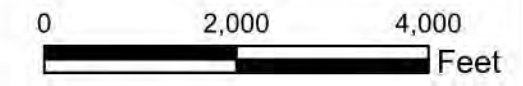
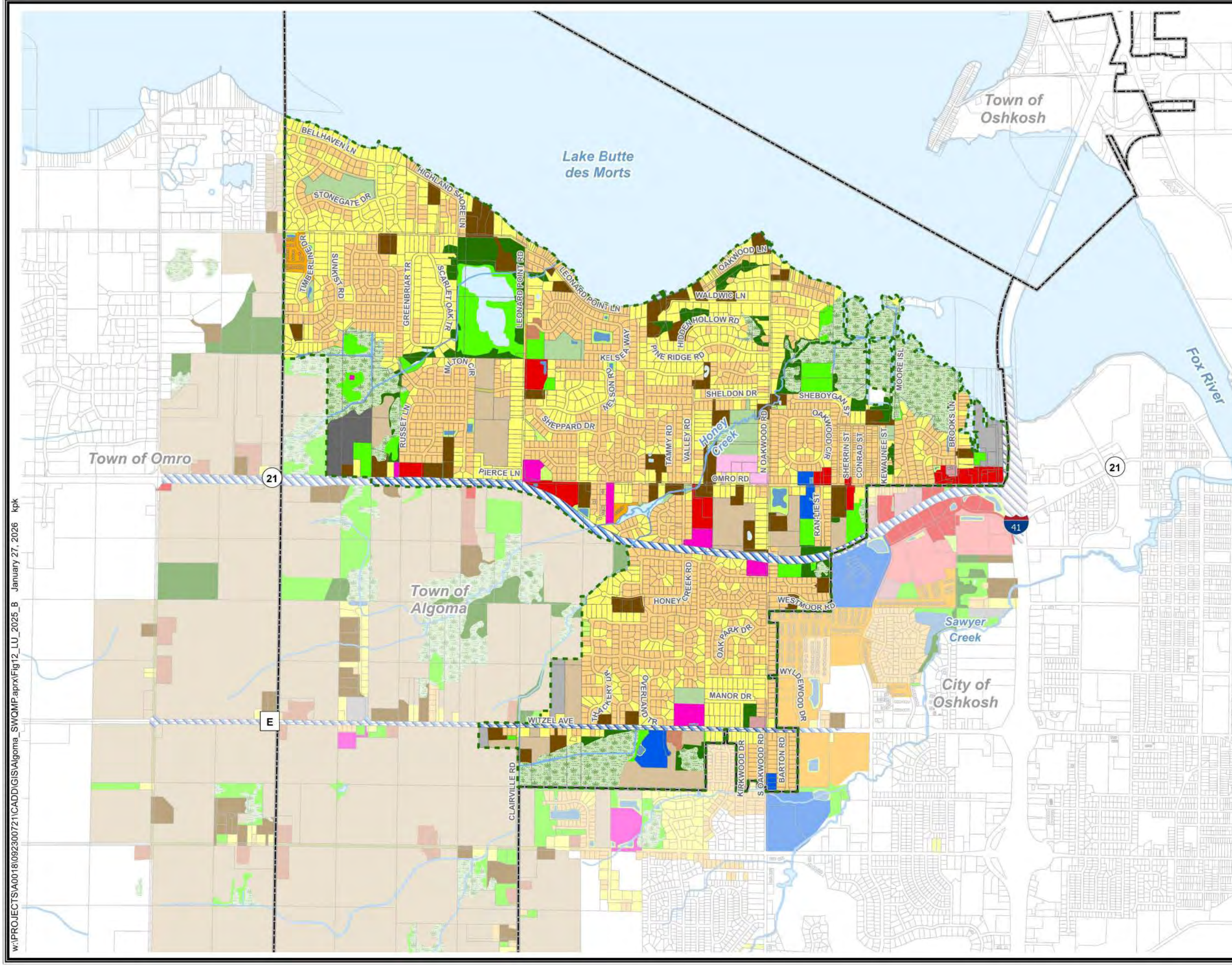


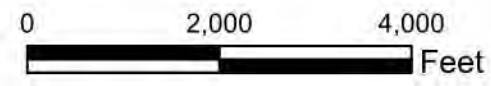
FIGURE 11
WPDES INDUSTRIAL PERMITS
STORMWATER QUALITY
MANAGEMENT PLAN
TOWN OF ALGOMA
WINNEBAGO COUNTY, WISCONSIN



- SLAMM Standard Land Uses**
- Residential**
- LDR - Low Density Single Family Residential (0.5 acre to 1.5 acre lots)
 - MDR - Medium Density Single Family Residential (0.25 acre to 0.5 acre lots)
 - MDRA - Medium Density Single Family Residential w/Alleys (0.25 acre to 0.5 acre lots)
 - HDR - High Density Single Family Residential (0.125 acre lots or smaller)
 - HDRA - High Density Single Family Residential w/Alleys (0.125 acre lots or smaller)
 - MFR - Multi-Family Residential (3 or more families, 1-3 story height)
 - HRR - High Rise Residential (1.5 acre to 5 acre lots, > 3 story)
 - SUBR - Suburban Residential (1.5 acre to 5 acre lots)
 - MOBR - Mobile Home or Trailer Park Residential
- Institutional**
- SCHOOL - Public or Private School
 - UNIV - University, College, Technical School, etc.
 - HOSP - Medical Facilities including Nursing Homes, Hospitals, etc.
 - MISC - Miscellaneous Facilities (Churches, Institutional Property)
- Commercial**
- CDNTN - Downtown Commercial and Institutional Areas
 - CSTRIP - Strip Commercial Areas (Courthouses, Police Stations, etc.)
 - SHCNTR - Shopping Centers (parking lot is 2.5 times building area)
 - OFFPRK - Office Parks (non-retail, multi-story, insurance, government)
- Industrial**
- LIGHTI - Light Industrial Areas (storage and distribution of goods for retail or sale)
 - MEDI - Medium Industrial Areas (lumber, junk, or auto salvage yard, ag. co-op, oil tank farm, coal and salt storage, slaughter house)
 - AIRPRT - Airport Facilities
 - QUARRY
- Open Space**
- CEM - Cemeteries, including grounds, roads, and buildings
 - PARK - Outdoor Recreational Areas (golf course, arboretums, botanical gardens, municipal playgrounds, and natural areas)
 - RAIL - Railroad ROW (Excludes road ROW, storage yards)
 - FRMSTD - Farmsteads, including limited houses, buildings, driveways and parking areas
 - AGRIC - Agriculture fields
 - GRASS - Undeveloped land that is vegetated (Excludes road ROW)
 - GRASS_SWPOND - Vegetated land around a stormwater pond (Excludes road ROW)
 - WOODS - Forested or Wooded Areas with Leaf Litter
 - WETLND - DNR Wetland Inventory Map
 - WATER - Waters of the State and Other Open Waters
 - WATER_SWPOND - Open water associated with stormwater pond
- Transportation**
- FREE - Limited Access Highways and Interchanges, including vegetated ROW
 - HWY - State or County Highway
 - RURALLR - Rural Road
- Other Mapped Features**
- Municipal Boundary
 - Parcel Line
 - Streams
 - Study Area Boundary

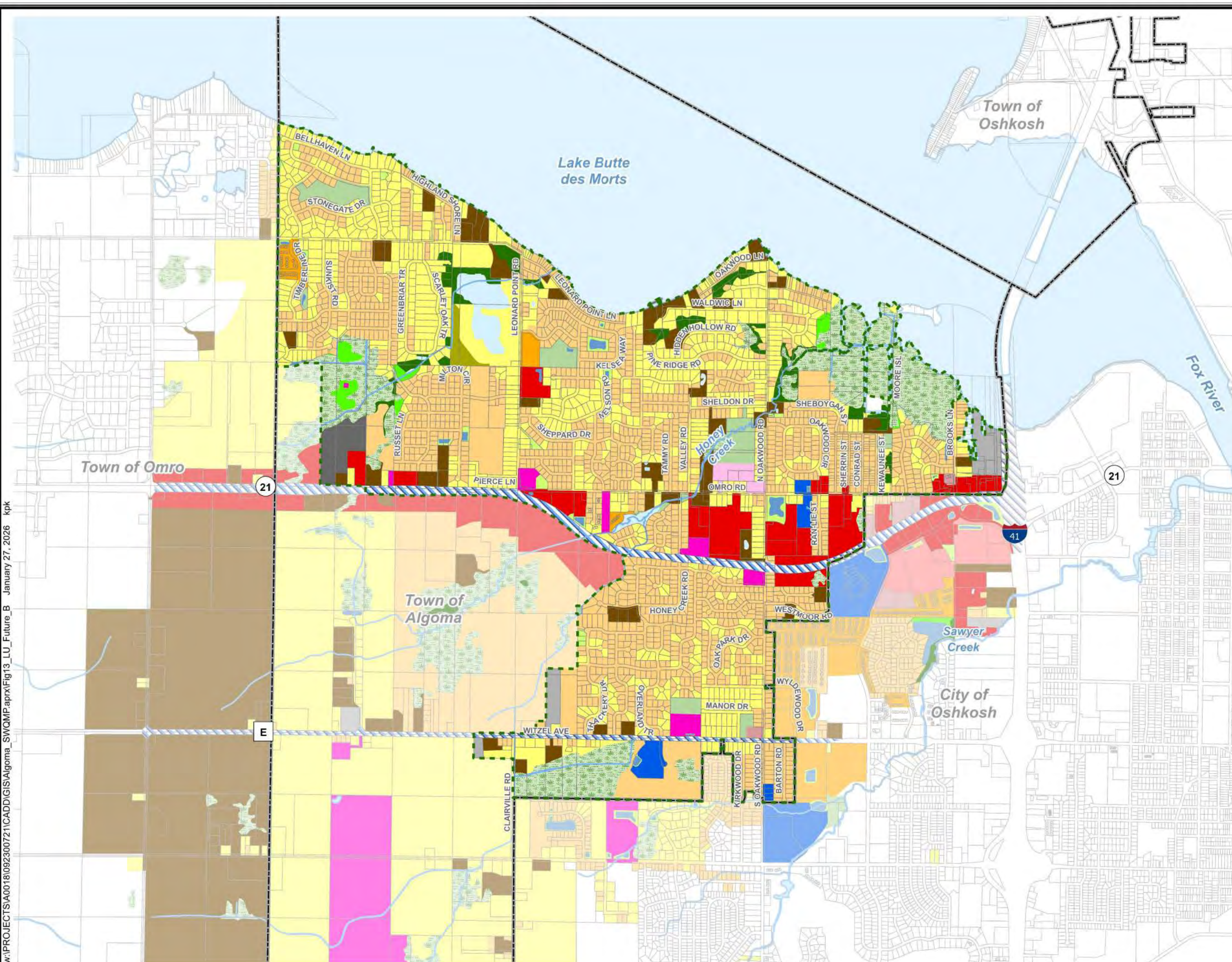
Source: Winnebago County, 2024-25.

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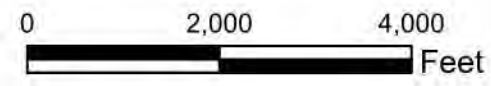
FIGURE 12
2025 LAND USE
STORMWATER QUALITY
MANAGEMENT PLAN
TOWN OF ALGOMA
WINNEBAGO COUNTY, WISCONSIN



- SLAMM Standard Land Uses**
- Residential**
- LDR - Low Density Single Family Residential (0.5 acre to 1.5 acre lots)
 - MDR - Medium Density Single Family Residential (0.25 acre to 0.5 acre lots)
 - MDRA - Medium Density Single Family Residential w/Alleys (0.25 acre to 0.5 acre lots)
 - HDR - High Density Single Family Residential (0.125 acre lots or smaller)
 - HDRA - High Density Single Family Residential w/Alleys (0.125 acre lots or smaller)
 - MFR - Multi-Family Residential (3 or more families, 1-3 story height)
 - HRR - High Rise Residential (1.5 acre to 5 acre lots, > 3 story)
 - SUBR - Suburban Residential (1.5 acre to 5 acre lots)
 - MOBR - Mobile Home or Trailer Park Residential
- Institutional**
- SCHOOL - Public or Private School
 - UNIV - University, College, Technical School, etc.
 - HOSP - Medical Facilities including Nursing Homes, Hospitals, etc.
 - MISC - Miscellaneous Facilities (Churches, Institutional Property)
- Commercial**
- CDNTN - Downtown Commercial and Institutional Areas
 - CSTRIP - Strip Commercial Areas (Courthouses, Police Stations, etc.)
 - SHCNTR - Shopping Centers (parking lot is 2.5 times building area)
 - OFFPRK - Office Parks (non-retail, multi-story, insurance, government)
- Industrial**
- LIGHTI - Light Industrial Areas (storage and distribution of goods for retail or sale)
 - MEDI - Medium Industrial Areas (lumber, junk, or auto salvage yard, ag, co-op, oil tank farm, coal and salt storage, slaughter house)
 - AIRPRT - Airport Facilities
 - QUARRY
- Open Space**
- CEM - Cemeteries, including grounds, roads, and buildings
 - PARK - Outdoor Recreational Areas (golf courses, arboretums, botanical gardens, municipal playgrounds, and natural areas)
 - RAIL - Railroad ROW (Excludes road ROW, storage yards)
 - FRMSTD - Farmsteads, including limited houses, buildings, driveways and parking areas
 - AGRIC - Agriculture fields
 - GRASS - Undeveloped land that is vegetated (Excludes road ROW)
 - GRASS_SWPOND - Vegetated land around a stormwater pond (Excludes road ROW)
 - WOODS - Forested or Wooded Areas with Leaf Litter
 - WETLND - DNR Wetland Inventory Map
 - WATER - Waters of the State and Other Open Waters
 - WATER_SWPOND - Open water associated with stormwater pond
- Transportation**
- FREE - Limited Access Highways and Interchanges, including vegetated ROW
 - HWY - State or County Highway
 - RURALRD - Rural Road
- Other Mapped Features**
- Municipal Boundary
 - Parcel Line
 - Streams
 - Study Area Boundary

Source: Winnebago County, 2024-25.

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FIGURE 13
FUTURE LAND USE
STORMWATER QUALITY
MANAGEMENT PLAN
TOWN OF ALGOMA
WINNEBAGO COUNTY, WISCONSIN

Structural BMPs

- Pond
- Biofilter
- Iron Enhanced Sand Filter
- Proprietary Filtration
- Existing BMP Watershed

Surface Drainage

- Curb and Gutter
- No Controls
- Grass Swale
- Internally Drained

MS4 Drainage System

- Storm Sewer System
- Culvert
- Private Culvert
- Drain Tile

Other Mapped Features

- Study Area Boundary
- Municipal Boundary
- Parcel Line
- Stream
- Surface Water
- Riparian Area
- MS4 'A' to 'B' Area
- WDNR Wetland Inventory (2 Acres and Greater)

FIGURE 14
2025 BMPs
STORMWATER QUALITY
MANAGEMENT PLAN
TOWN OF ALGOMA
WINNEBAGO COUNTY, WISCONSIN

BMP ID	Existing BMP Name
1	Bellhaven Lane Iron Enhanced Sand Filter
2	Bell Ridge Pond C
3	Bell Ridge Pond B
4	Bell Ridge Pond A
5	Hunters Court Pond
6	Rogge STH 21 Pond
7	Olde Apple Acres West Pond
8	Olde Apple Acres East Pond
9	Algoma Self Storage Pond
10	Jones Park Pond
11	Lakevista Estates North Pond
12	Lakevista Estates South Pond
13	Butte des Morts Meadows Pond
14	Jones Pond
15	Irvine Pond
16	FKC Oshkosh Pond
17	Oakwood Manor SW Pond
18	Willow Springs Pond
19	Coldwell Banker Pond
20	Tommy's Car Wash Biofilters
21	Wyldeewood Baptist Church Pond
22	Eden Meadows Pond
23	OSMS Isolator Row
24	OSMS Upflow Filter



Source: Winnebago County, 2024-25.

Disclaimer: The property lines, right-of-way lines, and other property information on this drawing were developed or obtained as part of the County Geographic Information System or through the County property tax mapping function. McMAHON ASSOCIATES, INC. does not guarantee this information to be correct, current, or complete. The property and right-of-way information are only intended for use as a general reference and are not intended or suitable for site-specific uses. Any use to the contrary of the above stated uses is the responsibility of the user and such use is at the user's own risk.

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BMP ID	Existing BMP Name
1	Bellhaven Ln Iron Enhanced Sand Filter
2	Bell Ridge Pond C
3	Bell Ridge Pond B
4	Bell Ridge Pond A
5	Hunters Court Pond
6	Rogge STH 21 Pond
7	Olde Apple Acres West Pond
8	Olde Apple Acres East Pond
9	Algoma Self Storage Pond
10	Jones Park Pond
11	Lakevista Estates North Pond
12	Lakevista Estates South Pond
13	Butte Des Morts Meadows Pond
15	Irvine Pond
14	Jones Pond
16	FKC Oshkosh Pond
17	Oakwood Manor SW Pond
18	Willow Springs Pond
19	Coldwell Banker Pond
20	Tommys Car Wash Biofilter
20	Tommys Car Wash Biofilter
21	Wyldehood Baptist Church Pond
22	Eden Meadows Pond
23	OSMS Isolator Row
24	OSMS Upflow Filter

BMP ID	Proposed BMP Name
A	Leonard Point Pond
B	Honey Creek Pond w/ Enhanced Settling
C	Town Hall Pond
D	Mercy Hospital North Pond w/ Enhanced Settling

Structural BMPs

- Pond
- Biofilter
- Iron Enhanced Sand Filter
- Proprietary Filtration
- Pond w/ Enhanced Settling
- Existing BMP Watershed
- Proposed BMP Watershed

Surface Drainage

- Curb and Gutter
- No Controls
- Grass Swale
- Internally Drained

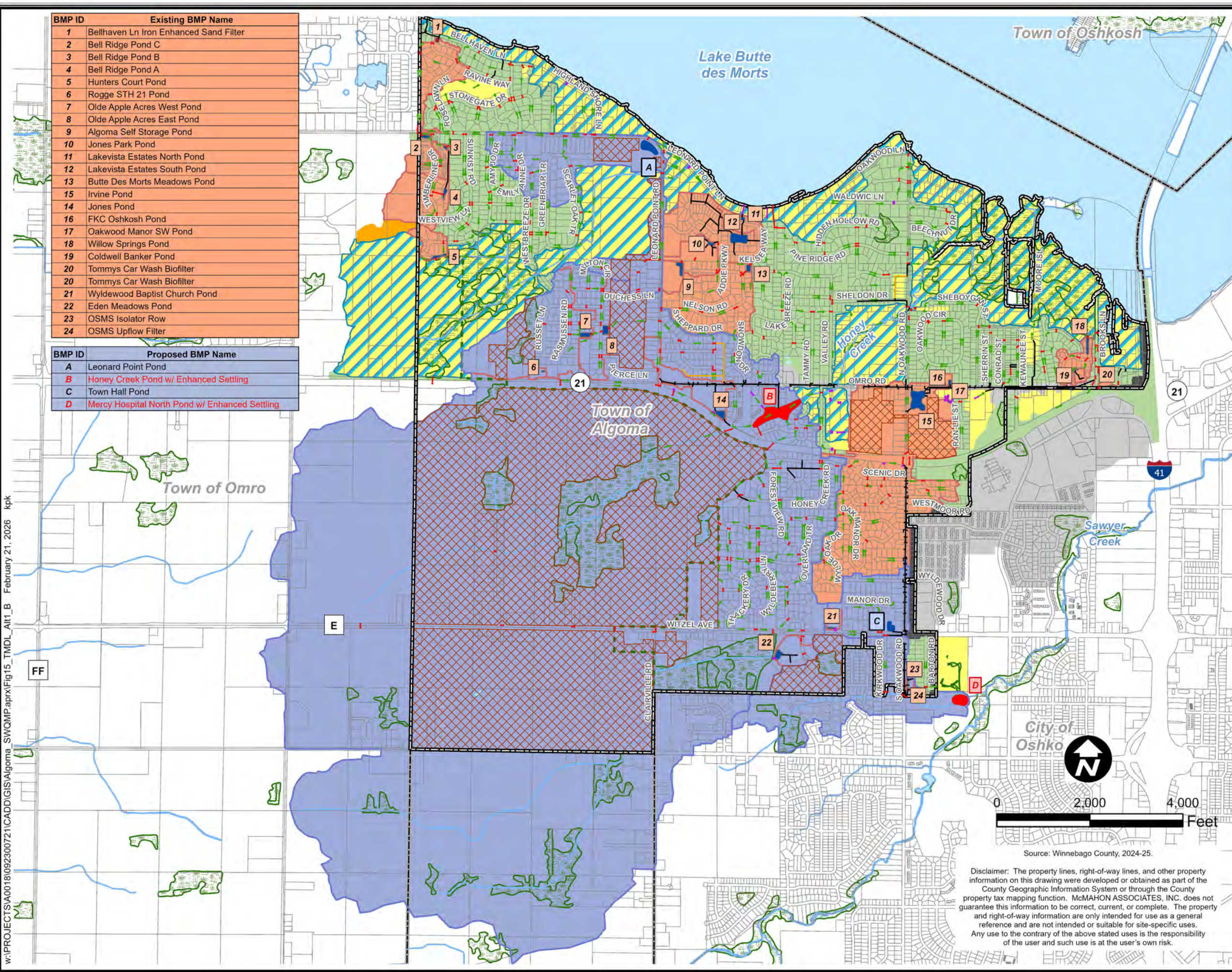
MS4 Drainage System

- Storm Sewer System
- Culvert
- Private Culvert
- Drain Tile

Other Mapped Features

- Study Area Boundary
- Municipal Boundary
- Future Municipal Boundary (Agreement w/ City of Oshkosh)
- Parcel Line
- Stream
- Surface Water
- Riparian Area
- MS4 'A' to 'B' Area
- WDR Wetland Inventory (2 Acres and Greater)
- Future Development

McMAHON
ENGINEERS ARCHITECTS
McMAHON ASSOCIATES, INC.



Source: Winnebago County, 2024-25.

Disclaimer: The property lines, right-of-way lines, and other property information on this drawing were developed or obtained as part of the County Geographic Information System or through the County property tax mapping function. McMAHON ASSOCIATES, INC. does not guarantee this information to be correct, current, or complete. The property and right-of-way information are only intended for use as a general reference and are not intended or suitable for site-specific uses. Any use to the contrary of the above stated uses is the responsibility of the user and such use is at the user's own risk.

FIGURE 15
TMDL ALTERNATIVE #1
PLAN OF ACTION
STORMWATER QUALITY
MANAGEMENT PLAN
TOWN OF ALGOMA
WINNEBAGO COUNTY, WISCONSIN

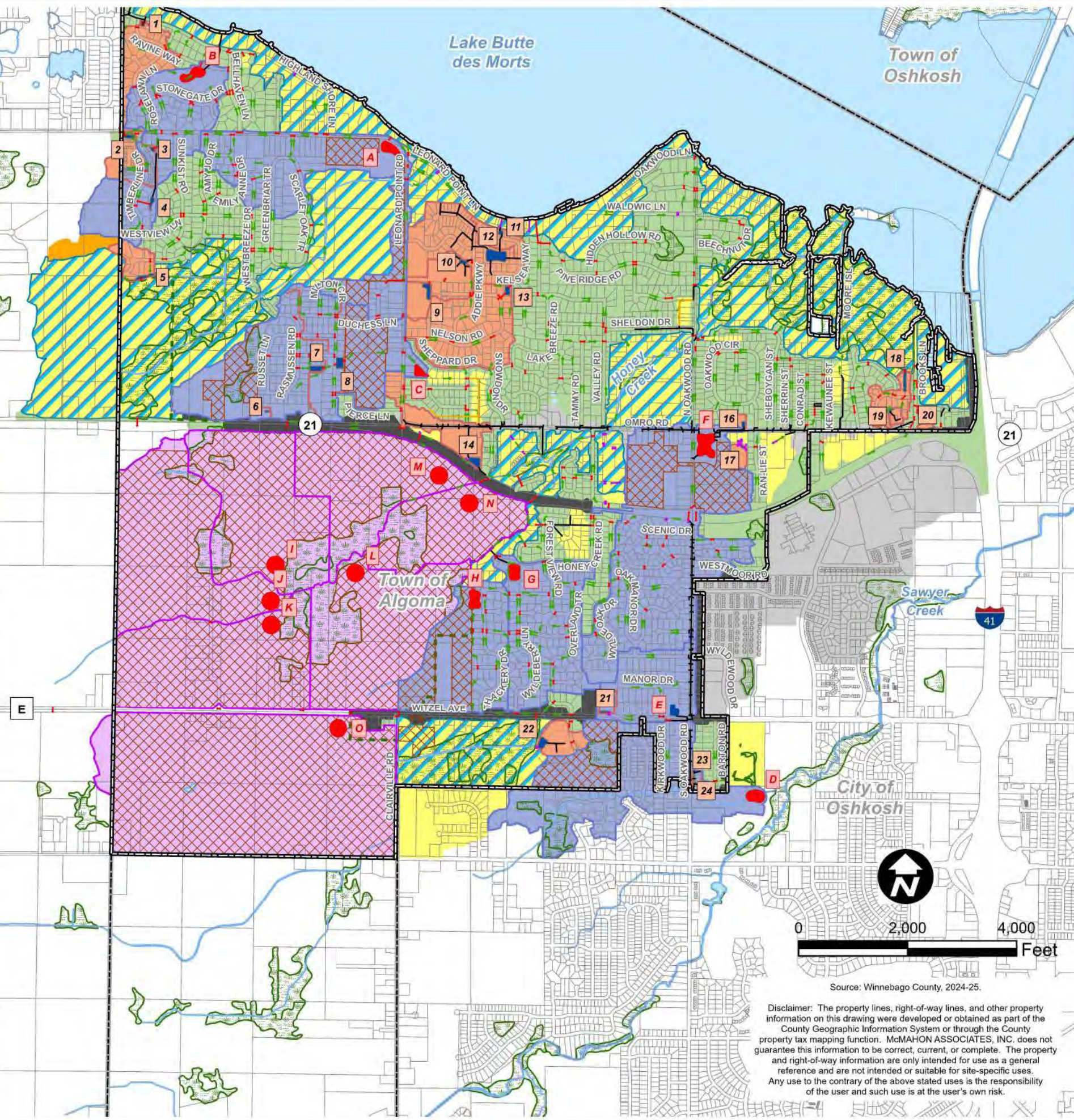
w:\PROJECTS\A0018\092300721\CADD\GIS\Algoma_SWQMP.aprx\Fig15_TMDL_Alt1_B February 21, 2026 kpk

BMP ID	Existing BMP Name
1	Bellhaven Ln Iron Enhanced Sand Filter
2	Bell Ridge Pond C
3	Bell Ridge Pond B
4	Bell Ridge Pond A
5	Hunters Court Pond
6	Rogge STH 21 Pond
7	Olde Apple Acres West Pond
8	Olde Apple Acres East Pond
9	Algoma Self Storage Pond
10	Jones Park Pond
11	Lakevista Estates North Pond
12	Lakevista Estates South Pond
13	Butte Des Morts Meadows Pond
14	Jones Pond
16	FKC Oshkosh Pond
17	Oakwood Manor SW Pond
18	Willow Springs Pond
19	Coldwell Banker Pond
20	Tommys Car Wash Biofilter
20	Tommys Car Wash Biofilter
21	Wyldeewood Baptist Church Pond
22	Eden Meadows Pond
23	OSMS Isolator Row
24	OSMS Upflow Filter

BMP ID	Proposed BMP Name
A	Leonard Point Pond w/ Enhanced Settling
B	Bellhaven Park Pond w/ Enhanced Settling
C	Sheppard Dr Pond w/ Enhanced Settling
D	Mercy Hospital North Pond w/ Enhanced Settling
E	Town Hall Pond
F	Irvine Pond w/ Enhanced Settling
G	Trillium Tr Pond Alt 2 w/ Enhanced Settling
H	Wyldeewood Pond Alt 1 w/ Enhanced Settling

BMP ID	Future BMP Name
I	Future Regional Pond H w/ Enhanced Settling
J	Future Regional Pond I w/ Enhanced Settling
K	Future Regional Pond J w/ Enhanced Settling
L	Future Regional Pond K w/ Enhanced Settling
M	Future Regional Pond L w/ Enhanced Settling
N	Future Regional Pond M w/ Enhanced Settling
O	Future Regional Pond N w/ Enhanced Settling

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Structural BMPs

- Pond
- Biofilter
- Iron Enhanced Sand Filter
- Proprietary Filtration
- Pond w/ Enhanced Settling
- Existing BMP Watershed
- Proposed BMP Watershed
- Future BMP Watershed

Surface Drainage

- Curb and Gutter
- No Controls
- Grass Swale
- Internally Drained

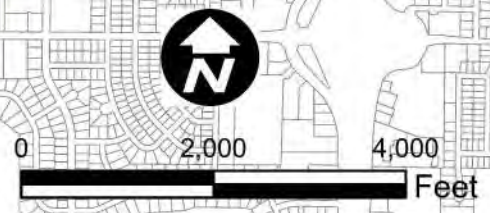
MS4 Drainage System

- Storm Sewer System
- Culvert
- Private Culvert
- Drain Tile

Other Mapped Features

- Study Area Boundary
- Municipal Boundary
- Future Municipal Boundary (Agreement w/ City of Oshkosh)
- Parcel Line
- Stream
- Surface Water
- Riparian Area
- MS4 'A' to 'B' Area
- WDR Wetland Inventory (2 Acres and Greater)
- Future Development

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ENGINEERS ARCHITECTS
McMAHON ASSOCIATES, INC.



Source: Winnebago County, 2024-25.

Disclaimer: The property lines, right-of-way lines, and other property information on this drawing were developed or obtained as part of the County Geographic Information System or through the County property tax mapping function. McMAHON ASSOCIATES, INC. does not guarantee this information to be correct, current, or complete. The property and right-of-way information are only intended for use as a general reference and are not intended or suitable for site-specific uses. Any use to the contrary of the above stated uses is the responsibility of the user and such use is at the user's own risk.

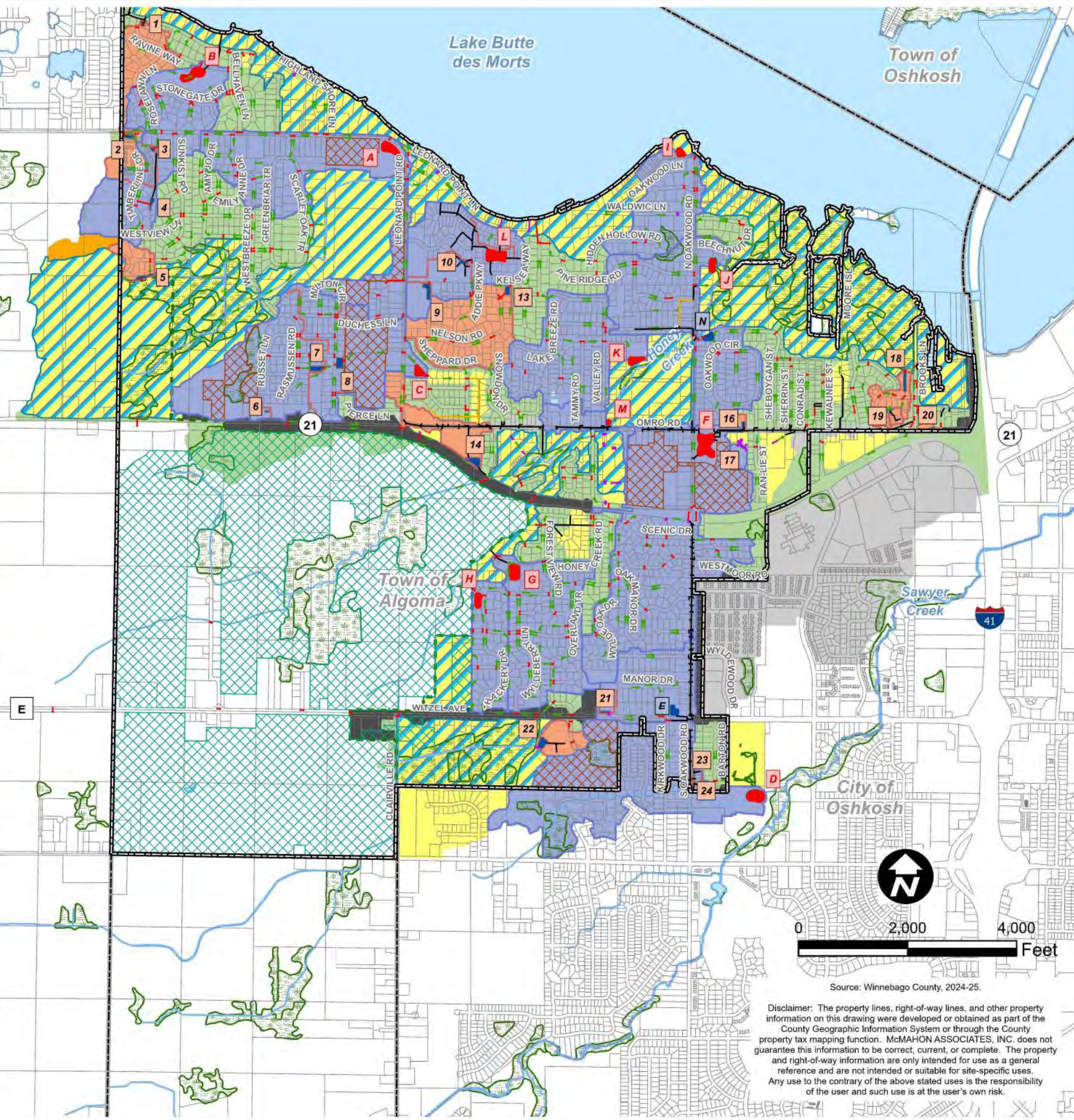
FIGURE 16
TMDL ALTERNATIVE #2
STORMWATER QUALITY
MANAGEMENT PLAN
TOWN OF ALGOMA
WINNEBAGO COUNTY, WISCONSIN

BMP ID	Existing BMP Name
1	Bellhaven Ln Iron Enhanced Sand Filter
2	Bell Ridge Pond C
3	Bell Ridge Pond B
4	Bell Ridge Pond A
5	Hunters Court Pond
6	Rogge STH 21 Pond
7	Olde Apple Acres West Pond
8	Olde Apple Acres East Pond
9	Algoma Self Storage Pond
10	Jones Park Pond
13	Butte Des Morts Meadows Pond
14	Jones Pond
16	FKC Oshkosh Pond
17	Oakwood Manor SW Pond
18	Willow Springs Pond
19	Coldwell Banker Pond
20	Tommys Car Wash Biofilter
20	Tommys Car Wash Biofilter
21	Wyldeewood Baptist Church Pond
22	Eden Meadows Pond
23	OSMS Isolator Row
24	OSMS Upflow Filter

BMP ID	Proposed BMP Name
A	Leonard Point Pond w/ Enhanced Settling
B	Bellhaven Park Pond w/ Enhanced Settling
C	Sheppard Dr Pond w/ Enhanced Settling
D	Mercy Hospital North Pond w/ Enhanced Settling
E	Town Hall Pond
F	Irvine Pond w/ Enhanced Settling
G	Trillium Tr Pond Alt. 2 w/ Enhanced Settling
H	Wyldeewood Pond Alt. 2 w/ Enhanced Settling
I	Our Lady Church Pond w/ Enhanced Settling
J	Prairie Wood Pond w/ Enhanced Settling
K	Sheldon Pond w/ Enhanced Settling
L	Lakevista Estates Ponds w/ Enhanced Settling
M	Valley Road Pond w/ Enhanced Settling
N	Oakwood Circle Pond

- Structural BMPs**
- Pond
 - Biofilter
 - Iron Enhanced Sand Filter
 - Proprietary Filtration
 - Pond w/ Enhanced Settling
 - Existing BMP Watershed
 - Proposed BMP Watershed
- Surface Drainage**
- Curb and Gutter
 - No Controls
 - Grass Swale
 - Internally Drained
- MS4 Drainage System**
- Storm Sewer System
 - Culvert
 - Private Culvert
 - Drain Tile
- Other Mapped Features**
- Study Area Boundary
 - Municipal Boundary
 - Future Municipal Boundary (Agreement w/ City of Oshkosh)
 - Parcel Line
 - Stream
 - Surface Water
 - Riparian Area
 - MS4 'A' to 'B' Area
 - WDNR Wetland Inventory (2 Acres and Greater)
 - Future Development
 - Future Development w/ 85% TP Reduction (Ordinance)

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Source: Winnebago County, 2024-25.

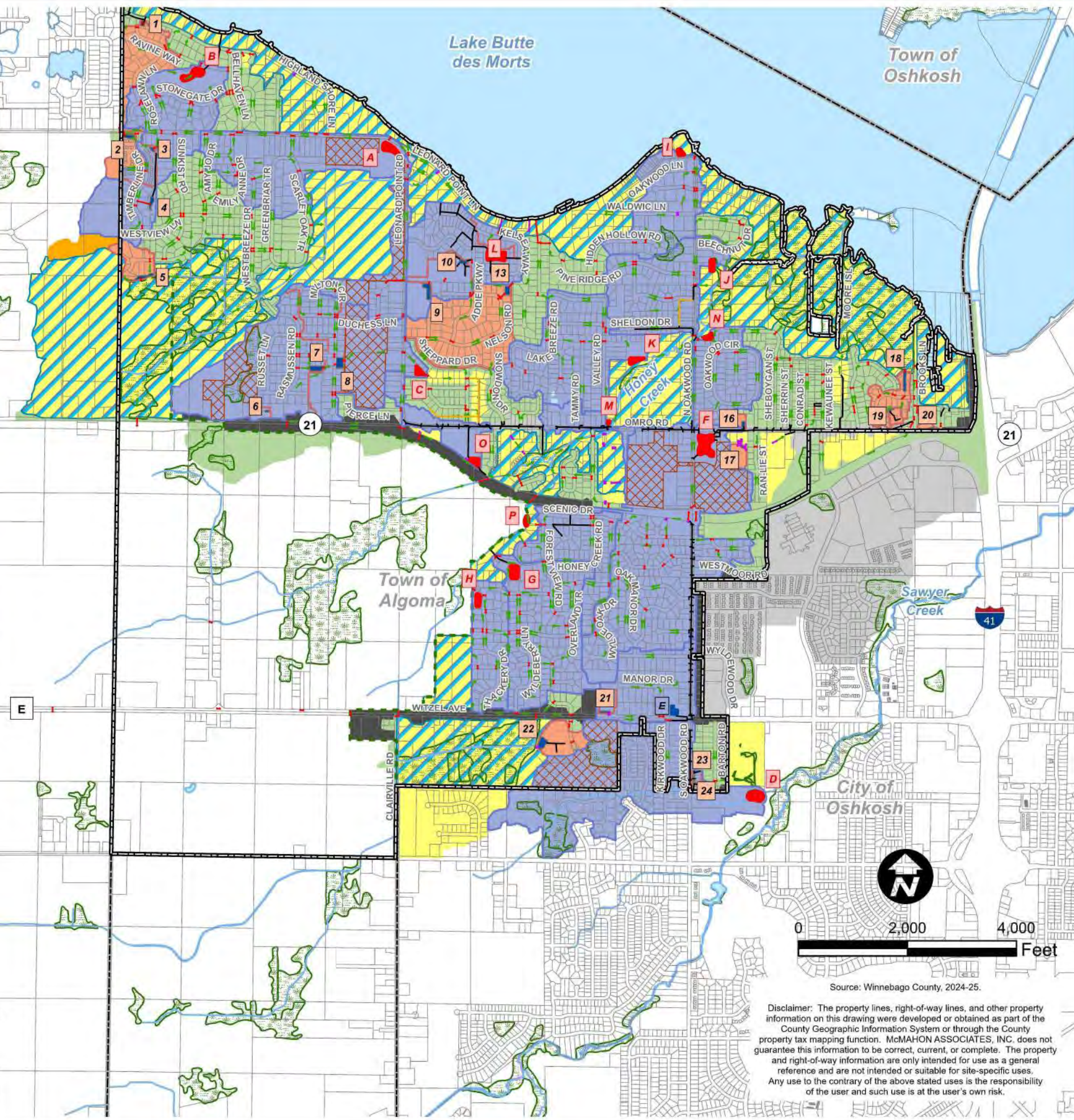
Disclaimer: The property lines, right-of-way lines, and other property information on this drawing were developed or obtained as part of the County Geographic Information System or through the County property tax mapping function. McMAHON ASSOCIATES, INC. does not guarantee this information to be correct, current, or complete. The property and right-of-way information are only intended for use as a general reference and are not intended or suitable for site-specific uses. Any use to the contrary of the above stated uses is the responsibility of the user and such use is at the user's own risk.

FIGURE 17
TMDL ALTERNATIVE #3
STORMWATER QUALITY
MANAGEMENT PLAN
TOWN OF ALGOMA
WINNEBAGO COUNTY, WISCONSIN

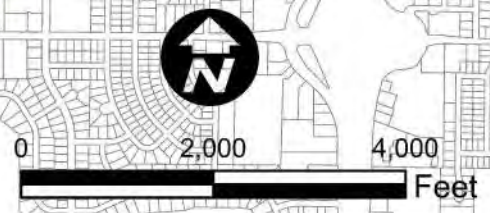
BMP ID	Existing BMP Name
1	Bellhaven Ln Iron Enhanced Sand Filter
2	Bell Ridge Pond C
3	Bell Ridge Pond B
4	Bell Ridge Pond A
5	Hunters Court Pond
6	Rogge STH 21 Pond
7	Olde Apple Acres West Pond
8	Olde Apple Acres East Pond
9	Algoma Self Storage Pond
10	Jones Park Pond
13	Butte Des Morts Meadows Pond
16	FKC Oshkosh Pond
17	Oakwood Manor SW Pond
18	Willow Springs Pond
19	Coldwell Banker Pond
20	Tommys Car Wash Biofilter
20	Tommys Car Wash Biofilter
21	Wyldewood Baptist Church Pond
22	Eden Meadows Pond
23	OSMS Isolator Row
24	OSMS Upflow Filter

BMP ID	Proposed BMP Name
A	Leonard Point Pond w Enhanced Settling
B	Bellhaven Park Pond w Enhanced Settling
C	Sheppard Dr Pond w Enhanced Settling
D	Mercy Hospital North Pond w Enhanced Settling
E	Town Hall Pond
F	Irvine Pond w Enhanced Settling
G	Trillium Tr Pond Alt 2 w Enhanced Settling
H	Wyldewood Pond Alt 2 w Enhanced Settling
I	Our Lady Church Pond w Enhanced Settling
J	Prairie Wood Pond w Enhanced Settling
K	Sheldon Pond w Enhanced Settling
L	Lakevista Estates Ponds w Enhanced Settling
M	Valley Road Pond w Enhanced Settling
N	Oakwood Circle Pond w Enhanced Settling
O	Jones Pond w Enhanced Settling
P	Forest View Pond w Enhanced Settling

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- Structural BMPs**
- Pond
 - Biofilter
 - Iron Enhanced Sand Filter
 - Proprietary Filtration
 - Pond w/ Enhanced Settling
 - Existing BMP Watershed
 - Proposed BMP Watershed
- Surface Drainage**
- Curb and Gutter
 - No Controls
 - Grass Swale
 - Internally Drained
- MS4 Drainage System**
- Storm Sewer System
 - Culvert
 - Private Culvert
 - Drain Tile
- Other Mapped Features**
- Study Area Boundary
 - Municipal Boundary
 - Future Municipal Boundary (Agreement w/ City of Oshkosh)
 - Parcel Line
 - Stream
 - Surface Water
 - Riparian Area
 - MS4 'A' to 'B' Area
 - WDR Wetland Inventory (2 Acres and Greater)
 - Future Development



Source: Winnebago County, 2024-25.

Disclaimer: The property lines, right-of-way lines, and other property information on this drawing were developed or obtained as part of the County Geographic Information System or through the County property tax mapping function. McMAHON ASSOCIATES, INC. does not guarantee this information to be correct, current, or complete. The property and right-of-way information are only intended for use as a general reference and are not intended or suitable for site-specific uses. Any use to the contrary of the above stated uses is the responsibility of the user and such use is at the user's own risk.

FIGURE 18
TMDL ALTERNATIVE #4
STORMWATER QUALITY
MANAGEMENT PLAN
TOWN OF ALGOMA
WINNEBAGO COUNTY, WISCONSIN

WDNR WPDES MS4 Permit & Guidance Documents



STATE OF WISCONSIN
DEPARTMENT OF NATURAL RESOURCES

GENERAL PERMIT TO DISCHARGE UNDER THE WISCONSIN
POLLUTANT DISCHARGE ELIMINATION SYSTEM
WPDES PERMIT NO. WI-S050075-3

In compliance with the provisions of ch. 283 Wis. Stats., and chs. NR 151 and 216, Wis. Adm. Code, owners and operators of municipal separate storm sewer systems are permitted to discharge storm water from all portions of the

MUNICIPAL SEPARATE STORM SEWER SYSTEM

owned or operated by the municipality to waters of the state in accordance with the conditions set forth in this permit.

With written authorization by the Department, this permit will be used to cover a municipal separate storm sewer system initially covered under a previous version of a municipal separate storm sewer system general permit. The **Start Date** of coverage under this permit is the date of the Department letter sent to the municipality authorizing coverage under this permit. The Department is required to charge an annual permit fee to owners and operators authorized to discharge under this permit in accordance with s. 283.33(9), Wis. Stats., and s. NR 216.08, Wis. Adm. Code.

State of Wisconsin Department of Natural Resources
For the Secretary

February 10, 2022

By _____

Date Permit Signed

Jill Schoen, Deputy Director
Bureau of Watershed Management
External Services Division

PERMIT EFFECTIVE DATE: May 1, 2019 **EXPIRATION DATE:** April 30, 2024
PERMIT MODIFICATION DATE: December 7, 2021; February 10, 2022, correction

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After May 1, 2019** **59**

1. APPLICABILITY CRITERIA

1.1 Permitted Area

This permit covers all areas under the ownership, control or jurisdiction of the permittee that contribute to discharges from a municipal separate storm sewer system (MS4) that receives runoff from any of the following:

1.1.1 An urbanized area, adjacent developing areas and areas whose runoff is connected or will connect to a municipal separate storm sewer regulated under subch. I of NR 216, Wis. Adm. Code; or

1.1.2 An area associated with a municipal population of 10,000 or more and a population density of 1,000 or more per square mile, adjacent developing areas and areas whose runoff is connected or will connect to an MS4 regulated under subch. I of NR 216, Wis. Adm. Code; or

1.1.3 An area that drains to an MS4 that is designated for permit coverage pursuant to s. NR 216.02(2) or 216.025, Wis. Adm. Code.

1.2 Authorized Discharges

This permit authorizes storm water point source discharges from the MS4 to waters of the state in the permitted area. This permit also authorizes the discharge of storm water co-mingled with flows contributed by process wastewater, non-process wastewater, and storm water associated with industrial activity, provided the discharges are regulated by other WPDES permits or are discharges which are not considered illicit discharges pursuant to section 2.3.1 of this permit.

1.3 Water Quality Standards

1.3.1 This permit specifies the conditions under which storm water may be discharged to waters of the state for the purpose of achieving water quality standards contained in chs. NR 102 through 105, NR 140, and NR 207, Wis. Adm. Code. For the term of this permit, compliance with water quality standards will be addressed by adherence to the requirements in this permit.

1.3.2 This permit does not authorize discharges that the Department determines will cause or have reasonable potential to cause or contribute to an excursion above any applicable water quality standards. Where such determinations have been made, the Department may notify the municipality that an individual permit is necessary. However, the Department may authorize coverage under this permit where the storm water management programs required under this permit will include appropriate controls and implementation procedures designed to bring the storm water discharge into compliance with water quality standards.

1.4 Outstanding and Exceptional Resource Waters

1.4.1 The permittee shall determine whether any part of its MS4 discharges to an outstanding resource water (ORW) or exceptional resource water (ERW). ORWs and ERWs are listed in ss. NR 102.10 and 102.11, Wis. Adm. Code.

Note: An unofficial list of ORWs and ERWs may be found on the Department's Internet site at: <https://dnr.wi.gov/topic/SurfaceWater/orwerw.html>

1.4.2 The permittee may not establish a new MS4 discharge of a pollutant to an ORW or an ERW unless the storm water management programs required under this permit are designed to ensure that any new MS4 discharge of a pollutant to an ORW or ERW will not exceed background concentration levels within the ORW or ERW.

1.4.3 If the permittee has an existing MS4 discharge to an ORW, it may increase the discharge of pollutants, either at the existing point of discharge or a new location, provided all of the following are met:

a. The pollutant concentration within the receiving water and under the influence of the existing discharge would not increase as compared to the level that existed prior to coverage under this permit.

b. The increased discharge would not result in a violation of water quality standards.

1.4.4 If the permittee has an existing MS4 discharge to an ERW, it may increase the discharge of pollutants if the increased discharge would not result in a violation of water quality standards.

1.5 Impaired Waterbodies and Total Maximum Daily Load Requirements

1.5.1 By March 31 of each odd-numbered year, the permittee shall determine whether any part of its MS4 discharges to an impaired waterbody listed in accordance with section 303(d)(1) of the federal Clean Water Act, 33 USC § 1313(d)(1)(C), and the implementing regulation of the US Environmental Protection Agency, 40 CFR § 130.7(c)(1). For a permittee that determines that any part of its MS4 does discharge to a listed impaired waterbody but for which there is no United States Environmental Protection Agency (USEPA) approved Total Maximum Daily Load (TMDL) for the pollutant of concern, the permittee shall include a written section in its storm water management program that discusses the management practices and control measures it will implement as part of its program to reduce, with the goal of eliminating, the discharge of pollutants of concern that contribute to the impairment of the waterbody. This section of the permittee's program shall specifically identify control measures and practices that will collectively be used to try to eliminate the MS4's discharge of pollutants of concern that contribute to the impairment of the waterbody and explain why these control measures and practices were chosen as opposed to other alternatives.

Note: Every two years, the Department updates and publishes a list of waters considered impaired under the Clean Water Act. The list is updated in even-numbered years. A list of Wisconsin impaired waterbodies may be found on the Department's Internet site at: <http://dnr.wi.gov/topic/impairedwaters/>

1.5.2 For a permittee with an MS4 discharge of a pollutant of concern to a waterbody subject to an USEPA approved TMDL under which the permittee is assigned a Wasteload Allocation (WLA), the permittee shall meet the following requirements, in addition to the minimum control measures described within Section 2 of the permit:

a. Appendix A provides the permit conditions for permittees subject to the Rock River Basin TMDL, Lower Fox River Basin and Lower Green Bay TMDL, Lake St. Croix Nutrient TMDL, Red Cedar River (Tainter Lake, Menomin Lake) TMDL, or Beaver Dam Lake TMDL. For a permittee subject to any of these TMDLs, the permittee shall comply with the provisions in Appendix A: MS4 Permittees Subject to a TMDL Approved Prior to May 1, 2014 including Applicable Updates.

b. Appendix B provides the permit conditions for permittees subject to the Milwaukee River Basin TMDL. For a permittee subject to this TMDL, the permittee shall comply with the provisions in Appendix B: MS4 Permittees Subject to Milwaukee River Basin TMDL.

c. Appendix C provides the permit conditions for permittees subject to the Wisconsin River Basin TMDL or any other TMDL approved on or after May 1, 2019. For a permittee subject to any of these TMDLs, the permittee shall comply with the provisions in Appendix C: MS4 Permittees Subject to the Wisconsin River Basin TMDL or a TMDL Approved After May 1, 2019.

Note: The reports for Department and USEPA approved TMDLs are available from the Department's Internet site at: <https://dnr.wi.gov/topic/TMDLs/tmdlreports.html>

1.5.3 After the effective date of this permit, the permittee may not establish a new MS4 discharge of a pollutant of concern to an impaired waterbody or increase the discharge of a pollutant of concern to an impaired waterbody unless the new or increased discharge causes the receiving water to meet applicable water quality standards, or the USEPA has approved a TMDL for the impaired waterbody.

1.6 Wetlands

The permittee's MS4 discharge shall comply with the applicable wetland water quality standards provisions in ch. NR 103, Wis. Adm. Code.

1.7 Endangered and Threatened Resources

The permittee's MS4 discharge shall comply with the endangered and threatened resource protection requirements of s. 29.604, Wis. Stats., and ch. NR 27, Wis. Adm. Code.

1.8 Historic Property

The permittee's MS4 discharge may not affect any historic property that is listed property, or on the inventory or on the list of locally designated historic places under s. 44.45, Wis. Stats., unless the Department determines that the MS4 discharge will not have an adverse effect on any historic property pursuant to s. 44.40(3), Wis. Stats.

1.9 General Storm Water Discharge Limitations

In accordance with s. NR 102.04, Wis. Adm. Code, practices attributable to municipal, industrial, commercial, domestic, agricultural, land development or other activities shall be controlled so that all surface waters including the mixing zone meet the following conditions at all times and under all flow and water level conditions:

1.9.1 Substances that will cause objectionable deposits on the shore or in the bed of a body of water, shall not be present in such amounts as to interfere with public rights in waters of the state.

1.9.2 Floating or submerged debris, oil, scum or other material shall not be present in such amounts as to interfere with public rights in waters of the state.

1.9.3 Materials producing color, odor, taste or unsightliness shall not be present in such amounts as to interfere with public rights in waters of the state.

1.9.4 Substances in concentrations or combinations which are toxic or harmful to humans shall not be present in amounts found to be of public health significance, nor shall substances be present in amounts which are acutely harmful to animal, plant or aquatic life.

1.10 Obtaining Permit Coverage

1.10.1 The owner or operator of an MS4 covered under a previous version of an MS4 permit before the effective date of this permit shall be covered by this permit pursuant to written authorization by the Department.

Note: The Department will notify in writing the owner or operator of an MS4 covered under a previous version of an MS4 permit that this permit has been reissued and that the MS4 is covered under it. However, the City of Madison and the City of Milwaukee are not eligible for coverage under this permit.

1.10.2 Coverage under this permit does not become effective until the Department sends the owner or operator a letter expressly authorizing coverage under this permit.

1.11 Transfers

Coverage under this permit is not transferable to another municipality without the express written approval of the Department. If the permittee's MS4 is annexed into another municipality, the permittee shall immediately notify the Department by letter of the change. If the permittee ceases to own or operate any MS4 regulated under this permit, the Department may terminate its coverage under this permit.

1.12 Exclusions

The following are excluded from coverage and are not authorized under this permit:

1.12.1 Combined Sewer and Sanitary Sewer Systems

Discharges of water from a sanitary sewer or a combined sewer system conveying both sanitary and storm water. These discharges are regulated under s. 283.31, Wis. Stats, and require an individual permit.

1.12.2 Agricultural Facilities and Practices

Discharges from agricultural facilities and agricultural practices. "Agricultural facility" means a structure associated with an agricultural practice. "Agricultural practice" means beekeeping; commercial feedlots; dairying; egg production; floriculture; fish or fur farming; grazing; livestock raising; orchards; poultry raising; raising of grain, grass, mint and seed crops; raising of fruits,

nuts and berries; sod farming; placing land in federal programs in return for payments in kind; owning land, at least 35 acres of which is enrolled in the conservation reserve program under 16 USC § 3831 to 3836; and vegetable raising.

1.12.3 Other Excluded Discharges

Storm water discharges from industrial operations or land disturbing construction activities that require separate coverage under a WPDES permit pursuant to subchs. II or III of ch. NR 216, Wis. Adm. Code. For example, while storm water from industrial or construction activity may discharge to an MS4, this permit does not satisfy the need to obtain any other permits for those discharges. This exclusion does not apply to the permittee's responsibility to regulate construction sites within its jurisdiction in accordance with sections 2.4 and 2.5 of this permit.

1.12.4 Indian Country

Storm water discharges within Indian Country. The federal Clean Water Act requires owners and operators of storm water discharges within Indian Country in Wisconsin to obtain permit coverage directly from the USEPA.

1.12.5 Non-MS4 Discharge

Storm water discharges that do not enter an MS4.

1.13 Compliance with Permit Requirements

Compliance with the requirements contained in this permit including the applicable appendices shall not be contingent upon receiving financial assistance from the Department or any other public or private grant or loan program.

2. PERMIT CONDITIONS

This permit establishes the following measurable goals, with a compliance schedule in section 3, for the permittee to maintain compliance with the minimum control measures for their storm water management program described under sections 2.1 through 2.6. The following permit conditions apply to the permittee, unless the Department issues a written determination that a condition is not appropriate under the circumstances. The permittee shall have a written storm water management program that describes in detail how the permittee intends to comply with the permit requirements for each minimum control measure. The permittee shall begin implementing any updates to its storm water management programs no later than March 31, 2021.

2.1 Public Education and Outreach

The permittee shall maintain its public education and outreach program to increase the awareness of storm water pollution impacts on waters of the state and to encourage changes in public behavior to reduce such impacts. The permittee shall implement the following measurable goals:

2.1.1 Topics. The permittee shall address all eight topics in Table 1 at least once during the permit term. Permittees that are a County shall address a minimum of six topics each year. Permittees that are a City, Village, Town, or University with a population of 5,000 or more based on the latest U.S. Census shall address a minimum of six topics each year. Permittees that are a City, Village, Town, or University with a population less than 5,000 based on the latest U.S. Census shall address a minimum of four topics each year. Topics may be repeated as necessary. Permittees shall select from the topic areas in Table 1.

Note: Universities should average its enrolled student population plus employee population over a recent ten-year period to determine which requirement it should follow for permit compliance. Universities are also expected to undertake public education efforts that reach the entire student body and staff.

Table 1: Public Education and Outreach Topic Areas and Descriptions

#	Topic Area	Description
1	Illicit Discharge Detection and Elimination	Promote detection and elimination of illicit discharges and water quality impacts associated with such discharges from municipal separate storm sewer systems.
2	Household Hazardous Waste Disposal/Pet Waste Management/Vehicle Washing	Inform and educate the public about the proper management of materials that may cause storm water pollution from sources including automobiles, pet waste, household hazardous waste and household practices.
3	Yard Waste Management/Pesticide and Fertilizer Application	Promote beneficial onsite reuse of leaves and grass clippings and proper use of lawn and garden fertilizers and pesticides.
4	Stream and Shoreline Management	Promote the management of streambanks and shorelines by riparian landowners to minimize erosion and restore and enhance the ecological value of waterways.

5	Residential Infiltration	Promote infiltration of residential storm water runoff from rooftop downspouts, driveways and sidewalks.
6	Construction Sites and Post-Construction Storm Water Management	Inform and educate those responsible for the design, installation, and maintenance of construction site erosion control practices and storm water management facilities on how to design, install and maintain the practices.
7	Pollution Prevention	Identify businesses and activities that may pose a storm water contamination concern, and educate those specific audiences on methods of storm water pollution prevention.
8	Green Infrastructure/Low Impact Development	Promote environmentally sensitive land development designs by developers and designers, including green infrastructure and low impact development.

Note: Additional information on green infrastructure and low impact development may be found on the USEPA’s Internet site at: <https://www.epa.gov/green-infrastructure>

2.1.2 Delivery mechanism. The permittee shall use at least four public education delivery mechanisms each year. Permittees that are a City, Village, Town, or University with a population of 5,000 or more based on the latest U.S. census shall use at least two from the Active/Interactive Mechanisms column in Table 2 each year. Permittees that are a City, Village, Town, or University with a population less than 5,000 based on the latest U.S. census shall use at least one from the Active/Interactive Mechanisms column in Table 2 each year. Permittees that are a County shall use at least one from the Active/Interactive Mechanisms column in Table 2 each year.”

Note: Universities should average its enrolled student population plus employee population over a recent ten-year period to determine which requirement it should follow for permit compliance. Universities are also expected to undertake public education efforts that reach the entire student body and staff.

Table 2: Public Education and Outreach Delivery Mechanisms (Active and Passive)

Active/Interactive Mechanisms	Passive Mechanisms
<ul style="list-style-type: none"> • Educational activities (school presentations, summer camps) • Informational booth at event • Targeted group training (contractors, consultants, etc.) • Government event (public hearing, council meeting) • Workshops • Tours • Other 	<ul style="list-style-type: none"> • Passive print media (brochures at front desk, posters, etc.) • Distribution of print media (mailings, newsletters, etc.) via mail or email • Media offerings (radio and TV ads, press release, etc.) • Social media posts • Signage • Website • Other

2.1.3 Target audience. The permittee shall identify the target audience for each public education and outreach topic. Target audiences may include the general public, public employees, residents, businesses, contractors, developers, industries, and/or other appropriate audiences.

2.2 Public Involvement and Participation

The permittee shall maintain its public involvement and participation program, in compliance with applicable state and local public notice requirements, to notify the public of activities required by this permit and to encourage input and participation from the public regarding these activities. The permittee shall implement the following measurable goals:

2.2.1 Permit activities. The permittee shall provide a minimum of one opportunity annually for the public to provide input on each of the following permit activities: annual report, storm water management program, and if applicable, the adoption or amendment of storm water related ordinances.

2.2.2 Delivery mechanism. The permittee shall identify the public involvement and participation delivery mechanism for each permit activity in section 2.2.1. Delivery mechanisms may include public workshop, presentation of storm water information, government event (public hearing, council meeting, etc.), citizen committee meeting, or website.

2.2.3 Volunteer activities. The permittee shall implement at a minimum one of the following volunteer activities per year: group best management practice (BMP) installation or maintenance, storm drain stenciling, planting community rain garden, clean up event, stream monitoring, citizen committee meeting, public workshop, presentation of storm water information, or other hands-on event.

2.2.4 Target participants. The permittee shall identify the targeted participants for each permit activity and volunteer activity. Participants may include general public, public employees, residents, businesses, contractors, developers, industries, and/or other appropriate audience.

2.3 Illicit Discharge Detection and Elimination (IDDE)

The permittee shall continue to implement and enforce its program to detect and remove illicit connections and discharges to the MS4. The permittee shall implement the following measurable goals:

2.3.1 IDDE ordinance. An ordinance or other regulatory mechanism to prevent and eliminate illicit discharges and connections to the MS4. At a minimum, the ordinance or other regulatory mechanism shall:

- a. Prohibit illicit discharges and the discharge, spilling or dumping of non-storm water substances or materials into waters of the state or the MS4.
- b. Identify non-storm water discharges or flows that are not considered illicit discharges. Categories of non-storm water discharges that are not considered illicit discharges include water line flushing, landscape irrigation, diverted stream flows, uncontaminated groundwater infiltration, uncontaminated pumped groundwater, discharges from potable water sources, foundation drains, air conditioning condensation, irrigation water, lawn watering, individual residential car washing, flows from riparian habitats

and wetlands, fire-fighting and discharges authorized under a WPDES permit. However, the occurrence of a discharge listed above may be considered an illicit discharge on a case-by-case basis if the permittee or the Department identifies it as a significant source of a pollutant to waters of the state.

c. Establish inspection and enforcement authority.

Note: Chapter NR 815, Wis. Adm. Code, regulates injection wells including storm water injection wells. Construction or use of a well to dispose of storm water directly into groundwater is prohibited under s. NR 815.11(5), Wis. Adm. Code.

2.3.2 IDDE field screening. On-going dry weather field screening shall be conducted at 100% of the total major outfalls at least once during the term of the permit. Additionally, the permittee shall select minor outfalls for annual on-going dry weather field screening during the term of the permit. The permittee shall develop a prioritization procedure to assist with selecting minor outfalls and consideration shall be given to hydrological conditions, total drainage area of the site, population density of the site, traffic density, age of the structures or buildings in the area, history of the area and land use types when selecting outfalls for annual field screening. At a minimum, field screening shall be documented and include:

a. Visual Observation - A narrative description of visual observations including color, odor, turbidity, oil sheen or surface scum, flow rate and any other relevant observations regarding the potential presence of non-storm water discharges or illicit dumping.

b. Field Analysis - If flow is observed, a field analysis shall be conducted to determine the presence of illicit non-storm water discharges or illicit dumping. The field analysis shall include sampling for pH, total chlorine, total copper, total phenol and detergents, unless the permittee elects instead to use detergent, ammonia, potassium and fluoride as the indicator parameters. Other alternative indicator parameters may be authorized by the Department in writing.

(1) Field screening points shall, where possible, be located downstream of any source of suspected illicit activity.

(2) Field screening points shall be located where practicable at the farthest manhole or other accessible location downstream in the system. Safety of personnel and accessibility of the location shall be considered in making this determination.

Note: The Department's MS4 Illicit Discharge Detection and Elimination guidance document includes several recommendations regarding selection of outfalls for field screening, screening frequency, indicator parameter selection, indicator parameter action levels and documentation. The Illicit Discharge Detection and Elimination guidance is available on the Department's Internet site at: <https://dnr.wi.gov/topic/stormwater/municipal/overview.html>

2.3.3 IDDE source investigation and elimination. Written procedures for responding to known or suspected illicit discharges, including an assessment of risks and the establishment to response times. At a minimum, procedures shall be established for:

a. Investigating portions of the MS4 that, based on the results of field screening or other information, indicate a reasonable potential for containing illicit discharges or other sources of non-storm water discharges.

b. Responding to spills that discharge into and/or from the MS4 including tracking and locating the source of the spill if unknown.

c. Preventing and containing spills that may discharge into or are already within the MS4.

d. Promoting, publicizing, and facilitating public reporting of illicit discharges or water quality impacts associated with discharges into or from MS4s through a central contact point, including a form, website, email address, and/or telephone number for complaints and spill reporting, and publicize to both internal permittee staff and the public.

e. Notifying the Department immediately in accordance with ch. NR 706, Wis. Adm. Code, in the event that the permittee identifies a spill or release of a hazardous substance, which has resulted or may result in the discharge of pollutants into waters of the state. The Department shall be notified via the 24-hour toll free spill hotline at 1-800-943-0003. The permittee shall cooperate with the Department in efforts to investigate and prevent such discharges from polluting waters of the state.

f. Detecting and eliminating cross-connections and leakage from sanitary conveyance systems into the MS4.

g. Providing the Department with advanced notice of the time and location of dye testing within an MS4. Department notification prior to dye testing is required due to the likelihood that dye observed in waterways will be reported to the Department as an illicit discharge or spill.

h. Documentation of the following information:

(1) Dates and locations of IDDE screenings conducted in accordance with section 2.3.2.

(2) Reports of alleged illicit discharges received, including dates of the reports, and any follow-up actions taken by the permittee.

(3) Dates of discovery of all illicit discharges.

(4) Identification of outfalls, or other areas, where illicit discharge have been discovered.

(5) Sources (including a description and the responsible party) of illicit discharges (if known).

(6) Actions taken by the permittee, including dates, to address discovered illicit discharges.

2.3.4 The permittee shall take appropriate action to remove known illicit discharges from its MS4 system discovered under section 2.3 as soon as possible. If it will take more than 30 days to remove an illicit connection or if the potential illicit discharge is from a facility with WPDES permit coverage, the Department shall be contacted to discuss an appropriate action and/or timeframe for removal. Notwithstanding this 30-day timeframe and notification of the Department, the permittee shall be responsible for any known illicit connections to its MS4 system that are a significant risk to human health and the environment.

2.3.5 In the case of interconnected MS4s, the permittee shall notify the appropriate municipality within one working day of either of the following:

- a.** An illicit discharge that originates from the permittee's permitted area that discharges directly to a municipal separate storm sewer or property under the jurisdiction of another municipality.
- b.** An illicit discharge that has been tracked upstream to the interconnection point with or outfall from another municipality.

2.3.6 The name, title and phone number of the individuals responsible for responding to reports of illicit discharges and spills shall be included in the illicit discharge response procedure.

2.4 Construction Site Pollutant Control

The permittee shall continue to implement and enforce its program to reduce the discharge of sediment and construction materials from construction sites. The permittee shall implement the following measurable goals:

2.4.1 Construction site ordinance. An ordinance or other regulatory mechanism to require erosion and sediment control at construction sites and establish sanctions to ensure compliance. At a minimum, the ordinance or other regulatory mechanism shall establish or include:

- a.** Applicability and jurisdiction, pursuant to the authority provided to the permittee under Wisconsin statutes, the ordinance shall apply to all construction sites with one acre or more of land disturbance, and to sites of less than one acre if they are part of a larger common plan of development or sale.
- b.** Requirements for design and implementation of erosion and sediment control practices consistent with the criteria of those approved by the Department.

Note: Department approved erosion and sediment control technical standards may be found on the Department's Internet site at:

https://dnr.wi.gov/topic/stormwater/standards/const_standards.html

c. Construction site performance standards equivalent to those in ss. NR 151.11(6m), (7), and (8), and 151.23(4m), (5), and (6), Wis. Adm. Code, to achieve the following measurable goals:

(1) BMPs for construction sites that, by design, discharge no more than 5 tons per acre per year, or to the maximum extent practicable, of the sediment load carried in runoff from initial grading to final stabilization.

(2) BMPs for transportation facilities that, by design, discharge no more than 5 tons per acre per year, or to the maximum extent practicable, of the sediment load carried in runoff from initial grading to final stabilization.

Note: The requirements for erosion and sediment control practices, sediment performance standards, and preventive measures for non-transportation facilities can be found in s. NR 151.11(6m), Wis. Adm. Code, and for transportation facilities can be found in NR. 151.23(4m), Wis. Adm. Code.

d. Erosion and sediment control plan requirements for landowners of construction sites equivalent to those contained in s. NR 216.46, Wis. Adm. Code.

e. Inspection and enforcement authority.

f. Requirements for construction site operators to manage waste such as discarded building materials, concrete truck washout, chemicals, litter and sanitary waste at the construction site to reduce adverse impacts to waters of the state.

Note: In accordance with section 2.10, when a town demonstrates to the Department that an adequate county ordinance that meets the requirements of this permit is administered and enforced within its town, then the town may be excused from having to adopt its own ordinance. Model ordinances for construction site erosion and sediment control can be found in ch. NR 152, Wis. Adm. Code: https://docs.legis.wisconsin.gov/code/admin_code/nr/100/152

2.4.2 Erosion and sediment control plan review. Written procedures for construction site plan review which incorporate consideration of potential water quality impacts. Preconstruction erosion control plan reviews shall be conducted for all construction sites with greater than one acre of land disturbance.

2.4.3 Administrative procedures. Written procedures for the administration of the construction site pollutant control program including the process for obtaining local approval, managing and responding to complaints, tracking regulated construction sites, and construction site plan receipt and consideration of information submitted by the public.

2.4.4 Construction site inspections and enforcement. Written procedures for construction site inspection and enforcement of erosion and sediment control measures. By April 1, 2020, at a minimum, the procedures shall establish:

a. Municipal departments or staff responsible for construction site inspections and enforcement.

Note: The Department recommends that municipal construction site inspectors obtain certification as a Soil Erosion Inspector pursuant to s. SPS 305.63, Wis. Adm. Code, for more information:

<https://dsps.wi.gov/Pages/Professions/SoilErosionInspector/Default.aspx>

b. Construction site inspection frequency. The permittee shall inspect all construction sites, at a minimum, in accordance with the frequency specified in Table 3 below.

Table 3: Construction Site Inspection Frequency

Site	Inspection Frequency
(1) All sites one acre or more in size	<ul style="list-style-type: none"> • New projects shall be inspected within the first two weeks of commencement of land disturbing activity • All active sites shall be inspected at least once every 45 days • All inactive sites shall be inspected at least once every 60 days
(2) Follow up inspection	<ul style="list-style-type: none"> • Follow up inspections are required within 7 days of any sediment discharge or inadequate control measure, unless corrections were made and observed by the inspector during initial inspection or corrections were verified via photographs submitted to the inspector
(3) Final inspection	<ul style="list-style-type: none"> • Confirm that all graded areas have reached final stabilization and that all temporary control measures are removed, and permanent storm water management BMPs are installed as designed

c. Construction site inspection documentation. Compliance with the inspection requirements in 2.4.4.a. and b. above, shall be determined by proper documentation and maintenance of records of an established inspection program designed to inspect all sites.

Note: The Department’s Construction Site Inspection Report (Form 3400-187) may be used to document inspections. The form can be found on the Department’s Internet site at: <https://dnr.wi.gov/topic/Stormwater/construction/forms.html>

d. Enforcement mechanisms that will be used to obtain compliance.

2.5 Post-Construction Storm Water Management

The permittee shall continue to implement and enforce its program to require control of the quality of discharges from areas of new development, infill, and redevelopment, after construction is completed. The permittee shall implement the following measurable goals:

2.5.1 Post-construction storm water ordinance. An ordinance or other regulatory mechanism to regulate post-construction storm water discharges from new development and redevelopment. At a minimum, the ordinance or other regulatory mechanism shall establish or include:

a. Applicability and jurisdiction, pursuant to the authority provided to the permittee under Wisconsin statutes, the ordinance shall apply to construction sites with one acre or more of land disturbance, and sites of less than one acre if they are part of a larger common plan of development or sale.

b. Requirements for design and implementation of post-construction storm water management control practices consistent with the criteria of those approved by the Department.

Note: Department approved post-construction storm water management control technical standards may be found on the Department's Internet site at:

https://dnr.wi.gov/topic/stormwater/standards/postconst_standards.html

c. For new development and infill, post-construction performance standards equivalent to those in ss. NR 151.122 through 151.126 and 151.242 through 151.246, Wis. Adm. Code, that meet the measurable goals for pollutant removal and post-construction storm water treatment. Post-construction performance standards for new development and infill may be more restrictive than those required in this section 2.5.1.c. if necessary to comply with federally approved TMDL requirements.

d. For redevelopment, post-construction performance standards equivalent to or more restrictive than those in ss. NR 151.122 through 151.126 and 151.242 through 151.246, Wis. Adm. Code, that meet the measurable goals for pollutant removal and post-construction storm water treatment.

e. Storm water plan requirements for landowners of construction sites equivalent to those contained in s. NR 216.47, Wis. Adm. Code.

f. Long-term maintenance requirements for landowners and other persons responsible for long-term maintenance of post-construction storm water control measures, including requirements for routine inspection and maintenance of privately owned post-construction storm water control measures that discharge to the MS4 to maintain their pollutant removal operating efficiency.

g. Inspection and enforcement authority.

Note: In accordance with section 2.10, when a town demonstrates to the Department that an adequate county ordinance that meets the requirements of this permit is administered and enforced within its town, then the town may be excused from having to adopt its own ordinance. Model ordinances for post-construction storm water management can be found in ch. NR 152, Wis. Adm. Code: https://docs.legis.wisconsin.gov/code/admin_code/nr/100/152

2.5.2 Administrative procedures. Written procedures for the administration of the post-construction storm water management program including the process for obtaining local approval and responding to complaints.

2.5.3 Storm water management plan review. Written procedures for post-construction site plan review which incorporate consideration of potential water quality impacts. Post-construction site plan reviews shall be conducted for all construction sites with greater than one acre of land disturbance.

Note: The Department recommends that municipal staff reviewing plans obtain training on post-construction plan review.

2.5.4 Long-term maintenance, inspections and enforcement. Written procedures that will be used by the permittee through its ordinance jurisdiction, approval process, and authority to, at a minimum, track and enforce the long-term maintenance of storm water management facilities implemented to meet the applicable post-construction performance standards in section 2.5.1.c and d of this permit. The procedures shall include:

- a. A mechanism for tracking regulated sites.
- b. At a minimum, long-term maintenance inspections shall occur once per permit term.
- c. Inspection documentation.
- d. Follow up enforcement with timeframes for corrective maintenance.

2.6 Pollution Prevention

The permittee shall continue to implement its pollution prevention program to prevent or reduce pollutant runoff from the MS4 to waters of the state. The permittee shall implement the following measurable goals:

2.6.1 Storm water management facilities. Update and maintain an inventory of municipally owned or operated storm water BMPs such as wet detention ponds, bioretention devices, infiltration basins and trenches, permeable pavement, proprietary sedimentation devices, vegetated swales, or any similar practices or devices used to meet a water quality requirement under this permit. At a minimum, the inventory shall be maintained in a tabular format and contain the following information for each structural storm water facility:

- a. A key corresponding to the location of the BMP on the storm sewer system map required under section 2.8.
- b. The name and a description of the BMP, including the type and year constructed.
- c. A confirmation of whether each of the following elements exist or are not available:
 - (1) An operation and maintenance plan with inspection procedures and schedule.
 - (2) A record drawing.

Note: A record drawing is a complete clean set of drawings that accurately reflect how the final practice was built.

(3) If using a BMP to meet a water quality requirement in this permit and the BMP is owned by another entity, written documentation exists that the permittee has permission from the owner to use the BMP for this purpose.

2.6.2 For each BMP inventoried under section 2.6.1, the permittee shall develop and implement a maintenance plan with inspection procedures and schedule to maintain the pollutant removal operating efficiency of the practice in compliance with any water quality requirement under this permit. Documentation of inspections and maintenance activities shall be maintained.

Note: Chapter NR 528, Wis. Adm. Code, *Management of Accumulated Sediment from Storm Water Management Structures*, establishes a process to regulate sediment removal and use to help storm water pond owners manage storm water pond sediment. Information on NR 528 and managing accumulated sediment from storm water ponds is available through the Department's Internet site at: <https://dnr.wi.gov/topic/waste/nr528.html>

2.6.3 Municipally owned public works facilities. The storm water pollution prevention plans (SWPPPs) for municipal garages, municipal storage areas, and other public works related municipal facilities located within the permitted area shall be maintained and updated annually as needed and shall include the information in sections 2.6.3.a. When a SWPPP is updated, it shall be submitted to the Department with the annual report.

a. SWPPPs shall include the following information:

(1) The physical locations of each facility with a key corresponding to the locations on the storm sewer system map required under section 2.8.

(2) The contact information for the individuals with overall responsibility for each facility.

(3) A map of each facility, drawn to scale, and including the following features:

i. The locations and descriptions of major activities and storage areas.

ii. Identification of drainage patterns, potential sources of storm water contamination, and discharge points.

iii. Identification of nearby receiving waters or wetlands.

iv. Identification of connections to the permittees MS4.

(4) A description of procedures, good housekeeping activities, and any BMPs installed to reduce or eliminate storm water contamination.

(5) A maintenance plan with inspection procedures and schedule for each facility to identify deficiencies, necessary improvements and/or repairs, assess effectiveness, and address new or unaddressed potential sources of storm water contamination.

(6) Spills prevention and response standard operating procedures.

b. The permittee is not required to comply with section 2.6.3 if the permittee certifies that the municipal facility qualifies for no exposure with the Department's concurrence.

(1) No exposure means that the facility shall have all materials and activities protected by a storm-resistant shelter to prevent exposure to storm water. Materials or activities include material handling equipment or activities, industrial machinery, raw materials, intermediate products, by-products, final products or waste products. Material handling activities include the storage, loading and unloading, transportation or conveyance of any raw material, intermediate product, final product or waste product.

(2) The permittee shall certify for no exposure for each facility at least once each permit term. The permittee shall submit a letter requesting no exposure, an inspection report of the site, and photos of all materials or activities at the site. The photo locations shall be labeled on an aerial photo diagram.

2.6.4 Measures to reduce municipal sources of storm water contamination within source water protection areas.

Note: Wisconsin's source water assessment program information may be found on the Department's Internet site at:
<https://dnr.wi.gov/topic/drinkingwater/sourcewaterprotection.html>

2.6.5 Collection services/Storm sewer system maintenance activities.

a. Street sweeping. If routine street sweeping is utilized to meet a water quality requirement under this permit, the permittee shall maintain documentation of the number and type of equipment used, standard operating procedures, an estimate of the number of lane-miles swept annually, and an estimate of the weight in tons of material collected annually.

b. Catch basins. If routine cleaning of catch basins with sumps is utilized to meet a water quality requirement under this permit, the permittee shall maintain documentation of the number of catch basins inspected, the number of catch basins cleaned, standard operating procedures, and an estimate of the weight in tons of material collected annually.

c. Material handling and disposal. Material collected under a. and b. of this section shall be handled and stored in a manner that prevents contamination of storm water runoff and shall be disposed of or beneficially reused in accordance with applicable solid and hazardous waste statutes and administrative codes. Non-storm water discharges to waters of the state associated with dewatering and drying material collected under sections a. and b. of this section are not authorized by this permit.

Note: Information on managing waste and materials is available on the Department's Internet site at: <https://dnr.wi.gov/topic/Waste/>. Information on WPDES permits for non-storm water discharges is available on the Department's Internet site at: <https://dnr.wi.gov/topic/wastewater/>

d. Leaf management. Proper management of leaves and grass clippings from municipally-owned properties and private property. The program may include instructions to private property owners for on-site composting, on-site beneficial reuse, or yard waste drop-off as opposed to a municipal collection program. On-site management and/or drop-off shall be communicated to private property owners in accordance with the public education and outreach program implemented under section 2.1 of this permit. If the permittee has a municipal collection program, collected material shall be handled and stored in a manner that prevents contamination of storm water runoff. For a municipal leaf collection program, the permittee shall maintain the following documentation:

(1) A description of the leaf collection program, including the type of pick-up methodology and equipment used, timing of associated street cleaning, standard operating procedures, schedule and frequency, and instructions for private property owners.

(2) An estimate of the weight in tons of material collected annually.

(3) Municipally operated leaf disposal locations with a key corresponding to the locations on the storm sewer system map required under section 2.8. If the disposal location is outside of the MS4 boundary, then the permittee can provide documentation if the disposal is taken elsewhere.

Note: The Department has developed "Interim Municipal Phosphorus Reduction Credit for Leaf Management Programs" guidance to assist permitted MS4s on creditable phosphorus reduction through leaf collection and management. The guidance document may be found on the Department's Internet site at: https://dnr.wi.gov/topic/stormwater/standards/ms4_modeling.html

2.6.6 Winter Road Management. If road salt or other deicers are applied by the permittee or a contractor on behalf of the permittee, no more shall be applied than necessary to maintain public safety. Documentation on deicing activities shall be performed by the permittee or a contractor on behalf of the permittee and include the following:

a. Contact information for the individuals with overall responsibility for winter roadway maintenance.

b. A description of the types of deicing products used.

c. The amount of deicing product used per month.

d. A description of the type of equipment used.

e. An estimate of the number of lane-miles treated with deicing products for the roadways that the permittee is responsible for, and an estimate in acres of the total area of municipally-owned parking lots treated with deicing products by the permittee or contractor.

f. If applicable, snow disposal locations with a key corresponding to the locations on the storm sewer system map required under section 2.8.

Note: Snow treatment and disposal guidance for municipalities is available through the Department's Internet site at: <https://dnr.wi.gov/topic/stormwater/publications.html>

g. A description of anti-icing, pre-wetting and brining, equipment calibration, pavement temperature monitoring, and/or salt reduction strategies implemented or being considered, and/or alternative products.

h. Other measurable data or information that the permittee uses to evaluate or modify its deicing activities.

Note: The Wisconsin Department of Transportation (WisDOT) Highway maintenance manual - Chapter 6, contains guidelines on winter maintenance including application of road salt and other deicers. Chapter 6 is available on the WisDOT's Internet site at: <https://wisconsindot.gov/Pages/doing-bus/local-gov/hwy-mnt/mntc-manual/chapter06.aspx>. The WisDOT highway salt storage requirements are contained in ch. Trans 277, Wis. Adm. Code.

2.6.7 Nutrient management. Application of turf and garden fertilizers on municipally controlled properties (such as parks, athletic fields, golf courses), with pervious surfaces over 5 acres each, in accordance with a site-specific nutrient application schedule based on appropriate soil tests.

Note: To assist permittees with this requirement, the Department has developed a technical standard for turf nutrient management. These documents may be found on the Department's Internet site at: https://dnr.wi.gov/topic/stormwater/standards/turf_nutrient.html

2.6.8 Environmentally sensitive development. Consideration of environmentally sensitive land development designs for municipal projects, including green infrastructure and low impact development, which shall be designed, installed, and maintained to comply with a water quality requirement under this permit.

Note: Additional information on green infrastructure and low impact development may be found on the following USEPA Internet sites:

<https://www.epa.gov/green-infrastructure>

<https://www.epa.gov/nps/urban-runoff-low-impact-development>

2.6.9 Internal training and education. At a minimum, the permittee shall hold one annual training event for appropriate municipal staff and other personnel involved in implementing each of the elements of the pollution prevention program under this section 2.6. Documentation shall be maintained of the date, the number of people attending the training, the names of each person attending and a summary of their responsibilities, and the content of the training. The permittee shall inform contractors performing any services to implement

section 2.6 of the permit requirements and expectations. The permittee shall also inform their elected officials of the permit requirements and expectations.

2.7 Storm Water Quality Management

The permittee shall implement its municipal storm water quality management program. This program shall maintain compliance with the developed urban area performance standards of s. NR 151.13(2)(b)1., Wis. Adm. Code, for those areas of the municipality that were not subject to the post-construction performance standards of ss. NR 151.12 or 151.24, or ss. NR 151.122 through 151.126, or ss. 151.242 through 151.246, Wis. Adm. Code. The permittee shall implement the following measurable goals:

2.7.1 To the maximum extent practicable, implementation and maintenance of all storm water management practices necessary to meet the more restrictive total suspended solids reduction of either of the following:

a. The permittee shall maintain all source area controls, structural storm water management facilities, and non-structural storm water BMPs that the permittee implemented on or before July 1, 2011, to achieve a reduction of 20% or more of total suspended solids carried by storm water runoff from existing development to waters of the state. If the permittee removes or modifies a storm water BMP, the permittee shall continue to achieve the reduction by installing, implementing, and maintaining the necessary storm water BMPs to, at a minimum, equal the same level of treatment. All structural storm water management facilities utilized to meet the requirements in section 2.7.1.a shall be inventoried and maintained in accordance with sections 2.6.1 and 2.6.2.

b. A 20% reduction in the annual average mass of total suspended solids discharging from the MS4 to surface waters of the state as compared to implementing no storm water management controls. All source area controls, structural storm water management facilities, and non-structural storm water BMPs implemented to achieve the 20% reduction in total suspended solids shall be maintained. If the permittee removes or modifies a storm water BMP, the permittee shall continue to achieve the 20% reduction by installing, implementing, and maintaining the necessary storm water BMPs to equal, at a minimum, the same level of treatment. All structural storm water management facilities utilized to meet the requirements in section 2.7.1.b shall be inventoried and maintained in accordance with sections 2.6.1 and 2.6.2.

Note: The total suspended solids reduction requirement applies to storm water runoff from areas of urban land use and is not applicable to agricultural or rural land uses and associated roads. Additional MS4 modeling guidance for modeling the total suspended solids control is available on the Department's Internet site at: https://dnr.wi.gov/topic/stormwater/standards/ms4_modeling.html. The permittee may elect to meet the applicable total suspended solids standard above on a watershed or regional basis by working with other permittees to provide regional treatment that collectively meets the standard.

2.8 Storm Sewer System Map

The permittee shall maintain its MS4 map. The storm sewer system map shall be updated annually as needed for changes occurring in the permitted area boundaries. The municipal storm sewer system map shall include:

2.8.1 Identification of waters of the state, name and classification of receiving waters, identification of whether the receiving water is an ORW, ERW or listed as an impaired water under s. 303(d) of the Clean Water Act, storm water drainage basin boundaries for each MS4 outfall, and the municipal separate storm sewer conveyance systems including direction of flow.

2.8.2 Identification of any known wetlands, endangered or threatened resources, and historical property, as defined in sections 1.6 through 1.8 of this permit, which might be affected.

2.8.3 Identification of all known MS4 outfalls discharging to waters of the state and other MS4s. Major outfalls shall be uniquely identified.

2.8.4 Location of any known discharge to the MS4 that has been issued WPDES permit coverage by the Department. A list of WPDES permit holders in the permittee's area may be obtained from the Department.

2.8.5 Location of municipally owned or operated structural storm water management facilities including detention basins, infiltration basins, and manufactured treatment devices. If the permittee will be taking total suspended solids credit for pollutant removal from privately-owned facilities, they shall be identified.

2.8.6 Identification of publicly owned parks, recreational areas and other open lands.

2.8.7 Location of municipal garages, storage areas and other public works facilities.

2.8.8 Identification of streets.

2.9 Annual Report

The permittee shall submit an annual report for each calendar year to the Department by **March 31 of the following year**. The permittee shall invite the municipal governing body, interest groups and the general public to review and comment on the annual report. The annual report shall include:

2.9.1 The status of implementing the permit requirements, status of meeting measurable program goals and compliance with permit schedules.

2.9.2 A fiscal analysis which includes the annual expenditures and budget for the reporting year, and the budget for the next year.

2.9.3 A summary of the number and nature of inspections and enforcement actions conducted to ensure compliance with the required ordinances.

2.9.4 Identification of any known water quality improvements or degradation in the receiving water to which the permittee's MS4 discharges. Where degradation is identified, identify why and what actions are being taken to improve the water quality of the receiving water.

2.9.5 An evaluation of program compliance, the appropriateness of identified BMPs, and progress towards achieving identified measurable goals. Any program changes made as a result of this evaluation shall be identified and described in the annual report. For any identified deficiencies towards achieving the requirements under section 2 of this permit or lack of progress towards meeting a measurable goal, the permittee shall initiate program changes to improve their effectiveness.

2.9.6 If applicable, notice that the permittee is relying on another municipality or entity to satisfy any of the permit requirements and a description of the arrangement where a permit requirement is being met in this manner.

2.9.7 A duly authorized representative of the permittee shall sign and certify the annual report and include a statement or resolution that the permittee's governing body or delegated representatives have reviewed or been apprised of the content of the annual report.

2.9.8. The annual report and other required reports, and permit compliance documents shall be submitted electronically through the Department's electronic reporting system.

Note: The Department's electronic reporting system is Internet-based and available at: <https://dnr.wi.gov/permits/water/>. Municipal storm water permit eReporting information and user support tools can be found at: <https://dnr.wi.gov/topic/stormwater/municipal/eReporting.html>

2.10 Cooperation

The permittee may, by written agreement, implement this permit with another municipality or contract with another entity to perform one or more of the conditions of this permit. The permittee is ultimately responsible for compliance with the conditions of this permit. The permittee may rely on another municipality or contract with another entity to satisfy a condition of this permit if all of the following are met:

2.10.1 The other municipality or entity implements the required control measure or permit requirement.

2.10.2 A particular control measure, or component thereof, is at least as stringent as the corresponding permit requirement.

2.10.3 The other municipality or entity agrees to implement a control measure or permit requirement on the permittee's behalf. This shall be shown by formal written agreement, signed by both parties' authorized representatives. The agreement shall be explicit as to which specific permit conditions are being covered by which municipality or other entity. Copies of current agreements shall be submitted with the annual report or to the Department upon request.

Note: If a county is implementing and enforcing adequate storm water ordinances within a town, the town would then not have to adopt its own ordinance. However, the town, as the permittee, is still expected to evaluate how the county is implementing and enforcing the ordinance in the town's permitted area, to verify the county is meeting the permit condition. Another example, if another entity agrees to implement the permit condition of long-term maintenance inspections, the permittee must

evaluate that the entity is completing inspections as agree upon. The permittee should not assume that another entity is implementing a permit condition as required because the permittee remains responsible for compliance with the conditions of this permit.

2.11 Amendments

The permittee shall amend a program required under this permit as soon as possible if the permittee becomes aware that it does not meet a requirement of this permit. The permittee shall amend its program if notified by the Department that a program or procedure is insufficient or ineffective in meeting a requirement of this permit. The Department notice to the permittee may include a deadline for amending and implementing the amendment.

2.12 Reapplication for Permit Coverage

To remain covered after the expiration date of this permit, pursuant to s. NR 216.09, Wis. Adm. Code, the permittee shall reapply to the Department at least 180 days prior to the expiration date of this permit for continued coverage under a reissued version of this permit.

3. COMPLIANCE SCHEDULE

The permittee shall comply with the specific permit conditions contained in sections 1 and 2 according to the schedule in this section 3 and Table 4. The permittee shall begin implementing any updates to its storm water management programs no later than March 31, 2021. Required reports and permit compliance documents shall be submitted electronically through the Department's electronic reporting system.

Note: The Department's electronic reporting system is Internet-based and available at: <https://dnr.wi.gov/permits/water/>. Municipal storm water permit eReporting information and user support tools can be found at: <https://dnr.wi.gov/topic/stormwater/municipal/eReporting.html>

3.1 Impaired Waterbodies and Total Maximum Daily Loads

3.1.1 The permittee shall determine whether any part of its MS4 discharges to an impaired waterbody as required under section 1.5.1 of this permit **by March 31 of each odd-numbered year.**

3.1.2 If the permittee is subject to TMDL requirements under section 1.5 of this permit, the permittee shall submit information to the Department in accordance with the schedule as required in the applicable appendix of this permit.

3.2 Public Outreach and Education

The permittee shall submit to the Department the public education and outreach program developed for the term of this permit as required under section 2.1 of this permit **by March 31, 2021.**

3.3 Public Involvement and Participation

The permittee shall submit to the Department the public involvement and participation program developed for the term of this permit as required under section 2.2 of this permit **by March 31, 2021.**

3.4 Illicit Discharge Detection and Elimination

The permittee shall submit to the Department the illicit discharge detection and elimination program developed for the term of this permit as required under section 2.3.2 to 2.3.6 of this permit **by March 31, 2021.**

3.5 Construction Site Pollutant Control

The permittee shall submit to the Department the construction site pollutant control program developed for the term of this permit as required under sections 2.4.2 to 2.4.4 of this permit **by March 31, 2021.**

3.6 Post-Construction Storm Water Management

The permittee shall submit to the Department the post-construction storm water management program developed for the term of this permit as required under sections 2.5.2 to 2.5.4 of this permit **by March 31, 2021.**

3.7 Pollution Prevention

3.7.1 The permittee shall submit to the Department the municipal storm water management facility inventory as required under section 2.6.1 of this permit by **March 31, 2021**. Include with the annual report submittal via the Department's electronic reporting system. When the inventory is updated, it shall be submitted by **March 31 of each year** to the Department.

3.7.2 The permittee shall submit to the Department the maintenance plan for municipal storm water management facilities as required under section 2.6.2 of this permit by **March 31, 2021**.

3.7.3 The permittee shall update SWPPPs for municipally owned properties as needed as required under section 2.6.3 of this permit. When a SWPPP is updated, it shall be submitted by **March 31 of each year** to the Department.

3.8 Storm Water Quality Management

The permittee shall report compliance with the developed urban area performance standards as required under section 2.7 of this permit by **March 31 of each year**.

3.9 Storm Sewer System Map

The permittee shall update the storm sewer system map as needed as required under section 2.8 of this permit. When the MS4 map is updated, it shall be submitted by **March 31 of each year** to the Department.

3.10 Annual Report

The permittee shall submit to the Department an annual report as required under section 2.9 of this permit for each calendar year by **March 31 of the following year**. The annual report and other required reports, and permit compliance documents shall be submitted electronically through the Department's electronic reporting system.

Table 4: Compliance Schedule for Permit Requirements

PERMIT SECTION	ACTIVITY	COMPLIANCE DATE	COMMENTS
Section 1.5.1	Identify discharges to an impaired waterbody	By March 31 of each odd-numbered year thereafter	All permittees
Section 1.5.2	Total maximum daily load implementation	See applicable Appendix.	Applies to a permittee with an MS4 discharge of a pollutant of concern to a waterbody subject to an USEPA approved TMDL that assigns the permittee a wasteload allocation.
Section 2.1	Public Education and Outreach – Submit public education and outreach program for the permit term with annual report	March 31, 2021	All permittees
Section 2.2	Public Involvement and Participation – Submit public involvement and participation program for the permit term with annual report	March 31, 2021	All permittees
Section 2.3.2 to 2.3.6	Illicit Discharge Detection and Elimination – Submit illicit discharge detection and elimination program for the permit term with annual report	March 31, 2021	All permittees
Section 2.4.2 to 2.4.4	Construction Site Pollutant Control – Submit construction site pollutant control program for the permit term with annual report	March 31, 2021	All permittees
Section 2.5.2 to 2.5.4	Post-Construction Storm Water Management – Submit post-construction storm water management program for the permit term with annual report	March 31, 2021	All permittees
Section 2.6	Pollution Prevention – Section 2.6.1, submit the municipal storm water management facility inventory with annual report	March 31, 2021, and annually thereafter (if updates)	All permittees
	Pollution Prevention – Section 2.6.2, submit the maintenance plan for municipal storm water management facilities with annual report	March 31, 2021	All permittees
	Pollution Prevention – Section 2.6.3, submit SWPPPs for municipally owned properties with annual report	March 31 of each year reporting on previous calendar year (if updates)	All permittees

Section 2.7	Storm Water Quality Management – Report TSS percent reduction	March 31 of each year reporting on previous calendar year	All permittees
Section 2.8	Storm sewer system map - Submit map with annual report	March 31 of each year reporting on previous calendar year (if updates)	All permittees
Section 2.9	Submit Annual Report	March 31 of each year reporting on previous calendar year	All permittees

4. GENERAL CONDITIONS

The conditions in s. NR 205.07(1) and (3), Wis. Adm. Code, are incorporated by reference in this permit. The permittee shall be responsible for meeting these requirements, except for s. NR 205.07(1)(n), Wis. Adm. Code, which does not apply to facilities covered under general permits. Some of these requirements are outlined below. Requirements not specifically outlined below can be found in s. NR 205.07(1) and (3), Wis. Adm. Code.

4.1 Duty to Comply: The permittee shall comply with all conditions of the permit. Any act of noncompliance with this permit is a violation of this permit and is grounds for enforcement action or withdrawal of permit coverage under this permit and issuance of an individual permit. If the permittee files a request for an individual WPDES permit or a notification of planned changes or anticipated noncompliance, this action by itself does not relieve the permittee of any permit condition.

4.2 Enforcement Action: The Department is authorized under s. 283.89 and 283.91, Wis. Stats., to utilize citations or referrals to the Wisconsin Department of Justice to enforce the conditions of this permit. Violation of a condition of this permit is subject to a fine of up to \$10,000 per day of the violation.

4.3 Compliance Schedules: Reports of compliance or noncompliance with interim and final requirements contained in any compliance schedule of the permit shall be submitted in writing within 14 days after the scheduled due date, except that progress reports shall be submitted in writing on or before each schedule date for each report. Any report of noncompliance shall include the cause of noncompliance, a description of remedial actions taken, and an estimate of the effect of the noncompliance on the permittee's ability to meet the remaining scheduled due dates.

4.4 Noncompliance

4.4.1 Upon becoming aware of any permit noncompliance that may endanger public health or the environment, the permittee shall report this information by a telephone call to the Department regional storm water specialist within 24 hours. A written report describing the noncompliance shall be submitted to the Department regional storm water specialist within 5 days after the permittee became aware of the noncompliance. The Department may waive the written report on a case-by-case basis based on the oral report received within 24 hours. The written report shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times; the steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance; and if the noncompliance has not been corrected, the length of time it is expected to continue.

4.4.2 Reports of any other noncompliance not covered under General Conditions sections 3.3, 3.4.1, or 3.6. shall be submitted with the annual report. The reports shall contain all the information listed in General Conditions section 3.4.1.

4.5 Duty to Mitigate: The permittee shall take all reasonable steps to minimize or prevent any adverse impact on the waters of the state resulting from noncompliance with the permit.

4.6 Spill Reporting: The permittee shall immediately notify the Department, in accordance with s. 292.11(2)(a), Wis. Stats., which requires any person who possesses or controls a hazardous substance or who causes the discharge of a hazardous substance to notify the DNR immediately of any discharge not

authorized by the permit. The discharge of a hazardous substance that is not authorized by this permit or that violates this permit may be a hazardous substance spill. To report a hazardous substance spill, call the DNR's 24-hour HOTLINE at 1-800-943-0003.

Note: For details on state and federal reportable quantities, visit:

<https://dnr.wi.gov/topic/Spills/define.html>

4.7 Proper Operation and Maintenance: The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control which are installed or used by the municipality to achieve compliance with the conditions of the permit and the storm water management plan. 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. This provision requires the operation of back-up or auxiliary facilities or similar systems only when necessary to achieve compliance with conditions of this permit.

4.8 Bypass: The permittee may temporarily bypass a storm water treatment facility if necessary for human safety or maintenance to assure efficient operation. A bypass shall comply with the general storm water discharge limitations in Section 1.9 of this permit. Notification of the Department is not required for these types of bypasses. Any other bypass is prohibited.

Note: A discharge from a storm water treatment facility that exceeds the operational design capacity of the facility is not considered a bypass.

4.9 Duty to Halt or Reduce Activity: Upon failure or impairment of storm water management practices identified in the storm water management program, the permittee shall, to the extent practicable and necessary to maintain permit compliance, modify or curtail operations until the storm water management practices are restored or an alternative method of storm water pollution control is provided.

4.10 Removed Substances: Solids, sludges, filter backwash or other pollutants removed from or resulting from treatment or control of storm water shall be stored and disposed of in a manner to prevent any pollutant from the materials from entering the waters of the state, and to comply with all applicable federal, state, and local regulations.

4.11 Additional Monitoring: If a permittee monitors any pollutant more frequently than required by the permit, the results of that monitoring shall be reported to the Department in the annual report.

4.12 Inspection and Entry: The permittee shall allow authorized representatives of the Department, upon the presentation of credentials, to:

4.12.1 Enter upon the municipal premises where a regulated facility or activity is located or conducted, or where records are required to be maintained under the conditions of the permit;

4.12.2 Have access to and copy, at reasonable times, any records that are required under the conditions of the permit;

4.12.3 Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices or operations regulated or required under the permit; and

4.12.4 Sample or monitor at reasonable times, for the purposes of assuring permit compliance, any substances or parameters at any location.

4.13 Duty to Provide Information: The permittee shall furnish the Department, within a reasonable time, any information which the Department may request to determine whether cause exists for modifying, terminating, suspending revoking or reissuing the permit or to determine compliance with the permit. The permittee shall give advance notice to the Department of any planned changes to the storm water management program which may result in noncompliance with permit requirements. The permittee shall also furnish the Department, upon request, copies of records required to be kept by the permittee.

4.14 Property Rights: The permit does not convey any property rights of any sort, or any exclusive privilege. The permit does not authorize any injury or damage to private property or an invasion of personal rights, or any infringement of federal, state or local laws or regulations.

4.15 Other Information: Where the permittee becomes aware that it failed to submit any relevant facts in applying for permit coverage or submitted incorrect information in any plan or report sent to the Department, it shall promptly submit such facts or correct information to the Department.

4.16 Records Retention: The permittee shall retain records of all monitoring information, copies of all reports required by the permit, and records of all data used to complete the notice of intent for a period of at least 5 years from the date of the sample, measurement, report or application. The permittee shall retain records documenting implementation of the minimum control measures in sections 2.1 through 2.6 of this permit for a period of at least 5 years from the date the record was generated.

4.17 Permit Actions: Under s. 283.35, Wis. Stats., the Department may withdraw a permittee from coverage under this general permit and issue an individual permit for the municipality if: (a) The municipality is a significant contributor of pollution; (b) The municipality is not in compliance with the terms and conditions of the general permit; (c) A change occurs in the availability of demonstrated technology or practices for the control or abatement of pollutants from the municipality; (d) Effluent limitations or standards are promulgated for a point source covered by the general permit after the issuance of that permit; or (e) A water quality management plan containing requirements applicable to the municipality is approved. In addition, as provided in s. 283.53, Wis. Stats., after notice and opportunity for a hearing this permit may be suspended, modified or revoked, in whole or in part, for cause. If the permittee files a request for a permit modification, termination, suspension, revocation and reissuance, or submits a notification of planned changes or anticipated noncompliance, this action by itself does not relieve the permittee of any permit condition.

4.18 Signatory Requirements: All applications, reports or information submitted to the Department shall be signed by a ranking elected official, or other person authorized by those responsible for the overall operation of the MS4 and storm water management program activities regulated by the permit. The representative shall certify that the information was gathered and prepared under his or her supervision and, based on report from the people directly under supervision that, to the best of his or her knowledge, the information is true, accurate, and complete.

4.19 Attainment of Water Quality Standards after Authorization: At any time after authorization, the Department may determine that the discharge of storm water from a permittee's MS4 may cause, have

the reasonable potential to cause, or contribute to an excursion of any applicable water quality standard. If such determination is made, the Department may require the permittee to do one of the following:

4.19.1 Develop and implement an action plan to address the identified water quality concern to the satisfaction of the Department.

4.19.2 Submit valid and verifiable data and information that are representative of ambient conditions to demonstrate to the Department that the receiving water or groundwater is attaining the water quality standard.

4.19.3 Submit an application to the Department for an individual storm water discharge permit.

4.20 Continuation of the Expired General Permit: The Department's goal is to reissue this general permit prior to its expiration date. However, in accordance with s. NR 216.09, Wis. Adm. Code, a permittee shall reapply to the Department at least 180 days prior to the expiration date for continued coverage under this permit after its expiration. If the permit is not reissued by the time the existing permit expires, the existing permit remains in effect.

4.21 Need to Halt or Reduce Activity not a Defense: It is not a defense for a permittee in an enforcement action to claim that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of the permit.

5. DEFINITIONS USED IN THIS PERMIT

Definitions for some of the terms found in this permit are as follows:

5.1 Department means the Wisconsin Department of Natural Resources.

5.2 Development means residential, commercial, industrial and institutional land uses and associated roads.

5.3 Erosion means the process by which the land's surface is worn away by the action of wind, water, ice or gravity.

5.4 Hazardous substance means any substance or combination of substances including any waste of a solid, semisolid, liquid or gaseous form which may cause or significantly contribute to an increase in mortality or an increase in serious irreversible or incapacitating reversible illness or which may pose a substantial present or potential hazard to human health or the environment because of its quantity, concentration or physical, chemical or infectious characteristics. This term includes, but is not limited to, substances which are toxic, corrosive, flammable, irritants, strong sensitizers or explosives as determined by the Department.

5.5 Illicit connection means any man-made conveyance connecting an illicit discharge to a municipal separate storm sewer system.

5.6 Illicit discharge means any discharge to a municipal separate storm sewer system that is not composed entirely of storm water except discharges authorized by a WPDES permit or other discharge not requiring a WPDES permit such as landscape irrigation, individual residential car washing, fire fighting, diverted stream flows, uncontaminated groundwater infiltration, uncontaminated pumped groundwater, discharges from potable water sources, foundation drains, air conditioning condensation, irrigation water, lawn watering, flows from riparian habitats and wetlands, and similar discharges. However, the occurrence of a discharge listed above may be considered an illicit discharge on a case-by-case basis if the permittee or the Department identifies it as a significant source of a pollutant to waters of the state.

5.7 Impaired water means a waterbody impaired in whole or in part and listed by the Department pursuant to 33 USC § 1313(d)(1)(A) and 40 CFR 130.7, for not meeting a water quality standard, including a water quality standard for a specific substance or the waterbody's designated use.

5.8 Infiltration means the entry and movement of precipitation or runoff into or through soil.

5.9 Jurisdiction means the area where the permittee has authority to enforce its ordinances or otherwise has authority to exercise control over a particular activity of concern.

5.10 Land disturbing construction activity means any man-made alteration of the land surface resulting in a change in the topography or existing vegetative or non-vegetative soil cover that may result in storm water runoff and lead to increased soil erosion and movement of sediment into waters of the state. Land disturbing construction activity includes clearing and grubbing, demolition, excavating, pit trench dewatering, filling and grading activities.

5.11 Maximum Extent Practicable has the meaning given it in s. NR 151.002(25), Wis. Adm. Code.

5.12 Major outfall means a municipal separate storm sewer outfall that meets one of the following criteria:

5.12.1 A single pipe with an inside diameter of 36 inches or more, or from an equivalent conveyance (cross sectional area of 1,018 square inches) which is associated with a drainage area of more than 50 acres.

5.12.2 A municipal separate storm sewer system that receives storm water runoff from lands zoned for industrial activity that is associated with a drainage area of more than 2 acres or from other lands with 2 or more acres of industrial activity, but not land zoned for industrial activity that does not have any industrial activity present.

5.13 Municipality means any city, town, village, county, county utility district, town sanitary district, town utility district, school district or metropolitan sewage district or any other public entity created pursuant to law and having authority to collect, treat or dispose of sewage, industrial wastes, storm water or other wastes.

5.14 Municipal Separate Storm Sewer System or MS4 means a conveyance or system of conveyances including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, constructed channels or storm drains, which meets all of the following criteria:

5.14.1 Owned or operated by a municipality.

5.14.2 Designed or used for collecting or conveying storm water.

5.14.3 Which is not a combined sewer conveying both sanitary and storm water.

5.14.4 Which is not part of a publicly owned wastewater treatment works that provides secondary or more stringent treatment.

5.15 New MS4 discharge of a pollutant means an MS4 discharge that would first occur after the permittee's original date of initial coverage under an MS4 permit to a surface water to which the MS4 did not previously discharge storm water, and does not include an increase in an MS4's discharge to a surface water to which the MS4 discharged on or before coverage under this permit.

5.16 Outfall means the point at which storm water is discharged to waters of the state or to a storm sewer (e.g., leaves one municipality and enters another).

5.17 Permittee means a person who has applied for and received WPDES permit coverage for storm water discharge. For the purposes of this permit, permittee is the owner or operator of a municipal separate storm sewer system authorized to discharge storm water into waters of the state.

5.18 Permitted area means the areas of land under the jurisdiction of the permittee that drains into a municipal separate storm sewer system, which is regulated under a permit issued pursuant to subch. I of NR 216, Wis. Adm. Code.

5.19 Pollutants of concern means a pollutant that is causing impairment of a waterbody.

5.20 Reach means a specific stream segment, lake or reservoir as identified in a TMDL.

5.21 Reachshed means the drainage area contributing runoff to a given reach.

5.22 Redevelopment means areas where development is replacing older development.

5.23 Riparian landowners are the owners of lands bordering lakes and rivers.

5.24 Sediment means settleable solid material that is transported by runoff, suspended within runoff or deposited by runoff away from its original location.

5.25 Start Date is the date of permit coverage under this permit, which is specified in the Department letter authorizing coverage.

5.26 Storm water management practice means structural or non-structural measures, practices, techniques or devices employed to avoid or minimize soil, sediment or pollutants carried in runoff to waters of the state.

5.27 Storm Water Pollution Prevention Plan or SWPPP refers to the development of a site-specific plan that describes the measures and controls that will be used to prevent and/or minimize pollution of storm water.

5.28 Structural storm water management facilities are engineered and constructed systems that are designed to provide storm water quality control such as wet detention ponds, constructed wetlands, infiltration basins and grassed swales.

5.29 Total maximum daily load or TMDL means the amount of pollutants specified as a function of one or more water quality parameters, that can be discharged per day into a water quality limited segment and still ensure attainment of the applicable water quality standard.

5.30 Urbanized area means a place and the adjacent densely settled surrounding territory that together have a minimum population of 50,000 people, as determined by the U.S. bureau of the census based on the latest decennial federal census.

5.31 Wasteload Allocation or WLA means the allocation resulting from the process of distributing or apportioning the total maximum load to each individual point source discharge.

5.32 Waters of the State has the meaning given it in s. 283.01(20), Wis. Stats.

5.33 WPDES permit means a Wisconsin Pollutant Discharge Elimination System permit issued pursuant to ch. 283, Wis. Stats.

Appendix A: MS4 Permittees Subject to a TMDL Approved Prior to May 1, 2014 including Applicable Updates

A.1 Applicability and Structure of Appendix.

A.1.1 Applicability. In accordance with section 1.5.2.a, this Appendix A applies to permittees subject to a total maximum daily load (TMDL) approved by the United States Environmental Protection Agency (USEPA) prior to May 1, 2014, that includes the following:

- “Total Maximum Daily Loads for Total Phosphorus and Total Suspended Solids in the Rock River Basin,” approved by USEPA September 2011
- “Total Maximum Daily Load and Watershed Management Plan for Total Phosphorus and Total Suspended Solids in the Lower Fox River Basin and Lower Green Bay,” approved by USEPA May 2012
- “Lake St. Croix Nutrient Total Maximum Daily Load,” approved by USEPA August 2012
- “Phosphorus Total Maximum Daily Loads (TMDLs) Tainter Lake and Lake Menomin, Dunn County Wisconsin,” approved by USEPA September 2012

In addition to the TMDLs listed above, Appendix A also applies to the following:

- “Beaver Dam Lake Total Maximum Daily Load for Total Phosphorus,” approved by USEPA August 2018

Note: The Beaver Dam Lake TMDL updates allocations from the Rock River Basin TMDL for the City of Beaver Dam and provides higher allocations, lower percent reductions, than those contained in the Rock River Basin TMDL approved in September 2011.

Note: If the MS4 area extends into or discharges to other basins with a USEPA approved TMDL, a permittee could be subject to more than one TMDL and thus the requirements under Appendices B and/or C.

A.1.2 Structure of Appendix. This appendix is structured to provide permittees with several compliance options. Section A.2 defines full TMDL compliance while sections A.3, A.4, and A.5 provide different compliance options. Section A.3 applies to permittees that submitted a plan meeting the requirements contained in sections 1.5.4.4 and 1.5.4.5 of WPDES Permit No. WI-S050075-2 or WI-S050181-1 and received Department concurrence regarding the plan. Section A.3 also applies to permittees that are participating in an approved adaptive management plan. Section A.4 details requirements for permittees that can comply with the TMDL during this permit term. Section A.5 applies to permittees who have not been able to utilize sections A.3 or A.4. Section A.5 contains two compliance tracks; permittees may choose between the requirements stipulated under section A.5.2 or meet the requirements under section A.5.3. Section A.6 outlines reporting requirements.

A.2 Full TMDL Compliance.

A.2.1 USEPA is allowing the Department to evaluate MS4 compliance with TMDL Wasteload Allocations (WLAs) using a percent reduction framework consistent with Wisconsin’s storm

water program. For consistency with existing storm water program requirements, demonstration of TMDL compliance will use the percent reduction measured from the no runoff management controls (no-controls) condition. The percent reduction from no-controls, for each pollutant of concern and reachshed, necessary to meet the TMDL WLAs for the USEPA approved TMDLs are listed in Tables A1-A4. The no-controls modeling condition means taking no (zero) credit for existing storm water control measures that reduce the discharge of pollutants. Existing practices can then be applied and counted toward meeting the TMDL reductions.

A.2.2 TMDLs may assign a percent reduction for one or more reachsheds for each pollutant of concern (i.e., total suspended solids (TSS) and total phosphorus (TP)). Full TMDL compliance is achieved by the permittee provided all of the following conditions are met:

- a. By October 31, 2023, the permittee submits the necessary data and documentation to the Department that demonstrates that the permittee meets the percent reductions stipulated in Tables A1-A4 for each reachshed that the MS4 discharges to and for each pollutant of concern.
- b. The documentation submitted by the permittee includes the policies, procedures, and regulatory mechanisms that the permittee will employ to ensure that storm water controls and management measures will continue to be operated and maintained so that their pollutant removal efficiency continues to be met.
- c. Based upon the data and documentation and any necessary subsequent information requested by the Department, the permittee receives written concurrence from the Department by April 30, 2024, that the permittee has achieved full TMDL compliance.

A.3 Implementation of TMDL Compliance Plan or Participation in an Approved Adaptive Management Plan.

A.3.1 If the permittee submitted a TMDL Implementation Plan meeting the requirements contained in sections 1.5.4.4 and 1.5.4.5 of WPDES Permit No. WI-S050075-2 or WI-S050181-1 and has received Department concurrence regarding the plan, the permittee shall implement the plan as its TMDL Compliance Plan.

A.3.2 In accordance with s. 283.13(7), Wis. Stats., and s. NR 217.18, Wis. Adm. Code, if by the effective date of this permit the permittee has chosen to participate in an Adaptive Management project that has been approved by the Department the permittee shall continue to participate in the implementation of the Adaptive Management project.

A.4 Compliance During the Term of This Permit. If the permittee determines that it can meet the requirements stipulated in section A.2.2 by October 31, 2023, the permittee shall meet all the following:

A.4.1 By March 31, 2020, the permittee shall notify the Department if compliance will be achieved by October 31, 2023.

A.4.2 Consistent with the reporting requirements contained in section A.6, the permittee shall submit written verification that it is has met the applicable requirements contained in section A.2.2.

A.5 Compliance Over Multiple Permit Terms. If the permittee cannot meet the requirements stipulated under sections A.3 or A.4, the permittee shall demonstrate continued progress towards compliance with the requirements contained in section A.2.2. During the term of this permit, the following are required:

A.5.1 By March 31, 2020, if the permittee determines that the applicable requirements contained in section A.2.2 will not be achieved by October 31, 2023, then the permittee shall notify the Department in writing which reachsheds and pollutants of concern are not in compliance with the requirements contained in section A.2.2.

A.5.2 By October 31, 2021, the permittee shall submit a TMDL Implementation Plan to the Department identifying and describing the actions that the permittee shall undertake, including a proposed schedule and milestones, to achieve the following by the end of the term of this permit:

a. A level of reduction that achieves at least 20% of the remaining reduction needed beyond the current 20% TSS reduction required under s. NR 151.13 (2)(b)1.b., Wis. Adm. Code, to achieve full compliance in sediment or TSS.

b. A level of reduction that achieves at least 10% of the remaining reduction needed beyond 15% TP reduction to achieve full compliance in TP.

Note: The reductions stipulated under section A.5.2 are interim compliance targets set for this permit term. Future permit reduction targets may taper off or vary between municipalities based on individual plans as it is expected that municipalities will rely more on reductions obtained through redevelopment.

Note: Unlike full compliance as outlined in section A.2.2, compliance with the reductions stipulated under sections A.5.2.a and A.5.2.b can be achieved utilizing an averaged reduction calculated from individual reductions achieved in one or multiple reachsheds and spanning the entire MS4 area that is impacted by the TMDL.

Note: Reductions obtained through a permittee's participation in a water quality trading project, in accordance with s. 283.84, Wis. Stats., and that has been reviewed and approved by the Department, may be counted toward credit in meeting the requirements stipulated under sections A.5.2.a and A.5.2.b. Additional information on water quality trading is available from the Department's Internet site at:

<https://dnr.wi.gov/topic/surfacewater/waterqualitytrading.html>

Note: Example calculation to meet section A.5.2.a for total suspended solids (TSS)

“Municipality A” has modeled a no-controls TSS load of 50 tons/year for Reachshed 2 and 100 tons/year for Reachshed 3.

Determine Calculated Wasteload Allocation

“Municipality A” has area in Rock River TMDL Reachsheds 2 and 3. From Table A.1, the TMDL requires the following reductions from no controls which under section A.2 must ultimately achieve a mass reduction as follows:

TMDL Reachshed	Modeled TSS from No-Controls (tons/yr)	TMDL TSS Reduction from No-Controls	Ultimate Mass Reduction Required for Full TMDL Compliance (tons/yr)	Calculated Wasteload Allocation (tons/yr)
2	50	40.6%	$50 * 0.406 = 20.3$	$50 - 20.3 = 29.7$
3	100	55.6%	$100 * 0.556 = 55.6$	$100 - 55.6 = 44.4$

Determine Minimum Control Required under Section NR 151.13(2)(b)1.b., Wis. Adm. Code

TMDL Reachshed	No Controls TSS (tons/yr)	NR 151 Required Reduction (tons/yr)	NR 151 Allowable Load (tons/yr)
2	50	$50 * 0.20 = 10$	$50 - 10 = 40$
3	100	$100 * 0.20 = 20$	$100 - 20 = 80$
Total		30.0	

Calculate 20% Additional Reduction from Section NR 151.13(2)(b)1.b., Wis. Adm. Code

Under section A.5.2.a, “Municipality A” must achieve an additional 20% reduction from the current 20% TSS reduction required under s. 151.13 (2)(b)1.b., Wis. Adm. Code. As shown below, “Municipality A” needs to achieve a 20% reduction of the remaining 45.9 tons results in “Municipality A” needing to achieve an additional 9.18 tons/year in reduction.

Reachshed	NR 151 Allowable Load (tons/yr)	Calculated Wasteload Allocation (tons/yr)	Additional Reduction from NR 151 (tons/yr)	20% Additional Reduction from NR 151 (tons/yr)
2	40	29.7	$40 - 29.7 = 10.3$	$10.3 * 0.2 = 2.06$
3	80	44.4	$80 - 44.4 = 35.6$	$35.6 * 0.2 = 7.12$
Total			45.9	9.18

Load reduction at the end of permit term

At the end of the permit term, “Municipality A” should demonstrate a minimum reduction from no controls of 39.18 (30 tons plus 9.18 tons). “Municipality A” has the flexibility to decide how much of that reduction is provided in TMDL Reachshed 2 and/or 3 over the next permit term. “Municipality A” will still require additional reductions in each reachshed over subsequent permit terms to reach the calculated wasteload allocation of 29.7 tons in TMDL Reachshed 2 and 44.4 tons in TMDL Reachshed 3.

The calculation process is similar for total phosphorus (TP).

A.5.3 If the permittee determines by October 31, 2021, that it is unable to achieve the reductions stipulated under sections A.5.2.a and A.5.2.b, the permittee shall meet the following requirements by October 31, 2023:

Note: The permittee may optimize deployment of resources between the requirements listed below to maximize reductions for the least cost. In some cases, permittees may already be meeting these requirements.

a. Pursuant to the permittee's authority under s. 281.33(6)(a)2., Wis. Stats., the permittee shall create or revise and promulgate a municipal storm water management ordinance applicable to redevelopment that requires compliance with post-construction storm water management performance standards that are stricter than the uniform statewide standards established by the Department. When reporting to the Department under section A.6.3, the permittee shall include a justification for the level of pollutant reduction in the ordinance with an assessment of the progress it achieves towards full compliance with the TMDL. The redevelopment reductions may be adjusted to account for other storm water control measures that may exist. The permittee may also establish TP reduction levels for redevelopment projects.

Note: The permittee may enact an ordinance that is municipal-wide, targets individual TMDL reachsheds, or designated areas within the permitted MS4, balancing required TMDL reductions, parcel size, and the impact of other treatment options. Increasing redevelopment reductions is one tool in moving toward TMDL compliance.

b. The permittee shall create or revise a municipal ordinance that requires the development and implementation of a maintenance plan for all privately-owned storm water treatment facilities for which the permittee takes a TSS and/or TP reduction credit. The permittee shall develop and implement procedures and measures to verify and track that the storm water treatment facilities are inspected on a regular schedule and maintained in the intended working condition in accordance with the plans. The permittee shall require that maintenance agreements be recorded with the appropriate property records that obligates the current and future owners to implement the maintenance plans.

c. The permittee shall revise or promulgate a municipal ordinance that requires the submittal of record drawings for storm water management facility that the permittee takes a TSS and/or TP reduction credit. The permittee shall require submittal of the record drawing prior to close-out of the local permit or upon final approval and shall maintain appropriate records and tracking of the plans.

d. If the pollutant of concern is TP, the permittee shall implement, expand, or optimize a municipal leaf collection program coupled with street cleaning to serve areas where municipal leaf collection is not currently provided within the MS4 but for which a phosphorus reduction has been assigned and additional reductions could be achieved.

Note: The Department's "Interim Municipal Phosphorus Reduction Credit for Leaf Management Programs" guidance document includes recommendations on how the permittee's municipal leaf collection program should be designed and implemented.

The guidance is available from the Department's Internet site at:
https://dnr.wi.gov/topic/stormwater/standards/ms4_modeling.html

- e. Within the MS4 permitted area, the permittee shall inventory the condition of the conveyance systems and outfalls. Where erosion or scour is occurring, the permittee shall develop a schedule to stabilize the identified areas over a 5-year period.
- f. The permittee shall install at least one new structural BMP or enhance one or more existing structural BMPs to reduce a pollutant of concern discharged via storm water runoff to an impaired waterbody for which a WLA has been assigned to the permittee. The permittee shall develop and implement a maintenance plan for each new structural BMP.
- g. The permittee shall conduct an analysis of the current municipal street cleaning program, to determine if additional pollutant loading reductions can be achieved. The permittee shall evaluate optimizing sweeping frequency, targeting of critical areas and time periods, and instituting parking restrictions. If a pollutant reduction can be achieved through optimizing the existing street cleaning program, the permittee shall adopt the optimized program the next calendar year or provide a written explanation to the Department explaining why the optimize street cleaning program is not feasible and provide alternative options to achieve similar pollutant reductions.

A.6 Reporting Requirements. For the term of this permit, the permittee shall meet the following reporting requirements:

A.6.1 Compliance Determination Reporting. The permittee shall submit the information requested in this appendix in accordance with the following schedule:

- a. By March 31, 2020, for sections A.4.1 and A.5.1.
- b. By October 31, 2021, for section A.5.2.
- c. By October 31, 2023, for sections A.2.2.a and A.5.3.

A.6.2 Annual Reporting. For compliance options outlined under sections A.3, A.4, and A.5, the permittee shall include a description and the status of progress toward implementing the identified actions and activities in their MS4 annual reports due by March 31 of each year.

A.6.3 Final Documentation. Except for permittees complying with a Department approved adaptive management plan under section A.3.2, by October 31, 2023, the permittee shall submit documentation to the Department to verify that the permittee has completed all actions required under this appendix including the following:

- a. An updated storm sewer system map that identifies:
 - (1) The current municipal boundary. For a permittee that is not a city or village, identify the permitted area.

Note: The permitted area for towns, counties and non-traditional MS4s pertains to the area within an urbanized area or the area served by its storm sewer system, such as a university campus.

(2) The TMDL reachshed boundaries within the municipal boundary, and the area of each TMDL reachshed in acres within the municipal boundary.

(3) The MS4 drainage boundary associated with each TMDL reachshed, and the area in acres of the MS4 drainage boundary associated with each TMDL reachshed.

b. The permittee shall submit an updated tabular summary that includes the following for each MS4 drainage boundary associated with each TMDL reachshed as identified under section A.6.3.a and for each pollutant of concern:

(1) The permittee's percent reduction needed to comply with its TMDL WLA from the no-controls modeling condition.

(2) The modeled MS4 annual average pollutant load without any storm water control measures.

(3) The modeled MS4 annual average pollutant load with existing storm water control measures.

(4) The percent reduction in pollutant load achieved calculated from the no-controls condition determined under section A.6.3.a(2) and the existing controls condition determined under section A.6.3.a(3).

(5) The existing storm water control measures, including the type of measure, area treated in acres, the pollutant load reduction efficiency, and confirmation of the permittee's authority for long-term maintenance of each practice.

c. If the updated tabular summary required under section A.6.3.b shows that the permittee is not achieving the requirements stipulated in section A.2, the permittee shall submit an updated written TMDL Implementation Plan to the Department that describes how the permittee will make progress toward achieving compliance. The TMDL Implementation Plan shall include the following information:

(1) A list of management options and an implementation schedule that over the next permit term achieves, to the maximum extent practicable, an additional 20% reduction in sediment or TSS and an additional 10% reduction in TP. The percent reductions shall be applied to the difference measured from loading conditions at the end of this permit to the total reductions listed in Tables A1-A4. The reductions can be achieved utilizing an averaged reduction calculated from individual reductions achieved in one or multiple reachsheds and spanning the entire MS4 area impacted by a TMDL.

Note: Reductions that occur through stricter redevelopment standards or through water quality trading can be counted toward meeting the reduction requirements under this section.

Note: Unlike full compliance as outlined in section A.2.2, interim compliance under this section can be based on an average reduction measured across the MS4 area impacted by a TMDL.

(2) Recommendations and options with supporting analysis for storm water control measures that will be installed or implemented in future permit terms to achieve the requirements, to the maximum extent possible, stipulated in section A.2.

(3) A proposed schedule for implementation of the recommendations and options identified under section A.6.3.c(1). The proposed schedule may extend into future permit terms.

(4) A cost effectiveness analysis for implementation of the recommendations and options identified under section A.6.3.c(1).

Table A1: Rock River Basin TMDL Load Reductions Necessary to Meet TMDL Wasteload Allocations by TMDL Reachshed

Reachshed Number (TMDL Subbasin)	Waterbody Name	County	TSS % Reduction from No-controls	TP % Reduction from No-controls
2	South Branch Rock River	Dodge, Fond du Lac, Green Lake	40.6	48.2
3	South Branch Rock River	Dodge, Fond du Lac	55.6	86.9
20	Rock River	Dodge, Jefferson, Washington, Waukesha	40.0	37.2
21	Rock River	Dodge, Jefferson, Washington, Waukesha	40.0	34.3
23	Oconomowoc River	Washington, Waukesha	46.6	35.8
24	Mason Creek	Dodge, Washington, Waukesha	47.2	35.0
25	Oconomowoc River	Jefferson, Waukesha	59.2	73.7
26	Battle Creek	Waukesha	57.4	52.6
27	Oconomowoc River	Jefferson, Waukesha	40.0	27.0
28	Rock River	Dodge, Jefferson	40.0	27.7
29	Rock River	Dodge, Jefferson	44.2	64.2
30	Johnson Creek	Jefferson	40.0	27.0
33	Mill Creek, Beaver Dam Lake	Columbia, Dodge	45.4	48.2
34	Beaver Dam River	Columbia	58.6	86.1
37	Park Creek	Columbia	72.4	75.2
39	Shaw Brook	Columbia	40.0	27.0
45	Mauneshia River	Columbia	44.8	36.5
51	Crawfish River	Columbia	40.0	37.2
54	Rock River	Columbia, Dodge, Jefferson	43.6	71.5
55	Bark River	Waukesha	65.8	76.6
56	Bark River	Jefferson, Waukesha	40.0	40.9

Reachshed Number (TMDL Subbasin)	Waterbody Name	County	TSS % Reduction from No-controls	TP % Reduction from No-controls
59	Steel Brook, Scuppernong River, Bark River	Jefferson, Walworth, Rock	49.0	66.4
60	Rock River	Jefferson, Rock	40.6	48.2
61	Rock River	Dane, Rock	41.2	31.4
62	Pheasant Branch Creek	Dane	82.0	78.1
63	Spring (Dorn) Creek	Dane	46.6	37.2
64	Yahara River, Lake Mendota, Lake Monona	Dane, Columbia	73.0	61.3
65	Nine Springs Creek	Dane	67.6	62.8
66	Yahara River, Lake Waubesa, Lake Kegonsa	Dane	62.2	54.0
67	Yahara River	Dane	40.0	27.0
68	Yahara River	Dane, Rock	50.8	65.0
69	Yahara River	Dane, Rock	52.6	79.6
70	Rock River	Rock	40.6	27.7
71	Rock River	Rock	58.6	48.2
72	Blackhawk Creek	Rock, Walworth	40.0	27.0
73	Blackhawk Creek	Rock	69.4	64.2
74	Rock River	Rock	52.0	39.4
75	Markham Creek	Rock	51.4	38.0
76	Rock River	Rock	57.4	81.8
78	Bass Creek	Rock	40.0	29.9
79	Rock River	Rock	62.2	66.4
80*	Turtle Creek	Rock, Walworth	55.0	62.8
81	Turtle Creek	Rock, Walworth	44.2	41.6
83	Lake Koshkonong	Dane, Jefferson, Rock	55.0	54.0

Note: *MS4 Reachshed 80 reductions are based on Non-Point Source annual average reductions as TMDL had not assigned a separate MS4 reduction for MS4s in this reach.

Table A2: Lower Fox River Basin and Lower Green Bay TMDL Load Reductions Necessary to Meet TMDL Wasteload Allocations by TMDL Reachshed

Reachshed Name (Subbasin)	County	Subbasin ID	TSS % Reduction from No-controls	TP % Reduction from No-controls
Lower Green Bay	Brown	LFS7 & LFS8	52%	41%
Lower Fox River Main Stem	Brown, Outagamie, Winnebago City of Green Bay ⁽¹⁾	LFM	72% 70.4% ⁽¹⁾	41%
East River	Brown, Calumet	LF01	52%	41%
Baird Creek	Brown	LF01	52%	41%
Bower Creek	Brown	LF01	52%	41%
Dutchman Creek	Brown	LF02	52%	41%
Ashwaubenon Creek	Brown	LF02	52%	41%
Apple Creek	Brown, Outagamie	LF02	52%	41%
Plum Creek	Brown, Calumet	LF03	52%	41%
Kankapot Creek	Calumet, Outagamie	LF03	52%	41%
Garners Creek	Outagamie	LF03	60%	69%
Mud Creek	Outagamie, Winnebago	LF04	43%	48%
Neenah Slough	Winnebago	LF06	52%	41%
Duck Creek	Brown, Outagamie	LF05	52%	41%
Trout Creek	Brown	LF05	52%	41%

Note: % TSS reduction from No Controls = 20 + [0.80 x (% TSS Control Lower Fox TMDL Report)]
 % TP reduction from No Controls = 15 + [0.85 x (% TP Control Lower Fox TMDL Report)]

(1) Due to the regionalization of Green Bay Packaging with New Water (GBMSD), the TSS WLA of 108,259 pounds allocated to Green Bay Packaging was reassigned to the City of Green Bay MS4. This results in a change in allocation for the City of Green Bay MS4 from 1,073,228 pounds to 1,181,478 pounds of TSS and a corresponding change in the percent reduction from 72% to 70.4%.

Table A3: Lake St. Croix Nutrient TMDL Load Reductions Necessary to Meet TMDL Wasteload Allocations by TMDL Reachshed

Waterbody Name	County	WBIC	MS4 TP % Reduction from No Controls
Lake St. Croix	St. Croix, Pierce	2601500	46.0

Table A4: Red Cedar River (Tainter Lake, Menomin Lake) TMDL Load Reductions Necessary to Meet TMDL Wasteload Allocations by TMDL Reachshed

Waterbody Name	County	WBIC	MS4 TP % Reduction from No Controls*
Tainter Lake	Dunn	2068000	$\frac{Load_{2025\ No\ Controls} - 1700 \frac{lbs}{yr}}{Load_{2025\ No\ Controls}}$
Lake Menomin	Dunn	2065900	39.2

Note: *The TMDL allocations and necessary reduction are calculated using the 2025 projected MS4 build out area. The 2025 area modeled in a No Controls condition compared against the WLA written in the TMDL yields the percent reduction.

Appendix B: MS4 Permittees Subject to Milwaukee River Basin TMDL

B.1 Applicability. In accordance with section 1.5.2.b, this Appendix B applies to permittees subject to a total maximum daily load (TMDL) approved by the United States Environmental Protection Agency (USEPA) that includes the following:

- “Total Maximum Daily Loads for Total Phosphorus, Total Suspended Solids, and Fecal Coliform Milwaukee River Basin, Wisconsin,” approved by USEPA March 2018

Note: If the MS4 area extends into or discharges to other basins with a USEPA approved TMDL, a permittee could be subject to more than one TMDL and thus the requirements under Appendices A and/or C.

B.2 Full TMDL Compliance for Total Suspended Solids (TSS) and Total Phosphorus (TP) WLAs.

B.2.1 USEPA is allowing the Department to evaluate MS4 compliance with TMDL Wasteload Allocations (WLAs) using a percent reduction framework consistent with Wisconsin’s storm water program. For consistency with existing storm water program requirements, TMDL compliance will use the percent reduction basis from the no runoff management controls (no-controls) condition. The percent reduction from no-controls, for TSS and TP for each reachshed, necessary to meet the TMDL WLAs for the USEPA approved TMDLs are listed on Table B1. The no-controls modeling condition means taking no (zero) credit for existing storm water control measures that reduce the discharge of pollutants. Existing practices can then be applied and counted toward meeting the TMDL reductions.

B.2.2 TMDLs may assign a percent reduction for one or more reachsheds for each pollutant of concern (i.e., total suspended solids (TSS) and total phosphorus (TP)). Full TMDL compliance is achieved by the permittee provided all of the following conditions are met:

- a. By October 31, 2023, the permittee submits the necessary data and documentation to the Department that demonstrates that the permittee meets the percent reductions stipulated in Table B1 for each reachshed that the MS4 discharges to and for each pollutant of concern.
- b. The documentation submitted by the permittee includes the policies, procedures, and regulatory mechanisms that the permittee will employ to ensure that storm water controls and management measures will continue to be operated and maintained so that their pollutant removal efficiency continues to be met.
- c. Based upon the data and documentation and any necessary subsequent information requested by the Department, the permittee receives written concurrence from the Department by April 30, 2024, that the permittee has achieved full TMDL compliance.

B.3 Participation in an Approved Adaptive Management Plan for Total Suspended Solids (TSS) and Total Phosphorus (TP) WLAs. In accordance with s. 283.13(7), Wis. Stats., and s. NR 217.18, Wis. Adm. Code, if the permittee chooses to participate in an Adaptive Management project, the permittee shall submit the plan to the Department by March 31, 2022 for approval.

Note: Information on adaptive management is available from the Department's Internet site at: <https://dnr.wi.gov/topic/SurfaceWater/AdaptiveManagement.html>

B.4 TMDL Implementation Plan for Total Suspended Solids (TSS) and Total Phosphorus (TP) WLAs. If the permittee has chosen not to participate in an adaptive management plan as stipulated in section B.3, the permittee shall perform the following activities:

B.4.1 By March 31, 2022, the permittee shall determine if the applicable requirements contained in section B.2.2 will be achieved during the term of this permit. The permittee shall notify the Department which reachsheds and pollutants of concern are not in compliance with the requirements contained in section B.2.2 with the tabular summary created under section B.4.2(b) and develop a TMDL Implementation Plan per section B.4.2(c).

B.4.2 The permittee shall develop and submit the following documentation to meet the requirements stipulated in section B.2.2:

a. By March 31, 2020, an updated storm sewer system map that identifies:

(1) The current municipal boundary. For a permittee that is not a city or village, identify the permitted area.

Note: The permitted area for towns, counties and non-traditional MS4s pertains to the area within an urbanized area or the area served by its storm sewer system, such as a university campus.

(2) The TMDL reachshed boundaries within the municipal boundary, and the area of each TMDL reachshed in acres within the municipal boundary.

(3) The MS4 drainage boundary associated with each TMDL reachshed, and the area in acres of the MS4 drainage boundary associated with each TMDL reachshed.

(4) Identification of areas on a map and the acreage of those areas within the municipal boundary that the permittee believes should be excluded from its analysis to show compliance with the TMDL WLA. In addition, the permittee shall provide an explanation of why these areas should not be its responsibility.

Note: An example of an area within a municipal boundary that may not be subject to a TMDL WLA for the permittee is an area that does not drain through the permittee's MS4.

(5) Flow paths of storm water through the storm sewer system.

(6) The location and associated drainage basin of structural BMPs the MS4 uses for TSS and TP treatment.

b. By March 31, 2022, the permittee shall submit a tabular summary that includes the following for each MS4 drainage boundary associated with each TMDL reachshed as identified under section B.4.2.a(2) and for each pollutant of concern listed in Table B1:

(1) The permittee's percent reduction needed to comply with its TSS and TP WLA from the no-controls modeling condition. The no-controls modeling condition means taking no (zero) credit for storm water control measures that reduce the discharge of pollutants.

Note: This model run is comparable to the no-controls condition modeled for the developed urban area performance standard of s. NR 151.13, Wis. Adm. Code.

(2) The modeled annual average pollutant load without any storm water control measures for each reachshed which the MS4 discharge to.

(3) The modeled MS4 annual average pollutant load with existing and current storm water control measures for each reachshed which the MS4 discharges to.

(4) The percent reduction in pollutant load achieved calculated from the no-controls condition determined under section B.4.2.b(2) and the existing controls condition determined under section B.4.2.b(3).

(5) The existing storm water control measures including the type of measure, area treated in acres, the pollutant load reduction efficiency, and confirmation of the permittee's authority for long-term maintenance of each practice.

c. By March 31, 2022, if the tabular summary required under section B.4.2.b shows that the permittee is not achieving the applicable percent reductions needed to comply with section B.2.2, then the permittee shall submit a written TMDL Implementation Plan to the Department that describes how the permittee will make progress toward achieving compliance. The plan shall include the following information:

(1) Recommendations and options for storm water control measures that will be considered to reduce the discharge of each pollutant of concern. At a minimum, the following shall be evaluated: all post-construction BMPs for which the Department has a technical standard, optimizing or retrofitting all existing public and private storm water control practices, regional practices, optimization or improvements to existing BMPs, incorporation of storm water control for all road reconstruction projects, more restrictive post-construction ordinances, updated development and redevelopment standards.

(2) A proposed schedule for implementation of the alternatives identified under section B.4.2.c(1). The proposed schedule may extend beyond the expiration date of this permit. The schedule should aim to achieve, to the maximum extent practicable, a level of reduction that achieves at least 20% of the remaining reduction needed beyond baseline to achieve full compliance in TSS and a level of reduction that achieves at least 10% of the remaining reduction needed

beyond baseline to achieve full compliance in TP over the next permit term. The reductions can be achieved utilizing an averaged reduction calculated from individual reductions achieved in one or multiple reachsheds and spanning the entire MS4 area impacted by a TMDL.

Note: The reductions stipulated under B.4.2.c(2) are interim compliance targets set as a planning target for the next permit term. Future permit reduction targets may taper off or vary between municipalities based on individual plans as it is expected that municipalities will rely more on reductions obtained through redevelopment.

(3) A cost effectiveness analysis for implementation of the recommendations and options identified under section B.4.2.c(1).

Note: The Department has developed the guidance document “TMDL Guidance for MS4 Permits: Planning, Implementation, and Modeling Guidance.” The guidance is available on the Department’s Internet site:

https://dnr.wi.gov/topic/stormwater/standards/ms4_modeling.html, and is available to assist a permittee with complying with the requirements of section B.4.

Note: Reductions obtained through a permittee’s participation in a water quality trading project, in accordance with s. 283.84, Wis. Stats., and that has been reviewed and approved by the Department, can be counted toward credit in meeting the requirements stipulated under section B.4.2.c(2). Additional information on water quality trading is available from the Department’s Internet site at:

<https://dnr.wi.gov/topic/surfacewater/waterqualitytrading.html>

B.4.3 TMDL Compliance During the Term of This Permit for Total Suspended Solids (TSS) and Total Phosphorus (TP) WLAs. If the permittee has chosen not to participate in an adaptive management plan as stipulated in section B.3, the permittee shall select and implement a minimum of three of the activities listed below, in addition to the planning requirements contained in section B.4.2, by October 31, 2023:

Note: The permittee may optimize deployment of resources between the requirements listed below to maximize reductions for the least cost. In some cases, permittees may already be meeting these requirements.

a. Pursuant to the permittee’s authority under s. 281.33(6)(a)2., Wis. Stats., the permittee shall create or revise and promulgate a municipal storm water management ordinance applicable to redevelopment that requires compliance with post-construction storm water management performance standards that are stricter than the uniform statewide standards established by the Department. When reporting to the Department under section B.6.3, the permittee shall include a justification for the level of pollutant reduction in the ordinance with an assessment of the progress it achieves towards full compliance with the TMDL. The redevelopment TSS reduction may be adjusted to account for other storm water controls measures that may exist. The permittee may also establish TP reduction levels for redevelopment projects.

Note: The permittee may enact an ordinance that is municipal wide, targets individual TMDL reachsheds, or designated areas within the permitted MS4 balancing required TMDL reductions, parcel size, and the impact of other treatment options. Increasing redevelopment reductions is one tool in moving toward TMDL compliance.

b. The permittee shall create or revise a municipal ordinance that requires the development and implementation of a maintenance plan for all privately-owned storm water treatment facilities for which the permittee takes a TSS and/or TP reduction credit. The permittee shall develop and implement procedures and measures to verify and track that the storm water treatment facilities are inspected on a regular schedule and maintained in the intended working condition in accordance with the plans. The permittee shall require that maintenance agreements be recorded with the appropriate property records that obligates the current and future owners to implement the maintenance plans.

c. The permittee shall revise or promulgate a municipal ordinance that requires the submittal of record drawings for which the permittee takes a TSS and/or TP reduction credit. The permittee shall require submittal of the record drawing prior to close-out of the local permit or upon final approval and shall maintain appropriate records and tracking of the plans.

d. If the pollutant of concern is TP, implement, expand, or optimize a municipal leaf collection program coupled with street cleaning to serve areas where municipal leaf collection is not currently provided within the MS4 but for which a phosphorus WLA has been assigned and additional reductions could be achieved.

Note: The Department's "Interim Municipal Phosphorus Reduction Credit for Leaf Management Programs" guidance document includes recommendations on how the permittee's municipal leaf collection program should be designed and implemented. The guidance is available from the Department's Internet site at:
https://dnr.wi.gov/topic/stormwater/standards/ms4_modeling.html

e. Within the MS4 permitted area, the permittee shall inventory the condition of the conveyance systems and outfalls. Where erosion or scour is occurring, the permittee shall develop a schedule to stabilize the identified areas.

f. Install one new structural BMP or enhance one existing structural BMPs to reduce a pollutant of concern discharged via storm water runoff to an impaired waterbody for which a WLA has been assigned to the permittee. The permittee shall develop and implement a maintenance plan for each new structural BMP.

Note: This option can be counted each time the permittee installs or enhances a structural BMP to satisfy the required activities. A permittee could meet the requirement if they solely chose this option and installed or enhanced three BMPs.

g. Permittee shall conduct an analysis of the current municipal street cleaning program, to determine if additional pollutant loading reductions can be achieved. The permittee shall evaluate optimizing sweeping frequency, targeting of critical areas and time

periods, and instituting parking restrictions. If a pollutant reduction can be achieved through optimizing the existing street cleaning program, the permittee shall adopt the optimized program the next calendar year or provide a written explanation to the Department explaining why the optimize street cleaning program is not feasible and provide alternative options to achieve similar pollutant reductions.

Note: The permittee may optimize deployment of resources between the requirements listed above to maximize reductions for the least cost; for example, only increase street sweeping where structural practices do not already exist to treat the runoff for the area.

B.5 TMDL Compliance and Implementation for Bacteria WLAs. This section applies to all permittees with a bacteria WLA specified in the Milwaukee River Basin TMDL Final Report dated March 19, 2018. The permittee shall do all of the following:

B.5.1 As part of its program to address illicit discharges under section 2.3 of this permit, by March 31, 2021, the permittee shall begin to conduct ongoing public education and outreach activities specifically to increase awareness of bacterial pollution problems, potential sources, proper pet waste management, and the impacts of urban wildlife and pests.

B.5.2 In addition to complying with the requirements in section 2.3 of this permit, the permittee shall comply with the following:

a. By March 31, 2022, the permittee shall develop and submit to the Department an inventory of bacteria sources and a map indicating the locations of the potential sources of fecal coliform and *E. coli* entering its MS4. The inventory shall be in a tabular format and include a label code, the name of the source, the physical address or location description of the source, and the ownership of the source (i.e., public or private). The map shall be to scale, identify all municipal streets, and indicate the locations of the sources using the label codes. The permittee shall consider the variation in flow conditions in its identification of potential sources. The inventory and map shall include the following potential sources of bacteria:

- Known or suspected leaking or failing septic systems.
- Sanitary sewer overflow locations.
- Livestock and domesticated animals housed or raised within the MS4 permitted area and discharging to the MS4, but not including household pets.
- Zoos, kennels, animal breeders, pet stores, and dog training facilities.
- Waste hauling, storage, and transfer facilities.
- Areas that attract congregations of nuisance urban birds and wildlife.
- Known or suspected properties with inadequate food or organic waste handling or storage.
- Composting sites or facilities.
- Known or suspected areas with improper human sanitation use.
- Any other source that the permittee or the Department has a reason to believe is discharging bacteria to the MS4.

b. By October 31, 2023, the permittee shall develop and submit to the Department a bacteria source elimination plan. The plan shall consist of a strategy and prioritization

scheme to eliminate each source of bacteria identified under section B.5.2.2. The plan shall include the BMPs to be used, cost estimates, sources of funding, and a schedule to eliminate the sources. BMPs identified in the plan may be structural, non-structural, targeted outreach, and/or additional ordinances, but the plan shall include the rationale for using each BMP, the reason for selected a BMP over another, and the expected outcome from implementing each BMP.

Note: While the TMDL allocations in the Milwaukee River Basin TMDL are expressed only in terms of fecal coliform, both fecal coliform and *E. coli* have been listed as sources of recreational use impairments that the TMDL was completed to address.

B.5.3 By March 31, 2023, the permittee shall adopt local ordinances to address the requirements for proper pet waste management, the restrictions on feeding of urban wildlife that are potential sources of bacteria entering the MS4, the requirements for property owners to cooperate with identifying and eliminating illicit sanitary sewerage cross-connections with the MS4, and the requirements for property owners to address other potential sources of bacteria that may enter the MS4 (e.g., refuse management, pest control).

B.6 Reporting Requirements. For the term of this permit, the permittee shall meet the following reporting requirements:

B.6.1 Compliance Determination Reporting. The permittee shall submit the information requested in this appendix in accordance with the following schedule:

- a. By March 31, 2020, for section B.4.2.a.
- b. By March 31, 2021, for sections B.5.1.
- c. By March 31, 2022, for sections B.4.1, B.4.2.b, and B.5.2.a.
- d. By March 31, 2023, for section B.5.3.
- e. By October 31, 2023, for section B.2.2.a, B.4.3, and B.5.2.b.

B.6.2 Annual Reporting. For requirements outlined under sections B.3, B.4, and B.5 the permittee shall include a description and the status of progress toward implementing the identified actions and activities in their MS4 annual reports due by March 31 of each year.

B.6.3 Final Documentation. By October 31, 2023, the permittee shall submit documentation to the Department to verify that the permittee has completed all actions required under this appendix including submittal of the TMDL Implementation Plan required under section B.4 and documentation that the three activities selected under section B.4.3 have been completed.

Table B1: Milwaukee River Basin TMDL Load Reductions Necessary to Meet TMDL Wasteload Allocations by TMDL Reachshed

Kinnickinnic River Basin:

Reachshed (TMDL Subbasin)	Waterbody Name	Waterbody Extents	TSS % Reduction from No-controls	TP % Reduction from No-controls
KK-1	Lyons Park Creek	Entire Length	78.4%	68.1%
KK-2	Kinnickinnic River	From Wilson Park Creek to Lyons Park Creek	77.6%	68.1%
KK-3	South 43rd St. Ditch	Entire Length	76.8%	78.7%
KK-4	Edgerton Channel, Wilson Park Creek, Villa Mann Creek	Entire Length	84.0%	89.4%
KK-5	Holmes Avenue Creek	Entire Length	80.0%	78.7%
KK-6	Cherokee Park Creek	Entire Length	77.6%	69.0%
KK-7	Kinnickinnic River	Estuary to Wilson Park Creek	75.2%	45.0%

Menomonee River Basin:

Reachshed (TMDL Subbasin)	Waterbody Name	Waterbody Extents	TSS % Reduction from No-controls	TP % Reduction from No-controls
MN-1	Menomonee River	From Nor-X-Way Channel to Headwaters	66.4%	63.6%
MN-2	Goldendale Creek	Entire Length	63.2%	47.7%
MN-3	West Branch Menomonee River	Entire Length	65.6%	60.1%
MN-4	Willow Creek	Entire Length	64.0%	51.2%
MN-5	Nor-X-Way Channel	Entire Length	70.4%	72.5%
MN-6	Menomonee River and Dretzka Park Creek	From Little Menomonee River to Nor-X-Way Channel	73.6%	69.0%
MN-7	Lilly Creek	Entire Length	70.4%	64.5%
MN-8	Butler Ditch	Entire Length	69.6%	58.3%
MN-9	Little Menomonee River	Entire Length	70.4%	64.5%
MN-10	Menomonee River	From Underwood Creek to Little Menomonee River	67.2%	31.7%
MN-11	Underwood Creek and Dousman Ditch	From South Branch Underwood Creek to Headwaters	72.0%	62.7%

Reachshed (TMDL Subbasin)	Waterbody Name	Waterbody Extents	TSS % Reduction from No-controls	TP % Reduction from No-controls
MN-12	Underwood Creek	From Menomonee River to South Branch Underwood Creek	80.0%	76.1%
MN-13	South Branch Underwood Creek	Entire Length	76.8%	69.8%
MN-14	Menomonee River	From Honey Creek to Underwood Creek	64.8%	49.4%
MN-15	Honey Creek	Entire Length	73.6%	67.2%
MN-16	Menomonee River	From Estuary to Honey Creek	72.0%	49.4%

Milwaukee River Basin:

Reachshed (TMDL Subbasin)	Waterbody Name	Waterbody Extents	TSS % Reduction from No-controls	TP % Reduction from No-controls
MI-1	Upper Milwaukee River	From Campbellsport to Headwaters	**	**
MI-2	Upper Milwaukee River	From Kewaskum To Campbellsport and Auburn	73.6%	71.6%
MI-3	West Branch Milwaukee River	Entire Length	77.6%	48.6%
MI-4	Kewaskum Creek	Entire Length	76.8%	55.7%
MI-5	Watercress Creek and East Branch Milwaukee River	Entire Length	73.6%	51.2%
MI-6	Quass Creek and Milwaukee River	Near West Bend	73.6%	86.7%
MI-7	Myra Creek and Milwaukee River	From North Branch Milwaukee River to West Bend	79.2%	67.2%
MI-8	North Branch Milwaukee River	from Adell Tributary to Headwaters	**	**
MI-9	Adell Tributary	Entire Length	**	**
MI-10	Chambers Creek, Batabia Creek, and North Branch Milwaukee River	Near Sherman	**	**
MI-11	Melius Creek	Entire Length	**	**
MI-12	Mink Creek	Entire Length	**	**

Reachshed (TMDL Subbasin)	Waterbody Name	Waterbody Extents	TSS % Reduction from No-controls	TP % Reduction from No-controls
MI-13	Stony Creek, Wallace Creek, and North Branch Milwaukee River	Near Farmington	74.4%	46.8%
MI-14	Silver Creek	Entire Length	**	**
MI-15	Milwaukee River	Near Fredonia	**	**
MI-16	Milwaukee River	Near Saukville	75.2%	77.8%
MI-17	Milwaukee River	From Cedar Creek to Saukville	76.0%	83.1%
MI-18	Cedar Creek	From Jackson Creek to Headwaters	76.8%	71.6%
MI-19	Lehner Creek	Entire Length	77.6%	61.0%
MI-20	Jackson Creek	Entire Length	80.8%	77.8%
MI-21	Little Cedar Creek	Entire Length	80.8%	77.8%
MI-22	Cedar Creek	Near Jackson	76.8%	54.8%
MI-23	Evergreen Creek	Near Jackson	79.2%	53.0%
MI-24	North Branch Cedar Creek and Cedar Creek	From Milwaukee River to Myra Creek	73.6%	79.6%
MI-25	Milwaukee River	From Pigeon Creek to Cedar Creek	81.6%	43.2%
MI-26	Pigeon Creek	Entire Length	90.4%	88.5%
MI-27	Milwaukee River	From Lincoln Creek to Pigeon Creek	72.8%	53.9%
MI-28	Beaver Creek	Entire Length	72.8%	88.5%
MI-29	South Branch Creek	Entire Length	71.2%	87.6%
MI-30	Indian Creek	Entire Length	65.6%	76.1%
MI-31	Lincoln Creek	Entire Length	71.2%	85.8%
MI-32	Milwaukee River	From Estuary to Lincoln Creek	58.4%	23.7%

Note: **The TMDL did not assign a percent reduction for these reachsheds because modeling indicated that there is no direct MS4 discharge to this subbasin. If more detailed analysis conducted by the permittee indicates the presence of an MS4 discharge, contact your DNR storm water engineer or specialist for more information on how best to proceed.

Appendix C: MS4 Permittees Subject to the Wisconsin River Basin TMDL or a TMDL Approved After May 1, 2019

C.1 Applicability. In accordance with section 1.5.2.c, this Appendix C applies to permittees subject to a total maximum daily load (TMDL) approved by the United States Environmental Protection Agency (USEPA) that includes the following:

- “Total Maximum Daily Loads for Total Phosphorus in the Wisconsin River Basin,” approved by USEPA April 2019

Note: The Wisconsin River Basin TMDL has two sets of allocations. Table J-4 of Appendix J of the TMDL report lists the allocations and corresponding percent reductions based on current water quality criteria and Table K-4 of Appendix K of the TMDL report lists the allocations and corresponding percent reductions based on recommended site-specific criteria. Both tables provide the percent reductions measured from no-controls and the TMDL baseline. Under this permit term, the allocations listed in Appendix J of the TMDL report apply. If the recommended site-specific criteria are approved by USEPA, the allocations and percent reductions listed in Appendix K of the TMDL report will become applicable. However, permittees may use the allocations from either Appendix J or Appendix K of the TMDL report for planning purposes under sections C.3 and C.4 below.

- A TMDL approved by the USEPA on or after May 1, 2019

Note: If the MS4 area extends into or discharges to other basins with a USEPA approved TMDL, a permittee could be subject to more than one TMDL and thus the requirements under Appendices A and/or B.

C.2 Full TMDL Compliance.

C.2.1 USEPA is allowing the Department to evaluate MS4 compliance with TMDL Wasteload Allocations (WLA) using a percent reduction framework consistent with Wisconsin’s storm water program. For consistency with existing storm water program requirements, TMDL compliance will use the percent reduction measured from the no runoff management controls (no-controls) condition. The percent reduction from no-controls, for each pollutant of concern and reachshed, necessary to meet the TMDL WLAs for the USEPA approved TMDLs are listed in the approved TMDLs. The no-controls modeling condition means taking no (zero) credit for existing storm water control measures that reduce the discharge of pollutants. Existing practices can then be applied and counted toward meeting the TMDL reduction reductions.

C.2.2 TMDLs may assign a percent reduction for one or more reachsheds for each pollutant of concern (i.e., total suspended solids (TSS) and total phosphorus (TP)). Full TMDL compliance is achieved by the permittee provided all of the following conditions are met:

- a. The permittee submits the necessary data and documentation to the Department that demonstrates that the permittee meets the percent reductions stipulated in the USEPA approved TMDL for each reachshed that the MS4 discharges to and for each pollutant of concern.

b. The documentation submitted by the permittee includes the policies, procedures, and regulatory mechanisms that the permittee will employ to ensure that storm water controls and management measures will continue to be operated and maintained so that their pollutant removal efficiency continues to be met.

c. Based upon the data and documentation and any necessary subsequent information requested by the Department, the permittee receives written concurrence from the Department that the permittee has achieved full TMDL compliance.

C.3 Participation in an approved Adaptive Management Plan. In accordance with s. 283.13(7), Wis. Stats., and s. NR 217.18, Wis. Adm. Code, if the permittee has chosen to participate in an Adaptive Management project that has been approved by the Department the permittee shall continue to participate in the implementation of the Adaptive Management project.

Note: Information on adaptive management is available from the Department's Internet site at: <https://dnr.wi.gov/topic/SurfaceWater/AdaptiveManagement.html>

C.4 TMDL Implementation Plan. If the permittee is not participating in a Department approved adaptive management plan as stipulated in section C.3, a permittee with MS4s discharging to TMDL reachsheds shall do all the following to demonstrate progress towards achieving the TMDL reductions stipulated in section C.2.2 and shall submit the following documentation:

C.4.1 Within 36 months of the approval date of the TMDL, an updated storm sewer system map that identifies:

a. The current municipal boundary. For a permittee that is not a city or village, identify the permitted area.

Note: The permitted area for towns, counties and non-traditional MS4s pertains to the area within an urbanized area or the area served by its storm sewer system, such as a university campus.

b. The TMDL reachshed boundaries within the municipal boundary, and the area of each TMDL reachshed in acres within the municipal boundary.

c. The MS4 drainage boundary associated with each TMDL reachshed, and the area in acres of the MS4 drainage boundary associated with each TMDL reachshed.

d. Identification of areas on a map and the acreage of those areas within the municipal boundary that the permittee believes should be excluded from its analysis to show compliance with the TMDL WLA. In addition, the permittee shall provide an explanation of why these areas should not be its responsibility.

Note: An example of an area within a municipal boundary that may not be subject to a TMDL WLA for the permittee is an area that does not drain through the permittee's MS4.

- e. Flow paths of storm water through the storm sewer system.
- f. The location and associated drainage basin of structural BMPs the MS4 uses for TSS and TP treatment.

C.4.2 Within 36 months of the approval date of the TMDL, the permittee shall submit a tabular summary that includes the following for each MS4 drainage boundary associated with each TMDL reachshed as identified under section C.4.1 and for each TMDL WLA:

- a. The permittee's percent reduction needed to comply with its TMDL WLA from the no-controls modeling condition. The no-controls modeling condition means taking no (zero) credit for storm water control measures that reduce the discharge of pollutants.
- b. The modeled annual average pollutant load without any storm water control measures for each subbasin which the MS4 discharges to as previously identified in section C.4.1.
- c. The modeled annual average pollutant load with existing storm water control measures for each subbasin with the MS4 discharges to as previously identified in section C.4.1.
- d. The percent reduction in pollutant load achieved from the no-controls condition and the existing controls condition.
- e. The existing storm water control measures including the type of measure, area treated in acres, the pollutant load reduction efficiency, and documentation of the permittee's authority for long-term maintenance of each practice.
- f. If applicable, the remaining pollutant load reduction for each pollutant of concern and reachshed to meet the TMDL reduction goals.

C.4.3 Within 48 months of the approval date of the TMDL, if the tabular summary required under section C.4.2 shows that the permittee is not achieving the applicable percent reductions needed to comply with its TMDL WLA for each TMDL reachshed, then the permittee shall submit a written TMDL Implementation Plan to the Department that describes how the permittee will make progress toward achieving compliance with the TMDL WLA. The plan shall include the following information:

- a. Recommendations and options for storm water control measures that will be considered to reduce the discharge of each pollutant of concern. At a minimum, the following shall be evaluated: all post-construction BMPs for which the Department has a technical standard, optimizing or retrofitting all existing public and private storm water control practices, regional practices, optimization or improvements to existing BMPs, incorporation of storm water control for all road reconstruction projects, more restrictive post-construction ordinances, updated development and redevelopment standards. Focus should be placed on those areas identified in section C.4.2 without any controls.

b. A proposed schedule for implementation of the alternatives identified under section C.4.3.a. The proposed schedule may extend beyond the expiration date of this permit. The schedule should aim to achieve, to the maximum extent practicable, a level of reduction that achieves at least 20% of the remaining reduction needed beyond baseline to achieve full compliance in TSS and a level of reduction that achieves at least 10% of the remaining reduction needed beyond baseline to achieve full compliance in TP over the next permit term. The reductions can be achieved utilizing an averaged reduction calculated from individual reductions achieved in one or multiple reachsheds and spanning the entire MS4 area impacted by a TMDL.

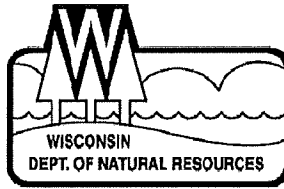
Note: The reductions stipulated under C.4.3.b are interim compliance targets set as a planning target for the next permit term. Future permit reduction targets may taper off or vary between municipalities based on individual plans as it is expected that municipalities will rely more on reductions obtained through redevelopment. In many some cases, reductions that occur through redevelopment activities as outlined in section C.4.3.d may provide the most economical and practical method toward eventually achieving the reduction goals.

c. A cost effectiveness analysis for implementation of the recommendations and options identified under section C.4.3.a.

Note: The Department has developed the guidance document “TMDL Guidance for MS4 Permits: Planning, Implementation, and Modeling Guidance.” The guidance is available on the Department’s Internet site: https://dnr.wi.gov/topic/stormwater/standards/ms4_modeling.html, and is available to assist a permittee with complying with the requirements of section C.4.

Note: Reductions obtained through a permittee’s participation in a water quality trading project, in accordance with s. 283.84, Wis. Stats., and that has been reviewed and approved by the Department, can be counted toward credit in meeting the requirements stipulated under section C.2.2. Additional information on water quality trading is available from the Department’s Internet site at: <https://dnr.wi.gov/topic/surfacewater/waterqualitytrading.html>

C.5 Annual Reporting. For requirements outlined under sections C.3 and C.4 the permittee shall include a description and the status of progress toward implementing the identified actions and activities in their MS4 annual reports due by March 31 of each year.



BUREAU OF WATERSHED MANAGEMENT PROGRAM GUIDANCE

Storm Water Management Program

TMDL Guidance for MS4 Permits: Planning, Implementation, and Modeling Guidance

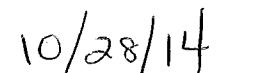
Effective: October 20, 2014
Guidance #: 3800-2014-04

Notice: This document is intended solely as guidance, and does not contain any mandatory requirements except where requirements found in statute or administrative rule are referenced. This guidance does not establish or affect legal rights or obligations, and is not finally determinative of any of the issues addressed. This guidance does not create any rights enforceable by any party in litigation with the State of Wisconsin or the Department of Natural Resources. Any regulatory decisions made by the Department of Natural Resources in any matter addressed by this guidance will be made by applying the governing statutes and administrative rules to the relevant facts.

APPROVED:



Pam Biersach, Director
Bureau of Watershed Management


Date

A. Statement of Problem

The U.S. Environmental Protection Agency (EPA) requires the wasteload allocations (WLAs) developed as part of a Total Maximum Daily Load (TMDL) be reflected and implemented through permits. In Wisconsin, storm water discharge permits are issued pursuant to ch. NR 216, Wis. Adm. Code. As part of the TMDL process, permitted Municipal Separate Storm Sewer Systems (MS4s) are assigned individual TMDL WLAs. The placement of the WLA in a storm water permit can create numerous challenges including defining the municipal area encompassed by the WLA and modeling conditions to which the storm water WLA is to be applied. Department staff, municipal officials and storm water management plan developers need guidance to clarify how assessment of permit compliance with a WLA is to be demonstrated.

B. Background

A TMDL quantifies the amount of pollution that a waterbody can assimilate and still meet water quality standards. EPA requires that waters listed as impaired on Wisconsin's 303-d list have TMDLs developed. At a minimum, TMDLs must allocate the assimilative capacity between the load allocation, the WLA, and a margin of safety. The WLA is the portion of the assimilative capacity that is allocated to point sources. Nonpoint sources receive load allocations (LAs). WLAs are established for continuous point source discharges and also intermittent pollutant releases such as permitted storm water discharges.

Establishing WLAs for storm water sources requires an understanding of under what flow conditions impairments occur, and how storm water discharges are contributing to the identified impairments. Establishing WLAs for storm water sources also requires an understanding of exactly where the discharges are occurring. In many cases, municipal separate storm sewer systems (MS4s) have multiple discharge points that can be located in more than one reach¹. In a TMDL, WLAs are assigned for each pollutant of concern and by reach. In a TMDL a MS4 can have multiple and different pollutant reduction goals within its municipal jurisdiction.

C. Discussion

Once EPA has approved a TMDL that contains permitted MS4s, the next permit issued must contain an expression of the WLAs consistent with the assumptions and requirements contained in the TMDL. As part of the TMDL process EPA approves the WLAs and generally these WLAs are mirrored directly in the permit. While this seems like a relatively straight forward permit process, the direct application of the WLA can present certain challenges in implementation due to assumptions required during the development of the TMDL. These assumptions revolve around aerial extent of the MS4 and its boundary, incorporation of new areas and expansion of the municipal boundary, and modeling differences between the tools used to create the TMDL versus the compliance tools used by the MS4. In addition, permitted MS4s have already performed municipal wide analysis to comply with requirements stipulated in ch. NR 151.13, Wis. Adm. Code. These requirements expressed reduction goals as a percent reduction from a defined no controls scenario with defined climate records.

¹ Reachsheds are also referred to as subwatersheds or segment sheds in TMDL development. A reach is a stream segment or individual lake or reservoir that is artificially assigned a compliance point or "pour point" where the applicable in-stream water quality standards must be met. Breaks for stream reaches are made at changes in stream listing (each individually named 303(d) water must have their own set of TMDLs), changes in water quality criteria, and at pour points or compliance points just upstream of significant changes in flow/assimilative capacity.

To build on established methodologies contained in s. NR 151.13, DNR's preferred option for implementing TMDLs is using a percent reduction methodology similar to s. NR 151.13. The use of a percent reduction strategy will utilize reduction goals consistent with the TMDL and allow implementation to continue to build on the same percent reduction strategy employed in s. NR 151.13 using the same models and tools that MS4s have already been utilizing. Since EPA only approves the WLA and not the corresponding percent reduction it is important that the TMDL reports and permit fact sheets, as appropriate, highlight that the percent reductions being used for implementation are consistent with the approved WLAs in the TMDL.

The usage of a percent reduction framework for implementation allows both the MS4 and DNR the ability to implement the reductions without having to reallocate and track WLAs across reachsheds, MS4s, and other land uses. This will minimize the need to continually update the TMDL as municipal boundaries evolve and ease reporting requirements. In some rare cases allocations may need to be adjusted. This is discussed in Attachment A.

D. Guidance

This document divides DNR's guidance for implementing TMDL WLAs for permitted MS4s into three parts:

- **Part 1** – Expressing WLAs and Reduction Targets
- **Part 2** – Implementation and Compliance Benchmarks
- **Part 3** – Modeling

PART 1 – Expressing WLAs and Reduction Targets

An MS4 will have a WLA for each pollutant of concern addressed by the TMDL. Generally the pollutant of concern for TMDLs in Wisconsin include total suspended solids (TSS) and total phosphorus (TP); however, allocations for other pollutants such as bacteria or chlorides are possible depending on what pollutants are causing impairments to surface waters.

Unlike the requirements contained in s. NR 151.13, individual MS4s may be divided in multiple reachsheds. As such, MS4s may have multiple WLAs and percent reductions instead of the uniform municipal wide percent reduction employed in s. NR 151.13. Multiple WLAs and percent reductions are the result of needing to meet water quality requirements for all water bodies and account for changes in water body type, changes in water quality criteria or targets, changes in flow, changes in designated use, and other similar factors. Compliance with TMDL requirements will need to be achieved on a reach by reach basis.

Due to the complexity of natural systems, the WLAs identified in the TMDL are the best estimate for meeting water quality standards and are modeled or simulated predictions. Initial implementation of the TMDL will be in most cases by design using SLAMM, P-8, or equivalent methodologies to estimate and track pollutant reductions. The MS4 is typically not required to perform ambient monitoring to assess if water quality standards are being met, but MS4s do need to track implementation activities and reductions achieved, and report on TMDL implementation in MS4 annual reports. Once an adequate level of implementation has been achieved, ambient monitoring can be used to judge progress and monitoring will ultimately be needed to de-list impaired waters and show compliance with the TMDL.

During the first term of an MS4 permit, after EPA approval of a TMDL, DNR will request that each permitted MS4 report its actual MS4 area served within each reachshed. Existing MS4 permittees should already have

sewershed mapping completed to satisfy previous MS4 permit conditions and this should be used to verify the current MS4 area served within each reachshed. The Department will provide the GIS data sets used for the TMDL reachshed boundaries through its website. The main reasons for reporting this information are to determine if the MS4 area served by each permittee corresponds to each other and does not overlap or omit MS4 service areas and to provide a detailed accounting of MS4 areas and responsible parties.

In most TMDLs, non-traditional MS4s such as permitted universities and state and county highway facilities were not given unique WLAs and these areas will need to be identified. In addition, most TMDLs are not able to account for modifications in drainage due to manmade conveyance systems such as storm sewers. These modifications may require modification of reachshed boundaries. To account for this, the MS4 permit (MS4 General Permit see section 1.5.4.3) will require that permittees submit information to the DNR to verify appropriate boundaries and areas. To accomplish this DNR will require the following information:

- Updated storm sewer system map that identifies:
 - The current municipal boundary/permited area. For city and village MS4s, identify the current municipal boundary. For MS4s that are not a city or village, identify its permitted area. The permitted area for towns, counties and non-traditional MS4s pertains to the area within the Urbanized Area of the 2010 Decennial Census.
 - The TMDL reachshed boundaries within the municipal boundary, and the area in acres of each TMDL reachshed within the municipal boundary.
 - The MS4 drainage area boundary associated with each TMDL reachshed, and the area in acres of the MS4 drainage area associated with each TMDL reachshed.
- Identification of areas on a map and the acreage of those areas within the municipal boundary that the permittee believes should be excluded from its analysis to show compliance with its WLA (see “WLA Analysis Area” in Part 3 of this document”). In addition, the permittee shall provide an explanation of why each area identified should not be its responsibility.

Note: This information is to be acquired by the DNR through an MS4 annual report.

DNR will evaluate this information and consider whether modifications to the TMDL are warranted. It is common for TMDL derived MS4 areas and reachsheds to deviate from the actual MS4 drainage areas. Such deviations can have an impact on the TMDL; however in most cases, these deviations will not have a significant effect on the calculated percent reduction needed to meet the TMDL allocations.

To assist in understanding allocations the TMDLs developed in Wisconsin have in many cases expressed reduction goals in both a WLA format (a load expressed as a mass) and a percent reduction format. The percent reduction is calculated from the baseline condition used in the TMDL to quantify what is needed to meet water quality standards. During the development of the TMDLs, the percent reduction is calculated using the following equation:

$$\text{Percent Reduction (from baseline)} = 100 * (1 - (\text{WLA Loading Condition} / \text{Baseline Loading Condition}))$$

The baseline loading condition should be described in the TMDL. While there is some variation across TMDLs in Wisconsin, the baseline loading condition should reflect the regulatory conditions stipulated in s. NR 151.13 and utilize either the 20% TSS control requirement or the 40% TSS control requirement as the starting point for TMDL allocations. This is because TMDLs are required, at a minimum, to meet existing regulatory requirements.

In 2011, the Wisconsin Legislature approved Act 32 which prohibited the Department from enforcing the 40% TSS reduction contained in s. NR 151.13, Wis. Adm. Code. As such, TMDLs under development and approved by EPA prior to January 1, 2012 used the 40% reduction as the baseline loading condition. For TMDLs approved by EPA after January 1, 2012, the 20% reduction serves as the baseline loading condition. The 20% reduction required under s. NR 151.13, Wis. Adm. Code, was to have been achieved by 2008.

For consistency with existing s. NR 151.13 guidance and requirements, the permittee's MS4 permit (MS4 General Permit - see section 1.5.4.4.1) will be requiring that the no-controls modeling condition be used such that the TMDL percent reduction goals will be measured from the no controls modeling condition. Since TMDL development uses the 20% or 40% TSS reduction baseline loading condition, implementation planning will necessitate converting the TMDL stipulated percent reduction back to a no-controls percent reduction for pollutants of concern such as TSS and Total Phosphorus (TP). As identified in the approved Rock River TMDL, a 40% TSS reduction corresponds with a 27% Total Phosphorus (TP) reduction. Based on loading data from the WinSLAMM model, a 20% TSS reduction for MS4s from the no-controls condition corresponds with a 15% TP reduction. This can be done using a mathematical conversion:

For a TMDL that uses 20% TSS reduction as the baseline loading condition (TMDLs approved after January 1, 2012) the conversion to the no-controls modeling condition is:

$$\begin{aligned} \text{TSS Percent Reduction (no-controls)} &= 20 + (0.80 * \% \text{ control from baseline in TMDL}) \\ \text{TP Percent Reduction (no-controls)} &= 15 + (0.85 * \% \text{ control from baseline in TMDL}) \end{aligned}$$

For a TMDL that uses 40% reduction as the baseline loading condition (TMDLs approved prior to January 1, 2012) the conversion to the no-controls modeling condition is:

$$\begin{aligned} \text{TSS Percent Reduction (no-controls)} &= 40 + (0.60 * \% \text{ control from baseline in TMDL}) \\ \text{TP Percent Reduction (no-controls)} &= 27 + (0.73 * \% \text{ control from baseline in TMDL}) \end{aligned}$$

The above calculated reductions correspond to the percent reduction measured from no-controls as required by the permittee's MS4 permit (MS4 General Permit - see section 1.5.4.4.1). These percent reductions can be compared to the reduction already achieved with existing management practices as required under the permittee's MS4 permit (MS4 General Permit - see section 1.5.4.4.4). This comparison, needed for each reachshed, will determine if additional reductions are needed to meet the TMDL requirements. The MS4 percent reductions from the no-controls condition for the Rock River TMDL and Lower Fox River TMDL are given in Attachments C and D.

For the MS4 area contained in each reachshed, the no controls load is calculated using SLAMM, P-8, or equivalent. The MS4 area includes the entire acreage that the MS4 is responsible for excluding areas not under the jurisdiction of the permittee. As new MS4 area is added or subtracted, the TMDL percent reduction applied to these areas remains the same. The percent reduction from no controls to meet the TMDL is applied to the MS4's modeled no-controls load to obtain the necessary load reduction to meet the TMDL. This load reduction may be different from that needed to meet the stipulated TMDL WLA; however, MS4 implementation of the TMDL is driven by the percent reduction and its corresponding load reduction.

For permittees that elect to use water quality trading or where adaptive management may lead to water quality trading, the load reduction calculated from the no-controls percent reduction should be used when evaluating the necessary mass.

TMDLs do not negate requirements stipulated in s. NR 151.13, Wis. Adm. Code. Therefore, both TMDL percent reductions and s. NR 151.13 requirements must be met. Once an MS4 meets the s. NR 151.13 requirement of 20% TSS control, an MS4 does not need to continue to update their s. NR 151.13 development urban area modeling. This is because s. 281.16 (2)(am)3., Wis. Stats., requires a municipality to maintain storm water treatment practices that are already in place prior to July 1, 2011.

TMDL reports may include both an average annual WLA and a percent reduction for MS4s. For implementation, MS4s should use the percent reduction. The average annual allocations represent the sum of allocations over the year and do not account for the monthly variations in the loading capacity of the receiving water. The percent reductions provided in the TMDL are based on monthly reductions and better reflect the reductions required to meet the water quality standards.

Example: Appendix V in the Rock River TMDL lists annual mass allocations for Reach 81. The City of Beloit has a baseline loading for TSS of 181.75 tons and a WLA of 259.62 tons (a net increase). However, Appendix I identifies that Beloit needs a 7% reduction in TSS for Reach 81 from the 40% TSS baseline condition. This is because on an overall annual basis Beloit meets its allocation but in certain individual months it does not. The percent reduction is calculated based on the average of the monthly allocations used to determine compliance with the water quality standards.

PART 2 – Implementation and Compliance Benchmarks

Storm Water Management Planning (SWMP)

As described in the permittee's MS4 permit (MS4 General Permit - see sections 1.5.4.4 and 1.5.4.5), DNR will be requiring a TMDL implementation analysis and plan be completed by MS4 permittees subject to TMDL WLAs. This analysis and plan should be incorporated in the SWMP as required by the permittee's MS4 permit (MS4 General Permit - see section 1.5.4). Each MS4 permittee should evaluate all potentially cost-effective alternatives to reduce its discharge of pollutants of concern so that its discharge is comparable to the percent reductions stipulated in the TMDL. MS4 permittees may work together with other MS4s that reside in the same reachshed.

A focus of the SWMP should be on improving storm water treatment for areas of existing development during times of redevelopment. Older, urban development patterns typically did not include the same level of stormwater management controls that new development does. Reductions achieved through redevelopment can be counted towards compliance with WLAs. Each municipality should estimate the pollutant reductions that are expected to be achieved over time through redevelopment of both public and private facilities, including roadway reconstruction. The rate of redevelopment should be estimated in order to provide a gauge as to how long it would take to improve storm water management in areas of redevelopment.

When developing components of a TMDL implementation plan, municipalities should, at a minimum, consider the following implementation methods:

- **Ordinance Review and Updates** – A municipality may elect to revise its current post-construction storm water management ordinance to require greater levels of pollutant control for redevelopment and highway reconstruction that are above the minimum performance standards of ch. NR 151, Wis. Adm. Code and are consistent with the reduction requirements contained in the TMDL.

Current ch. NR 151 post-construction performance standards for areas of new development include an 80% TSS control level and maintaining 60 - 90% of predevelopment infiltration (with certain exemptions

and exclusions). Areas that have stormwater management practices designed and maintained to meet these performance standards should already be controlling TSS and total phosphorus to levels comparable to TMDL water quality targets.

In addition, core provisions in the municipality's SWMP could be strengthened. For example, if bacteria are a pollutant of concern the MS4 may want to place greater emphasis on detecting and eliminating cross-connections between wastewater pipes and storm sewers or stronger pet waste programs.

- **Quantifiable Management Practices** – These practices include, but are not limited to, structural controls such as wet detention ponds, infiltration basin, bioretention, sump cleaning, low impact development (LID), street cleaning and vegetated swales where reductions can be quantified through water quality modeling such as WinSLAMM and P-8.
- **Non-Quantifiable Management Practices** – Quantifiable pollutant reductions may be difficult to determine for some practices such as residential leaf and yard debris management programs, lawn fertilizer bans and information and education outreach activities. This could also include strengthened provisions of the core SWMP. For example, if bacteria is a pollutant of concern the MS4 may place greater emphasis on detecting and eliminating cross connections, stronger pet waste programs and greater focus on elimination of leaching from dumpsters. As data becomes available to quantify reductions the appropriate credit will be given toward meeting the TMDL reduction requirements. In the interim, DNR and the permittee should be able to come to an agreement as to whether the measure is beneficial. In cases where quantifiable reductions are not possible, the use of a non-quantifiable but beneficial practice shall be deemed as making progress toward compliance with the TMDL reductions. The DNR, in consultation with stakeholders, will evaluate these practices as new science and data becomes available.
- **Stabilization of MS4** – Stabilization of eroding streambanks are eligible for a 50% cost share match through DNR's Runoff Management Grant Program. DNR considers streambank stabilization activities an important step in reducing the discharge of sediment. However, TMDL baseline modeling already assumes that drainage systems are stable; therefore, it is not appropriate to take credit against the WLA or percent reduction in the TMDL for stabilization of a drainage ditch or channel of the MS4. However stabilization projects should be identified in the TMDL implementation plan and can serve as a compliance benchmark toward meeting overall TMDL goals.
- **Streambank Stabilization Outside of the Permitted MS4** – Permitted MS4s may take credit through pollutant trading for stabilization of channels and streambanks which are outside of the area served by their MS4. Applicable credit thresholds and trade ratios would apply.
- **Water Quality Trading and Adaptive Management** - If economically beneficial, a MS4 may wish to participate in one of these programs. MS4s are eligible to participate in water quality trading to help meet WLAs. MS4 permittees with areas in the same reachshed can share load reduction credits for practices within those reachsheds using a 1:1 trade ratio. Also a MS4 may be invited by a Waste Water Treatment Facility (WWTF) to participate in an adaptive management program pursuant to s. NR 217.18, Wis. Adm. Code, to reduce phosphorus. Water quality trading and adaptive management guidance are covered under separate DNR guidance documents available on the DNR website.
- **Constructed Wetland Treatment** – Wetlands constructed for the purpose of providing storm water treatment are eligible for treatment credit provided that a long-term maintenance plan is implemented. Wetlands that receive runoff pollutants are expected to, at some point, reach a certain equilibrium point

where they would provide minimal pollutant removal or even act as a pollutant source unless they are maintained by harvesting vegetation and/or have accumulated sediment removed from them. Additionally, constructed wetlands installed need to be maintained as stormwater treatment areas in order to maintain their “non-waters-of-the-state” status. Per federal regulations, wetlands constructed as part of wetland mitigation cannot be used for treatment credit.

- **Storm Water Practices and Existing Wetlands** - Wetlands are waters of the state and wetland water quality standards under ch. NR 103, Wis. Adm. Code apply. Additionally, the U.S. Army Corps of Engineers has authority to protect wetlands as well. As such, existing wetlands cannot be used for treatment, however, in limited circumstances storm water practices can be installed in a wetland provided all applicable state and federal wetland permits are obtained. It is often difficult to obtain state and federal permits to construct a storm water treatment facility in a wetland. Contact the local DNR water management specialist to discuss whether this project might be permissible and the associated written justification needed to support a wetland permit application.

As discussed, SWMPs for municipalities with approved TMDLs should identify what pollutant reduction measures will be employed and over what time frame reductions will occur (i.e. 20 tons/yr TSS for redevelopment sites over the next 20 years).

Compliance Schedule and Benchmarks

Once a TMDL is approved, affected MS4 permittees will receive a TMDL implementation planning requirement within their next (or potentially initial) permit term. TMDL implementation planning will include determining storm water management treatment and other measures needed and their associated implementation costs and timelines to achieve TMDL reductions consistent with the TMDL WLAs. It is expected that the following MS4 permit term will include a compliance schedule to implement pollutant reduction measures in accordance with a storm water management plan to meet applicable TMDL reductions.

The compliance schedule will require that the permittee be able to show continual progress by meeting ‘benchmarks’ of performance within each permit term. In this case, a ‘benchmark’ means a progress increment – a level of pollutant reduction or an application of a pollutant reduction measure, which is part of a larger TMDL implementation plan designed to bring the overall MS4 discharge of pollutants of concern down to a level which is comparable to the MS4’s TMDL WLA. It is possible that certain benchmarks will not be easily quantifiable but there needs to be evidence that such benchmarks will provide a legitimate step toward reducing the discharge of pollutants of concern.

DNR may elect to place specific benchmarks in an MS4 permit. However, it is expected that MS4 permittees will have the primary role in establishing their own benchmarks for each 5-year permit term. Benchmarks should be reevaluated at least once every 5 years and are interim steps/goals of compliance. Where substantial reductions are required multiple benchmarks of compliance will be needed and likely implemented over more than one permit cycle. However, the schedule should lead to meeting the TMDL WLA as quickly as is feasible.

Redevelopment ordinances designed to implement stormwater management controls to achieve compliance with the TMDL requirements are an excellent tool to show progress in meeting the WLA with smart growth and development patterns. Management practices should be installed as infrastructure is replaced. For example, it may be most cost-effective for municipalities to install storm water treatment and infiltration practices as other street or sewer projects are scheduled.

Under a TMDL, EPA does not acknowledge the concept of maximum extent practicable as defined in s. NR 151.006, Wis. Adm. Code, but rather compliance schedules can be structured in SWMPs and permits to allow MS4s the flexibility needed to meet TMDL goals. Any storm water control measures employed by the MS4 permittee to reduce its pollutant discharge to comply with the TMDL reductions will need to be maintained or replaced with comparable stormwater control measures to ensure that load reductions will be maintained into the future.

Runoff Treatment Outside of the MS4's Jurisdiction

In order for an MS4 to take credit for the control of pollutants by another municipality or private property owner (i.e. industry or riparian property owner), the MS4 must have an agreement with the entity with control over such treatment measure. This agreement must specify how the pollutant reduction credit will be shared or otherwise granted to an MS4. Responsibilities for maintenance of the BMPs and preservation of the BMPs over time should also be addressed in any such agreement.

Tracking

The permittee will need to track and show progress in reducing discharges of pollutants of concern. This tracking should assist in showing that MS4 permit compliance benchmarks have been achieved in accordance with an overall storm water management plan to achieve compliance with the TMDL percent reduction targets.

A tabular TMDL compliance summary of pollutant loading per reach will be required to be submitted to DNR with the MS4 report at least once every MS4 permit term. The summary should identify the following: reach name and number (consistent with the name and number in the TMDL report), the MS4 outfall numbers, named/labeled drainage areas, the applicable TMDL percent reduction target(s), pollutant reduction benchmarks, storm water management control measures implemented, and pollutant reduction achieved as compared to no controls. Attachment B is an example of a tabular TMDL MS4 compliance summary.

PART 3 – Modeling

Discussion

The following discussion highlights the main compatibility challenges between TMDL development and MS4 implementation and how they will be addressed.

TMDL waste load allocations are by definition expressed as daily loads. There is flexibility, however, to implement the loads using monthly, seasonal, or annual load allocations. Due to the variability of storm water events and associated pollutant loadings, MS4's have historically used modeling to estimate flows and pollutant loadings using a percent reduction format for the purpose of s. NR151.13 compliance. As part of TMDL implementation, average percent reductions have been developed for MS4s for each reach. These percent reductions generally reflect an average of monthly reductions needed to meet allocations because waters are evaluated against the phosphorus criteria based on monthly sampling protocols. This will allow MS4s to continue using water quality models such as WinSLAMM and P-8 for demonstrating compliance with TMDL allocations. As with s. NR 151.13, TMDL compliance for MS4s will be by design.

Since the modeling tools used to demonstrate compliance with s. NR151.13 pollutant loadings are the same tools used to demonstrate compliance with TMDL pollutant load allocations, much of the existing mapping, water quality modeling, and planning methodologies used for s. NR151.13 compliance can be used or adjusted for TMDL compliance planning.

Generally, the modeling completed as part of TMDL development is at a less detailed scale than the modeling completed by individual MS4s. Due to the scale at which the respective models are completed, it is not unusual to have differences in the drainage areas and the pollutant mass loadings associated with them. Because of the scale at which they are developed, allocations from a TMDL have generally been applied across the entire urban area that is served by the permitted MS4. It is important to note that while many components of existing planning efforts and modeling results can be used for TMDL implementation, adjustments will likely be necessary to account for a TMDL focus on compliance by reachshed.

There may be inconsistencies between the TMDL modeled drainage areas to the actual MS4 drainage areas. Actual MS4 drainage areas may not follow the surface drainage areas and MS4 drainage areas commonly expand due to urban development. For example, the modeled versus actual MS4 drainage areas commonly deviated by 30% and by as much as 60% in the Rock River TMDL. Although these deviations may have a significant effect on a mass wasteload allocation, its affects are greatly moderated on a percent reduction basis across the reachshed. Area deviations commonly affect the MS4 percent reductions by only a few percent. Given the modeling assumptions that have gone into TMDL modeling, deviations by even 10% are within the expected error range of TMDL modeling. Modeling is not an exact science and the TMDL MS4 percent reductions are still considered valid implementation targets to work toward achieving in-stream water quality.

As noted above, MS4s subject to a TMDL should perform analyses and planning to identify cost-effective approaches for reducing discharges of pollutants of concern. To cost-effectively achieve pollutant reductions, MS4s should look for opportunities such as site redevelopment and road reconstruction projects, implementation of streambank stabilization and wetland restoration projects, implementation of traditional BMPs, and possibly water quality trading and adaptive management². Each of these elements can be considered for implementation to meet the requirements of a TMDL. It is likely that existing MS4 water quality modeling and mapping can be used and adjusted as necessary for SWM planning needs for TMDL implementation.

Guidance

TMDL-established WLAs and LAs are ‘targets’ of treatment performance and/or pollutant control for point and non-point sources. The WLAs and LAs are TMDL modeled estimates of the level of pollutants that can be discharged and still meet in-stream standards. The ultimate goal of a TMDL is for continual reduction of pollutants discharged so that both the listed impaired waters and other waters meet in-stream water quality standards, which would then allow for removal of waters from the 303-d impaired waters list. Municipalities should consider the drainage area served by their MS4 and look for the most cost-effective means to reduce discharges of pollutants of concern until their discharge is comparable with its TMDL requirements.

TMDL Analysis Area

An MS4 is to include all areas within its corporate boundary unless it is listed as optional. Although the MS4 permit focuses on current areas served by an MS4, it may be appropriate to include future land use planning areas.

Incorporation of rural areas: A city or village may have incorporated the entire township or a large portion of the rural township in which it resides. In this situation, the city or village needs to include all areas within the most

² The Department has prepared separate guidance documents on water quality trading and adaptive management. MS4s are considered non-point sources for the purposes of adaptive management. This does not preclude them from participating in an adaptive management program if approached by a traditional point source such as a municipal or industrial wastewater treatment facility. The “Adaptive Management Technical Handbook” is available for download at <http://dnr.wi.gov/topic/surfacewater/adaptivemanagement.html>

recent urbanized area, adjacent developed and developing areas whose runoff is connected or will connect to their MS4.

Highways: A permitted MS4 owner/operator of a highway needs to account for the pollutants generated within the Right-Of-Way (ROW). An exception would be a roadway crossing over a highway where the owner of the roadway crossing structure is responsible for the pollutants associated with their bridge and approach structure within the lower highway's ROW. WisDOT is responsible for state highways that are not connected highways. A county is responsible for county highways that it maintains. Cities and villages need to include connecting highways as identified and listed in the Official Highway State Truck Highway System Maps at: <http://www.dot.wisconsin.gov/localgov/highways/connecting.htm>

Optional: The pollutant loads associated with the following areas are optional for an MS4 to include:

1. Area that never passes through a permittee's MS4 such as a riparian area.
2. Land zoned for agricultural use and operating as such.
3. Manufacturing, outside storage and vehicle maintenance areas of industrial facilities permitted under subch. II of ch. NR 216, Wis. Adm. Code, are optional to include. This does not include any industrial facilities that have certified a condition of "no exposure" pursuant to s. NR 216.21(3), Wis. Adm. Code. *Note: DNR recommends that municipalities include all industrial facility areas within their WLA analysis area instead of creating 'holes' within its area of analysis.*
4. Any area that discharges to an adjacent municipality's MS4 (Municipality B) without passing through the jurisdictional municipality's MS4 (Municipality A). Municipality B that receives the discharge into their MS4 may choose to be responsible for this area from Municipality A. If Municipality B has a stormwater treatment practice that serves a portion of A as well as a portion of B, then the practice must be modeled as receiving loads from both areas, independent of who carries the responsibility for the area. However, if runoff from an area within Municipality A's jurisdiction drains into Municipality B's MS4 but then drains back into Municipality A's MS4 farther downgradient, then Municipality B does not have the option of including the load from Municipality A in their analysis and the load from that area is Municipality A's responsibility.
5. For county and towns, the area outside of the most recent urbanized area as defined by the US Census Bureau. This area is classified as non-permitted urban and part of the non-point source load allocation (NPS LA).

MS4 Water Quality Models and Related Information

To model pollutants such as TSS and total phosphorus in the area served by the MS4, the municipality must select a model such as SLAMM, P8 or an equivalent method deemed acceptable by the Department. For the analysis to show compliance, SLAMM version 9.2 or P8 version 3.4 or a subsequent version of these models may be used.

All roadway right-of-ways within the urbanized area that are part of a county or town's MS4 are the responsibility of the county or town. Model the road based on the urban land use that will most typify the traffic, even if agricultural land use is on one or both sides of the road (for example commercial or residential) and include that area in the corresponding standard land use file.

A municipality is not required to use the standard land use files if it has surveyed the land uses in its developed urban area and has "real" source area data on which to base the input files. The percent connected imperviousness beyond the standard land use files must be verified in the field. Disconnection may be assumed for residential rooftops where runoff has a flow path of 20 feet or greater over a pervious area in good condition. Disconnection for impervious surfaces other than residential rooftops may be assumed provided all of the following are met:

- The source area flow length does not exceed 75 feet,

- The pervious area is covered with a self-sustaining vegetation in “good” condition and at a slope not exceeding 8%,
- The pervious area flow length is at least as long as the contributing impervious area and there can be no additional runoff flowing into the pervious area other than that from the source area.
- The pervious area must receive runoff in a sheet flow manner across an impervious area with a pervious width at least as wide as the contributing impervious source area.

Water quality modeling is a means to determine a storm water management control practice’s treatment efficiency. If the model cannot predict efficiencies for certain storm water management control measures that a municipality identifies as a water quality management practice, then a literature review should be conducted to estimate the reduction value. Proprietary stormwater management control measures that utilize settling as their means of TSS reduction should be modeled in accordance with DNR Technical Standard 1006 (Method for Predicting the Efficiency of Proprietary Storm Water Sedimentation Devices).

When designing storm water management practices, runoff draining to a management practice from off-site must be taken into account in determining the treatment efficiency of the measure. Any impact on the efficiency must be compensated for by increasing the size of the measure accordingly.

Storm water management practices on private property that drain to an MS4 can be given treatment credit, provided the municipality enters into an agreement or has an equivalent enforceable mechanism with the facility/land owner that will ensure the management practice is properly maintained. The municipality will need a tracking system that includes maintenance of treatment practices. An operation and maintenance plan, including a maintenance schedule, must be developed for the stormwater management practice in accordance with relevant DNR technical standards. The agreement or equivalent mechanism between the municipality and the private owner should include the following:

- A description of the stormwater management practice including dimensions and location.
- Identify the owner of the property on which the stormwater management practice is located.
- Identify who is responsible for implementing the operation and maintenance plan.
- Outline a means of terminating the agreement that includes notifying DNR.

The efficiency of a storm water management practice on both public and private property must be modeled using the best information the municipality can obtain on the design of the practice. For example, permanent pool area is not sufficient information to know the pollutant reduction efficiency of a wet detention basin even if it matches the area requirements identified in Technical Standard 1001 Wet Detention Basin for an 80% reduction. Information on the depth of the wet pool and the outlet design are critical features that determine the level of control a detention pond is providing.

Modeling Clarifications

- A TMDL might remove certain internally drained areas from its analysis. If an internally drained area is removed from the TMDL analysis, the MS4 permittee shall not include such area in its MS4 analysis to show compliance with its TMDL requirements. Under this scenario if stormwater is pumped from inside the internally drained area to an external drainage area, then this additional pollutant discharge needs to be accounted for in the MS4 analysis to show compliance with its TMDL requirements.
- Where an internally drained area is included in the TMDL analysis, an MS4 permittee has the option of including this area in its TMDL analysis to show compliance with its TMDL requirements. However, credit for pollutant removal in internally drained areas may only be taken provided the April 6, 2009 DNR Internally Drained Area guidance memo is met with respect to taking pollutant reduction credit within internally drained areas.

- When water is pumped rather than gravity drained from an internally drained area of many acres in area, the MS4 will be expected to use monitoring data to determine the annual average mass of pollutants discharged to the surface water to which the TMDL applies. This does not apply to dewatering covered under a DNR storm water construction site general permit.
- If a portion of a municipality's MS4 drains to a stormwater treatment facility in an adjacent municipality, the municipality generating the load will not receive any treatment credit due to the downstream municipality's treatment facility unless there is an inter-municipal agreement where the downstream municipality agrees to allow the upstream municipality to take credit for such treatment. DNR anticipates that such an agreement would have the upstream municipality assist with the construction and/or maintenance of the treatment facility. This contract must be in writing with signatures from both municipalities specifying how the treatment credit will be shared.
- For reporting purposes, the pollutant reductions must be summarized by TMDL reachshed. Additionally, pollutant loads for grouped drainage areas as modeled shall also be reported. Drainage areas may be grouped at the discretion of the modeler for such reasons as to emphasize higher priority areas, balance model development with targeting or for cost-effectiveness.
- The additional runoff volume from areas that are outside of the analysis area needs to be accounted for when it drains into treatment devices. The pollutant load can be "turned off" but the runoff hydrology needs to be accounted for to properly calculate the treatment efficiency of the device.
- Due to concerns of sediment resuspension, basins with an outlet on the bottom are generally not eligible for pollutant removal based solely on settling. However, credit may be taken for treatment due to infiltration or filtration. Filtration might occur through engineered soil or proprietary filters. Features to prevent scour should always be included for any practice where appropriate.
- Credit should not be taken for street cleaning unless a curb or equivalent barrier is present which leads to sediment buildup on the street.
- To model a combination of mechanical broom and vacuum assisted street cleaning, it may require an analysis of several model runs depending on the timing of the mechanical and vacuum cleaning. If mechanical broom and vacuum cleaning occur at generally the same time (e.g. within two weeks of each other) then only the removal efficiency of the vacuum cleaning should be taken. If the municipality performs broom sweeping in the spring or fall and vacuum clean the remained of the year, calculate the combined cleaning efficiency using the following method:
 - (A) Model the entire street cleaning program as if entire period is done by a mechanical broom cleaner.
 - (B) Model just the period of time for vacuum cleaning (do not include the mechanical broom cleaning).
 - (C) Model the same period as B) but with a mechanical broom.
 - (D) The overall combined efficiency would be $A + B - C$.

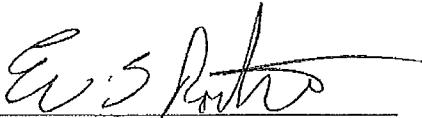
WinSLAMM clarification

- WinSLAMM 9.4 and earlier versions of WinSLAMM result in double counting of pollutant removal for most treatment practices modeled in series. WinSLAMM 9.2 and subsequent versions contain warnings to help alert modelers of this issue. The modeler will need to make adjustments to ensure that the results do not include double credit for removal of the same particle size. PV & Associates has created a document titled 'Modeling Practices in Series Using WinSLAMM' which helps to guide a user as to whether and or how certain practices can be modeled in series and this document is available at: http://winslamm.com/Select_documentation.html
- In WinSLAMM 9.4 and earlier versions, when street cleaning is applied across a larger modeled area with devices that serve only a certain area within the larger modeled area, it is acceptable to first take credit for street cleaning across the entire larger area but then the treatment efficiency for other devices must be reduced by the efficiency of the street cleaning to prevent double counting.

P8 clarifications

- P8 does not account for scour and sediment resuspension. DNR requires that a wet basin with less than a 3-foot permanent pool have its treatment efficiency reduced. A basin with zero permanent pool depth should be considered to get zero credit for pollutant removal due to settling and a basin with 3 or more feet of permanent pool depth can be given the full pollutant removal efficiency credited by settling. The pollutant removal efficiency may be given straight-line depreciation such that a basin with a 1.5 foot-deep permanent pool would be eligible for 1/2 the pollutant removal efficiency that would be credited due to settling.
- A device that DNR gives no credit for pollutant removal may still be modeled if it is in series with other practices because of its benefit on runoff storage capacity that may enhance the treatment efficiency of downgradient treatment devices. To do so, turn the treatment efficiency off in P-8.
- P8 should be started an extra year or at least several months before the “keep dates”, in order to allow the model to build up representative pollutant concentrations in wet basins.

CREATED:



Eric S. Rortvedt, Water Resource Engineer
On behalf of the Storm Water Liaison Team

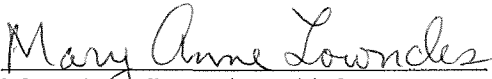
10/20/14
Date



Kevin Kirsch, Water Resource Engineer
TMDL Development Coordinator

10/20/14
Date

APPROVED:



Mary Anne Lowndes, Chief
Runoff Management Section

10/21/14
Date

Runoff Management Policy Management Team approved on 9/30/14 (date).

Attachment A: Technical Notes

Establishing relationships between multiple point and nonpoint pollutant sources and their influences on stream flow and water quality is complex. This process is often further complicated by the spatial scale under which TMDLs are developed. In order to help make TMDL development manageable, TMDLs are often developed using large scale modeling approaches that can be difficult to translate to the smaller scale often needed for implementation. For instance, loadings from “non-traditional” permitted MS4s (WDOT and county highways and UW campus systems) are often aggregated with the loadings of traditional MS4s (cities, villages and towns). This loss in resolution can result in inconsistencies in the WLA assignment necessitating a more thorough examination and possible reallocation of a portion of the WLA to non-traditional MS4 permittees.

In many cases where there is an existing TMDL that aggregated WLAs, the Wisconsin Department of Natural Resources (DNR) will need to review, and may need to reallocate WLAs to MS4 permittees. MS4 permittees will then need to conduct storm water management planning to evaluate their current pollutant loads relative to the TMDL reduction goals and create and implement a plan to meet the TMDL reductions.

Whether or not a municipality changes in size or land use, the allowable pollutant load that the receiving water can handle does not change. In the TMDL, the total allowable permitted MS4 load was determined by reach and typically was distributed uniformly across permitted MS4s on a unit area load basis. Since the permitted MS4 allowable unit area load is the same across a reachshed, MS4 WLAs can be reallocated between each other based on area. However, this reallocation must occur at the same time step that was used in the TMDL development process.

Example: the Rock River TMDL generated allocations on a monthly basis so any reallocation of the WLA between sources must also proceed on a monthly basis. Simply adding the monthly allocations into an annual load and reallocating using an average annual unit load approach will result in a misrepresentation of the TMDL allocations. Analysis must be conducted on a monthly basis.

It is expected that the extent area that will need to be modeled for the MS4 WLA will be larger than that modeled under the s. NR 151.13 (developed urbanized area modeling analysis). This is because the s. NR 151.13 modeling area has many optional and excluded areas, whereas, the TMDL WLA analysis generally lumps all of these areas into the WLA. Also, s. NR 151.13 modeling was based on year 2004 developed area condition versus a TMDL which generally considers most recent development information.

In municipalities that have recently experienced significant growth, there may be a significant increase in urban area. In addition, in some instances the total actual permitted MS4 area within a reachshed is different than that used in the TMDL development process. Initially DNR believed that it would be easy to reallocate a portion of the non-point source LA to the permitted MS4s based on a unit load approach; however, the task can be more difficult than it initially appears. As explained above, the reallocation needs to be conducted using the same time step used in the development of the TMDL and at the same critical flow period used to develop the TMDL. In many cases, this critical flow period used in the development of the TMDL may not correspond with an average annual unit load.

Reallocation Option: In some cases, where TMDL analysis was conducted on an average annual basis it may be appropriate to adjust WLAs based on the acreage associated with each MS4 by reachshed. If reallocating WLAs and LAs within the same reach will still not be adequate to address significant area differences between actual and TMDL modeled reachsheds, DNR will consider on a case-by-case basis as to whether a reallocation between reaches is warranted. For example, an MS4 may collect runoff from a substantial amount of area from one reachshed and discharge it directly into another reachshed.

DNR would include reallocated WLAs in the next reissued permit of affected MS4s. MS4s would have the opportunity to comment and/or adjudicate reallocated WLAs when the permit is public noticed.

Attachment B: TMDL Compliance Summary

TMDL Reach Number & Name: 64 (Yahara River, Lake Mendota & Lake Monona)

MS4 TMDL Percent Reductions needed (no controls): 73% (TSS) & 68% (TP)*

MS4 Existing Controls Percent Reduction (year 2014): 32% (TSS) & 24% (TP)

Modeled MS4 Annual Average Pollutant Load (no controls): 433 tons/yr (TSS) & 124 lb/yr

Modeled MS4 Annual Average Pollutant Load (existing controls): 294 tons/yr (TSS) & 94 lb/yr

Benchmark (BM)	Description of BM Measure	Outfalls Affected by BM control	Affected Drainage Areas (as modeled)	Implementation Date	Measure Treatment Performance	BM % Reduction toward TMDL Reduction	MS4 Cumulative % Control (from no controls)
N/A	Existing control measures	All	All	Ongoing	TSS: 32% TP: 24%	TSS: 32% TP: 24%	TSS: 32% TP: 24%
1	Increased SWM control for Roadway Reconstruction	All	All	1/1/2020	TSS: 60% TP: 40% to MEP	TSS: 0.6% (annually) TP: 0.4% (annually) (30% TSS reduction over 50 years)	TSS: 35% TP: 26% (Accounts for 5 years of reduction)
2	Implement Enhanced Street Cleaning Program	001 003 004 008	1A - 1D 3A – 3K 4C – 4F 8D	1/1/2020	TSS: 12% TP: 8% (no redundant controls)	TSS: 9% TP: 6% (eff. reduced for redundant measures)	TSS: 44% TP: 32%
3	Implement Enhanced Yard Waste Collection Program	All	All	1/1/2021	TSS: 2% TP: 6% (no redundant controls)	TSS: 1.6% TP: 5% (eff. reduced for redundant measures)	TSS: 46% TP: 37%
4	Ordinance Revised – Higher Redevelopment Standard	All	All	1/1/2022	TSS: 60% TP: 40% to MEP	TSS: 0.6% (annually) TP: 0.4% (annually) (30% of TSS reduction over 50 years)	TSS: 49% TP: 39% (Accounts for 5 years of reduction)
5	Retrofit 2 nd St. Basin into wet basin	002	B4	1/1/2023	TSS: 60% TP: 40%	TSS: 2% TP: 1% (only serves part of MS4)	TSS: 51% TP: 40%
6	New Wet Basin B15	005	5B - 5H	1/1/2023	TSS: 60% TP: 40% to MEP	TSS: 3% TP: 2% (only serves part of MS4)	TSS: 54% TP: 42%
7	Stabilize MS4 Drainage Ways between X and Y streets	003	3D and 3E	1/1/2024	20 tons/year sediment reduction	N/A Streambank & MS4 stabilization does not count against TMDL reduction requirement	TSS: 54% TP: 42%

* The TSS and TP percent reductions were taken from the Rock River Report’s Appendix H and I. All other mass and percent reductions listed are fictitious and shown for example purposes only.

Attachment C: Rock River TMDL MS4 Annual Average Percent Reductions

Reach	Appendix H TP reduction from baseline of 27%	Appendix I TSS reduction from baseline of 40%	Calculated TP reduction from no-controls	Calculated TSS reduction from no-controls
2	29%	1%	48%	41%
3	82%	26%	87%	56%
20	14%	0%	37%	40%
21	10%	0%	34%	40%
23	12%	11%	36%	47%
24	11%	12%	35%	47%
25	64%	32%	74%	59%
26	35%	29%	53%	57%
27	0%	0%	27%	40%
28	1%	0%	28%	40%
29	51%	7%	64%	44%
30	0%	0%	27%	40%
33	29%	9%	48%	45%
34	81%	31%	86%	59%
37	66%	54%	75%	72%
39	0%	0%	27%	40%
45	13%	8%	36%	45%
51	14%	0%	37%	40%
54	61%	6%	72%	44%
55	68%	43%	77%	66%
56	19%	0%	41%	40%
59	54%	15%	66%	49%
60	29%	1%	48%	41%
61	6%	2%	31%	41%
62	70%	70%	78%	82%
63	14%	11%	37%	47%
64	47%	55%	61%	73%
65	49%	46%	63%	68%
66	37%	37%	54%	62%
67	0%	0%	27%	40%
68	52%	18%	65%	51%
69	72%	21%	80%	53%
70	1%	1%	28%	41%
71	29%	31%	48%	59%
72	0%	0%	27%	40%
73	51%	49%	64%	69%
74	17%	20%	39%	52%
75	15%	19%	38%	51%
76	75%	29%	82%	57%
78	4%	0%	30%	40%
79	54%	37%	66%	62%
81	20%	7%	42%	44%
83	37%	25%	54%	55%

Baseline reductions of TP = 27% & TSS = 40% were identified in the RR TMDL report on pages 25 & 27.

% TP reduction from no-controls = $27 + [0.73 \times (\% \text{ TP control in Appendix H})]$

% TSS reduction from no-controls = $40 + [0.60 \times (\% \text{ TSS control in Appendix I})]$

Reaches that are not listed above did not have a permitted MS4 within the reach.

Table developed by: Eric Rortvedt, DNR Stormwater Engineer

Dated: 9/16/2014

Attachment D: Lower Fox River Basin TMDL MS4 Annual Average Percent Reductions

Sub-Basin	TMDL Report TP reduction from baseline of 15%	TMDL Report TSS reduction from baseline of 20%	Calculated TP reduction from no-controls	Calculated TSS reduction from no-controls
East River	30.0%	40.0%	41%	52%
Baird Creek	30.0%	40.0%	41%	52%
Bower Creek	30.0%	40.0%	41%	52%
Apple Creek	30.0%	40.0%	41%	52%
Ashwaubenon Creek	30.0%	40.0%	41%	52%
Dutchman Creek	30.0%	40.0%	41%	52%
Plum Creek	30.0%	40.0%	41%	52%
Kankapot Creek	30.0%	40.0%	41%	52%
Garners Creek	63.1%	49.9%	69%	60%
Mud Creek	39.0%	28.5%	48%	43%
Duck Creek	30.0%	40.0%	41%	52%
Trout Creek	30.0%	40.0%	41%	52%
Neenah Slough	30.0%	40.0%	41%	52%
Lower Fox River Main Stem	30.0%	65.2%	41%	72%
Lower Green Bay	30.0%	40.0%	41%	52%

Baseline reductions of TP = 15% & TSS = 20%.

% TP reduction from no-controls = 15 + [0.85 x (% TP control in Lower Fox TMDL Report)]

% TSS reduction from no-controls = 20 + [0.80 x (% TSS control Lower Fox TMDL Report)]

Table checked by : Eric Rortvedt and Amy Minser, DNR Stormwater Engineers


Dated: 9/16/2014

CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: November 24, 2010

TO: Regional Water Leaders, Basin Leaders and Experts
Storm Water Permit Staff (via email)

FROM: Russ Rasmussen, Director, Bureau of Watershed Management
DNR Storm Water Permit Engineers 

SUBJECT: Process to Assess and Model Grass Swales for ss. NR 151.13(2) and NR 216.07(6), Wis. Adm. Code
- Total Suspended Solids Reduction

*This document is intended solely as guidance and does not contain any mandatory requirements except where requirements found in statute or administrative rule are referenced. Any regulatory decisions made by the Department of Natural Resources in any matter addressed by this guidance will be made by applying the governing statutes and administrative rules to the relevant facts. **This guidance document supersedes the guidance document on Dated April 24, 2008 and subsequent erratas dated August, 2008 and April, 2009.***

Issue

Under s. NR 151.13(2), Wis. Adm. Code, a municipality subject to the municipal storm water permit requirements of s. NR 216.07(6), Wis. Adm. Code, must implement a 20% reduction in total suspended solids (TSS), by March 10, 2008 or 24 months from coverage under the Municipal Separate Storm Sewer System (MS4) general permit, and a 40% TSS reduction by March 10, 2013. This memorandum provides DNR staff with guidance to advise affected municipalities and their consultants on how to evaluate grassed swales in the developed urban area for water quality credit. (This guidance does not address design of grassed swales to serve new development. The Vegetated Infiltration Swale, Interim Technical Standard, No. 1005 provides information on construction of new grassed swales.)

Discussion

To meet the requirements of the MS4 permit and the TSS reduction goal of s. NR 151.13(2), Wis. Adm. Code, a municipality must assess existing best management practices (BMPs) for TSS control and propose additional BMPs if the performance standard cannot be met with existing practices. One BMP available to many permitted municipalities is the grassed swale. This guidance provides a basis for assessing and modeling swales for TSS reduction to foster consistent application of this practice in all permitted municipalities. The goals of this guidance are to:

- Determine which water quality swales in the MS4 are eligible to receive TSS reduction credit, and
- Identify a typical swale geometry that can be considered representative. (It may be appropriate to develop more than one typical swale geometry if the swale characteristics in the MS4 are highly variable.)

DNR Guidance

Step 1. Identify which swales in the municipality can be considered water quality swales for the purpose of meeting the 20% and 40% TSS reduction goal.

The following apply to all swales in the developed urban area if they are to be considered water quality swales:

- A. Swales are not required to have pretreatment swales or equivalent pretreatment.
- B. The longitudinal slope must be less than 4% unless slope interruption devices are installed in the swales to ensure low flow velocities. Slope interruption devices must be consistent with Ditch Check Technical

Standard, No. 1062. Swales with slope interruption devices will be evaluated using a modified longitudinal slope of 1%.

- C. The Department is concerned about channel scouring and re-suspension of previously settled particles in swales that are being used for MS4 pollutant removal credit. To address this concern, all swales should be inspected for visual evidence of scour. Swales with visual evidence of scour, such as channel cuts in the bottom or areas of bare soil, can not be included.

There are two ways of identifying water quality swales within an MS4:

- A. If swale survey data is available, determine the locations of water quality swales and arrive at typical swale geometry based on statistical methods.
- B. In the absence of survey data, a desktop and field survey would be appropriate. The desktop and field procedure is as follows:
1. Identify potential water quality swale areas by using available topographic, land use and soil information.
 2. Based on results of the desktop evaluation, select a representative number of typical swale locations in the MS4 by conducting a field survey. A minimum of five locations should be selected. At each location:
 - Measure the width of the swale bottom using a tape measure.
 - For side slopes, measure the vertical drop over the level length using a carpenter's level and tape measure.
 - Select at least three cross-sections of the swale and average the results to determine the bottom width and side slopes.
 - Determine longitudinal slope using 2-ft contour mapping or other available topographic information.
 3. Use the typical swale geometry that best represents each drainage area.

Step 2. Model the swales identified in **Step 1.** using a model such as SLAMM or P8.

When modeling swales in SLAMM or P8 the following must be considered:

How should drainage basins with a mix of swale and storm sewer conveyance systems be evaluated?

Drainage basins with a combination of swales and storm sewer should be subdivided by conveyance system type and the subdivisions modeled separately. In SLAMM, swales need to be modeled separately because drainage system type (e.g., swale vs. storm sewer) cannot be assigned to individual source areas.

Where swale density varies within a modeled area, the swale density should be an area weighted average across the model area. For example, if a 100 acre modeled area has 90 acres of residential land use with an average swale density of 359 ft/acre and 10 acres of strip commercial with an average swale density of 412 ft/acre then the area weighted average across modeled area is $[(90 \times 359) + (10 \times 412)] / 100 = 364$ ft/acre.

Table 1 identifies the average swale density used in the standard land use files from SLAMM version 9.2. It is recommended that rather than using these averages, the municipality should identify the actual swale density for each of the representative areas.

TABLE 1

<u>Land use</u>	<u>Swale Density (ft/acre)</u>
Low density residential	238
Medium density residential	359
High density residential	385
Strip commercial	412
Shopping centers	92
Industrial	265
Freeway (Shoulder only)	1309
Freeway (Shoulder and Center)	1964

Note: These average swale density figures are from the SLAMM version 9.2 Standard Land Use files available on the USGS website at: <http://wi.water.usgs.gov/slamm/>

Should swales be modeled using the “wetted perimeter” or “typical swale geometry” option?

The typical swale geometry option must be used. Both SLAMM and P8 calculate wetted perimeter from the geometry for each storm event, which is more accurate than a user selected defined wetted perimeter.

What Manning’s “n” should be used for the typical swale geometry¹?

A Manning’s “n” value of 0.30 or less is recommended, based on type of vegetation, mowing height and depth of flow. Supporting documentation should be provided if Manning’s “n” values greater than 0.30 are used

How should the infiltration rate be determined?

The guidance provided in the Site Evaluation for Stormwater Infiltration Technical Standard, No. 1002 should be followed. The swale infiltration rate should be determined based on the representative soil texture identified in the NRCS soil survey or other soil data if available. When the representative soil texture has been determined, the appropriate design infiltration rate should be selected from Table 2 of the Technical Standard, No. 1002. If the infiltration rate is measured in the field using a scientifically credible field test method, the measured value can be used for the static infiltration rate without using the correction factors in Table 3 of Technical Standard, No. 1002. **Prior to entering an infiltration rate in the model, the design infiltration rate from Table 2, or the measured infiltration rate must be reduced by 50%.** The SLAMM default “infiltration rate by soil type” values should not be used.

Existing language in Technical Standard 1002 V. Step C. 4.b indicates that a measured infiltration rate using a double-ring infiltrometer test must follow the requirements of ASTM D3385. While this may be appropriate for designing new swales, is there any flexibility for measuring an existing swale using a double-ring infiltrometer test?

To determine the static infiltration rate of existing swales using a double-ring infiltrometer the following modifications to procedures in ASTM D3385 are allowed:

While the dimension and materials used for the double-ring should be based on the requirements of ASTM D3385, the infiltration rate can be measured in a time frame of a minimum of 2 hours instead of 24 hours and the water level in both rings does not have to stay constant during the test. The following procedure is a more cost-effective

¹ SLAMM version 9.3 will adjust Manning’s “n” based on flow, swale geometry and vegetative retardance classifications

approach to obtaining a reasonable estimate of the infiltration rate of existing grass swales. For most soil types the infiltration rate measured by the procedure should represent the soils under more saturated conditions. Sandier soil types might not be represented by saturated conditions, but the higher infiltration rate will probably represent reality for the duration of most storm events. The lowest infiltration rate observed is the one to be used for estimating the TSS reduction for the swales and is considered a static infiltration rate. The static rate should be cut in half to represent the dynamic infiltration rate in the model.

Field Test Procedure for Double-Ring Infiltrometer

1. Select a relatively flat test area so that the double-ring infiltrometer will not be placed at an angle.
2. Cut the grass to a height of between two to four inches.
3. Gently drive the infiltrometer into the ground.
4. Inspect the soil seal around each ring to make sure that it is even and smooth.
5. Pour clean water into the inner chamber and allow it to overflow and fill up the outer ring. Maintain a level in the outer ring approximately equal to the level in the inner ring.
6. Add more water to both rings when the level in the inner ring has dropped a measurable amount. For most soil types this should be less than an inch.
7. Repeat this step until the rate the water level drops begins to decline.
8. When the rate of decline begins to slow, bring the water level up to the top and start timing the decrease in water level.
9. Record the start time.
10. Stop timing when the water level in the inner ring has gone down a measureable level (the ASTM standard requires keeping the water level constant). Timing the rate of decline should probably be started almost immediately for more clayey soils, since it might be difficult to observe when the rate change has slowed.
11. Record the time, elapsed time, and change in water level.
12. Refill both rings and restart the timing.
13. Record the time, elapsed time, change in water level, and the elapsed time since the beginning of the first measurement.
14. Repeat the timing steps until the infiltration rate has become relatively constant or the test has been conducted for a minimum of two hours. (The ASTM standard requires 24 hours).
15. The measured rate of infiltration is considered a static infiltration rate. The dynamic infiltration rate is $\frac{1}{2}$ the static rate. Be aware some models, such as WinSLAMM, call for the dynamic rate for swales.

I have taken a number of measurements along a swale length and have several infiltration rates to average. How do I average the results of my in-field tests?

The geometric mean(s) of infiltration testing results should be used. However, equally important is to consider whether the measured infiltration rates should be 'grouped' in order to apply separate geometric means to different areas in order to provide representative TSS results across a municipality. Grouping of results might be done based on soil type, spatial reasons or simply done as a method to help provide representative results. For instance, if there are several relatively low infiltration rates measured and the geometric mean of the entire data set is quite high, it may be prudent to group the relatively low rates together and assign them to a representative area.

Note: In order to calculate a geometric mean, the data set of values must be greater than zero. Where the infiltration rate is too low to measure, a rate of 0.03 in/hr may be used to calculate a geometric mean of the data set.

Are velocity calculations required?

The swales that were not eliminated by visual inspection should be evaluated for scour and re-suspension using the results of velocity or shear stress calculations conducted at the representative swale locations

from **Step 1**. Velocity or shear stress calculations should be conducted based on the peak discharge rate for a 2-yr, 24-hr design event (or a reasonably equivalent event from the SLAMM or P8 rainfall file for the area) to verify that scour and re-suspension will not be a problem.

Do water quality swales need to meet the slope parameters identified in Vegetated Infiltration Swale, Interim Technical Standard, No. 1005?

If functioning as vegetated conveyance systems, swales with longitudinal slope less than 1% can be used. However, there is concern that swales with slopes less than 1% can clog. Where visual evidence indicates that the infiltration rate has been reduced (e.g., significant duration of ponded water or evidence of wetland vegetation), infiltration rates appropriate for clay soils should be used.

How do I model road runoff that sheet flows off the road and is dispersed with no apparent concentrated flow path?

For roads where runoff sheet flows off to the side of the road and is dispersed into adjacent pervious areas with no concentrated flow path in the vicinity, the roadway would be considered a disconnected impervious surface. Currently, SLAMM does not have the option of disconnecting a roadway, whereas rooftops and driveways can be disconnected. Therefore, an alternative method is needed to give treatment credit for such a system. If there is no concentrated flow path near the roadway and the runoff is dispersed as sheet flow across healthy vegetated areas, model this as a very broad, flat swale unless there is an option to model it as a vegetated filter strip.

Approved By:



Gordon Stevenson, Chief
Runoff Management Section

40 **CRITERIA**41 **General Criteria**

42 **Laws and Regulations.** Comply with all federal, tribal, state, and local laws, rules, or regulations. This
 43 standard does not contain the text of federal, tribal, state, or local laws.

44 **Sampling Methods.** Some of the steps below require acquiring water samples. Detailed instructions are
 45 not included in this standard. See the references section for links to instructions and how-to videos
 46 unless otherwise specified.

47 **Design Parameters.**

48 Conduct influent storm water jar testing prior to designing a flow-weighted dosing system:

- 49
- Collect runoff samples for jar testing as close to the actual *facility* inflow location(s) as possible:
 - 50 ○ Use an automated sampler using manufacturer's recommendations and methods
 51 described in WA Dept. of Ecology's "Automatic Sampling for Stormwater Monitoring"
 52 standard operating procedure.²
 - 53 ○ Collect a flow proportional composite sample from a minimum of 3 rain events. Sample
 54 rain events that are forecasted to be between 0.25 and 2.5 inches (7.62 and 76.2
 55 centimeters) in a 24-hour period. Sample at least one rain event between May 1 and
 56 October 15 when leaves are not falling. Sample at least one rain event during the time
 57 period of leaf accumulation, typically between September 15 and November 15. If
 58 possible, sample the event that occurs when the most leaves are present in the street.
 59 Allow at least 3 days of dry weather between sampling events.
 - 60 ○ Collect flow-weighted samples to represent a composite goal of 80% or more of the total
 61 volume from the runoff event.
 - 62 ○ Collect enough influent water to satisfy the volume requirements for jar testing both a
 63 control (untreated) and 3 concentrations of each coagulant tested. Generally, 0.40
 64 gallons (1.5 liters) per jar test is required for analytical testing.
 - 65 ○ Process and preserve the composite water samples as required by the laboratory
 66 conducting the jar testing.
 - Select coagulants that will be evaluated during jar testing.
 - 68 ○ Consult with WDNR if the influent water pH is below 6.5 as an additional monitoring or
 69 safeguards may be needed. Safeguards could include coagulants with a lower pH
 70 impact or the use of a buffering agent.
 - 71 ○ Aluminum (Al)-based coagulants, such as aluminum sulfate (alum), polyaluminum
 72 chloride (PAC) and aluminum chlorohydrate (ACH), may be used provided all of the
 73 following are true:
 - 74 ▪ Jar testing of the site's storm water produces *floc* and will not lower the pH below
 75 6.0 standard units at the proposed dosage.
 - 76 ▪ The settling pond is capable of settling the floc between the inlet and the outlet
 77 for the range of flows the system is designed to handle. This is assumed to be
 78 the case for ponds designed for at least 60% TSS reduction or 5 hours retention
 79 time unless there is short-circuiting between the inlet and outlet. In cases with
 80 inadequate separation between inlet and outlet, a baffle may be needed in order
 81 to increase retention time.
 - 82 ▪ Coagulant products are NSF/ANSI/CAN 60 certified for use in potable water
 83 treatment.

² Links are provided in the references section.

- 84 • Evaluate potential coagulants and doses using collected runoff jar testing. Recommended jar
85 testing procedures are described in Attachment 1.

86 Prepare a preliminary design report that summarizes the following information:

- 87 • The proposed treatment location(s). Show the existing or proposed wet detention pond
88 characteristics and dimensions on a map with inlet and outlet locations.
- 89 • A description and map of contributing drainage areas and any other storm water control practices
90 upstream of the facility.
- 91 • The proposed owner/operator of the system.
- 92 • Jar testing procedures and field notes.
- 93 • Analytical results and conclusions, including recommendations for coagulant compounds and
94 dosing concentrations.
- 95 • Append documentation of pollutant modeling for the watershed using an *approved model* for use
96 in predicting pollutant reductions.
- 97 • Where applicable also include for hydrologic and hydraulic modeling for the wet detention pond.
- 98 • Estimated design storm, peak design water flow rate, average annual water volume treated, peak
99 coagulant dose (typically between 5 and 7.5 mg/L³ as Al), average annual coagulant volume, and
100 average annual floc volume.
- 101 • Estimated pond permanent pool volume (PPV), residence time required based on jar testing floc
102 settling time, and peak design water flow rate.
- 103 • Expected approach to dispose of consolidated wet floc. Either dredging or pumping to the
104 sanitary sewer system or dewatering on-site and trucking/use or disposal of the dewatered floc
105 off-site.

106 Obtain concurrence from WDNR on the preliminary design report.

107 Use jar testing results to design a system that provides all the following capabilities:

- 108 • Locates the discharge of coagulant-containing water far enough from the wet detention pond
109 outlet for the floc to settle before water discharges from the facility to waters of the state.
- 110 • Provides a dosing system that accomplishes the following:
- 111 ○ Treats inflow water during runoff events up to the *maximum design treatment flow rate*.
- 112 ○ Provides a system shut-off or bypass flow option for flows larger than the maximum
113 design treatment flow rate, including safe passage of the 100-year, 24-hour design storm.
- 114 ○ Doses the coagulant at the design dosing rate with equipment that can be calibrated and
115 adjusted. If a buffering agent is needed, provide similar dosing equipment for the
116 buffering agent.
- 117 ○ Provides *rapid mixing* of the coagulant within the water.
- 118 ○ Provides sufficient heating or winterization to enable operation in the early spring (after
119 the pond thaws) and late fall (before pond freezes).
- 120 • Provides a control system that accomplishes the following:
- 121 ○ Automatically notifies operators if the coagulant level is low or power is lost.
- 122 ○ Measures storm water inflow rate and cumulative flow volume on a continuous basis.
- 123 ○ Measures coagulant feed rate and cumulative coagulant volume on a continuous basis.

³Concentration values shown in metric units only for simplicity—1 mg/L = 2.72 lbs/acre-ft.

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- Monitors facility influent and effluent pH on a continuous basis with meters that are calibrated and maintained per the manufacturer's instructions.
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- Automatic operation of the coagulant treatment system to maintain the same design coagulant/aluminum dose over the full range of design water flow rates by the equipment and a programmable logic controller (PLC). Provide Supervisory Control and Data Acquisition (SCADA) system (or equal) for automatic and remote operation of the coagulant treatment system.
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- Provides an automated shutdown and notification system if conditions are not suitable for treatment (e.g., equipment malfunction) or outside of acceptable design parameters (e.g., pH less than 6.0). System will automatically or manually be re-enabled when the pH increases to an acceptable level (e.g., pH greater than 6.2).
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- Provides an automatic stop to coagulant addition if the inflow water flow rate exceeds the peak design water flow rate. Provides for automatic or manual re-enabling when the water flow rate decreases to an acceptable level (e.g., water flow rate is lower than the peak design water flow rate).
- 139
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- Provides a secure building or other space, while maintaining compliance with existing building codes that includes the following features:
 - Adequate space for pump(s), piping, controls, operations, and miscellaneous appurtenances.
 - Climate control.
 - Adequate power and communications service including remote monitoring compatible with the local platform.
 - Maintenance and delivery access.
 - Coagulant storage, with any required secondary containment, sufficient to treat the flows during an average one-month period in conditions appropriate for the selected coagulant. Ensure the tank materials and fittings are compatible with the chemical(s) being stored.
 - Health and safety provisions and equipment.
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- Provides a wet detention pond that:
 - Includes at least 3 feet (0.9 meters) of permanent pool depth above the sediment storage area.
 - Has sufficient sediment storage volume to accommodate the planned floc accumulation and removal frequency.
 - A wet pond designed for 60% or greater TSS control per an approved modelling approach. A wet pond sized to provide at least 5 hours residence time for floc settling is also acceptable. The minimum residence time can be calculated by dividing the volume of the permanent pool, excluding the sediment storage volume, by the maximum design treatment flow rate.
 - Has safe access for pond effluent monitoring/sample collection.
 - Does not contain aerators or fountains that may cause resuspension of floc and sediment. Fountains or aerators must follow Technical Standard 1001.
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- 164 Calculate the expected treatment benefits of the system considering the following:
- The anticipated loading, as determined via an approved model, for the drainage area conditions after accounting for any upstream pollution control practices.
 - For phosphorus removal, treatment is not expected to reduce the outfall concentration to less than 0.05 mg/L on an annual average basis. The outlet value of 0.05 mg/L total phosphorus (TP)
- 165
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- 167
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169 can be compared to the average annual influent TP concentration generated by an approved
170 model.

171 ● For TSS removal, treatment is not expected to reduce the outfall concentration to less than 6
172 mg/L on an annual average basis. This can be compared to the average annual influent TSS
173 concentration generated by an approved model to estimate an average annual TSS load
174 reduction.

175 ● The annual average pollutant reductions should be prorated if the maximum design treatment
176 flow rate is less than the 1-year, 24-hour rainfall event. Prorating should account for the portion of
177 the annual average rainfall identified in s. NR 151.12 (1) (b), Wis. Adm. Code, that is less than or
178 equal to the maximum design treatment flow rate occurring during the anticipated operating
179 period for the system. The anticipated operating period may be assumed to be 100% of the
180 annual average rainfall included in the non-winter season if the maximum design treatment flow
181 rate is at least as great as the flow expected during the 1-year, 24-hour rainfall event and the
182 system is heated to allow operation during the full non-winter season.

183 ● During time periods when coagulant dosing is offline, pollutant removal due to Stokes' Law
184 settling may be assumed for water flowing through the settling pond. Example pollutant removal
185 calculations are provided in Attachment 2.

186 Prepare and submit a safety plan for material handling, and spill control/containment procedures.

187 Provide updates from the preliminary design report to your storm water permit contact at the WDNR.

188

189 **CONSIDERATIONS**

190 The following are not required under this technical standard but are recommendations and reminders of
191 commonly overlooked measures that may be required under other rules, laws, and regulations:

192 ● Where the receiving water is listed as impaired for any of the ingredients in the coagulants
193 considered (i.e., chloride), include the pollutant of concern in jar testing measurements. Evaluate
194 alternative coagulants and include a written justification if the coagulant containing a pollutant of
195 concern is proposed within the preliminary design report.

196 ● Adjust jar testing sampling protocol for systems with multiple inlets. If multiple inlets will be
197 treated, consider the size and watershed characteristics for each inlet.

198 ○ In situations where the watershed characteristics (e.g., land use, size, soil type, tree
199 canopy) differ substantially, sample and test multiple inlets.

200 ○ If the watershed characteristics are substantially similar, jar test sampling of a single inlet
201 may be acceptable.

202 ○ If there will be inlets to a settling pond that are not treated by the flow-weighted dosing
203 system, then sampling and testing of these inlets are not required.

204 ● If location-specific constraints preclude the use of automated sampling, the project proponent
205 may propose an alternate sampling methodology for review by the WDNR. Any manual sampling
206 methodology must include flow measurement and multiple samples per event.

207 ● If possible, sample at least one event in early spring when chloride levels would be expected to
208 be highest.

209 ● Use of coagulants other than those listed in the Criteria section or products that contain both a
210 listed coagulant and other ingredients, such as buffers, requires pre-approval. The coagulant
211 proposed should form a bond with phosphorus that is stable under anoxic conditions when pH is
212 between 6.0 and 9.0 standard units.

213 ● Include a forebay immediately following coagulant dosing for ease of maintenance.

214 ● See WDNR Technical Standard 1001 Wet Detention Pond for liner requirements.

- 215 • If an operator believes that their system is providing a higher level of pollution removal than
216 estimated via modeling, they may opt to conduct continuous influent and effluent monitoring. Two
217 years of continuous influent and effluent monitoring may be used to document actual pollutant
218 removal for the purposes of TMDL compliance.
- 219 • Pollution control credit for untreated inlets may be taken for the traditional settling achieved by the
220 pond, as calculated by an approved model. Prorate the overall pollution control credit for the
221 facility by runoff volume from each inlet, based on the enhanced settling credit for runoff from
222 treated inlet(s) and the traditional settling credit for untreated inlet(s).
- 223 • Use of the system during spring blossoming and fall leaf drop periods is highly recommended if
224 weather conditions do not limit operation.
- 225 • If the system is not heated to allow operation during the full non-winter season, then the credit
226 must be prorated to only account for the portion of the annual average rainfall identified in s. NR
227 151.12 (1) (b), Wis. Adm. Code, that occurs within the anticipated operating period for the
228 system.
- 229 • Consider reducing chloride use in the drainage area of the facility to reduce resuspension
230 potential.

231

232 PLANS AND SPECIFICATIONS

233 Prepare plans and specifications in accordance with the criteria of this standard. Provide materials
234 specifications, construction requirements, locations, sizes and elevations of all components of the
235 practice to allow for project acceptance by the owner upon completion.

236 Include the following start-up tasks in the specifications:

- 237 • Confirm system components are installed per specifications, calibrated, and tested;
- 238 • Confirm all components and systems are working properly and that operation and maintenance
239 information for components are delivered to the owner or appended to the operations and
240 maintenance manual;
- 241 • Develop as-built plans; and
- 242 • Confirm automated notification/warning systems (SCADA) work.

243

244 OPERATIONS AND MAINTENANCE

245 Develop and implement an operation and maintenance plan that is consistent with the purposes of this
246 practice, the treatment practice's intended life, safety requirements and the criteria for its design. The
247 operation and maintenance plan will include:

- 248 • Owner and responsible party for the treatment system;
- 249 • Staff, by title, responsible for system operation and maintenance. Confirm staff are trained in
250 system operation;
- 251 • Written description of the system and its operation;
- 252 • Frequency, procedures, and timing of remote or in-person operational checks and inspections for
253 both dry and wet-weather conditions;
- 254 • Equipment calibration requirements and procedures;
- 255 • Expected responses to alarms;
- 256 • Safety procedures for materials handling and storage, equipment malfunctions, and other safety
257 related matters, including the following:
 - 258 ○ Safety, security, and access requirements for the system;

- 259 ○ Material safety data sheets for all onsite chemicals;
- 260 ○ Spills procedures and reporting;
- 261 ● Anticipated floc removal or sediment dredging frequency, frequency of depth measurements
262 necessary to identify when removal is required. A summary of anticipated disposal options and
263 associated sediment testing requirements according to ch. NR 528, Wis. Adm. Code;
- 264 ● Winter shut-down timing and procedures. Timing may be based on observed weather conditions
265 and forecasted weather conditions;
- 266 ● Spring start-up timing and procedures. Timing may be based on observed weather conditions and
267 forecasted weather conditions;
- 268 ● Jar testing requirements for changes in coagulants or significant changes in the influent
269 concentrations of TP;
- 270 ● Append as-built drawings or note locations where drawings can be accessed;
- 271 ● Records required to be kept, including monitoring information required by permit.

272 Maintain the following records and submit them as required by the operator's WPDES permit:

- 273 ● Dates of operation, including spring start-up, outages, and winter shutdown;
- 274 ● Equipment calibration dates and methods;
- 275 ● Water flow volume treated;
- 276 ● Coagulant quantities purchased and used annually;
- 277 ● Inspection logs and required maintenance, calibration, and repairs of all components;
- 278 ● Floc accumulation monitoring and disposal;
- 279 ● Monitoring records;
- 280 ● Logs of any alarms triggered by the system and response actions taken;
- 281 ● Spills;
- 282 ● Daily outlet pH recordings (daily min and max).

283 Report on facility operations with the annual report for the owner.

284

285 REFERENCES

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300 Wisconsin Department of Natural Resources, Low Impact Discharge General Permit WI-0066575-01-0
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303

304 GLOSSARY

305 *Additive* – Any substance, typically a commercial product, which is added to water to remove or trap a
306 pollutant and has the potential to be directly or indirectly discharged to surface water and may cause
307 toxicity to fish and aquatic organisms.

308 *Approved model* – A computer model that is used to predict pollutant loads from urban lands and has
309 been approved by the applicable regulatory authorities. WinSLAMM and P8 are examples of models that
310 may be used to verify that a wet detention pond design meets the desired pollutant reduction.

311 *Coagulant* – Additive used to neutralize charged particles to promote bonding substances into settleable
312 solids and/or larger settleable solids.

313 *Episodic dosing* – Applying an additive directly to the surface of a wet detention pond intermittently and
314 not related to runoff events (see DNR Technical Standard 1014 - Episodic coagulant dosing for
315 maintenance of storm water wet detention ponds).

316 *Facility* – For the purposes of this standard, facility includes a wet detention pond and associated
317 infrastructure including inlet sewer, outlet structure, outlet sewer, and any coagulant treatment system
318 appurtenances such as mixing chamber, chemical storage building, chemical feed pumps, controls,
319 monitoring equipment, and other similar items.

320 *Floc* – A loosely clumped mass of fine particles.

321 *Flocculation* – A physical process using a flocculant and mixing to enhance agglomeration or collection of
322 smaller floc particles into larger, more easily settleable particles.

323 *Maximum design treatment flow rate* – The maximum design treatment flow rate is the maximum flow rate
324 the system is capable of treating, typically equal to or greater than the peak flow from the 1-year, 24-hour
325 design storm. During flow rates in excess of the maximum design treatment flow, the dosing system is
326 shut down or bypassed.

327 *Rapid Mixing* – A mechanical process of agitating the coagulant with the storm water at the point of
328 injection to enhance floc formation.

329 *Wet detention pond* – A permanent pool of water with designed dimensions, inlets, outlets, and storage
330 capacity, constructed to collect, detain, treat and release storm water runoff.

Attachment 1

Storm Water Jar Testing Protocol for Application of Coagulants to Storm Water Ponds

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Introduction

The purpose of the jar testing process is to:

- 1) Select a coagulant with optimal floc-forming characteristics and pollutant removal performance under the weather conditions seen throughout the year.
- 2) Determine a coagulant's impact on treated water's chemistry and potential need for buffering coagulants.
- 3) Determine an optimal coagulant concentration dosing level to achieve optimal pollutant removal.

The testing protocol is described below.

Coagulant Testing Protocol

Laboratory Procedures

Once at the laboratory, split the influent water samples (using a churn splitter) for coagulant testing. A churn splitter is used so that a homogenous aliquot is achieved for each testing jar. Each jar will need to hold a minimum of 0.26 - 0.53 gallons (1-2 liters) of sample water for the analyses listed below. This means that the field-collected water sample must total a minimum of 1.1 - 2.1 gallons (4 to 8 liters) per coagulant tested. (NOTE: Verify the volume with the laboratory as being adequate to analyze the parameter list.) For each coagulant to be tested, split the influent water sample into four jars representing:

- (1) Influent water (no coagulant)
- (2) Influent water with coagulant added at three different doses (to achieve a predetermined lower, medium and higher active ingredient concentration; different active ingredient concentrations of the same coagulant may be tested for different sampling events)

Specific Laboratory Steps

- (1) Label each 1-2-liter container:
 - a. Unique ID #
 - b. "Influent Water" or coagulant name and % active ingredient
 - c. % active ingredient dose by weight
 - d. Date/test start time
- (2) Add the field sample to churn splitter.
- (3) Fill 4 containers with 0.26 - 0.53 gallons (1-2 liters) of influent water.
- (4) Conduct listed analysis of Influent Water container (No coagulant) and pH and temperature of remaining 3 containers (as shown in Table 1 below).
- (5) Place containers for coagulant treatment on stirring plates or equally effective mixing devices.
- (6) Stir for about 30 seconds before adding coagulant, simulating the expected mixing intensity of the facility, as determined by the designer.
- (7) Add the measured dose of coagulant to each of 3 containers (one container for each aluminum concentration). Continue stirring for the design mixing contact time after adding coagulant.

372 NOTE: The conversion between a concentration ‘as Al’ and the quantity of product added to each
 373 container must be calculated for each product used because the aluminum concentration varies
 374 between products and manufacturers.

375 (8) Record time coagulant added to container.

376 (9) After turning off stir:

377 a. Measure pH of 3 coagulant treated containers

378 b. Measure temperature

379 c. Photograph

380 (10) Extract aliquots from influent water jar for analytical measurements per Table 1. For obtaining
 381 sample water from the coagulant treatment jars, pipet required volumes from middle to top of the
 382 water column at approximately the same depth for each jar. Do not extract water from the floc
 383 layer at the top or bottom of the jar.

	Influent Water Jar (No coagulant)				Each Coagulant-Treated Jar				
Before coagulant	pH		Temperature	Alkalinity					
	Total P	Dissolved P	TSS	Sulfate					
	Total Al	Dissolved Al	Chloride	Photo					
After coagulant and stirring					pH	Temperature			
After time period corresponding to basin residence time					pH	Temperature	Alkalinity	Floc depth	
					Total P	Dissolved P	TSS	Sulfate	
					Total Al	Dissolved Al	Chloride	Photo	

384 (11) Conduct remaining analytical tests at time interval shown on Table 1 at a minimum. Additional
 385 test times may be added, however additional test times will require a larger volume in each test
 386 jar.
 387

388 (12) Monitor the floc settling visually and record observations of floc accumulation with a photograph
 389 of all jars lined up after at least 24 hours, but no more than 30 hours.

390 (13) Optional: Continue to monitor floc generation and setting rate beyond the time frame specified in
 391 the previous step if additional information on floc accumulation and consolidation is desired.

392 a. Floc from various tests may be combined for monitoring over the course of the testing
 393 and evaluation period. Clean water above floc may be decanted and floc placed in
 394 smaller graduated cylinders and allowed to settle for better visualization of relative floc
 395 accumulation and consolidation.

396 b. Measure the depth/volume of the accumulated floc on a regular basis (recommended
 397 weekly). Estimate the floc that may be generated by a treatment system based on the
 398 volume of treated water and accumulated floc.

399 **Documentation and Recording Results**

400 For each sampled runoff event, document analytical results to include:

401 (1) Sample site description including watershed size, land use, photograph(s) of sample site, a map
 402 of watershed.

- 403 (2) Description of each sampled event including date, nearest rain gauge with start/stop time and rain
404 depth of event, runoff period (start/stop times or best estimate), and total volume of sample
405 collected, names of field staff, any observation notes of runoff quality (such as odor, oil sheen,
406 etc.).
- 407 (3) Laboratory Analytical Results: For each parameter, report analyte concentration and % change
408 from the influent water. Note any laboratory comments on QA/QC exceedances and/or errors.
409 Also, note each parameter's level of detection and any results at less than detection recorded.
- 410 (4) Note the approximate quantity of water treated and when or if the floc resulting from the treatment
411 was included in the floc generation and settling evaluation.
412

Attachment 2

Example Calculations of Pollution Removal Credit for Flow-Weighted Coagulant Dosing

413
414
415

416 Introduction

417 The information below converts the concepts in the technical standard into equations and provides an
418 example calculation. Based on a review of literature and monitoring records from flow-weighted coagulant
419 dosing elsewhere in the country, 'floor' concentrations have been identified. A floor concentration is the
420 lowest concentration of a pollutant that is consistently observed in the facility effluent. A value of 0.05
421 mg/L has been identified for TP and 6 mg/L for TSS.

422 423 Inputs Required

424 For TP:

- 425 ● Determine the following values using an approved model and the rainfall period identified in s. NR
426 151.12 (1) (b), Wis. Adm. Code, for the closest rainfall location after accounting for any upstream
427 pollution control practices. The winter period for the rainfall record may be excluded.
 - 428 ○ No-controls flow-weighted annual average influent concentration (No Controls TP in
429 mg/L),
 - 430 ○ Annual average influent volume (AAIV), and
 - 431 ○ Proportion of the AAIV expected to be treated (Portion Dosed), accounting for storms
432 less than or equal to the maximum design treatment flow rate. If all storms in an average
433 annual year, excluding winter season, are expected to be treated, then Portion Dosed =
434 1.
 - 435 ○ Percent TP reduction compared to no controls for the settling pond (Settling only TP in %
436 reduction from no controls) assuming no coagulant dosing.
- 437 ● Determine the average annual TP concentration (Floor TP in mg/L) anticipated at the outlet of the
438 settling pond after dosing. Assume a value of 0.05 mg/L unless WDNR concurs with using a
439 different value based on site-specific and coagulant-specific information.

440 For TSS:

- 441 ● Determine the anticipated no-controls influent load (No Controls TSS in lbs/year), as determined
442 via an *approved model*, for the land uses in the drainage area after accounting for any upstream
443 pollution control practices.
- 444 ● Determine the anticipated with-controls % TSS reduction, as determined via an approved model,
445 without coagulant dosing (Settling Only TSS).
- 446 ● Determine the average annual TSS concentration (Floor TSS in mg/L) anticipated at the outlet of
447 the settling pond after dosing. Assume a value of 6 mg/L unless WDNR concurs with using a
448 different value based on site-specific and coagulant-specific information.

449 450 Equations

451 Estimate the expected treatment benefits of the system considering the following:

- 452 ● Calculate the expected TP removal (TP Reduction in % reduction from no controls) using the
453 following equation:

$$\begin{aligned}
 454 \quad TP \text{ Reduction} &= \frac{(No \text{ Controls } TP - Floor \text{ TP})}{No \text{ Controls } TP} \times Portion \text{ Dosed} \\
 455 \quad &+ Settling \text{ only } TP \text{ Reduction} \times (1 - Portion \text{ Dosed})
 \end{aligned}$$

- 456 • Calculate the expected TSS removal (TSSR in % reduction from no controls) using the following
457 equation:

$$\begin{aligned}
 458 \quad TSS \text{ Reduction} &= \frac{(No \text{ Controls } TSS - Floor \text{ TSS})}{No \text{ Controls } TSS} \times Portion \text{ Dosed} \\
 459 \quad &+ Settling \text{ only } TSS \text{ Reduction} \times (1 - Portion \text{ Dosed})
 \end{aligned}$$

460 **Example Calculation for TSS and TP % reductions from no-controls**

461 A wet pond serving 100 acres of Medium Density Residential land use and 100 acres of park land use is
462 being designed for a watershed that does not have any upstream best management practices (BMPs).
463 The settling pond is designed per WDNR Technical Standard 1001 to get 74% TSS removal. The pond is
464 located in Dane County, so the Madison 1981 rainfall file was used during modeling and design. The
465 winter season dates for that year are March 12 and December 2. The system is expected to be started on
466 April 15 and be shut down on October 15. The maximum design treatment flow rate would not be
467 exceeded in the average year.

468 The pond was modeled in WinSLAMM for settling only and the following values were obtained from the
469 detailed output:

470 No Controls TP = 0.7295 mg/L⁴
471 Floor TP = 0.05 mg/L
472 No Controls TSS = 161 mg/L
473 Floor TSS = 6 mg/L
474 Average Annual Influent Volume Treated: 3,493,715 cf
475 Total Annual Influent Volume: 4,251,000 cf
476 Portion Dosed = 0.82
477 Settling-only TP Reduction = 51%
478 Settling-only TSS Reduction = 74%

479 The expected TP and TSS removal are calculated as:

$$481 \quad TP \text{ Reduction} = \frac{0.7295 - 0.05}{0.7295} \times 0.82 + 0.51 \times (1 - 0.82) = 0.86 \text{ (86\% TP reduction)}$$

482

⁴ Concentration values shown in metric units only for simplicity—1 mg/L = 2.72 lbs/acre-ft.

483 $TSS\ Reduction = \frac{(161 - 6)}{161} \times 0.82 + 0.74 \times (1 - 0.82)$

484 $= 0.92$ (92 % TSS reduction)

485

Draft

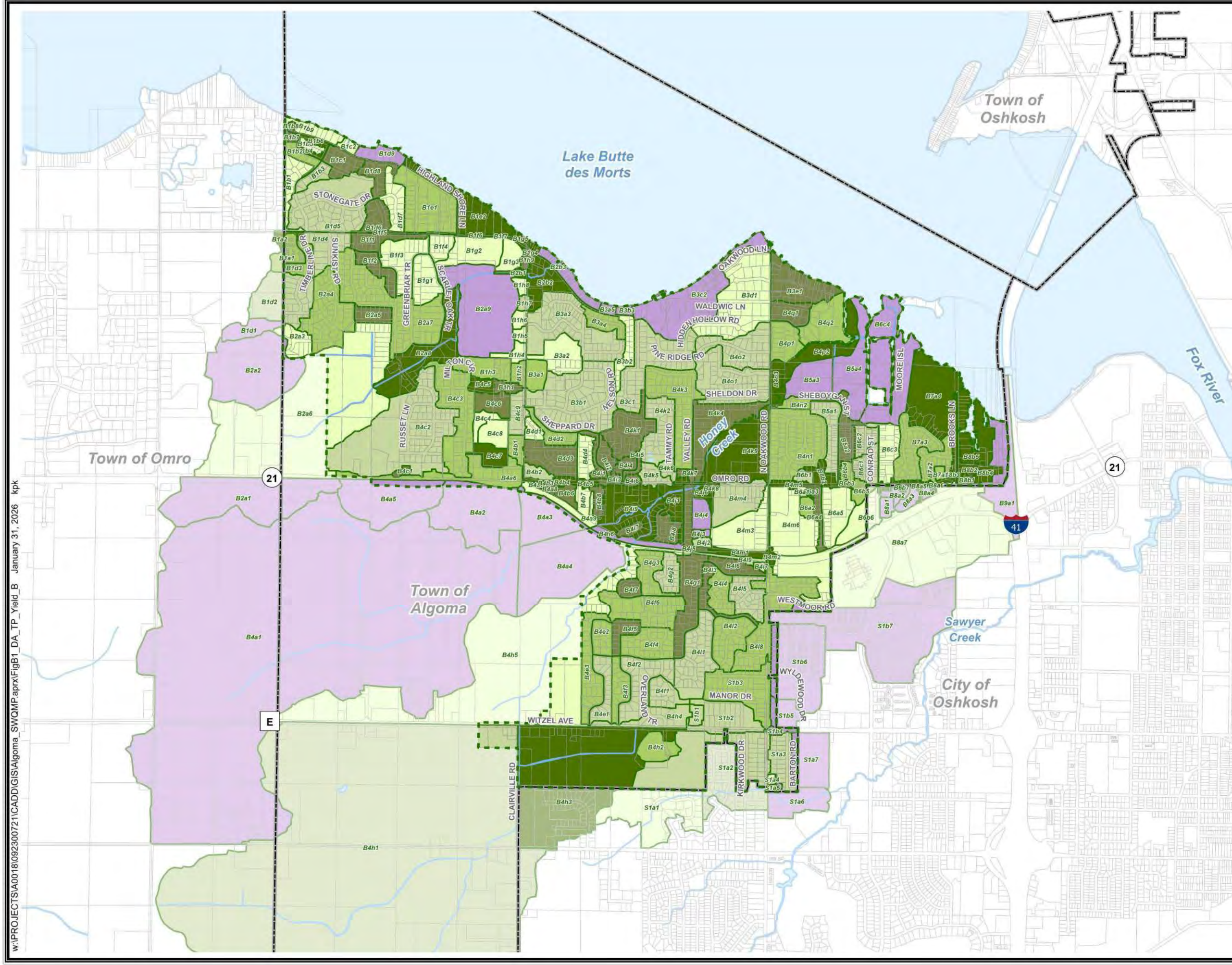
Baseline Pollutant Load & Yield Rankings

Town of Algoma 2025 Outfall Inventory







Outfall ID	Outfall Location	Outfall Size & Material	Watershed (acres)	Outfall Type
B1	Bellhaven Ln	24"x38" HERCP	28	Minor
B2	Leonard Point Rd	S Road Swale	8	Minor
B3	Bellhaven Ln	18" CMP	9	Minor
B4	Bellhaven Ln	36" RCP	135	Major
B5	Leonard Point Rd	(2) 18" CMP	85	Major
B6	Leonard Point Ln	18" CMP	1	Minor
B7	Leonard Point Rd	NE Road Swale	1	Minor
B7	Leonard Point Rd	NW Road Swale	1	Minor
B7	Leonard Point Rd	SE Road Swale	1	Minor
B7	Leonard Point Rd	SW Road Swale	26	Minor
B8	Scarlet Oak Dr	15" CMP	48	Minor
B9	Rasmussen Rd	E & W Road Swales	1	Minor
B10	Westbreeze Dr	E & W Road Swales	1	Minor
B11	Meadowview Ln	S Road Swale	6	Minor
B12	Sunkist Rd	Rear Yard Swale	26	Minor
B13	Twilight Ct	S Road Swale	2	Minor
B14	Hunters Ct Pond	18" RCP (Pond Outlet)	9	Minor
B15	Lakevista Estates N Pond	24" RCP (Pond Outlet)	71	Major
B16	Kelsea Way	Rear Yard Swale	61	Major
B17	Lake Breeze Road	29"x42" CMPA	36	Major
B18	N Oakwood Rd	24"x35" CMPA	48	Minor
B18	N Oakwood Rd	W Road Swale	3	Minor
B19	Beechnut Dr	Twin 18" CMPs	5	Minor
B20	Beechnut Dr	18" CMP	4	Minor
B21	Fleur de Lis Ct	S Road Swale	2	Minor
B22	N Oakwood Rd	2'x2' Conc Box	23	Minor
B23	Red Bird Meadows Pond	18" CMP (Pond Outlet)	4	Minor
B24	N Oakwood Rd	24"x38" HERCP	32	Minor
B25	N Oakwood Rd	18" RCP	6	Minor
B25	N Oakwood Rd	SE Road Swale	2	Minor
B26	Valley Rd	24" CMP	71	Major
B27	Omro Rd	24" RCP	14	Minor
B28	Honey Creek Rd	NE Road Swale	1	Minor
B28	Honey Creek Rd	NW Road Swale	1	Minor
B28	Honey Creek Rd	SE Road Swale	2	Minor
B28	Honey Creek Rd	SW Road Swale	2	Minor
B29	Honey Creek Ct	Road Swale	2	Minor
B30	Honey Creek Ct	Road Swale	7	Minor
B31	Elmhurst Ln	42" RCP	190	Major

Town of Algoma 2025 Outfall Inventory





Outfall ID	Outfall Location	Outfall Size & Material	Watershed (acres)	Outfall Type
B32	Creek Side Dr	18" CMP	3	Minor
B33	Cambria Ct	S Road Swale	3	Minor
B34	Jones Pond	18" RCP	22	Minor
B35	Scenic Dr	W Road Swale	2	Minor
B36	Forest View Dr	24" CMP	38	Minor
B37	Trillium Tr	18" CMP	5	Minor
B38	Honey Creek Rd	30" CMP	85	Major
B39	Wyldeewood West Pond	24" CMP	37	Minor
B39	Wyldeewood West Pond	(3) 18" CMP	37	Minor
B40	Overland Tr	S Road Swale	5	Minor
B41	Eden Meadows Dr	18" CMP	1	Minor
B42	Eden Meadows Dr	18" CMP	2	Minor
B43	Sheboygan St	N Road Swale	23	Minor
B44	Kewaunee St	E Road Swale	22	Minor
B45	Kewaunee Park	38"x60" HERCP	256	Major
B46	Willow Springs Rd	N Road Swale	10	Minor
B47	Willow Way Dr	N Road Swale	6	Minor
B48	Willow Way Dr	N Road Swale	4	Minor
B49	Willow Springs Pond	(3) 15" CMP	25	Minor
B50	Brooks Ln	Twin 30" CMP	174	Major
B51	Abraham Ln	18" RCP	7	Minor
B52	Westmoor Rd	N Road Swale	4	Minor
S1	Kirkwood Dr	Twin 30" CMP	133	Major
S2	S Oakwood Rd	30" RCP	9	Minor
S3	Barton Rd	E Road Swale	13	Minor
S4	N Oakwood Rd	18" RCP	27	Minor



**No Controls
TP Pollutant Yield (lbs/ac/year)**

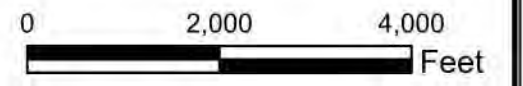
-  <0.65
-  0.65 - 0.73
-  0.73 - 0.79
-  0.79 - 1.00
-  >1.00
-  Excluded Drainage Area

Other Mapped Features

-  Municipal Boundary
-  Parcel Line
-  Stream
-  Surface Water

Source: Winnebago County, 2024-25.

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**FIGURE B1
DRAINAGE AREA
TP POLLUTANT YIELD
STORMWATER QUALITY
MANAGEMENT PLAN
TOWN OF ALGOMA
WINNEBAGO COUNTY, WISCONSIN**

w:\PROJECTS\A00181092300721\CADD\GIS\Algoma_SWQMP.aprx\FigB1_DA_TP_Yield_B January 31, 2026 kpk

**No Controls
TP Pollutant Load (lbs/year)**

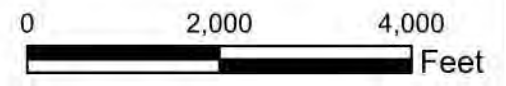
-  <1.2
-  1.2 - 2.6
-  2.6 - 5.0
-  5.0 - 8.0
-  >8.0
-  Excluded Drainage Area

Other Mapped Features

-  Municipal Boundary
-  Parcel Line
-  Stream
-  Surface Water

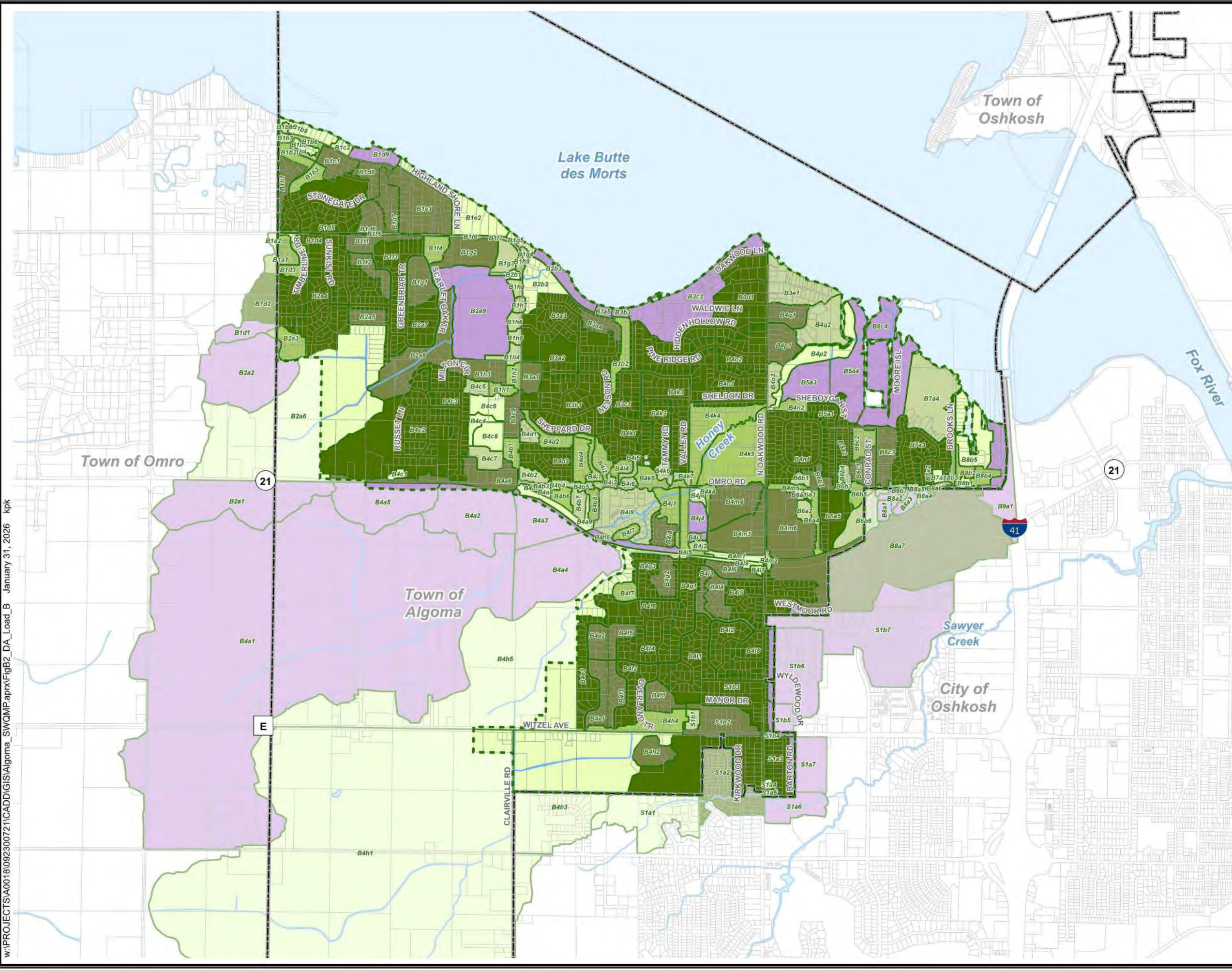
Source: Winnebago County, 2024-25.

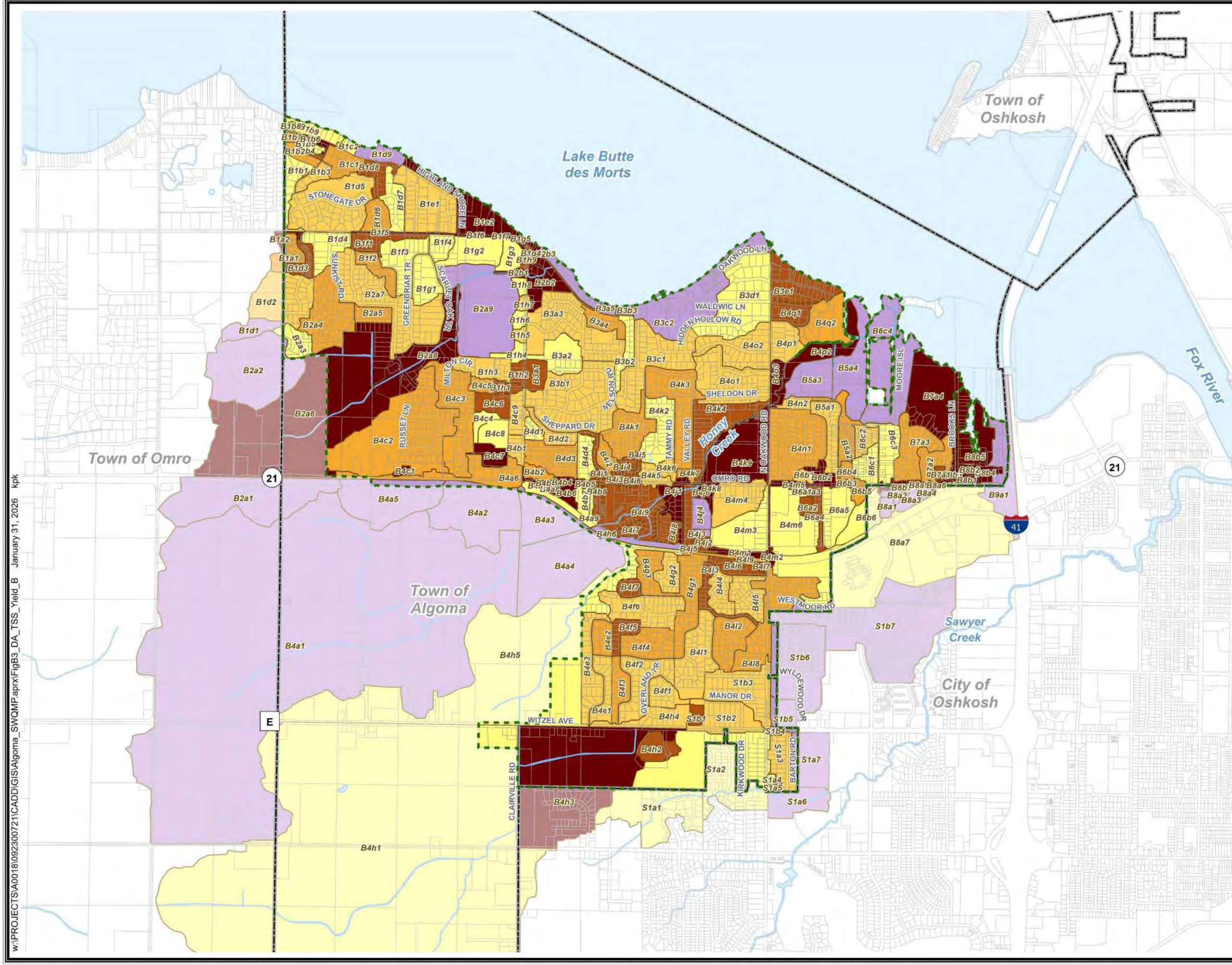
Disclaimer: The property lines, right-of-way lines, and other property information on this drawing were developed or obtained as part of the County Geographic Information System or through the County property tax mapping function. McMAHON ASSOCIATES, INC. does not guarantee this information to be correct, current, or complete. The property and right-of-way information are only intended for use as a general reference and are not intended or suitable for site-specific uses. Any use to the contrary of the above stated uses is the responsibility of the user and such use is at the user's own risk.









**FIGURE B2
DRAINAGE AREA
TP POLLUTANT LOAD
STORMWATER QUALITY
MANAGEMENT PLAN
TOWN OF ALGOMA
WINNEBAGO COUNTY, WISCONSIN**

w:\PROJECTS\A00181092300721\CADD\GIS\Algoma_SWQMP.aprx\FigB2_DA_Load_B_January 31, 2026 kpk









**No Controls
TSS Pollutant Yield (lbs/ac/year)**

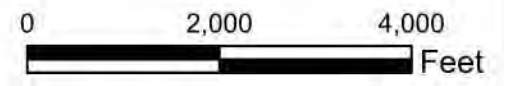
-  <160
-  160 - 190
-  190 - 220
-  220 - 310
-  >310
-  Excluded Drainage Area

Other Mapped Features

-  Municipal Boundary
-  Parcel Line
-  Stream
-  Surface Water

Source: Winnebago County, 2024-25.

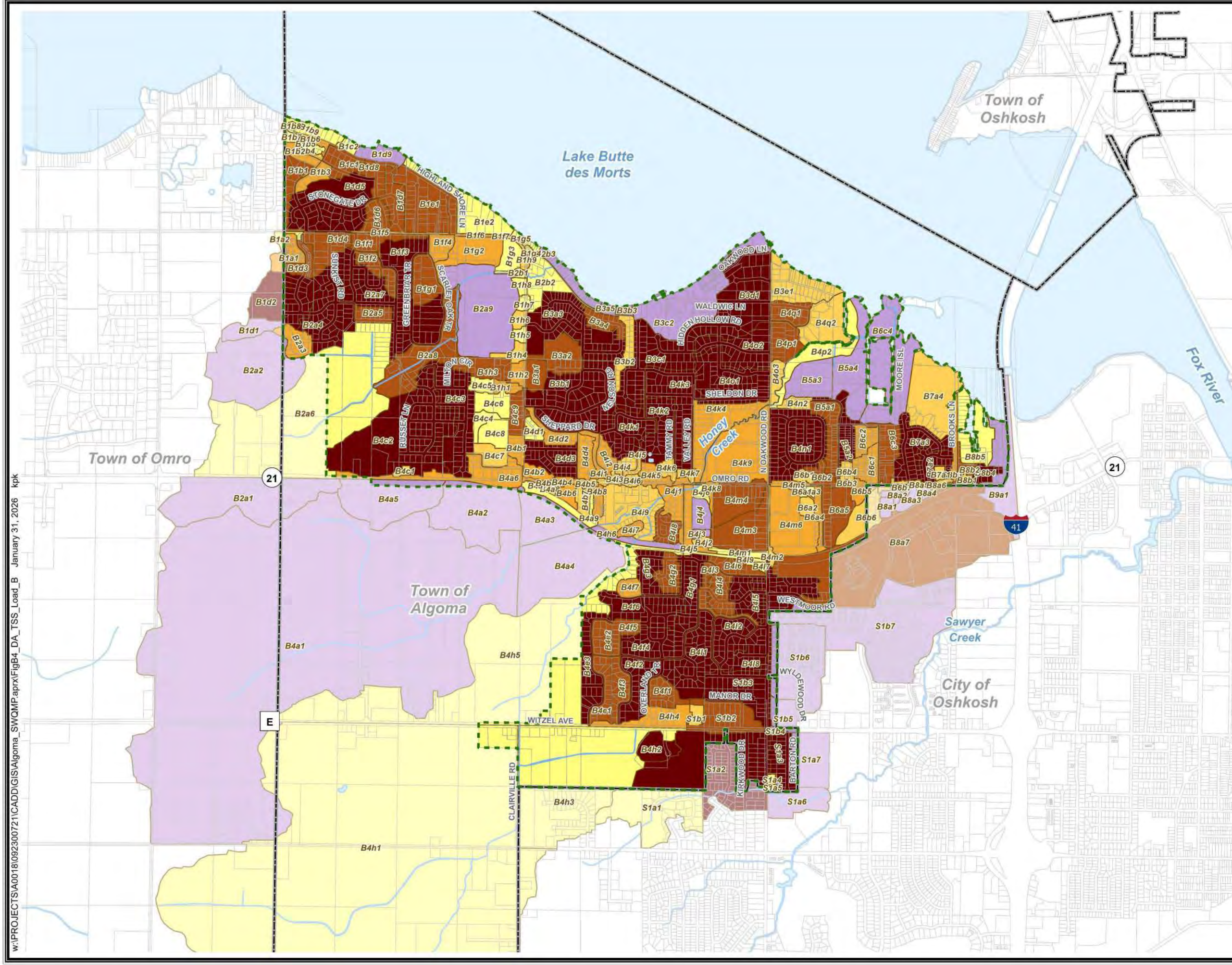
Disclaimer: The property lines, right-of-way lines, and other property information on this drawing were developed or obtained as part of the County Geographic Information System or through the County property tax mapping function. McMAHON ASSOCIATES, INC. does not guarantee this information to be correct, current, or complete. The property and right-of-way information are only intended for use as a general reference and are not intended or suitable for site-specific uses. Any use to the contrary of the above stated uses is the responsibility of the user and such use is at the user's own risk.









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**FIGURE B3
DRAINAGE AREA
TSS POLLUTANT YIELD
STORMWATER QUALITY
MANAGEMENT PLAN
TOWN OF ALGOMA
WINNEBAGO COUNTY, WISCONSIN**





w:\PROJECTS\A00181092300721\CADD\GIS\Algoma_SWQMP.aprx\FigB3_DA_TSS_Yield_B_January 31, 2026 .kpk



**No Controls
TSS Pollutant Load (lbs/year)**

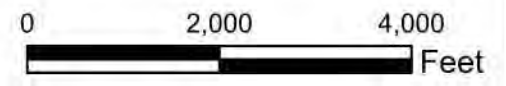
-  <360
-  360 - 730
-  730 - 1,300
-  1,300 - 2,100
-  >2,100
-  Excluded Drainage Area

Other Mapped Features

-  Municipal Boundary
-  Parcel Line
-  Stream
-  Surface Water

Source: Winnebago County, 2024-25.







Disclaimer: The property lines, right-of-way lines, and other property information on this drawing were developed or obtained as part of the County Geographic Information System or through the County property tax mapping function. McMAHON ASSOCIATES, INC. does not guarantee this information to be correct, current, or complete. The property and right-of-way information are only intended for use as a general reference and are not intended or suitable for site-specific uses. Any use to the contrary of the above stated uses is the responsibility of the user and such use is at the user's own risk.







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**FIGURE B4
DRAINAGE AREA
TSS POLLUTANT LOAD
STORMWATER QUALITY
MANAGEMENT PLAN
TOWN OF ALGOMA
WINNEBAGO COUNTY, WISCONSIN**

**No Controls
TP Pollutant Yield (lbs/ac/year)**

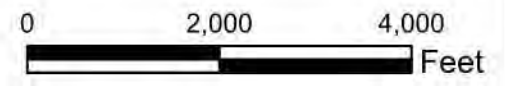
-  <0.65
-  0.65 - 0.72
-  0.72 - 0.76
-  0.76 - 0.80
-  >0.80
-  Excluded BMP Catchment

Other Mapped Features

-  Municipal Boundary
-  Parcel Line
-  Stream
-  Surface Water

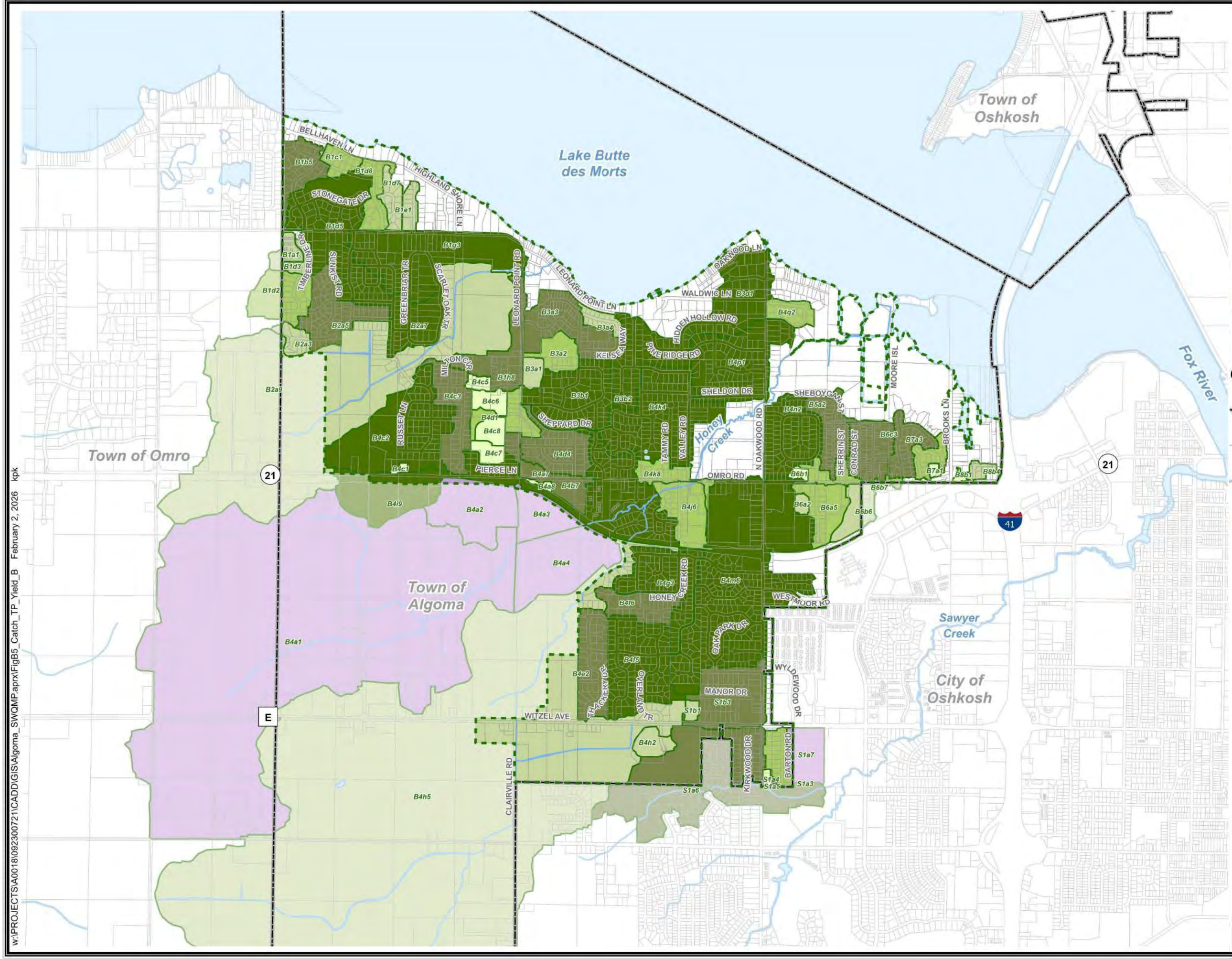
Source: Winnebago County, 2024-25.

Disclaimer: The property lines, right-of-way lines, and other property information on this drawing were developed or obtained as part of the County Geographic Information System or through the County property tax mapping function. McMAHON ASSOCIATES, INC. does not guarantee this information to be correct, current, or complete. The property and right-of-way information are only intended for use as a general reference and are not intended or suitable for site-specific uses. Any use to the contrary of the above stated uses is the responsibility of the user and such use is at the user's own risk.









**FIGURE B5
BMP CATCHMENT
TP POLLUTANT YIELD
STORMWATER QUALITY
MANAGEMENT PLAN
TOWN OF ALGOMA
WINNEBAGO COUNTY, WISCONSIN**




w:\PROJECTS\A00181092300721\CADD\GIS\Algoma_SWQMP.aprx\FigB5_Catch_TP_Yield_B February 2, 2026 kpk



**No Controls
TP Pollutant Load (lbs/year)**

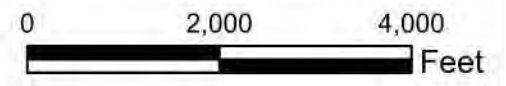
-  <2
-  2 - 7
-  7 - 14
-  14 - 27
-  >27
-  Excluded BMP Catchment

Other Mapped Features

-  Municipal Boundary
-  Parcel Line
-  Stream
-  Surface Water

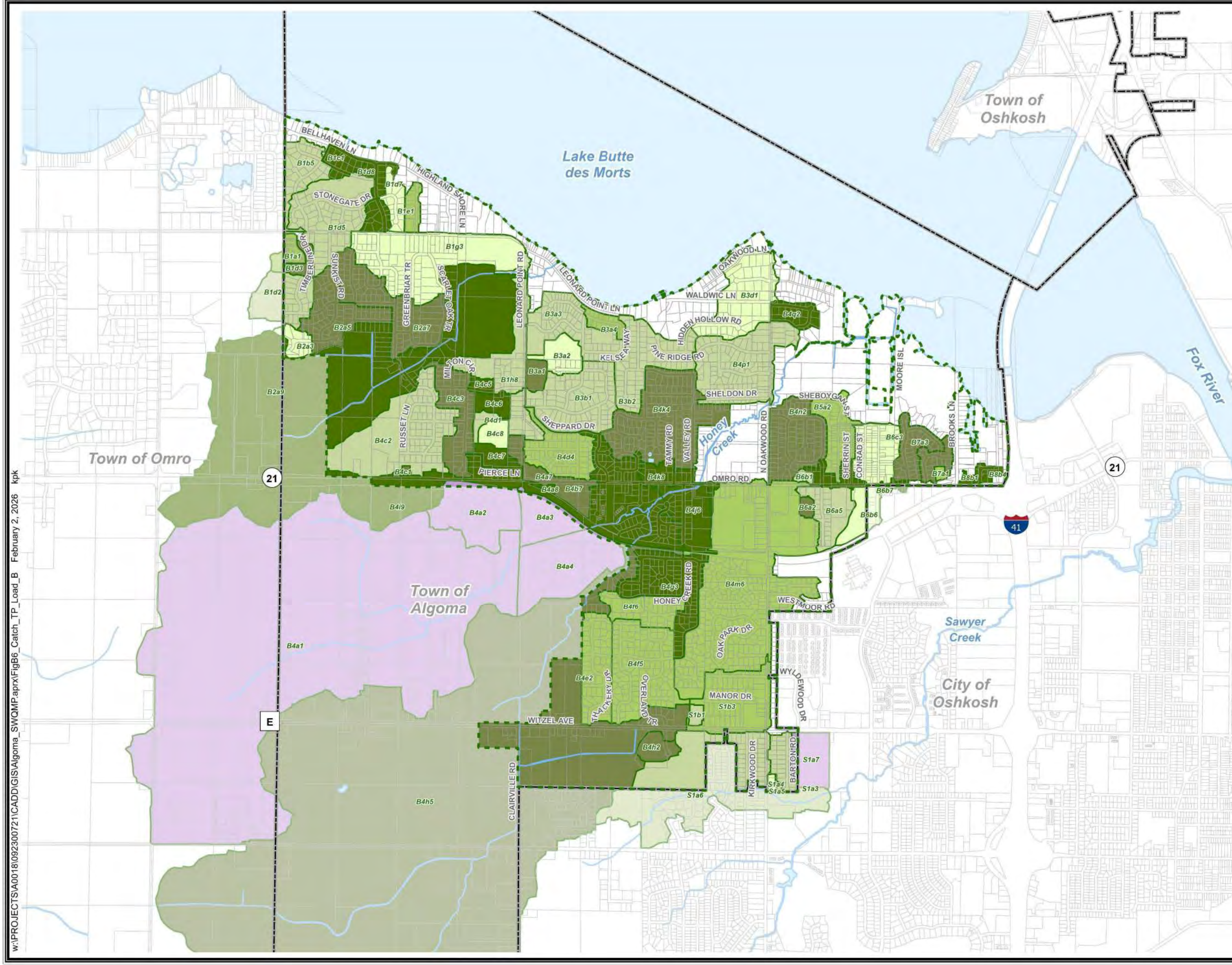
Source: Winnebago County, 2024-25.

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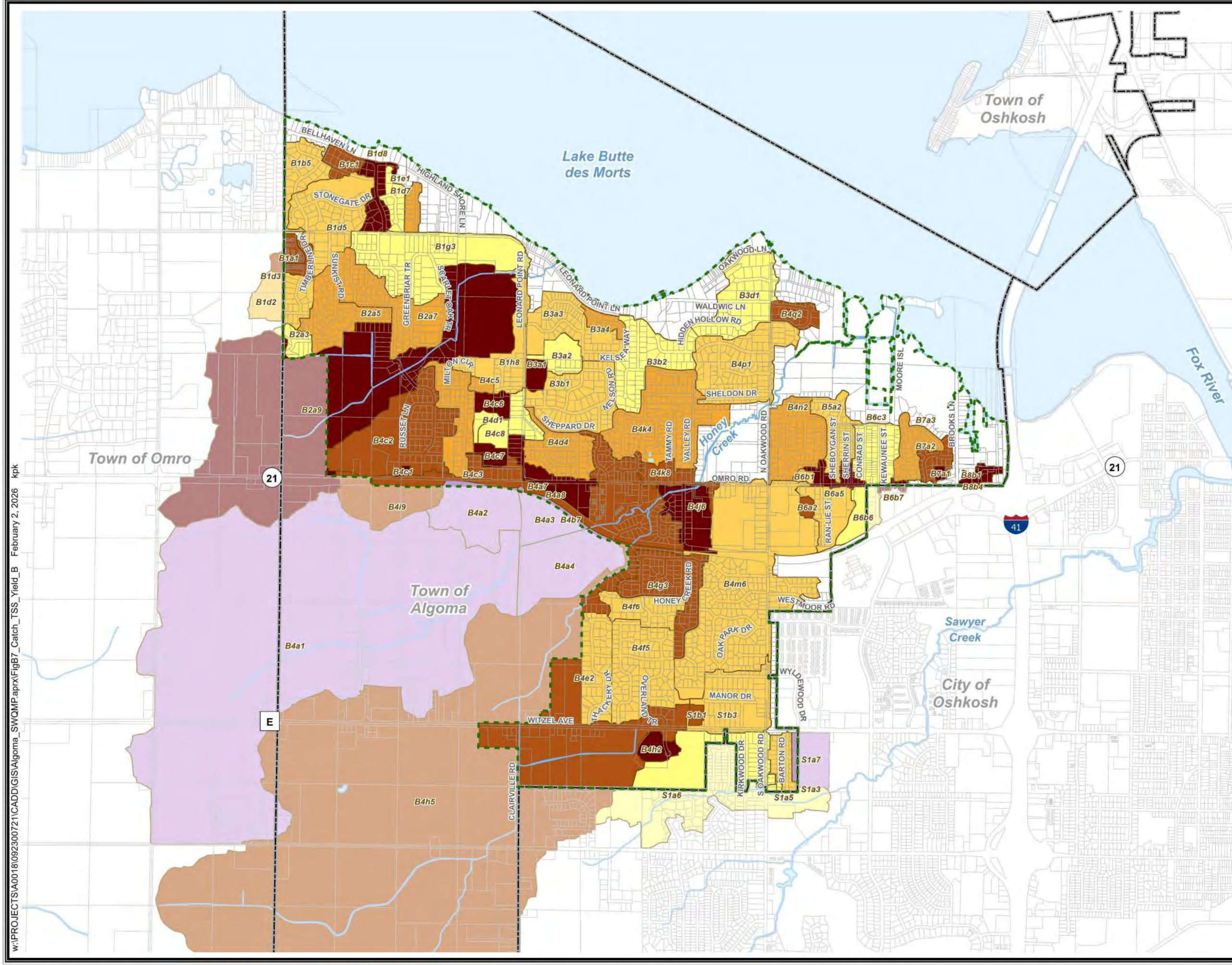


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**FIGURE B6
BMP CATCHMENT
TP POLLUTANT LOAD
STORMWATER QUALITY
MANAGEMENT PLAN
TOWN OF ALGOMA
WINNEBAGO COUNTY, WISCONSIN**





w:\PROJECTS\A00181092300721\CADD\GIS\Algoma_SWQMP.aprx\FigB6_Catch_TP_Load_B February 2, 2026 kpk



**No Controls
TSS Pollutant Yield (lbs/ac/year)**

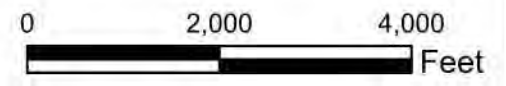
-  <160
-  160 - 185
-  185 - 200
-  200 - 235
-  >235
-  Excluded BMP Catchment

Other Mapped Features

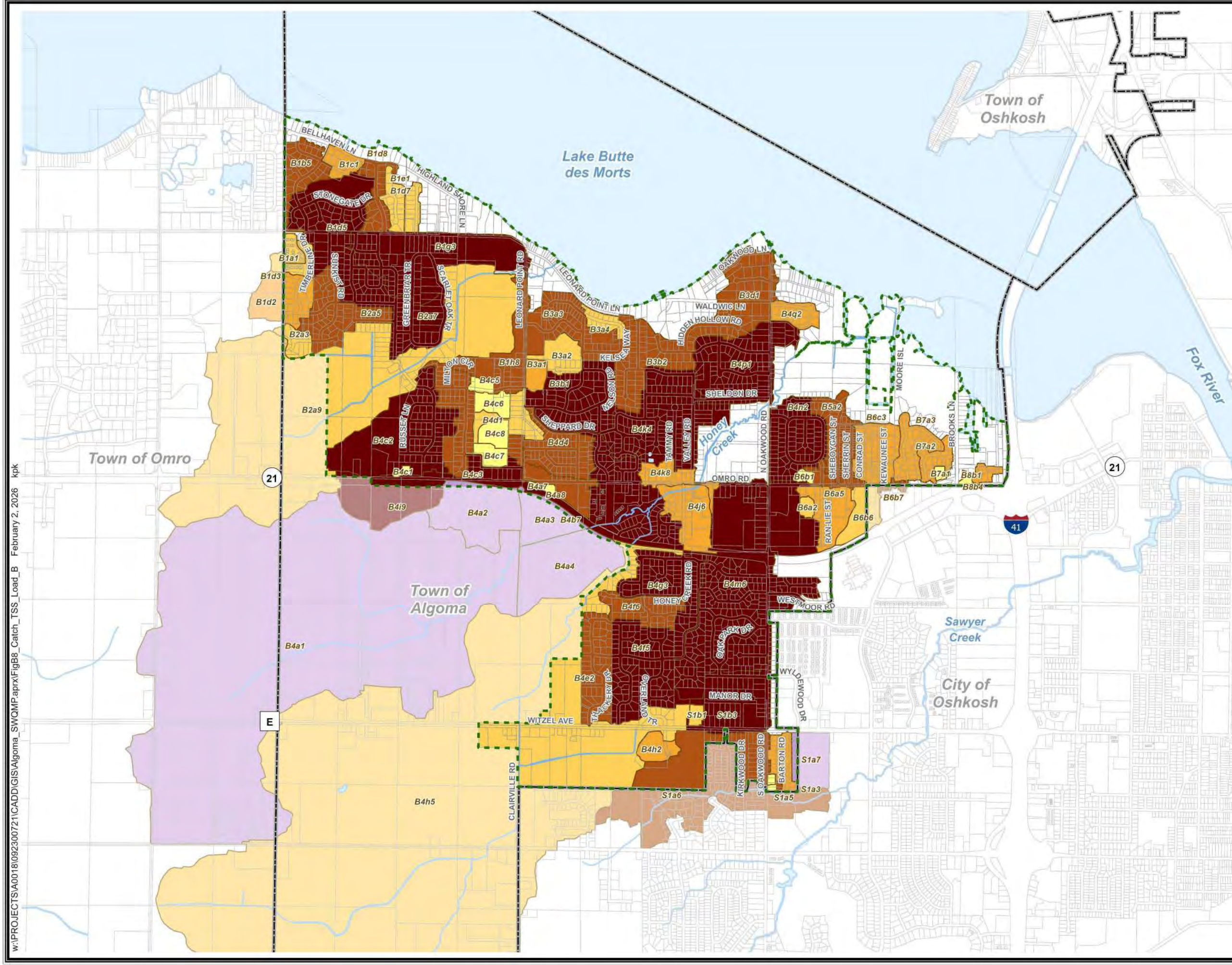
-  Municipal Boundary
-  Parcel Line
-  Stream
-  Surface Water

Source: Winnebago County, 2024-25.

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**FIGURE B7
BMP CATCHMENT
TSS POLLUTANT YIELD
STORMWATER QUALITY
MANAGEMENT PLAN
TOWN OF ALGOMA
WINNEBAGO COUNTY, WISCONSIN**



**No Controls
TSS Pollutant Load (lbs/year)**

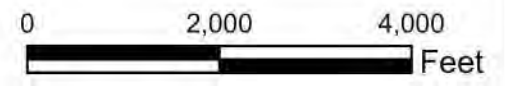
-  <500
-  500 - 2,000
-  2,000 - 3,700
-  3,700 - 6,600
-  >6,600
-  Excluded BMP Catchment

Other Mapped Features

-  Municipal Boundary
-  Parcel Line
-  Stream
-  Surface Water

Source: Winnebago County, 2024-25.

Disclaimer: The property lines, right-of-way lines, and other property information on this drawing were developed or obtained as part of the County Geographic Information System or through the County property tax mapping function. McMAHON ASSOCIATES, INC. does not guarantee this information to be correct, current, or complete. The property and right-of-way information are only intended for use as a general reference and are not intended or suitable for site-specific uses. Any use to the contrary of the above stated uses is the responsibility of the user and such use is at the user's own risk.



**FIGURE B8
BMP CATCHMENT
TSS POLLUTANT LOAD
STORMWATER QUALITY
MANAGEMENT PLAN
TOWN OF ALGOMA
WINNEBAGO COUNTY, WISCONSIN**

w:\PROJECTS\A00181092300721\CADD\GIS\Algoma_SWQMP.aprx\FigB8_Catch_TSS_Load_B_February 2, 2026 .kpk



**Town of Algoma
 Pollutant Load & Yield Summary
 Lake Butte des Morts Drainage Area Rankings**

Rank	Drainage Area ID	TSS Load (lbs/yr)
1	B4c2	14,349
2	B2a7	9,399
3	B3b1	8,888
4	B1d5	7,501
5	B4n1	7,449
6	B3a3	6,568
7	B4I8	6,529
8	B4c3	6,425
9	B4k3	6,128
10	B3c1	5,862
11	B4o1	5,501
12	B3d1	5,487
13	B2a4	5,229
14	B4g1	4,519
15	B4I1	4,464
16	B4f6	4,187
17	B4k1	4,128
18	B7a3	3,650
19	B4f2	3,606
20	B4o2	3,474
21	B4d3	3,435
22	B4I2	3,297
23	B4e3	3,250
24	B4f4	3,150
25	B4k2	2,949
26	B4I5	2,422
27	B1d2	2,409
28	B1f3	2,368
29	B5a2	2,238
30	B4g3	2,225

Rank	Drainage Area ID	TSS Load (lbs/ac/yr)
1	B8a6	817
2	B4h3	745
3	B4b3	729
4	B4j6	652
5	B2b1	611
6	B4p2	604
7	B2b2	595
8	B4c7	589
9	B1g5	572
10	B8b5	571
11	B1f5	563
12	B1f6	558
13	B7a4	555
14	B4m2	544
15	B6b3	536
16	B4k9	504
17	B8b4	502
18	B8b3	448
19	B1e2	445
20	B8b2	437
21	B4m1	433
22	B1f7	418
23	B2a6	405
24	B6b2	402
25	B4b4	401
26	B4m5	401
27	B1b6	399
28	B4a7	392
29	B1a2	352
30	B4a8	343

Rank	Drainage Area ID	TP Yield (lbs/yr)
1	B4c2	47.8
2	B2a7	37.7
3	B3b1	37.1
4	B1d5	29.7
5	B4n1	29.4
6	B3a3	26.7
7	B3d1	25.5
8	B4I8	25.4
9	B4c3	25.3
10	B3c1	24.7
11	B4k3	24.0
12	B4o1	22.7
13	B2a4	20.7
14	B4I1	18.4
15	B4g1	17.2
16	B4f6	17.1
17	B4k1	15.8
18	B4f2	14.9
19	B4o2	14.5
20	B7a3	14.4
21	B4e3	13.1
22	B4I2	13.1
23	B4d3	13.0
24	B4k2	12.9
25	B4f4	12.3
26	B1f3	10.5
27	B1d2	10.1
28	B4I5	9.8
29	B1d4	8.7
30	B5a2	8.7

Rank	Drainage Area ID	TP Yield (lbs/ac/yr)
1	B2b1	1.82
2	B4p2	1.81
3	B4j6	1.78
4	B2b2	1.78
5	B4c7	1.77
6	B1g5	1.74
7	B8b5	1.71
8	B1f6	1.69
9	B1f5	1.69
10	B4m2	1.66
11	B7a4	1.63
12	B8a6	1.53
13	B4h3	1.50
14	B4k9	1.46
15	B4b3	1.43
16	B1e2	1.40
17	B4m1	1.33
18	B6b3	1.32
19	B1f7	1.31
20	B1b6	1.29
21	B4m5	1.19
22	B8b3	1.19
23	B8b2	1.15
24	B2a8	1.13
25	B1a2	1.13
26	B4j1	1.12
27	B4o3	1.09
28	B6b7	1.08
29	B8b4	1.06
30	B4b4	1.06

**Town of Algoma
Pollutant Load & Yield Summary
Lake Butte des Morts Drainage Area Rankings**

Rank	Drainage Area ID	TSS Load (lbs/yr)
31	B7a2	2,190
32	B8b4	2,116
33	B4h2	2,107
34	B1f1	2,088
35	B6b2	2,077
36	B3a1	2,055
37	B1d8	2,038
38	B5a1	2,016
39	B1c1	2,008
40	B1d4	2,008
41	B4q1	1,990
42	B6a5	1,984
43	B4m4	1,935
44	B3a2	1,878
45	B2a8	1,863
46	B4l4	1,848
47	B1g1	1,772
48	B1f2	1,767
49	B4f3	1,762
50	B4e1	1,761
51	B1d6	1,727
52	B4i8	1,724
53	B4l6	1,696
54	B8a7	1,676
55	B4l3	1,676
56	B1d7	1,571
57	B4e2	1,550
58	B4f1	1,501
59	B4m3	1,492
60	B3a4	1,480
61	B1h3	1,466
62	B4f5	1,461
63	B8b2	1,451
64	B1d3	1,439
65	B4g2	1,436

Rank	Drainage Area ID	TSS Load (lbs/ac/yr)
31	B8b1	343
32	B2a8	338
33	B4j1	332
34	B4b6	331
35	B4o3	318
36	B6b7	318
37	B4k8	313
38	B4c1	310
39	B3a1	309
40	B4i3	307
41	B8a5	307
42	B1b4	306
43	B4i9	304
44	B4j5	300
45	B4b5	296
46	B1h9	291
47	B7a1	291
48	B1h1	270
49	B1g4	266
50	B1d8	263
51	B4f7	262
52	B4i5	260
53	B4i7	255
54	B4h2	254
55	B3e1	249
56	B4b8	245
57	B4j2	245
58	B4l7	245
59	B4i6	242
60	B4l3	241
61	B4c6	239
62	B4i8	238
63	B6a3	237
64	B4l6	237
65	B1h2	237

Rank	Drainage Area ID	TP Yield (lbs/yr)
31	B4g3	8.6
32	B3a2	8.4
33	B5a1	8.4
34	B6a5	8.2
35	B7a2	8.0
36	B1g1	7.7
37	B8a7	7.7
38	B4m4	7.6
39	B1c1	7.6
40	B1f1	7.6
41	B4q1	7.5
42	B4e1	7.4
43	B4l4	7.4
44	B1d8	7.3
45	B4f3	7.0
46	B4m3	6.9
47	B4m6	6.9
48	B1f2	6.8
49	B1d7	6.7
50	B4h2	6.5
51	B6c3	6.5
52	B1d6	6.4
53	B4i8	6.4
54	B2a8	6.2
55	B4l3	6.2
56	B4e2	6.1
57	B4f1	5.9
58	B4g2	5.9
59	B1b1	5.9
60	B1h3	5.9
61	B4l6	5.8
62	B1e1	5.6
63	B3a4	5.6
64	B4c9	5.6
65	B6c1	5.5

Rank	Drainage Area ID	TP Yield (lbs/ac/yr)
31	B8a5	1.06
32	B1b4	1.05
33	B4i9	1.04
34	B4b5	1.03
35	B4c5	1.03
36	B6b2	1.02
37	B4k8	1.02
38	B4i3	1.00
39	B1h9	0.99
40	B4j5	0.98
41	B1h1	0.96
42	B1g4	0.95
43	B1d8	0.94
44	B4f7	0.94
45	B4i5	0.93
46	B4i7	0.92
47	B3e1	0.91
48	B4b8	0.90
49	B4i6	0.89
50	B4l3	0.88
51	B4c6	0.88
52	B4i8	0.88
53	B4k4	0.87
54	B4i1	0.86
55	B1f1	0.85
56	B4q1	0.84
57	B4f5	0.84
58	B4i4	0.83
59	B8b1	0.83
60	B4a8	0.83
61	B4g1	0.82
62	B4a7	0.82
63	B6a4	0.82
64	B4b6	0.82
65	B1c1	0.82

**Town of Algoma
Pollutant Load & Yield Summary
Lake Butte des Morts Drainage Area Rankings**

Rank	Drainage Area ID	TSS Load (lbs/yr)
66	B1e1	1,426
67	B4c9	1,380
68	B4p1	1,377
69	B6c3	1,344
70	B1b1	1,320
71	B2a5	1,314
72	B8b3	1,297
73	B6c1	1,297
74	B4a6	1,281
75	B4b6	1,260
76	B4b3	1,231
77	B4d2	1,188
78	B4f7	1,168
79	B4m6	1,165
80	B4i2	1,132
81	B1f5	1,122
82	B2a3	1,104
83	B1a1	1,103
84	B4k8	1,092
85	B4j1	1,075
86	B4k4	1,061
87	B6c2	1,048
88	B4d4	1,038
89	B4m5	1,030
90	B6a4	1,023
91	B4k5	974
92	B4k9	968
93	B1b6	955
94	B4i1	952
95	B1b3	928
96	B1f4	893
97	B1h2	886
98	B1h1	875
99	B4j5	875
100	B4b8	867

Rank	Drainage Area ID	TSS Load (lbs/ac/yr)
66	B4k4	236
67	B1f1	233
68	B4i1	231
69	B4h2	230
70	B1d3	228
71	B6a2	225
72	B4f5	222
73	B4q1	222
74	B6a4	221
75	B4i4	221
76	B6b5	219
77	B4g1	217
78	B1a1	216
79	B1c1	215
80	B1d6	215
81	B1f2	213
82	B4k1	212
83	B4k7	212
84	B7a2	210
85	B4b2	210
86	B1b7	209
87	B4d3	209
88	B4i2	208
89	B1b8	205
90	B5a2	205
91	B2a5	205
92	B6b4	204
93	B4c2	203
94	B4g3	202
95	B4a6	200
96	B4e2	200
97	B4l8	199
98	B4k3	198
99	B4f4	198
100	B4c5	198

Rank	Drainage Area ID	TP Yield (lbs/yr)
66	B4f5	5.5
67	B4p1	5.5
68	B6b2	5.3
69	B1g2	5.2
70	B2a5	5.1
71	B3a1	5.0
72	B4a6	5.0
73	B1d3	5.0
74	B2a3	4.9
75	B4d2	4.7
76	B4d4	4.7
77	B8b4	4.5
78	B6c2	4.4
79	B4i2	4.4
80	B4f7	4.2
81	B4k5	4.1
82	B4k4	3.9
83	B1f4	3.9
84	B8b2	3.8
85	B6a4	3.8
86	B1a1	3.8
87	B1b3	3.7
88	B3b2	3.7
89	B4j1	3.6
90	B4i1	3.6
91	B4k8	3.5
92	B8b3	3.4
93	B1b2	3.4
94	B1f5	3.4
95	B4b1	3.3
96	B4h4	3.2
97	B4b8	3.2
98	B1h1	3.1
99	B4b6	3.1
100	B1b6	3.1

Rank	Drainage Area ID	TP Yield (lbs/ac/yr)
66	B1f2	0.81
67	B4k1	0.81
68	B4k7	0.81
69	B4l6	0.81
70	B1b7	0.81
71	B6a3	0.80
72	B4i2	0.80
73	B1b8	0.80
74	B1d6	0.80
75	B4h2	0.79
76	B5a2	0.79
77	B2a5	0.79
78	B4c1	0.79
79	B4d3	0.79
80	B4h2	0.79
81	B1d3	0.79
82	B6b5	0.79
83	B4g3	0.79
84	B4a6	0.78
85	B4e2	0.78
86	B6a2	0.78
87	B4k3	0.78
88	B4f4	0.78
89	B4q2	0.78
90	B4l8	0.77
91	B7a2	0.77
92	B1b2	0.77
93	B1h2	0.77
94	B4n1	0.77
95	B4c3	0.77
96	B7a3	0.77
97	B4f3	0.76
98	B3a1	0.76
99	B4l2	0.76
100	B2a4	0.76

**Town of Algoma
Pollutant Load & Yield Summary
Lake Butte des Morts Drainage Area Rankings**

Rank	Drainage Area ID	TSS Load (lbs/yr)
101	B4h4	862
102	B1b2	856
103	B4b1	851
104	B1f6	836
105	B4b4	814
106	B6b5	807
107	B4b2	773
108	B1g2	745
109	B4i7	733
110	B4i4	728
111	B4n2	714
112	B4m2	686
113	B3b2	686
114	B4i3	683
115	B8a6	679
116	B6a2	672
117	B3e1	612
118	B6b4	588
119	B4k6	536
120	B4q2	505
121	B4i6	505
122	B4i9	494
123	B4o3	493
124	B1h4	476
125	B4i5	475
126	B4j2	468
127	B4c7	466
128	B8b1	454
129	B7a4	453
130	B1h9	451
131	B4b5	447
132	B7a1	444
133	B4c1	443
134	B6b3	437
135	B1f7	435

Rank	Drainage Area ID	TSS Load (lbs/ac/yr)
101	B4q2	197
102	B1b2	195
103	B4c3	195
104	B4n1	194
105	B7a3	194
106	B3a4	193
107	B4f3	192
108	B4l2	191
109	B2a4	191
110	B4l9	190
111	B4n2	189
112	B1e1	189
113	B4l4	188
114	B4h4	188
115	B4d2	187
116	B4b1	187
117	B2a7	186
118	B4e3	185
119	B4p1	185
120	B6b1	184
121	B1h3	183
122	B1b3	180
123	B4f6	180
124	B1h7	179
125	B4l5	179
126	B4c9	178
127	B4k6	175
128	B1d5	175
129	B4m4	173
130	B4o1	173
131	B4g2	171
132	B4k5	170
133	B4l1	170
134	B4f2	168
135	B3a3	167

Rank	Drainage Area ID	TP Yield (lbs/yr)
101	B4m5	3.1
102	B6b5	2.9
103	B1h2	2.9
104	B4n2	2.9
105	B4j5	2.8
106	B4k9	2.8
107	B4i4	2.7
108	B4i7	2.7
109	B6b6	2.6
110	B1f6	2.5
111	B4b2	2.5
112	B4b3	2.4
113	B6a2	2.3
114	B3e1	2.2
115	B4i3	2.2
116	B4k6	2.2
117	B1h4	2.2
118	B4b4	2.1
119	B6b4	2.1
120	B4m2	2.1
121	B1g3	2.1
122	B4q2	2.0
123	B4b7	1.9
124	B4i6	1.9
125	B4d1	1.7
126	B4i5	1.7
127	B4i9	1.7
128	B1h6	1.7
129	B4o3	1.7
130	B4k7	1.6
131	B4b5	1.6
132	B6b1	1.5
133	B1h9	1.5
134	B4c5	1.5
135	B1b4	1.5

Rank	Drainage Area ID	TP Yield (lbs/ac/yr)
101	B4n2	0.76
102	B7a1	0.75
103	B4l4	0.75
104	B1e1	0.75
105	B4d2	0.75
106	B4e3	0.75
107	B2a7	0.75
108	B6b4	0.74
109	B1a1	0.74
110	B3a4	0.74
111	B4p1	0.74
112	B4f6	0.73
113	B1h3	0.73
114	B4b1	0.73
115	B4l5	0.73
116	B4c9	0.73
117	B4k6	0.72
118	B1b3	0.72
119	B4h1	0.72
120	B4o1	0.71
121	B4l7	0.71
122	B4j2	0.71
123	B4k5	0.71
124	B4g2	0.70
125	B4l1	0.70
126	B3b1	0.70
127	B4h4	0.70
128	B4e1	0.70
129	B4f2	0.70
130	B3c1	0.69
131	B1d5	0.69
132	B6c2	0.69
133	B1h7	0.69
134	B4m4	0.68
135	B3a3	0.68

**Town of Algoma
Pollutant Load & Yield Summary
Lake Butte des Morts Drainage Area Rankings**

Rank	Drainage Area ID	TSS Load (lbs/yr)
136	B1b4	423
137	B6b1	416
138	B4k7	414
139	B1h6	391
140	B4a8	389
141	B6b7	389
142	B4b7	386
143	B8a5	375
144	B6b6	361
145	B1a2	356
146	B8b5	355
147	B4h3	346
148	B1h7	335
149	B1h8	329
150	B1h5	322
151	B1b7	318
152	B4c5	287
153	B4d1	287
154	B4l7	242
155	B1g3	232
156	B4l9	218
157	B4a7	218
158	B6a3	204
159	B4h1	202
160	B1b5	201
161	B1b8	194
162	B1g4	193
163	B4c6	179
164	B4a9	131
165	B1g5	130
166	B6a1	107
167	B4j6	49
168	B2b2	34
169	B4p2	32
170	B1e2	20

Rank	Drainage Area ID	TSS Load (lbs/ac/yr)
136	B3b1	167
137	B4e1	167
138	B4f1	167
139	B1h5	166
140	B6c2	165
141	B3c1	164
142	B5a1	162
143	B4o2	162
144	B1d2	161
145	B6c1	157
146	B1h8	156
147	B1d4	153
148	B6a5	151
149	B4k2	150
150	B1d7	149
151	B1h6	146
152	B1f4	144
153	B2a3	141
154	B4h1	141
155	B4d4	140
156	B1b1	140
157	B1g1	140
158	B1f3	135
159	B4m3	130
160	B3a2	129
161	B3d1	126
162	B8a7	117
163	B1h4	115
164	B6a1	110
165	B6c3	109
166	B3b2	95
167	B4b7	92
168	B1b5	88
169	B4h5	88
170	B4a9	88

Rank	Drainage Area ID	TP Yield (lbs/yr)
136	B4c7	1.4
137	B4j2	1.4
138	B1f7	1.4
139	B7a4	1.3
140	B6b7	1.3
141	B1h8	1.3
142	B8a5	1.3
143	B1h7	1.3
144	B8a6	1.3
145	B1b7	1.2
146	B1h5	1.2
147	B7a1	1.1
148	B1b5	1.1
149	B1a2	1.1
150	B4c1	1.1
151	B8b1	1.1
152	B6b3	1.1
153	B8b5	1.1
154	B4h1	1.0
155	B4a8	0.9
156	B1b8	0.8
157	B4l9	0.8
158	B4a9	0.7
159	B4l7	0.7
160	B4h3	0.7
161	B6a3	0.7
162	B1g4	0.7
163	B4c6	0.7
164	B6a1	0.5
165	B4a7	0.5
166	B1g5	0.4
167	B4j6	0.1
168	B4c4	0.1
169	B2b2	0.1
170	B4p2	0.1

Rank	Drainage Area ID	TP Yield (lbs/ac/yr)
136	B4o2	0.68
137	B6b1	0.68
138	B1d2	0.68
139	B4c2	0.68
140	B5a1	0.67
141	B4b2	0.67
142	B6c1	0.67
143	B1d4	0.66
144	B4f1	0.66
145	B4k2	0.65
146	B4l9	0.65
147	B1d7	0.63
148	B1h5	0.63
149	B1h6	0.63
150	B4d4	0.63
151	B1f4	0.63
152	B2a3	0.63
153	B6a5	0.63
154	B1b1	0.62
155	B1h8	0.61
156	B1g1	0.61
157	B4m3	0.61
158	B1f3	0.60
159	B3d1	0.59
160	B2a6	0.58
161	B3a2	0.58
162	B6a1	0.54
163	B8a7	0.54
164	B1h4	0.53
165	B6c3	0.53
166	B3b2	0.51
167	B1b5	0.50
168	B4a9	0.50
169	B4h5	0.50
170	B4d1	0.49

**Town of Algoma
Pollutant Load & Yield Summary
Lake Butte des Morts Drainage Area Rankings**

Rank	Drainage Area ID	TSS Load (lbs/yr)
171	B4m1	19
172	B2b1	17
173	B4c4	16
174	B2a6	4
175	B4c8	4
176	B4h2	0
177	B4h5	0
178	B1b9	0
179	B1c2	0

Rank	Drainage Area ID	TSS Load (lbs/ac/yr)
171	B4d1	81
172	B1c2	76
173	B4c8	76
174	B1b9	76
175	B4c4	74
176	B4m6	71
177	B6b6	67
178	B1g2	44
179	B1g3	35

Rank	Drainage Area ID	TP Yield (lbs/yr)
171	B1e2	0.1
172	B4m1	0.1
173	B2b1	0.1
174	B4c8	0.0
175	B2a6	0.0
176	B4h5	0.0
177	B4h2	0.0
178	B1b9	0.0
179	B1c2	0.0

Rank	Drainage Area ID	TP Yield (lbs/ac/yr)
171	B4c4	0.48
172	B6b6	0.48
173	B4c8	0.47
174	B1c2	0.47
175	B1b9	0.47
176	B4b7	0.44
177	B4m6	0.42
178	B1g3	0.31
179	B1g2	0.31



**Town of Algoma
 Pollutant Load & Yield Summary
 Sawyer Creek Drainage Area Rankings**

Rank	Drainage Area ID	TSS Load (lbs/yr)
1	S1b3	5,158
2	S1a2	3,993
3	S1a3	2,115
4	S1b2	1,774
5	S1b1	671
6	S1a4	87
7	S1a5	80
8	S1a1	6

Rank	Drainage Area ID	TSS Load (lbs/ac/yr)
1	S1b1	230
2	S1b3	189
3	S1a3	174
4	S1b2	173
5	S1a2	159
6	S1a4	98
7	S1a5	98
8	S1a1	76

Rank	Drainage Area ID	TP Yield (lbs/yr)
1	S1b3	20.2
2	S1a2	16.7
3	S1a3	8.7
4	S1b2	6.7
5	S1b1	2.0
6	S1a4	0.5
7	S1a5	0.4
8	S1a1	0.0

Rank	Drainage Area ID	TP Yield (lbs/ac/yr)
1	S1b3	0.74
2	S1a3	0.71
3	S1b1	0.67
4	S1a2	0.66
5	S1b2	0.66
6	S1a5	0.52
7	S1a4	0.52
8	S1a1	0.47

**Town of Algoma
 Pollutant Load & Yield Summary
 Lake Butte des Morts Catchment Area Rankings**

Rank	Catchment Area ID	TSS Load (lbs/yr)
1	BMP-B4m6	28,722
2	BMP-B4c2	14,349
3	BMP-B4k4	14,157
4	BMP-B1g3	12,709
5	BMP-B4f5	11,479
6	BMP-B4p1	10,845
7	BMP-B2a7	10,337
8	BMP-B4i9	9,706
9	BMP-B1d5	9,509
10	BMP-B4g3	9,348
11	BMP-B3b1	8,888
12	BMP-B4n2	8,163
13	BMP-B3a3	6,568
14	BMP-B4e2	6,562
15	BMP-B3b2	6,548
16	BMP-B2a5	6,543
17	BMP-B4c3	6,425
18	BMP-B3d1	6,099
19	BMP-B4b7	5,762
20	BMP-B4d4	5,661
21	BMP-B1h8	5,079
22	BMP-B5a2	4,254
23	BMP-B4f6	4,187
24	BMP-B6b7	4,011
25	BMP-B1d8	3,765
26	BMP-B1b5	3,728
27	BMP-B6c3	3,688
28	BMP-B7a3	3,650
29	BMP-B6a5	3,318
30	BMP-B4k8	3,016

Rank	Catchment Area ID	TSS Load (lbs/ac/yr)
1	BMP-B4c7	589
2	BMP-B8b4	502
3	BMP-B4a7	392
4	BMP-B6b7	354
5	BMP-B4a8	343
6	BMP-B8b1	343
7	BMP-B4c1	310
8	BMP-B3a1	309
9	BMP-B4j6	303
10	BMP-B7a1	291
11	BMP-B2a9	288
12	BMP-B4b7	268
13	BMP-B4h2	254
14	BMP-B4c6	239
15	BMP-B1d8	238
16	BMP-B4i9	230
17	BMP-B1d3	228
18	BMP-B6a2	225
19	BMP-B4h5	218
20	BMP-B4q2	216
21	BMP-B1a1	216
22	BMP-B1c1	215
23	BMP-B4k8	212
24	BMP-B7a2	210
25	BMP-B4g3	209
26	BMP-B4c2	203
27	BMP-B4c5	198
28	BMP-B2a7	195
29	BMP-B4c3	195
30	BMP-B4n2	194

Rank	Catchment Area ID	TP Yield (lbs/yr)
1	BMP-B4m6	114.2
2	BMP-B4k4	56.3
3	BMP-B1g3	52.5
4	BMP-B4c2	47.8
5	BMP-B4f5	45.7
6	BMP-B4p1	44.5
7	BMP-B2a7	40.7
8	BMP-B1d5	38.3
9	BMP-B3b1	37.1
10	BMP-B4i9	36.1
11	BMP-B4g3	35.9
12	BMP-B4n2	32.2
13	BMP-B3b2	28.4
14	BMP-B3d1	27.8
15	BMP-B3a3	26.7
16	BMP-B4e2	26.5
17	BMP-B2a5	25.8
18	BMP-B4c3	25.3
19	BMP-B4d4	22.4
20	BMP-B1h8	19.6
21	BMP-B4f6	17.1
22	BMP-B5a2	17.0
23	BMP-B4b7	16.9
24	BMP-B6c3	16.4
25	BMP-B1b5	15.6
26	BMP-B7a3	14.4
27	BMP-B1d8	13.7
28	BMP-B6a5	13.2
29	BMP-B6b7	11.4
30	BMP-B4k8	11.4

Rank	Catchment Area ID	TP Yield (lbs/ac/yr)
1	BMP-B4c7	1.77
2	BMP-B8b4	1.06
3	BMP-B4c5	1.03
4	BMP-B6b7	1.01
5	BMP-B2a9	1.00
6	BMP-B4j6	0.98
7	BMP-B4c6	0.88
8	BMP-B1d8	0.87
9	BMP-B4i9	0.86
10	BMP-B8b1	0.83
11	BMP-B4a8	0.83
12	BMP-B4q2	0.82
13	BMP-B4a7	0.82
14	BMP-B1c1	0.82
15	BMP-B4g3	0.80
16	BMP-B4k8	0.80
17	BMP-B4c1	0.79
18	BMP-B4h2	0.79
19	BMP-B4b7	0.79
20	BMP-B1d3	0.79
21	BMP-B6a2	0.78
22	BMP-B7a2	0.77
23	BMP-B2a7	0.77
24	BMP-B4c3	0.77
25	BMP-B4n2	0.77
26	BMP-B7a3	0.77
27	BMP-B2a5	0.76
28	BMP-B4h5	0.76
29	BMP-B3a1	0.76
30	BMP-B4k4	0.76

**Town of Algoma
 Pollutant Load & Yield Summary
 Lake Butte des Morts Catchment Area Rankings**

Rank	Catchment Area ID	TSS Load (lbs/yr)
31	BMP-B4q2	2,496
32	BMP-B4j6	2,467
33	BMP-B1d2	2,409
34	BMP-B7a2	2,190
35	BMP-B8b4	2,116
36	BMP-B4h2	2,107
37	BMP-B3a1	2,055
38	BMP-B1c1	2,008
39	BMP-B3a2	1,878
40	BMP-B4d1	1,684
41	BMP-B1d7	1,571
42	BMP-B3a4	1,480
43	BMP-B1d3	1,439
44	BMP-B1e1	1,426
45	BMP-B4h5	1,410
46	BMP-B2a3	1,104
47	BMP-B1a1	1,103
48	BMP-B2a9	929
49	BMP-B6a2	672
50	BMP-B6b6	647
51	BMP-B4c7	466
52	BMP-B8b1	454
53	BMP-B7a1	444
54	BMP-B4c1	443
55	BMP-B6b1	416
56	BMP-B4a8	389
57	BMP-B4c5	287
58	BMP-B4a7	218
59	BMP-B4c6	179
60	BMP-B4c8	4

Rank	Catchment Area ID	TSS Load (lbs/ac/yr)
31	BMP-B2a5	194
32	BMP-B7a3	194
33	BMP-B3a4	193
34	BMP-B4k4	190
35	BMP-B1e1	189
36	BMP-B4d4	187
37	BMP-B4f5	185
38	BMP-B6b1	184
39	BMP-B1h8	183
40	BMP-B4e2	183
41	BMP-B5a2	182
42	BMP-B4m6	181
43	BMP-B4f6	180
44	BMP-B4p1	174
45	BMP-B1d5	170
46	BMP-B6a5	169
47	BMP-B3a3	167
48	BMP-B3b1	167
49	BMP-B1b5	165
50	BMP-B1d2	161
51	BMP-B3b2	153
52	BMP-B1g3	153
53	BMP-B1d7	149
54	BMP-B4d1	146
55	BMP-B2a3	141
56	BMP-B6c3	137
57	BMP-B3d1	132
58	BMP-B3a2	129
59	BMP-B6b6	83
60	BMP-B4c8	76

Rank	Catchment Area ID	TP Yield (lbs/yr)
31	BMP-B1d2	10.1
32	BMP-B4q2	9.5
33	BMP-B3a2	8.4
34	BMP-B7a2	8.0
35	BMP-B4j6	8.0
36	BMP-B1c1	7.6
37	BMP-B4d1	7.5
38	BMP-B1d7	6.7
39	BMP-B4h2	6.5
40	BMP-B1e1	5.6
41	BMP-B3a4	5.6
42	BMP-B3a1	5.0
43	BMP-B1d3	5.0
44	BMP-B4h5	4.9
45	BMP-B2a3	4.9
46	BMP-B8b4	4.5
47	BMP-B6b6	3.9
48	BMP-B1a1	3.8
49	BMP-B2a9	3.2
50	BMP-B6a2	2.3
51	BMP-B6b1	1.5
52	BMP-B4c5	1.5
53	BMP-B4c7	1.4
54	BMP-B7a1	1.1
55	BMP-B4c1	1.1
56	BMP-B8b1	1.1
57	BMP-B4a8	0.9
58	BMP-B4c6	0.7
59	BMP-B4a7	0.5
60	BMP-B4c8	0.0

Rank	Catchment Area ID	TP Yield (lbs/ac/yr)
31	BMP-B7a1	0.75
32	BMP-B1e1	0.75
33	BMP-B4d4	0.74
34	BMP-B4e2	0.74
35	BMP-B1a1	0.74
36	BMP-B3a4	0.74
37	BMP-B4f5	0.74
38	BMP-B4f6	0.73
39	BMP-B5a2	0.73
40	BMP-B4m6	0.72
41	BMP-B4p1	0.71
42	BMP-B1h8	0.71
43	BMP-B3b1	0.70
44	BMP-B1b5	0.69
45	BMP-B1d5	0.68
46	BMP-B3a3	0.68
47	BMP-B6b1	0.68
48	BMP-B1d2	0.68
49	BMP-B4c2	0.68
50	BMP-B6a5	0.68
51	BMP-B3b2	0.66
52	BMP-B4d1	0.65
53	BMP-B1d7	0.63
54	BMP-B1g3	0.63
55	BMP-B2a3	0.63
56	BMP-B6c3	0.61
57	BMP-B3d1	0.60
58	BMP-B3a2	0.58
59	BMP-B6b6	0.50
60	BMP-B4c8	0.47



**Town of Algoma
 Pollutant Load & Yield Summary
 Sawyer Creek Catchment Area Rankings**

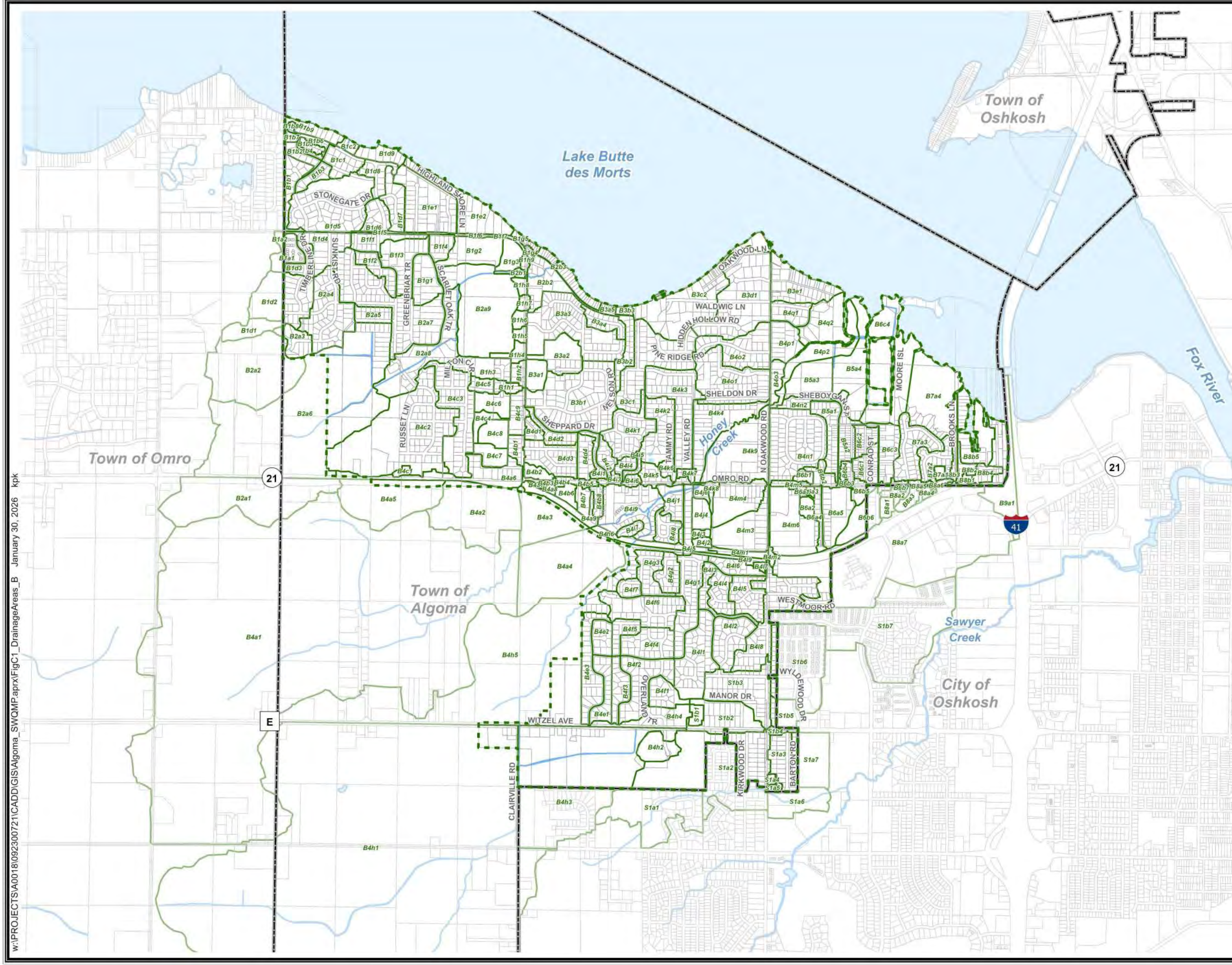
Rank	Catchment Area ID	TSS Load (lbs/yr)
1	BMP-S1b1	9,509
2	BMP-S1a3	3,728
3	BMP-S1a5	2,409
4	BMP-S1a4	2,008
5	BMP-S1b3	1,571
6	BMP-S1a6	1,439


Rank	Catchment Area ID	TSS Load (lbs/ac/yr)
1	BMP-S1a6	228
2	BMP-S1a4	215
3	BMP-S1b1	170
4	BMP-S1a3	165
5	BMP-S1a5	161
6	BMP-S1b3	149

Rank	Catchment Area ID	TP Yield (lbs/yr)
1	BMP-S1b1	38.3
2	BMP-S1a3	15.6
3	BMP-S1a5	10.1
4	BMP-S1a4	7.6
5	BMP-S1b3	6.7
6	BMP-S1a6	5.0

Rank	Catchment Area ID	TP Yield (lbs/ac/yr)
1	BMP-S1a4	0.82
2	BMP-S1a6	0.79
3	BMP-S1a3	0.69
4	BMP-S1b1	0.68
5	BMP-S1a5	0.68
6	BMP-S1b3	0.63

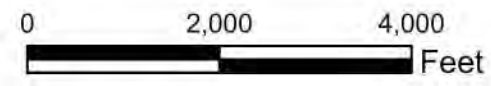
Water Quality Results



-  Drainage Area and ID
- Other Mapped Features**
-  Municipal Boundary
-  Parcel Line
-  Stream
-  Surface Water

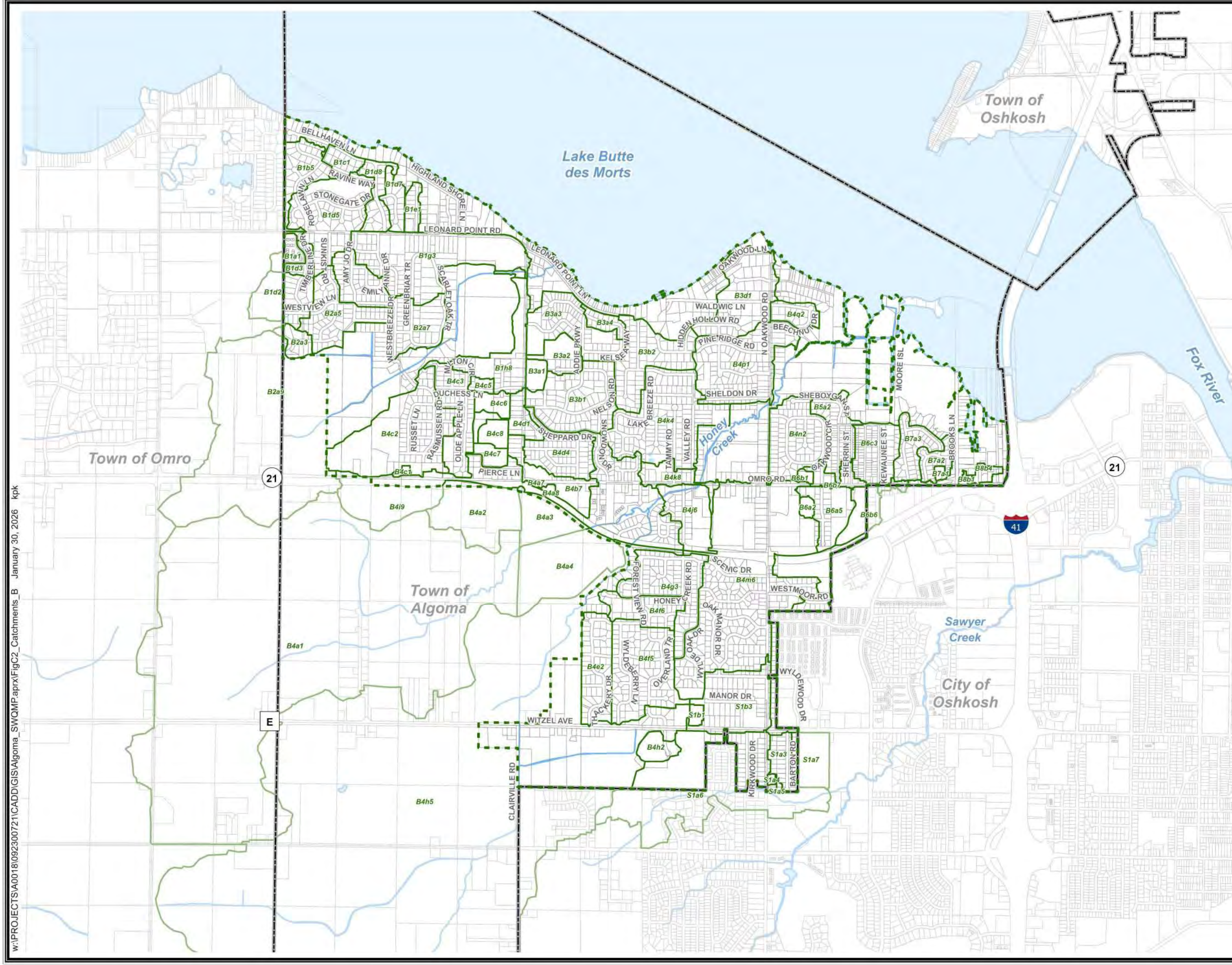
Source: Winnebago County, 2024-25.

Disclaimer: The property lines, right-of-way lines, and other property information on this drawing were developed or obtained as part of the County Geographic Information System or through the County property tax mapping function. McMAHON ASSOCIATES, INC. does not guarantee this information to be correct, current, or complete. The property and right-of-way information are only intended for use as a general reference and are not intended or suitable for site-specific uses. Any use to the contrary of the above stated uses is the responsibility of the user and such use is at the user's own risk.



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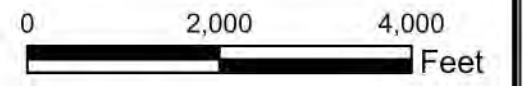
FIGURE C1
DRAINAGE AREAS
STORMWATER QUALITY
MANAGEMENT PLAN
TOWN OF ALGOMA
WINNEBAGO COUNTY, WISCONSIN



- Catchment and ID
- Other Mapped Features**
- Municipal Boundary
- Parcel Line
- Stream
- Surface Water

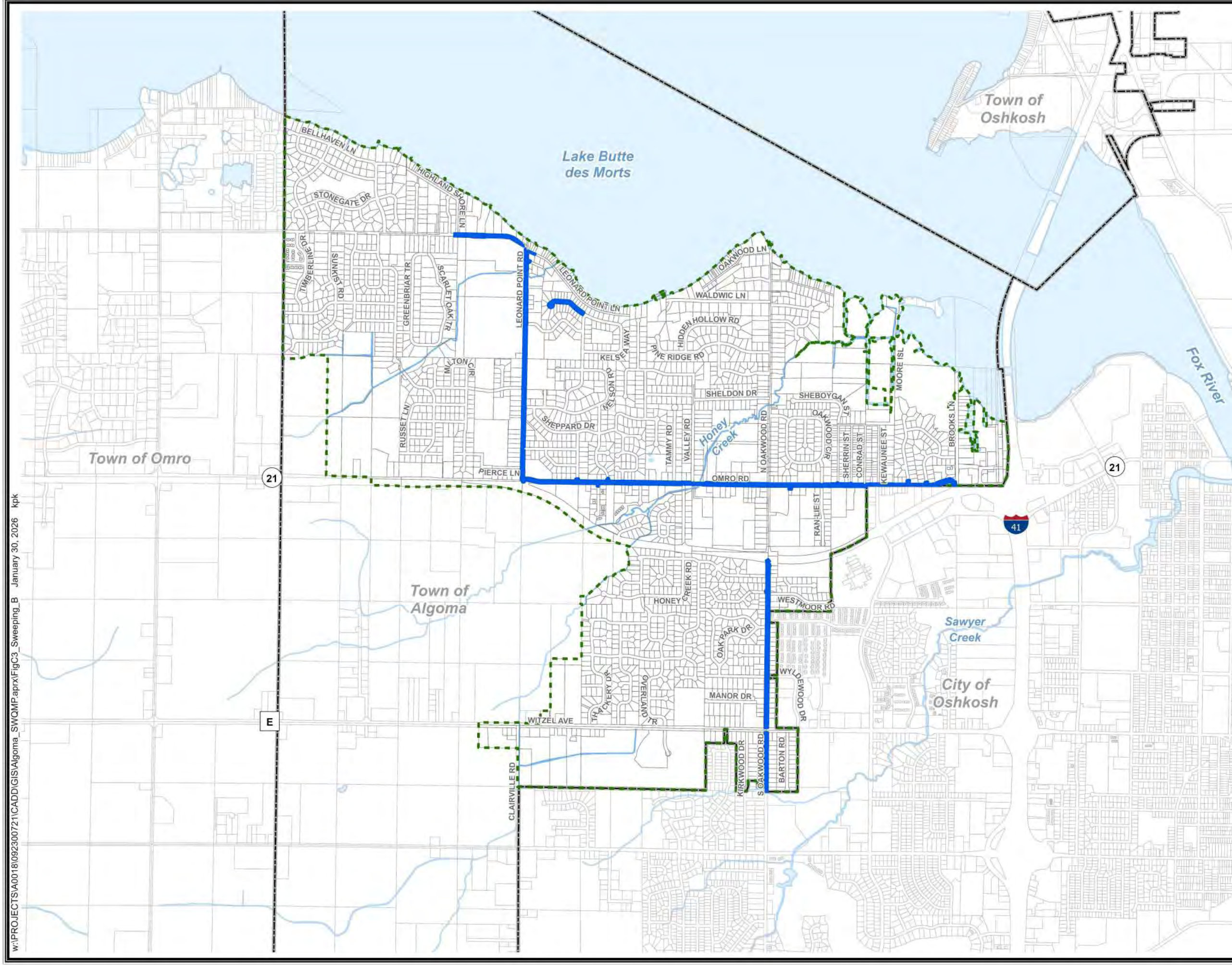
Source: Winnebago County, 2024-25.

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



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FIGURE C2
BMP CATCHMENTS
STORMWATER QUALITY
MANAGEMENT PLAN
TOWN OF ALGOMA
WINNEBAGO COUNTY, WISCONSIN



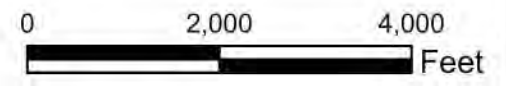
 Street Sweeping

Mapped Features

-  Study Area Boundary
-  Municipal Boundary
-  Parcel Line
-  Stream
-  Surface Water

Source: Winnebago County, 2024-25.

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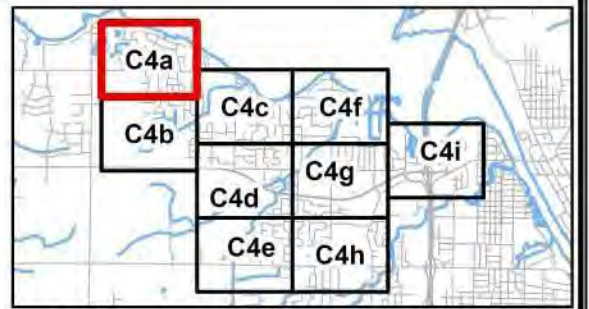
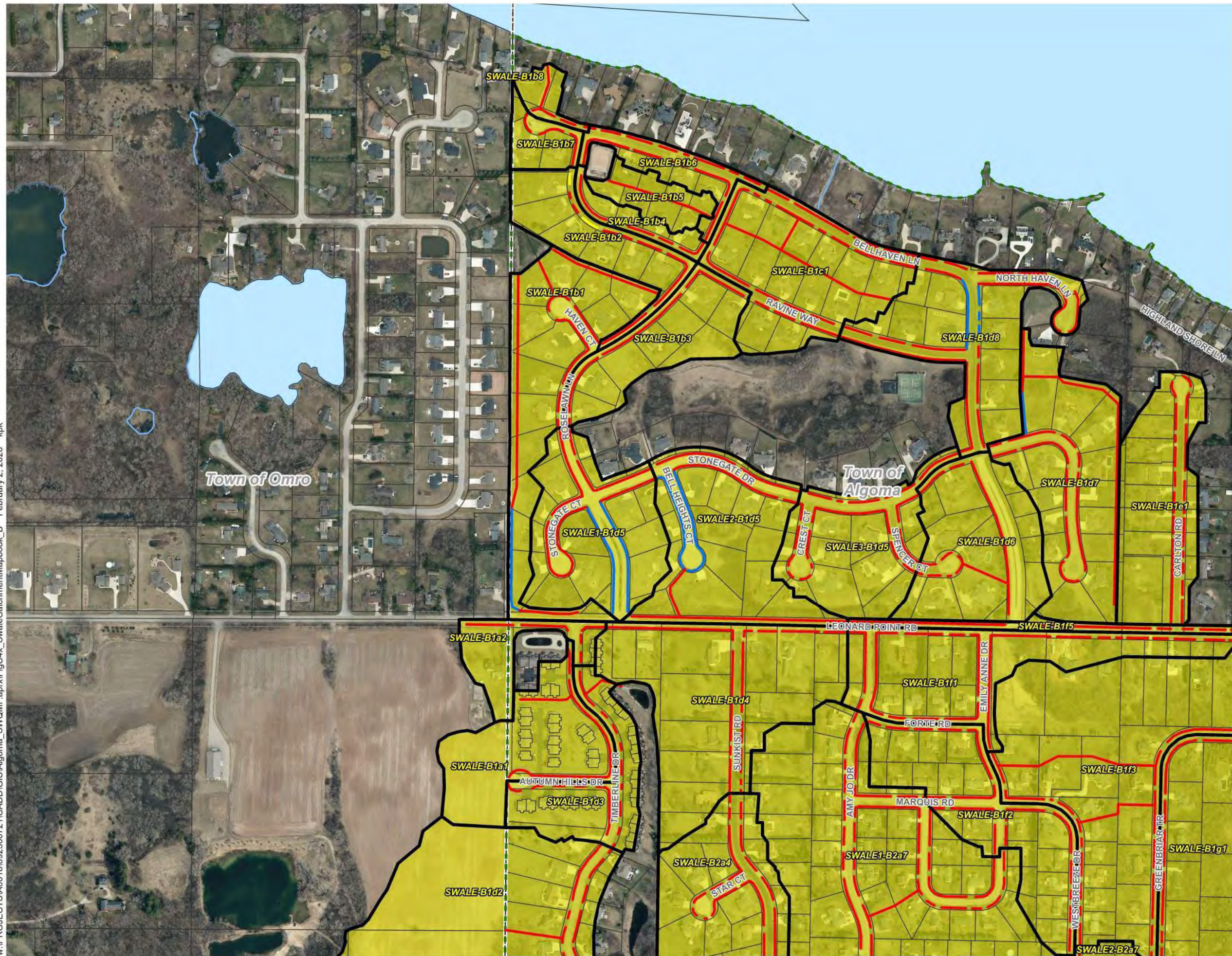


McMAHON
ENGINEERS ARCHITECTS
McMAHON ASSOCIATES, INC.

FIGURE C3
STREET SWEEPING
STORMWATER QUALITY
MANAGEMENT PLAN
TOWN OF ALGOMA
WINNEBAGO COUNTY, WISCONSIN

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- Swale Categories**
- Non-Water Quality Swale (Enclosed Liner)
 - Non-Water Quality Swale (Greater than 4% Slope)
 - Non-Water Quality Swale (Rock or Ditch Liner)
 - Water Quality Swale
 - Water Quality Swale (Standing Water-Wetland Vegetation)
- Swale Jurisdiction**
- Town of Algoma
 - Other MS4
 - County
 - State
- Other Mapped Features**
- Study Area Boundary
 - Municipal Boundary
 - Parcel Line
 - Stream
 - Surface Water

Source: Winnebago County, 2024-25.

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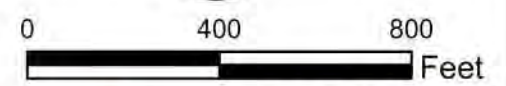
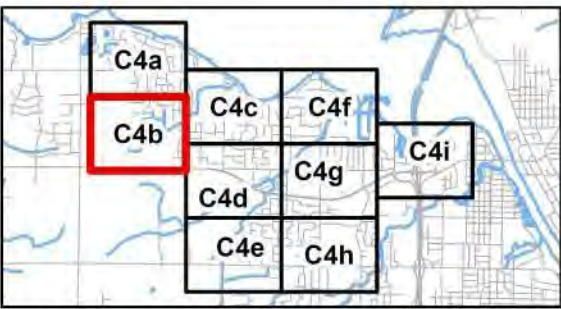
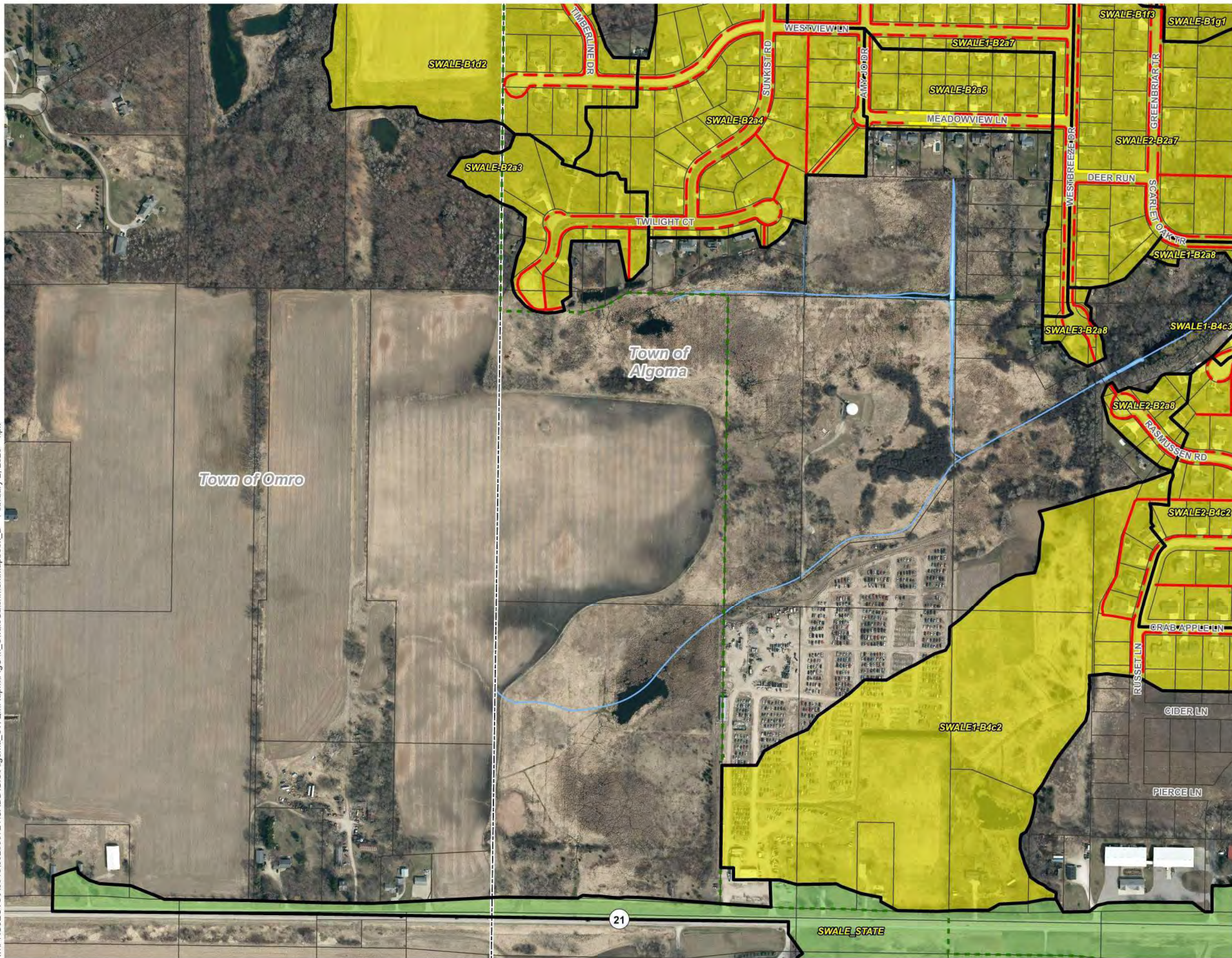


FIGURE C4a
SWALE CATCHMENTS
STORMWATER QUALITY
MANAGEMENT PLAN
TOWN OF ALGOMA
WINNEBAGO COUNTY, WISCONSIN



Swale Categories

- Non-Water Quality Swale (Enclosed Liner)
- Non-Water Quality Swale (Greater than 4% Slope)
- Non-Water Quality Swale (Rock or Ditch Liner)
- Water Quality Swale
- Water Quality Swale (Standing Water-Wetland Vegetation)

Swale Jurisdiction

- Town of Algoma
- Other MS4
- County
- State

Other Mapped Features

- Study Area Boundary
- Municipal Boundary
- Parcel Line
- Stream
- Surface Water

Source: Winnebago County, 2024-25.

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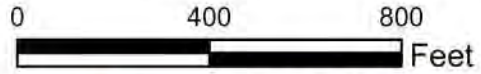
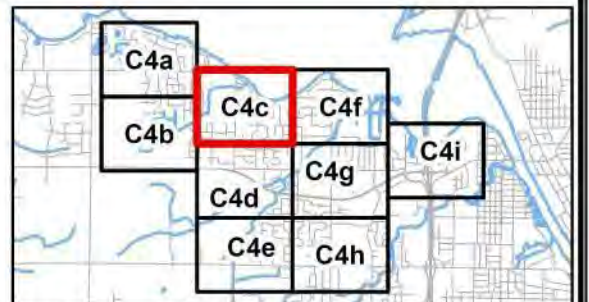
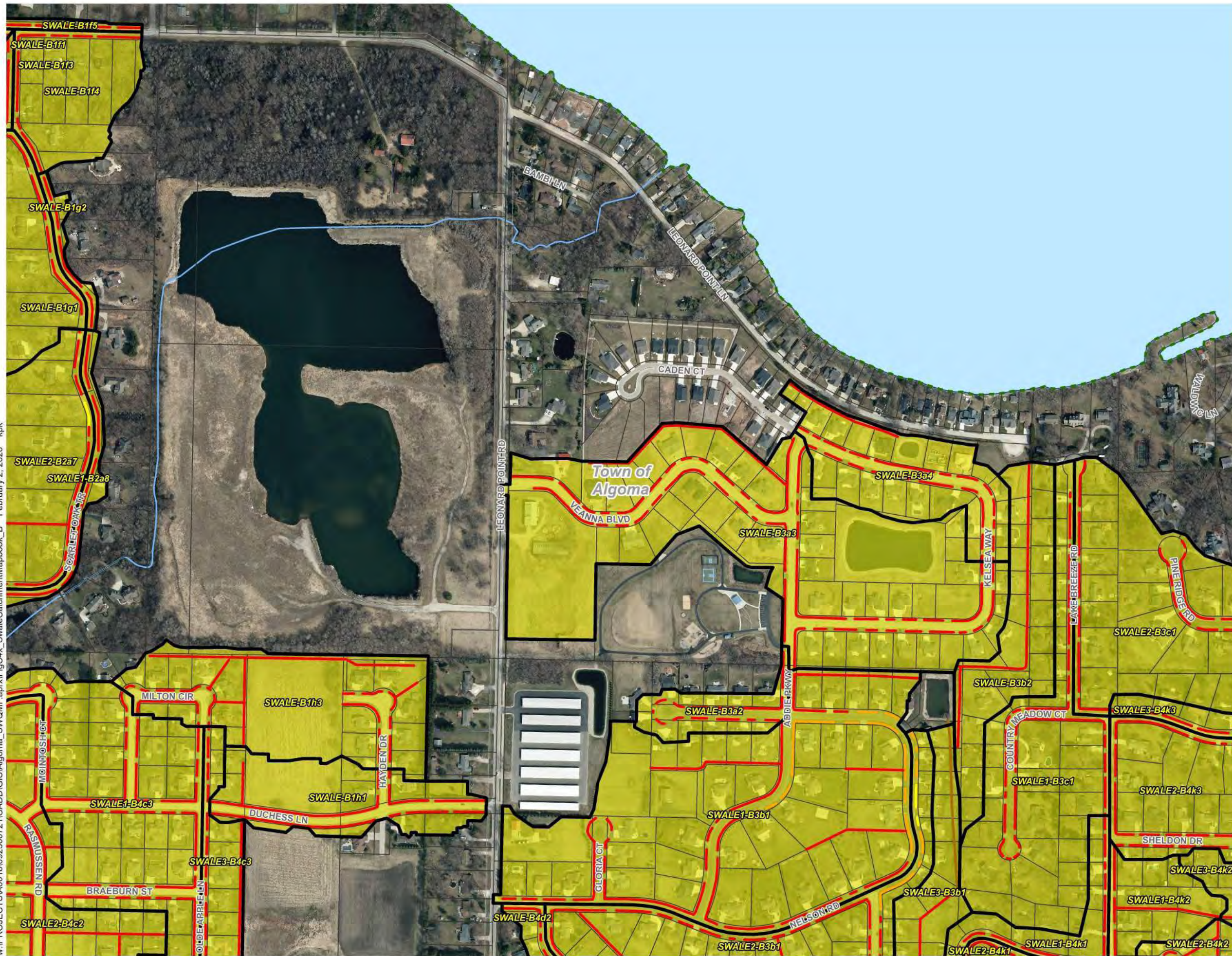


FIGURE C4b
SWALE CATCHMENTS
STORMWATER QUALITY
MANAGEMENT PLAN
TOWN OF ALGOMA
WINNEBAGO COUNTY, WISCONSIN

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Swale Categories

- Non-Water Quality Swale (Enclosed Liner)
- Non-Water Quality Swale (Greater than 4% Slope)
- Non-Water Quality Swale (Rock or Ditch Liner)
- Water Quality Swale
- Water Quality Swale (Standing Water-Wetland Vegetation)

Swale Jurisdiction

- Town of Algoma
- Other MS4
- County
- State

Other Mapped Features

- Study Area Boundary
- Municipal Boundary
- Parcel Line
- Stream
- Surface Water

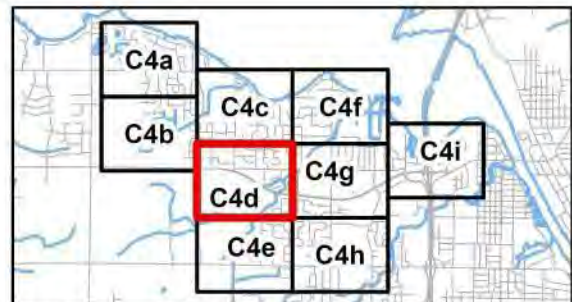
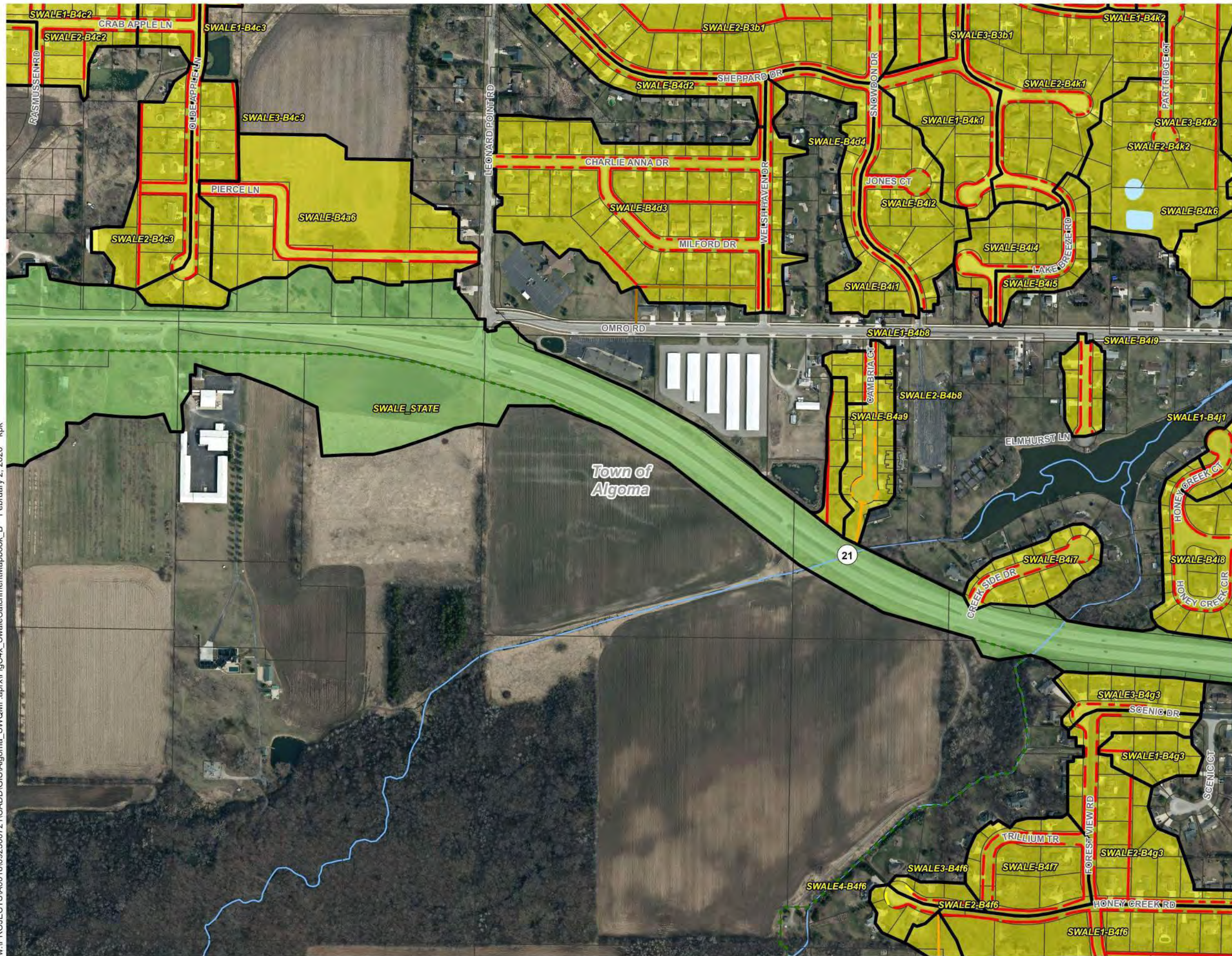
Source: Winnebago County, 2024-25.

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0 400 800
Feet

FIGURE C4c
SWALE CATCHMENTS
STORMWATER QUALITY
MANAGEMENT PLAN
TOWN OF ALGOMA
WINNEBAGO COUNTY, WISCONSIN

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Swale Categories

- Non-Water Quality Swale (Enclosed Liner)
- Non-Water Quality Swale (Greater than 4% Slope)
- Non-Water Quality Swale (Rock or Ditch Liner)
- Water Quality Swale
- Water Quality Swale (Standing Water-Wetland Vegetation)

Swale Jurisdiction

- Town of Algoma
- Other MS4
- County
- State

Other Mapped Features

- Study Area Boundary
- Municipal Boundary
- Parcel Line
- Stream
- Surface Water

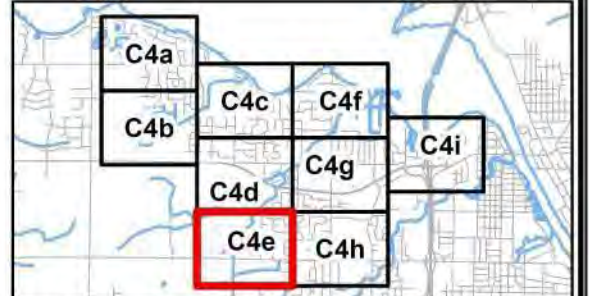
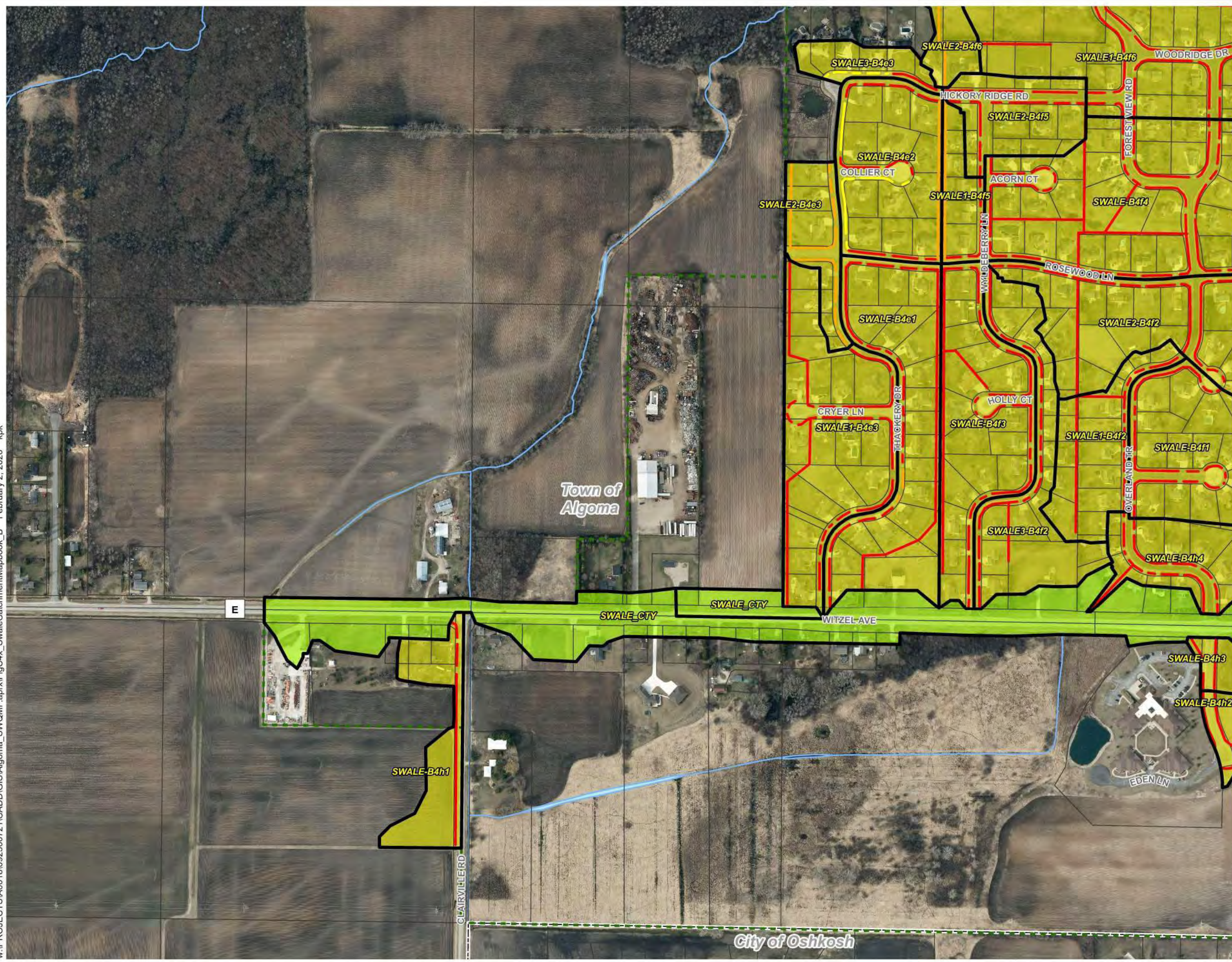
Source: Winnebago County, 2024-25.

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0 400 800
Feet

TOWN OF ALGOMA **McMAHON**
ENGINEERS ARCHITECTS
A SUSTAINABLE SOLUTION McMAHON ASSOCIATES, INC.

FIGURE C4d
SWALE CATCHMENTS
STORMWATER QUALITY
MANAGEMENT PLAN
TOWN OF ALGOMA
WINNEBAGO COUNTY, WISCONSIN



Swale Categories

- Non-Water Quality Swale (Enclosed Liner)
- Non-Water Quality Swale (Greater than 4% Slope)
- Non-Water Quality Swale (Rock or Ditch Liner)
- Water Quality Swale
- Water Quality Swale (Standing Water-Wetland Vegetation)

Swale Jurisdiction

- Town of Algoma
- Other MS4
- County
- State

Other Mapped Features

- Study Area Boundary
- Municipal Boundary
- Parcel Line
- Stream
- Surface Water

Source: Winnebago County, 2024-25.

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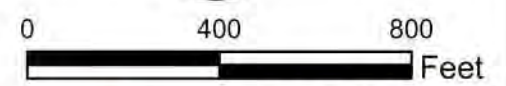
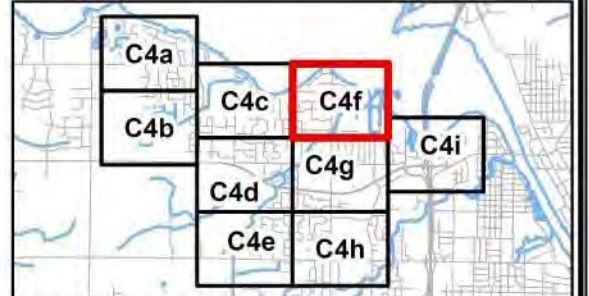
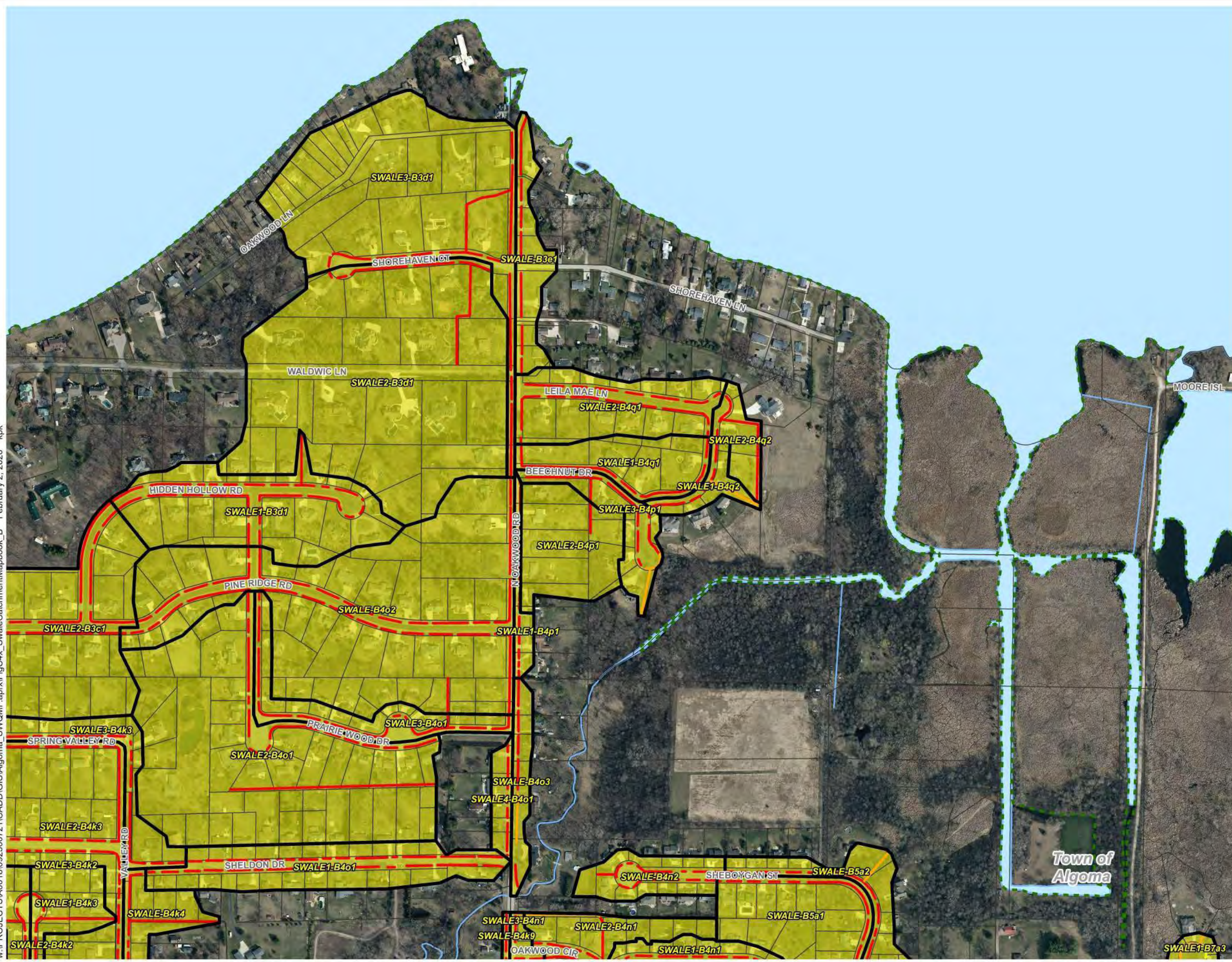


FIGURE C4e
SWALE CATCHMENTS
STORMWATER QUALITY
MANAGEMENT PLAN
TOWN OF ALGOMA
WINNEBAGO COUNTY, WISCONSIN

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Swale Categories

- Non-Water Quality Swale (Enclosed Liner)
- Non-Water Quality Swale (Greater than 4% Slope)
- Non-Water Quality Swale (Rock or Ditch Liner)
- Water Quality Swale
- Water Quality Swale (Standing Water-Wetland Vegetation)

Swale Jurisdiction

- Town of Algoma
- Other MS4
- County
- State

Other Mapped Features

- Study Area Boundary
- Municipal Boundary
- Parcel Line
- Stream
- Surface Water

Source: Winnebago County, 2024-25.

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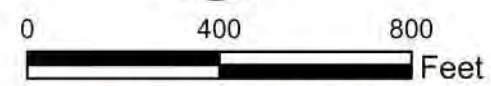
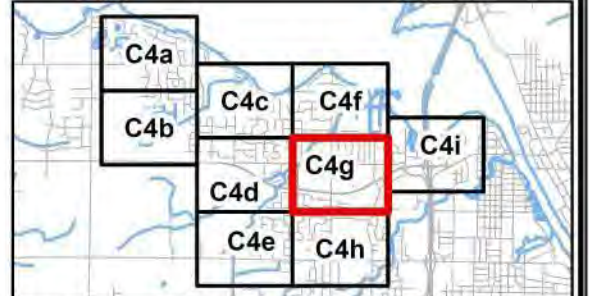
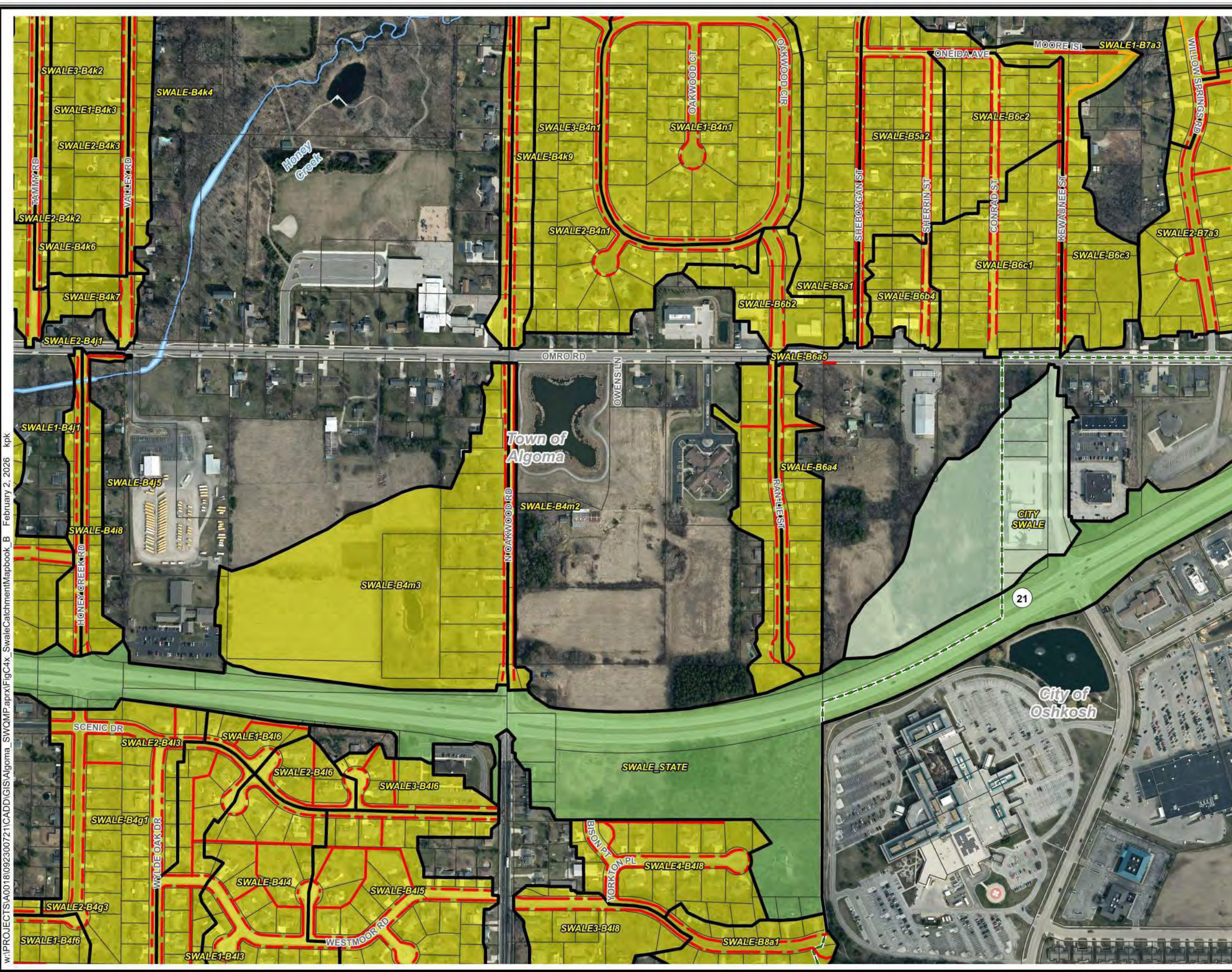


FIGURE C4f
SWALE CATCHMENTS
STORMWATER QUALITY
MANAGEMENT PLAN
TOWN OF ALGOMA
WINNEBAGO COUNTY, WISCONSIN



- Swale Categories**
- Non-Water Quality Swale (Enclosed Liner)
 - Non-Water Quality Swale (Greater than 4% Slope)
 - Non-Water Quality Swale (Rock or Ditch Liner)
 - Water Quality Swale
 - Water Quality Swale (Standing Water-Wetland Vegetation)
- Swale Jurisdiction**
- Town of Algoma
 - Other MS4
 - County
 - State
- Other Mapped Features**
- Study Area Boundary
 - Municipal Boundary
 - Parcel Line
 - Stream
 - Surface Water

Source: Winnebago County, 2024-25.

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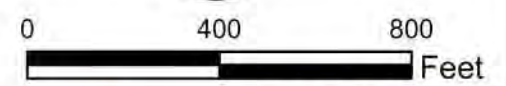
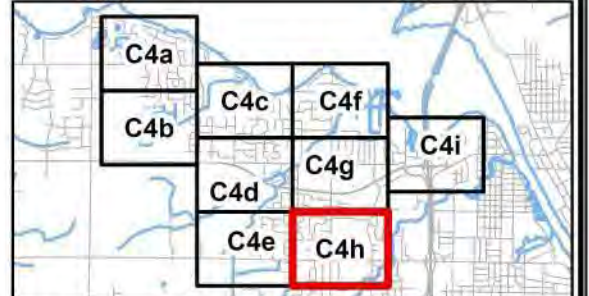
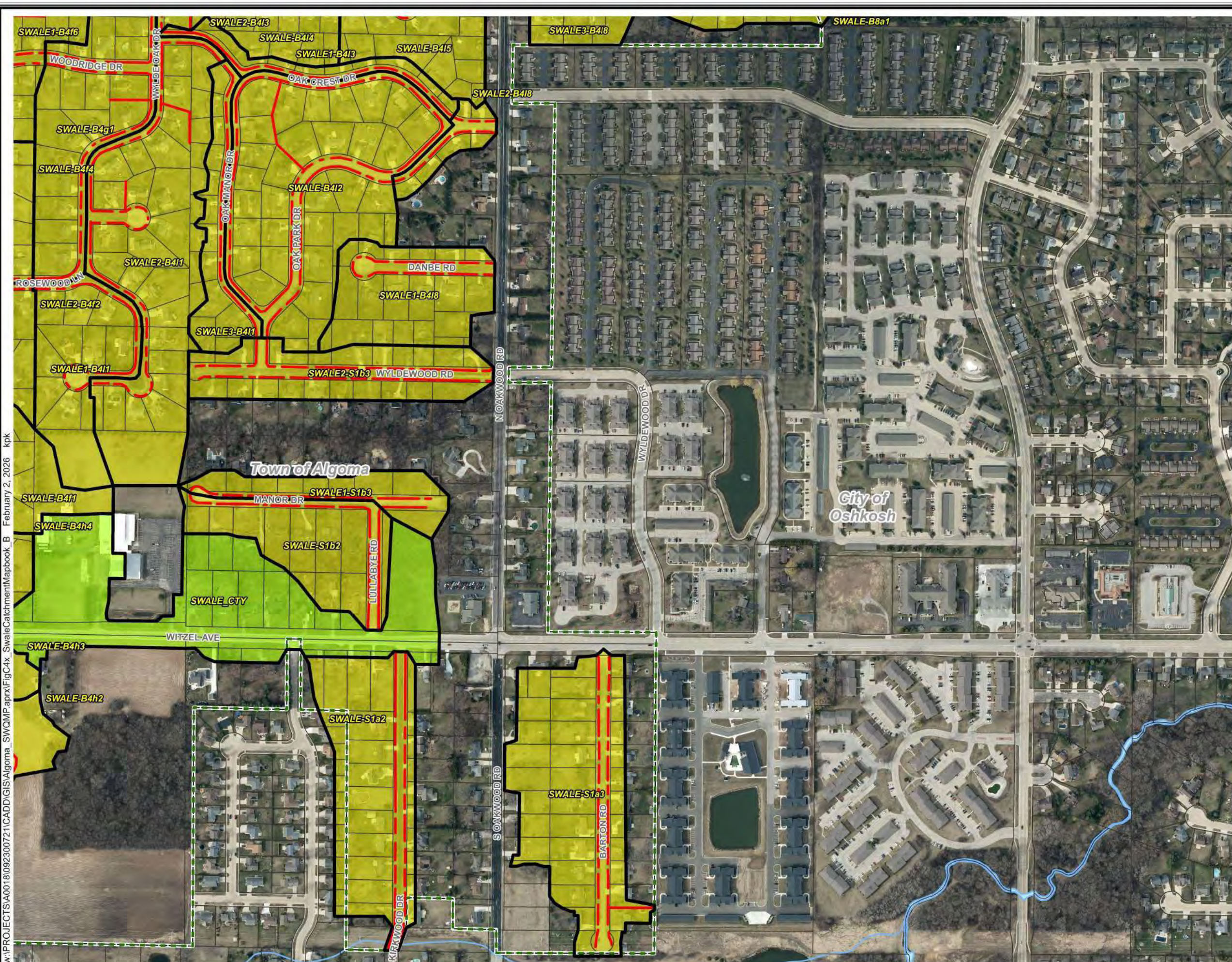


FIGURE C4g
SWALE CATCHMENTS
STORMWATER QUALITY
MANAGEMENT PLAN
TOWN OF ALGOMA
WINNEBAGO COUNTY, WISCONSIN

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- Swale Categories**
- Non-Water Quality Swale (Enclosed Liner)
 - Non-Water Quality Swale (Greater than 4% Slope)
 - Non-Water Quality Swale (Rock or Ditch Liner)
 - Water Quality Swale
 - Water Quality Swale (Standing Water-Wetland Vegetation)
- Swale Jurisdiction**
- Town of Algoma
 - Other MS4
 - County
 - State
- Other Mapped Features**
- Study Area Boundary
 - Municipal Boundary
 - Parcel Line
 - Stream
 - Surface Water

Source: Winnebago County, 2024-25.

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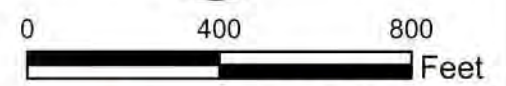
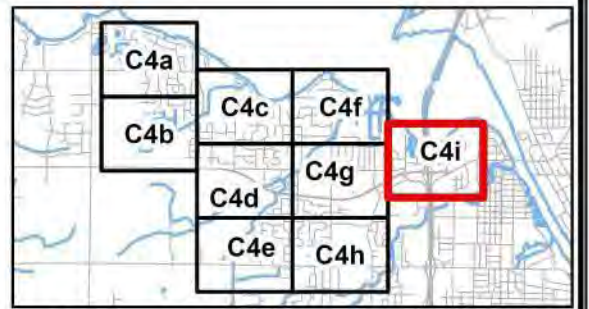
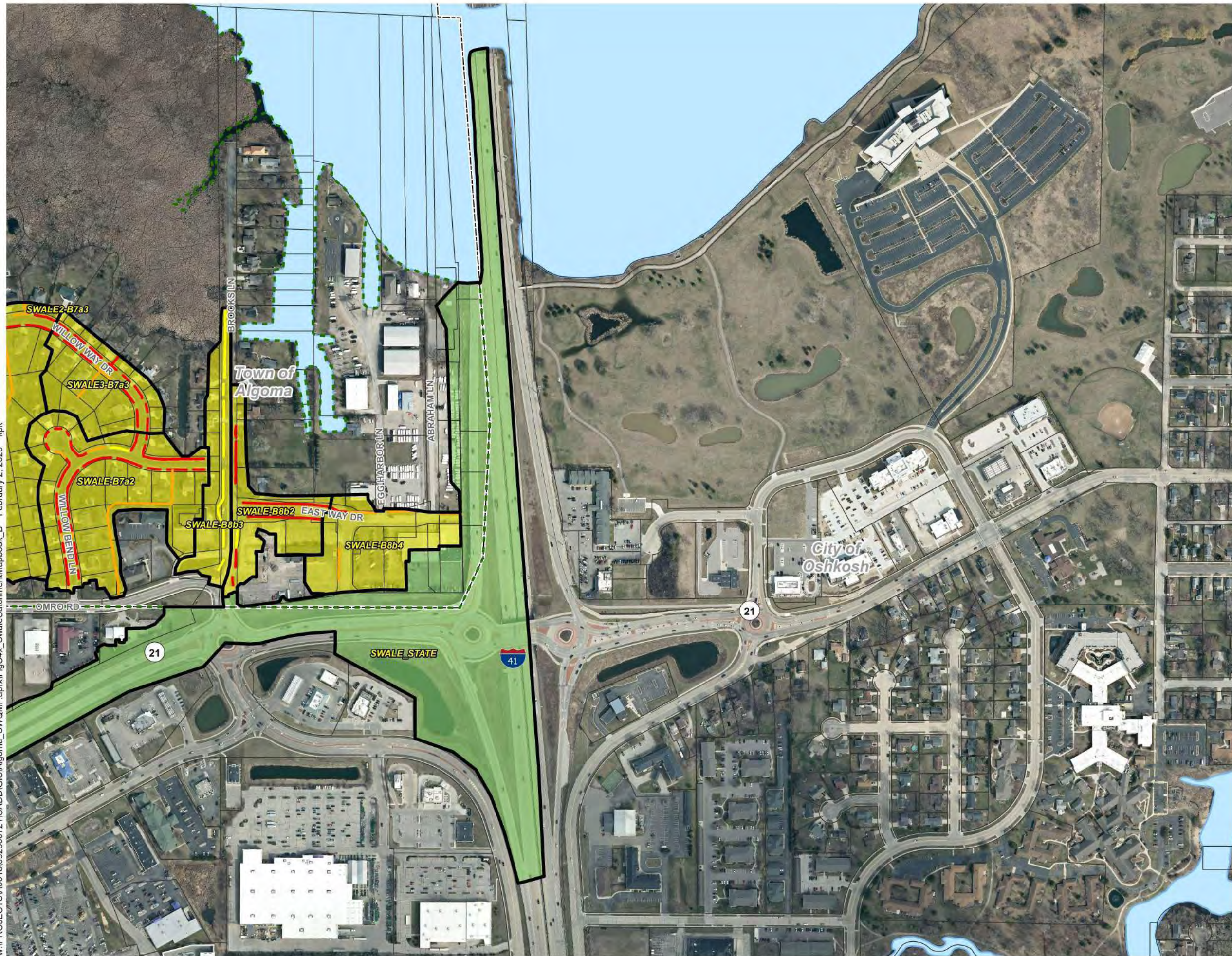


FIGURE C4h
SWALE CATCHMENTS
STORMWATER QUALITY
MANAGEMENT PLAN
TOWN OF ALGOMA
WINNEBAGO COUNTY, WISCONSIN

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Swale Categories

- Non-Water Quality Swale (Enclosed Liner)
- Non-Water Quality Swale (Greater than 4% Slope)
- Non-Water Quality Swale (Rock or Ditch Liner)
- Water Quality Swale
- Water Quality Swale (Standing Water-Wetland Vegetation)

Swale Jurisdiction

- Town of Algoma
- Other MS4
- County
- State

Other Mapped Features

- Study Area Boundary
- Municipal Boundary
- Parcel Line
- Stream
- Surface Water

Source: Winnebago County, 2024-25.

Disclaimer: The property lines, right-of-way lines, and other property information on this drawing were developed or obtained as part of the County Geographic Information System or through the County property tax mapping function. McMAHON ASSOCIATES, INC. does not guarantee this information to be correct, current, or complete. The property and right-of-way information are only intended for use as a general reference and are not intended or suitable for site-specific uses. Any use to the contrary of the above stated uses is the responsibility of the user and such use is at the user's own risk.

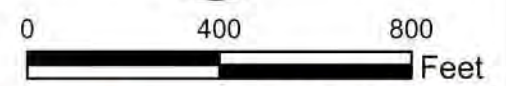
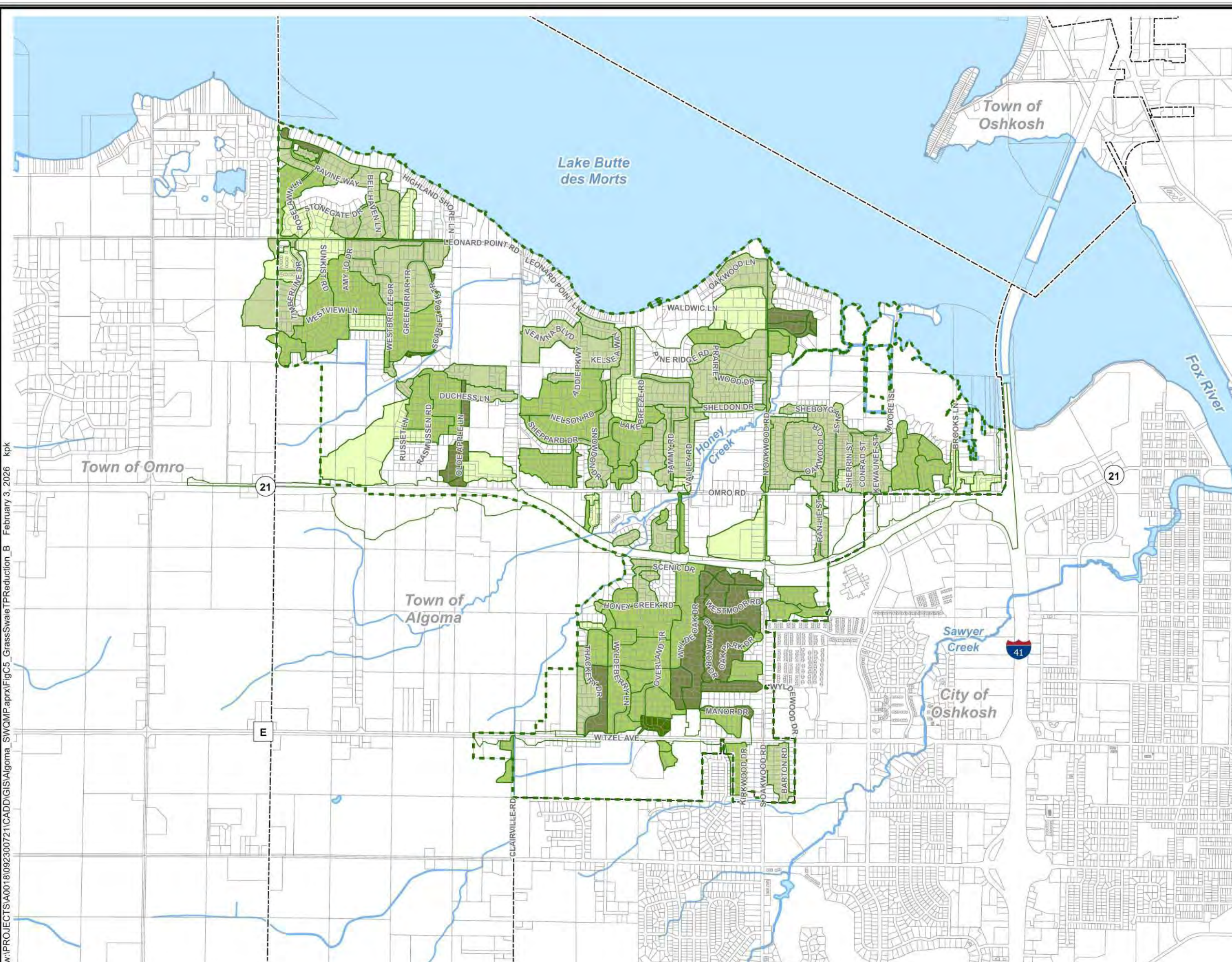











FIGURE C4i
SWALE CATCHMENTS
STORMWATER QUALITY
MANAGEMENT PLAN
TOWN OF ALGOMA
WINNEBAGO COUNTY, WISCONSIN



**Grass Swales
TP Reduction**

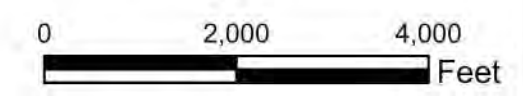
-  Less than 65%
-  65 - 75%
-  75 - 83%
-  83 - 90%
-  90 - 100%

Other Mapped Features

-  Municipal Boundary
-  Parcel Line
-  Stream
-  Surface Water

Source: Winnebago County, 2024-25.

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**FIGURE C5
GRASS SWALES
TP REDUCTION
STORMWATER QUALITY
MANAGEMENT PLAN
TOWN OF ALGOMA
WINNEBAGO COUNTY, WISCONSIN**

TOWN OF ALGOMA GRASS SWALES WATER QUALITY SUMMARY & COST ANALYSIS

Swale ID	Drainage Area (acres)	Total Swale Length (ft)	Swale Density (ft/ac)	Typical Bottom Width (ft)	Typical Swale Side Slope (ft H:1ft V)	*Typical Longitudinal Slope (ft/ft, V/H)	Swale Retardance Factor	Typical Grass Height (in)	Avg Measured Dynamic Infiltration Rate (in/hr)	Annual TSS Reduction (lbs)	Annual TP Reduction (lbs)	TSS Load Reduction (%)	TP Load Reduction (%)	Max Velocity (ft/s)	Ave Annual O&M Costs (2015)	Avg Annual O&M Costs Over 20 Years	Avg Annual TSS Reduction Over 20 Years (lbs)	Avg Annual TP Reduction Over 20 Years (lbs)	Ave Annual TSS Cost (\$/lb)	Ave Annual TP Cost (\$/lb)
SWALE1-B1d5	8.3	1,899	229	1	4	0.0350	D	2	0.98	1,327	4.4	70.5%	64.2%	1.1	\$779.3	\$23,207.2	26,538	87.90	\$0.9	\$264
SWALE1-B2a7	26.2	6,309	241	1	4	0.0075	D	2	0.66	7,775	30.1	84.9%	80.2%	1.0	\$2,589.2	\$77,100.5	155,500	601.12	\$0.5	\$128
SWALE1-B2a8	2.2	1,409	655	1	4	0.0050	D	2	0.64	794	2.5	93.9%	91.6%	0.3	\$578.2	\$17,219.0	15,871	50.16	\$1.1	\$343
SWALE1-B3b1	30.3	5,581	184	1	4	0.0050	D	2	0.63	4,158	17.0	85.7%	81.4%	0.8	\$2,290.4	\$68,203.9	83,156	340.10	\$0.8	\$201
SWALE1-B3c1	13.4	2,475	185	1	4	0.0125	D	2	0.64	1,592	6.1	69.8%	63.8%	0.9	\$1,015.7	\$30,246.3	31,848	121.54	\$0.9	\$249
SWALE1-B3d1	8.6	2,228	259	1	4	0.0100	D	2	0.67	1,405	5.2	81.8%	76.6%	0.7	\$914.4	\$27,227.8	28,104	103.92	\$1.0	\$262
SWALE1-B4b8	1.1	313	287	1	4	0.0100	D	2	0.66	290	1.0	33.7%	29.2%	0.3	\$128.5	\$3,825.1	5,794	19.00	\$0.7	\$201
SWALE1-B4c2	42.2	2,001	47	1	4	0.0100	D	2	0.61	2,720	7.2	41.2%	34.1%	1.3	\$821.2	\$24,453.7	54,400	143.20	\$0.4	\$171
SWALE1-B4c3	16.2	4,620	286	1	4	0.0075	D	2	0.60	3,006	10.8	83.1%	79.0%	0.8	\$1,896.0	\$56,459.7	60,120	216.72	\$0.9	\$261
SWALE1-B4e3	10.7	3,238	302	1	4	0.0050	D	2	0.65	1,788	7.0	70.6%	68.2%	0.6	\$1,328.9	\$39,570.7	35,754	140.22	\$1.1	\$282
SWALE1-B4f2	5.0	1,347	267	1	4	0.0075	D	2	0.66	13,166	51.1	87.3%	82.9%	0.5	\$552.8	\$16,461.3	263,320	1,021.80	\$0.1	\$16
SWALE1-B4f5	2.2	1,044	472	1	4	0.0050	D	2	0.62	13,166	51.1	87.3%	82.9%	0.9	\$428.5	\$12,758.4	263,320	1,021.80	\$0.0	\$12
SWALE1-B4f6	19.5	4,771	245	1	4	0.0050	D	2	0.65	13,166	51.1	87.3%	82.9%	0.7	\$1,958.0	\$58,305.1	263,320	1,021.80	\$0.2	\$57
SWALE1-B4g3	1.7	120	73	1	3	0.0050	D	2	0.63	1,598	5.8	73.8%	68.2%	0.3	\$49.2	\$1,466.5	31,966	116.80	\$0.0	\$13
SWALE1-B4j1	1.2	468	384	1	4	0.0050	D	2	0.60	828	2.7	80.6%	76.6%	0.2	\$192.1	\$5,719.3	16,558	54.01	\$0.3	\$106
SWALE1-B4k1	8.2	2,489	304	1	4	0.0050	D	2	0.61	3,788	14.1	83.2%	78.1%	0.5	\$1,021.5	\$30,417.4	75,758	281.86	\$0.4	\$108
SWALE1-B4k2	3.7	955	259	1	4	0.0125	D	2	0.61	3,788	14.1	83.2%	78.1%	1.0	\$391.9	\$11,670.8	75,758	281.86	\$0.2	\$41
SWALE1-B4k3	3.9	1,535	390	1	4	0.0050	D	2	0.63	7,277	27.7	78.6%	73.2%	0.4	\$630.0	\$18,758.8	145,540	554.20	\$0.1	\$34
SWALE1-B4l1	6.7	941	141	1	4	0.0075	D	2	0.65	8,365	32.3	88.1%	83.9%	0.5	\$386.2	\$11,499.7	167,300	646.16	\$0.1	\$18
SWALE1-B4l3	2.2	1,183	548	1	4	0.0050	D	2	0.66	8,365	32.3	88.1%	83.9%	0.3	\$485.5	\$14,457.1	167,300	646.16	\$0.1	\$22
SWALE1-B4l6	1.5	636	436	1	4	0.0050	D	2	0.67	8,365	32.3	88.1%	83.9%	0.9	\$261.0	\$7,772.4	167,300	646.16	\$0.0	\$12
SWALE1-B4l8	6.6	971	148	1	4	0.0050	D	2	0.67	3,077	11.7	81.3%	76.3%	0.4	\$398.5	\$11,866.3	61,532	234.36	\$0.2	\$51
SWALE1-B4n1	19.8	4,597	232	1	4	0.0100	D	2	0.66	5,530	20.7	76.3%	71.1%	1.0	\$1,886.6	\$56,178.7	110,600	413.62	\$0.5	\$136
SWALE1-B4o1	6.0	2,146	358	1	4	0.0075	D	2	0.60	3,650	13.8	73.5%	66.5%	0.5	\$880.7	\$26,225.7	73,000	276.66	\$0.4	\$95
SWALE1-B4p1	0.9	623	708	1	4	0.0100	D	2	0.62	1,093	4.2	81.6%	76.0%	0.3	\$255.7	\$7,613.5	21,856	83.32	\$0.3	\$91
SWALE1-B4q1	3.6	999	280	1	4	0.0100	D	2	0.66	2,130	7.8	88.1%	83.5%	0.4	\$410.0	\$12,208.5	42,596	156.90	\$0.3	\$78
SWALE1-B4q2	1.2	626	540	1	4	0.0050	D	2	0.61	2,130	7.8	88.1%	83.5%	0.2	\$256.9	\$7,650.2	42,596	156.90	\$0.2	\$49
SWALE1-B7a3	2.5	793	312	1	4	0.0050	D	2	0.61	4,321	16.2	82.8%	78.5%	0.3	\$325.4	\$9,691.0	86,426	324.36	\$0.1	\$30
SWALE1-S1b3	3.4	1,063	312	1	4	0.0050	D	2	0.67	2,088	7.5	89.5%	85.6%	0.3	\$436.2	\$12,990.6	41,760	149.58	\$0.3	\$87
SWALE2-B1d5	9.6	2,325	241	1	4	0.0225	D	2	0.89	2,730	10.2	69.8%	63.6%	1.4	\$954.2	\$28,413.2	54,600	204.30	\$0.5	\$139
SWALE2-B2a7	24.4	4,298	176	1	4	0.0075	D	2	0.63	7,775	30.1	84.9%	80.2%	1.2	\$1,763.9	\$52,524.7	155,500	601.12	\$0.3	\$87
SWALE2-B2a8	2.2	736	335	1	4	0.0125	D	2	0.60	391	1.3	71.8%	66.3%	0.4	\$302.0	\$8,994.5	7,824	26.51	\$1.1	\$339
SWALE2-B3b1	17.0	4,423	260	1	4	0.0050	D	2	0.61	2,870	10.9	86.6%	82.7%	0.7	\$1,815.2	\$54,052.3	57,398	218.24	\$0.9	\$248
SWALE2-B3c1	22.3	3,610	162	1	4	0.0100	D	2	0.67	2,656	10.7	77.0%	71.3%	1.0	\$1,481.5	\$44,116.8	53,110	214.80	\$0.8	\$205
SWALE2-B3d1	23.3	1,101	47	1	4	0.0050	D	2	0.64	1,947	7.3	54.2%	47.0%	0.7	\$451.8	\$13,455.0	38,940	145.50	\$0.3	\$92

TOWN OF ALGOMA GRASS SWALES WATER QUALITY SUMMARY & COST ANALYSIS

Swale ID	Drainage Area (acres)	Total Swale Length (ft)	Swale Density (ft/ac)	Typical Bottom Width (ft)	Typical Swale Side Slope (ft H:1ft V)	*Typical Longitudinal Slope (ft/ft, V/H)	Swale Retardance Factor	Typical Grass Height (in)	Avg Measured Dynamic Infiltration Rate (in/hr)	Annual TSS Reduction (lbs)	Annual TP Reduction (lbs)	TSS Load Reduction (%)	TP Load Reduction (%)	Max Velocity (ft/s)	Ave Annual O&M Costs (2015)	Avg Annual O&M Costs Over 20 Years	Avg Annual TSS Reduction Over 20 Years (lbs)	Avg Annual TP Reduction Over 20 Years (lbs)	Ave Annual TSS Cost (\$/lb)	Ave Annual TP Cost (\$/lb)
SWALE2-B4b8	2.7	726	268	1	4	0.0100	D	2	0.02	290	1.0	33.7%	29.2%	0.5	\$297.9	\$8,872.2	5,794	19.00	\$1.5	\$467
SWALE2-B4c2	17.5	6,063	346	1	4	0.0100	D	2	0.60	3,081	11.4	84.6%	80.7%	1.0	\$2,488.2	\$74,094.2	61,622	228.12	\$1.2	\$325
SWALE2-B4c3	5.2	1,807	347	1	4	0.0050	D	2	0.60	814	3.2	88.9%	84.9%	0.4	\$741.6	\$22,082.8	16,276	64.51	\$1.4	\$342
SWALE2-B4e3	3.1	1,302	424	1	4	0.0050	D	2	0.03	1,788	7.0	70.6%	68.2%	0.5	\$534.3	\$15,911.4	35,754	140.22	\$0.4	\$113
SWALE2-B4f2	9.5	2,069	218	1	4	0.0050	D	2	0.63	13,166	51.1	87.3%	82.9%	0.7	\$849.1	\$25,284.7	263,320	1,021.80	\$0.1	\$25
SWALE2-B4f5	4.4	1,281	293	1	4	0.0050	D	2	0.61	13,166	51.1	87.3%	82.9%	0.4	\$525.7	\$15,654.7	263,320	1,021.80	\$0.1	\$15
SWALE2-B4f6	2.1	690	335	1	4	0.0050	D	2	0.02	13,166	51.1	87.3%	82.9%	1.1	\$283.2	\$8,432.3	263,320	1,021.80	\$0.0	\$8
SWALE2-B4g3	7.1	2,001	282	1	4	0.0050	D	2	0.63	1,598	5.8	73.8%	68.2%	0.5	\$821.2	\$24,453.7	31,966	116.80	\$0.8	\$209
SWALE2-B4j1	2.0	896	446	1	4	0.0100	D	2	0.63	828	2.7	80.6%	76.6%	0.4	\$367.7	\$10,949.8	16,558	54.01	\$0.7	\$203
SWALE2-B4k1	11.3	2,542	225	1	4	0.0075	D	2	0.64	3,788	14.1	83.2%	78.1%	0.7	\$1,043.2	\$31,065.1	75,758	281.86	\$0.4	\$110
SWALE2-B4k2	11.4	2,069	182	1	4	0.0125	D	2	0.66	7,277	27.7	78.6%	73.2%	0.8	\$849.1	\$25,284.7	145,540	554.20	\$0.2	\$46
SWALE2-B4k3	23.0	4,262	185	1	4	0.0100	D	2	0.64	7,277	27.7	78.6%	73.2%	1.0	\$1,749.1	\$52,084.7	145,540	554.20	\$0.4	\$94
SWALE2-B4l1	16.0	2,574	160	1	4	0.0050	D	2	0.64	8,365	32.3	88.1%	83.9%	0.7	\$1,056.4	\$31,456.1	167,300	646.16	\$0.2	\$49
SWALE2-B4l3	4.8	2,038	425	1	4	0.0100	D	2	0.64	8,365	32.3	88.1%	83.9%	1.2	\$836.4	\$24,905.8	167,300	646.16	\$0.1	\$39
SWALE2-B4l6	2.1	853	412	1	4	0.0050	D	2	0.67	1,856	7.4	91.4%	87.8%	0.5	\$350.1	\$10,424.3	37,110	148.54	\$0.3	\$70
SWALE2-B4l8	1.5	549	368	1	4	0.0050	D	2	0.67	3,077	11.7	81.3%	76.3%	0.3	\$225.3	\$6,709.2	61,532	234.36	\$0.1	\$29
SWALE2-B4n1	15.0	2,499	166	1	4	0.0100	D	2	0.64	5,530	20.7	76.3%	71.1%	0.9	\$1,025.6	\$30,539.6	110,600	413.62	\$0.3	\$74
SWALE2-B4o1	19.3	2,077	108	1	4	0.0100	D	2	0.63	3,650	13.8	73.5%	66.5%	0.9	\$852.4	\$25,382.4	73,000	276.66	\$0.3	\$92
SWALE2-B4p1	4.5	132	29	1	4	0.0050	D	2	0.66	1,093	4.2	81.6%	76.0%	0.3	\$54.2	\$1,613.1	21,856	83.32	\$0.1	\$19
SWALE2-B4q1	5.4	1,469	271	1	4	0.0050	D	2	0.67	2,130	7.8	88.1%	83.5%	0.4	\$602.9	\$17,952.2	42,596	156.90	\$0.4	\$114
SWALE2-B4q2	1.4	650	461	1	4	0.0050	D	2	0.64	2,130	7.8	88.1%	83.5%	0.4	\$266.8	\$7,943.5	42,596	156.90	\$0.2	\$51
SWALE2-B7a3	12.3	2,622	213	1	4	0.0050	D	2	0.64	4,321	16.2	82.8%	78.5%	0.6	\$1,076.1	\$32,042.7	86,426	324.36	\$0.4	\$99
SWALE2-S1b3	6.7	2,226	332	1	4	0.0050	D	2	0.67	2,088	7.5	89.5%	85.6%	0.5	\$913.5	\$27,203.3	41,760	149.58	\$0.7	\$182
SWALE3-B1d5	7.0	1,985	284	1	4	0.0250	D	2	0.88	1,116	3.8	74.0%	67.9%	0.9	\$814.6	\$24,258.1	22,318	76.82	\$1.1	\$316
SWALE3-B2a8	1.2	455	392	1	4	0.0150	D	2	0.60	280	0.9	70.9%	65.7%	0.4	\$186.7	\$5,560.4	5,604	17.54	\$1.0	\$317
SWALE3-B3b1	4.8	625	129	1	6	0.0050	D	2	0.60	320	1.7	72.1%	68.3%	0.3	\$256.5	\$7,638.0	6,392	33.59	\$1.2	\$227
SWALE3-B3d1	15.6	2,418	155	1	4	0.0075	D	2	0.62	1,770	7.0	77.0%	70.6%	0.7	\$992.3	\$29,549.7	35,392	139.64	\$0.8	\$212
SWALE3-B4c3	7.1	2,366	334	1	4	0.0050	D	2	0.61	1,241	4.7	87.1%	83.3%	0.5	\$971.0	\$28,914.2	24,814	93.28	\$1.2	\$310
SWALE3-B4e3	1.9	200	103	1	4	0.0050	D	2	0.60	224	0.8	62.8%	55.7%	0.2	\$82.1	\$2,444.1	4,472	16.18	\$0.5	\$151
SWALE3-B4f2	6.9	1,574	228	1	4	0.0050	D	2	0.70	13,166	51.1	87.3%	82.9%	0.5	\$646.0	\$19,235.4	263,320	1,021.80	\$0.1	\$19
SWALE3-B4f6	0.8	261	326	1	4	0.0075	D	2	0.60	13,166	51.1	87.3%	82.9%	0.2	\$107.1	\$3,189.6	263,320	1,021.80	\$0.0	\$3
SWALE3-B4g3	2.2	208	93	1	4	0.0075	D	2	0.63	1,598	5.8	73.8%	68.2%	0.3	\$85.4	\$2,541.9	31,966	116.80	\$0.1	\$22
SWALE3-B4k2	4.6	1,106	239	1	4	0.0050	D	2	0.64	7,277	27.7	78.6%	73.2%	0.4	\$453.9	\$13,516.1	145,540	554.20	\$0.1	\$24
SWALE3-B4k3	4.0	1,449	363	1	4	0.0075	D	2	0.65	7,277	27.7	78.6%	73.2%	0.4	\$594.7	\$17,707.8	145,540	554.20	\$0.1	\$32
SWALE3-B4l1	3.6	1,004	279	1	4	0.0075	D	2	0.65	8,365	32.3	88.1%	83.9%	0.4	\$412.0	\$12,269.6	167,300	646.16	\$0.1	\$19

TOWN OF ALGOMA GRASS SWALES WATER QUALITY SUMMARY & COST ANALYSIS

Swale ID	Drainage Area (acres)	Total Swale Length (ft)	Swale Density (ft/ac)	Typical Bottom Width (ft)	Typical Swale Side Slope (ft H:1ft V)	*Typical Longitudinal Slope (ft/ft, V/H)	Swale Retardance Factor	Typical Grass Height (in)	Avg Measured Dynamic Infiltration Rate (in/hr)	Annual TSS Reduction (lbs)	Annual TP Reduction (lbs)	TSS Load Reduction (%)	TP Load Reduction (%)	Max Velocity (ft/s)	Ave Annual O&M Costs (2015)	Avg Annual O&M Costs Over 20 Years	Avg Annual TSS Reduction Over 20 Years (lbs)	Avg Annual TP Reduction Over 20 Years (lbs)	Ave Annual TSS Cost (\$/lb)	Ave Annual TP Cost (\$/lb)
SWALE3-B4I6	2.8	987	356	1	4	0.0050	D	2	0.67	2,824	10.4	87.7%	85.1%	0.6	\$405.1	\$12,061.9	56,474	207.92	\$0.2	\$58
SWALE3-B4I8	5.4	979	183	1	4	0.0050	D	2	0.67	3,077	11.7	81.3%	76.3%	0.4	\$401.8	\$11,964.1	61,532	234.36	\$0.2	\$51
SWALE3-B4n1	3.5	1,269	365	1	3	0.0100	D	2	0.63	5,530	20.7	76.3%	71.1%	0.6	\$520.8	\$15,508.1	110,600	413.62	\$0.1	\$37
SWALE3-B4o1	3.3	1,494	447	1	4	0.0100	D	2	0.64	3,650	13.8	73.5%	66.5%	0.5	\$613.1	\$18,257.8	73,000	276.66	\$0.3	\$66
SWALE3-B4p1	2.3	1,270	545	1	4	0.0100	D	2	0.65	1,093	4.2	81.6%	76.0%	0.6	\$521.2	\$15,520.3	21,856	83.32	\$0.7	\$186
SWALE3-B7a3	4.0	1,026	257	1	4	0.0050	D	2	0.60	4,321	16.2	82.8%	78.5%	0.4	\$421.1	\$12,538.5	86,426	324.36	\$0.1	\$39
SWALE4-B4f6	0.9	148	157	1	4	0.0050	D	2	0.60	154	0.5	71.5%	65.1%	0.2	\$60.7	\$1,808.7	3,071	10.56	\$0.6	\$171
SWALE4-B4I8	7.1	2,300	326	1	4	0.0050	D	2	0.67	3,077	11.7	81.3%	76.3%	0.5	\$943.9	\$28,107.7	61,532	234.36	\$0.5	\$120
SWALE4-B4o1	1.0	372	392	1	4	0.0050	D	2	0.60	3,650	13.8	73.5%	66.5%	0.2	\$152.7	\$4,546.1	73,000	276.66	\$0.1	\$16
SWALE-B1a1	6.8	1,260	186	1	4	0.0150	D	2	0.67	880	3.0	58.3%	52.6%	0.8	\$517.1	\$15,398.1	17,606	59.08	\$0.9	\$261
SWALE-B1a2	2.5	590	234	1	4	0.0075	D	2	0.72	422	1.4	75.5%	70.6%	0.4	\$242.1	\$7,210.2	8,432	28.66	\$0.9	\$252
SWALE-B1b1	9.0	2,506	278	1	4	0.0125	D	2	0.70	1,055	4.4	83.1%	77.8%	0.7	\$1,028.4	\$30,625.1	21,096	88.86	\$1.5	\$345
SWALE-B1b2	4.4	843	191	1	4	0.0050	D	2	0.61	646	2.4	77.5%	71.8%	0.4	\$346.0	\$10,302.1	12,918	48.31	\$0.8	\$213
SWALE-B1b3	5.1	1,036	202	1	4	0.0100	D	2	0.65	1,071	3.9	81.5%	76.8%	0.5	\$425.2	\$12,660.7	21,410	78.54	\$0.6	\$161
SWALE-B1b4	1.4	590	428	1	4	0.0050	D	2	0.60	1,071	3.9	81.5%	76.8%	0.4	\$242.1	\$7,210.2	21,410	78.54	\$0.3	\$92
SWALE-B1b5	1.9	475	250	1	4	0.0075	D	2	0.63	132	0.7	74.3%	70.5%	0.3	\$194.9	\$5,804.8	2,647	13.77	\$2.2	\$422
SWALE-B1b6	2.4	1,436	598	1	4	0.0050	D	2	0.64	840	2.7	91.9%	89.5%	0.3	\$589.3	\$17,549.0	16,805	53.66	\$1.0	\$327
SWALE-B1b7	1.6	354	228	1	4	0.0050	D	2	0.60	238	0.9	76.6%	71.0%	0.2	\$145.3	\$4,326.1	4,761	17.40	\$0.9	\$249
SWALE-B1b8	1.0	385	405	1	4	0.0050	D	2	0.60	166	0.6	88.4%	83.9%	0.2	\$158.0	\$4,705.0	3,328	12.51	\$1.4	\$376
SWALE-B1c1	9.3	3,195	342	1	4	0.0150	D	2	0.63	1,506	5.4	77.3%	72.2%	0.9	\$1,311.2	\$39,045.2	30,120	108.90	\$1.3	\$359
SWALE-B1d2	26.1	2,445	94	1	4	0.0050	D	2	0.65	2,157	10.2	73.2%	67.3%	0.7	\$1,003.4	\$29,879.7	43,140	203.60	\$0.7	\$147
SWALE-B1d3	4.6	1,083	234	1	4	0.0150	D	2	0.66	657	2.1	56.3%	51.6%	0.7	\$444.5	\$13,235.0	13,136	41.14	\$1.0	\$322
SWALE-B1d4	13.1	1,997	152	1	4	0.0200	D	2	0.66	2,730	10.2	69.8%	63.6%	1.0	\$819.6	\$24,404.8	54,600	204.30	\$0.4	\$119
SWALE-B1d6	8.0	1,398	174	1	4	0.0250	D	2	0.85	4,197	14.8	74.8%	69.5%	0.9	\$573.7	\$17,084.6	83,940	296.88	\$0.2	\$58
SWALE-B1d7	9.8	3,236	332	1	4	0.0250	D	2	0.83	4,197	14.8	74.8%	69.5%	1.0	\$1,328.0	\$39,546.3	83,940	296.88	\$0.5	\$133
SWALE-B1d8	8.8	3,140	358	1	4	0.0200	D	3	0.66	4,197	14.8	74.8%	69.5%	1.4	\$1,288.6	\$38,373.1	83,940	296.88	\$0.5	\$129
SWALE-B1e1	7.6	1,676	222	1	4	0.0200	D	2	0.64	837	3.0	60.2%	53.7%	0.9	\$687.8	\$20,481.9	16,748	60.30	\$1.2	\$340
SWALE-B1f1	9.0	3,044	340	1	4	0.0250	D	2	0.79	5,033	18.8	72.4%	65.2%	1.0	\$1,249.2	\$37,199.9	100,660	375.00	\$0.4	\$99
SWALE-B1f2	8.3	2,022	244	1	4	0.0250	D	2	0.67	5,033	18.8	72.4%	65.2%	1.0	\$829.8	\$24,710.3	100,660	375.00	\$0.2	\$66
SWALE-B1f3	17.6	3,222	183	1	4	0.0200	D	2	0.82	5,033	18.8	72.4%	65.2%	1.4	\$1,322.3	\$39,375.2	100,660	375.00	\$0.4	\$105
SWALE-B1f4	6.2	975	157	1	4	0.0150	D	2	0.61	5,033	18.8	72.4%	65.2%	1.4	\$400.1	\$11,915.2	100,660	375.00	\$0.1	\$32
SWALE-B1f5	2.0	1,883	942	1	4	0.0150	D	2	0.81	964	2.9	90.2%	88.0%	0.5	\$772.8	\$23,011.6	19,276	57.17	\$1.2	\$403
SWALE-B1g1	12.7	1,774	140	1	4	0.0075	D	2	0.84	1,412	5.8	80.7%	74.9%	0.6	\$728.0	\$21,679.6	28,240	116.40	\$0.8	\$186
SWALE-B1g2	0.8	588	717	1	4	0.0075	D	2	0.67	319	1.0	90.8%	88.1%	0.2	\$241.3	\$7,185.8	6,376	19.76	\$1.1	\$364
SWALE-B1h1	7.0	2,594	371	1	4	0.0150	D	2	0.62	1,004	4.2	78.3%	73.2%	0.7	\$1,064.6	\$31,700.6	20,078	83.00	\$1.6	\$382

TOWN OF ALGOMA GRASS SWALES WATER QUALITY SUMMARY & COST ANALYSIS

Swale ID	Drainage Area (acres)	Total Swale Length (ft)	Swale Density (ft/ac)	Typical Bottom Width (ft)	Typical Swale Side Slope (ft H:1ft V)	*Typical Longitudinal Slope (ft/ft, V/H)	Swale Retardance Factor	Typical Grass Height (in)	Avg Measured Dynamic Infiltration Rate (in/hr)	Annual TSS Reduction (lbs)	Annual TP Reduction (lbs)	TSS Load Reduction (%)	TP Load Reduction (%)	Max Velocity (ft/s)	Ave Annual O&M Costs (2015)	Avg Annual O&M Costs Over 20 Years	Avg Annual TSS Reduction Over 20 Years (lbs)	Avg Annual TP Reduction Over 20 Years (lbs)	Ave Annual TSS Cost (\$/lb)	Ave Annual TP Cost (\$/lb)
SWALE-B1h3	12.2	3,265	268	1	4	0.0150	D	2	0.61	1,301	5.5	76.0%	70.1%	0.9	\$1,339.9	\$39,900.7	26,024	110.30	\$1.5	\$362
SWALE-B2a3	7.1	1,751	247	1	4	0.0100	D	2	0.66	827	3.5	82.8%	77.0%	0.6	\$718.6	\$21,398.5	16,546	69.04	\$1.3	\$310
SWALE-B2a4	27.9	6,956	249	1	4	0.0075	D	2	0.64	4,397	17.0	86.2%	82.3%	1.0	\$2,854.7	\$85,007.3	87,944	340.18	\$1.0	\$250
SWALE-B2a5	6.4	1,003	156	1	4	0.0050	D	2	0.62	902	3.3	70.4%	64.9%	0.5	\$411.6	\$12,257.4	18,030	65.38	\$0.7	\$187
SWALE-B3a2	2.8	930	336	1	4	0.0100	D	2	0.67	614	2.0	78.4%	73.8%	0.4	\$381.7	\$11,365.3	12,270	40.93	\$0.9	\$278
SWALE-B3a3	30.5	6,030	198	1	4	0.0150	D	2	0.74	3,573	13.7	71.8%	66.4%	1.5	\$2,474.7	\$73,691.0	71,460	273.64	\$1.0	\$269
SWALE-B3a4	7.7	2,108	275	1	4	0.0100	D	2	0.88	1,123	4.1	77.6%	72.5%	0.7	\$865.1	\$25,761.3	22,452	81.66	\$1.1	\$315
SWALE-B3b2	7.2	1,521	211	1	4	0.0100	D	2	0.67	500	2.6	72.1%	68.3%	0.6	\$624.2	\$18,587.7	10,004	51.06	\$1.9	\$364
SWALE-B3e1	2.6	930	363	1	4	0.0150	D	2	0.64	488	1.7	75.4%	69.9%	0.5	\$381.7	\$11,365.3	9,762	33.10	\$1.2	\$343
SWALE-B4a6	12.7	2,840	223	1	4	0.0175	D	2	0.61	1,384	5.6	71.2%	64.3%	0.9	\$1,165.5	\$34,706.9	27,682	112.28	\$1.3	\$309
SWALE-B4a9	1.2	575	464	1	4	0.0100	D	2	0.63	94	0.5	82.7%	79.8%	0.3	\$236.0	\$7,026.9	1,876	10.09	\$3.7	\$697
SWALE-B4d2	3.0	1,142	376	1	4	0.0075	D	2	0.60	686	2.3	81.4%	77.2%	0.4	\$468.7	\$13,956.1	13,716	46.32	\$1.0	\$301
SWALE-B4d3	16.5	4,207	256	1	4	0.0075	D	2	0.60	2,682	9.8	79.9%	75.7%	0.8	\$1,726.5	\$51,412.6	53,630	195.44	\$1.0	\$263
SWALE-B4d4	2.1	748	365	1	4	0.0050	D	2	0.60	483	1.6	85.6%	81.4%	0.3	\$307.0	\$9,141.1	9,660	32.75	\$0.9	\$279
SWALE-B4e1	10.6	3,184	301	1	4	0.0050	D	2	0.63	1,525	6.2	88.1%	84.5%	0.5	\$1,306.7	\$38,910.8	30,492	124.62	\$1.3	\$312
SWALE-B4e2	7.7	1,668	216	1	4	0.0050	D	2	0.65	1,217	4.6	80.6%	75.9%	0.5	\$684.5	\$20,384.2	24,334	91.02	\$0.8	\$224
SWALE-B4f1	9.0	1,414	157	1	4	0.0050	D	2	0.88	13,166	51.1	87.3%	82.9%	0.5	\$580.3	\$17,280.1	263,320	1,021.80	\$0.1	\$17
SWALE-B4f3	9.2	3,385	369	1	4	0.0075	D	2	0.62	13,166	51.1	87.3%	82.9%	0.6	\$1,389.2	\$41,367.1	263,320	1,021.80	\$0.2	\$40
SWALE-B4f4	15.9	5,080	319	1	4	0.0075	D	2	0.64	13,166	51.1	87.3%	82.9%	0.8	\$2,084.8	\$62,081.3	263,320	1,021.80	\$0.2	\$61
SWALE-B4f7	4.5	1,642	367	1	4	0.0075	D	2	0.61	943	3.3	83.7%	79.5%	0.5	\$673.9	\$20,066.4	18,864	65.48	\$1.1	\$306
SWALE-B4g1	20.9	5,567	267	1	4	0.0075	D	2	0.66	3,751	13.9	85.4%	81.6%	0.9	\$2,284.7	\$68,032.8	75,020	277.10	\$0.9	\$246
SWALE-B4h1	3.8	903	235	1	4	0.0050	D	2	0.60	425	2.1	81.1%	76.5%	0.3	\$370.6	\$11,035.3	8,498	41.82	\$1.3	\$264
SWALE-B4h2	2.3	656	289	1	4	0.0050	D	2	0.67	575	1.5	88.9%	82.0%	0.3	\$269.2	\$8,016.8	11,496	29.20	\$0.7	\$275
SWALE-B4h3	1.3	388	298	1	4	0.0050	D	2	0.67	353	0.8	83.3%	77.1%	0.2	\$159.2	\$4,741.6	7,060	16.88	\$0.7	\$281
SWALE-B4h4	4.6	1,296	283	1	4	0.0050	D	2	1.12	795	2.9	94.1%	91.1%	0.4	\$531.9	\$15,838.1	15,908	58.76	\$1.0	\$270
SWALE-B4i1	4.1	1,030	249	1	4	0.0050	D	2	0.61	740	2.6	80.3%	75.4%	0.4	\$422.7	\$12,587.3	14,800	52.86	\$0.9	\$238
SWALE-B4i2	5.4	1,235	227	1	4	0.0050	D	2	0.61	861	3.2	78.1%	73.3%	0.4	\$506.8	\$15,092.6	17,222	63.22	\$0.9	\$239
SWALE-B4i4	3.3	860	261	1	4	0.0050	D	2	0.65	568	2.1	80.3%	75.7%	0.3	\$352.9	\$10,509.8	11,352	41.09	\$0.9	\$256
SWALE-B4i5	1.8	599	327	1	4	0.0050	D	2	0.67	384	1.3	83.6%	79.4%	0.3	\$245.8	\$7,320.2	7,677	26.72	\$1.0	\$274
SWALE-B4i7	2.9	725	247	1	4	0.0075	D	2	0.60	532	1.8	73.8%	68.5%	0.4	\$297.5	\$8,860.0	10,644	36.69	\$0.8	\$242
SWALE-B4i8	7.2	1,485	205	1	4	0.0050	D	2	0.63	1,287	4.5	77.0%	72.2%	0.5	\$609.4	\$18,147.8	25,734	90.58	\$0.7	\$200
SWALE-B4i9	1.5	619	405	1	4	0.0125	D	2	0.60	312	1.0	74.6%	69.5%	0.4	\$254.0	\$7,564.6	6,246	20.79	\$1.2	\$364
SWALE-B4j5	2.8	1,126	408	1	4	0.0100	D	2	0.64	651	2.0	80.0%	75.5%	0.5	\$462.1	\$13,760.5	13,028	40.66	\$1.1	\$338
SWALE-B4k4	4.3	1,629	381	1	4	0.0075	D	2	0.61	7,277	27.7	78.6%	73.2%	0.4	\$668.5	\$19,907.6	145,540	554.20	\$0.1	\$36
SWALE-B4k6	3.1	599	196	1	4	0.0050	D	2	0.65	404	1.6	77.4%	71.8%	0.3	\$245.8	\$7,320.2	8,080	31.58	\$0.9	\$232

TOWN OF ALGOMA GRASS SWALES WATER QUALITY SUMMARY & COST ANALYSIS

Swale ID	Drainage Area (acres)	Total Swale Length (ft)	Swale Density (ft/ac)	Typical Bottom Width (ft)	Typical Swale Side Slope (ft H:1ft V)	*Typical Longitudinal Slope (ft/ft, V/H)	Swale Retardance Factor	Typical Grass Height (in)	Avg Measured Dynamic Infiltration Rate (in/hr)	Annual TSS Reduction (lbs)	Annual TP Reduction (lbs)	TSS Load Reduction (%)	TP Load Reduction (%)	Max Velocity (ft/s)	Ave Annual O&M Costs (2015)	Avg Annual O&M Costs Over 20 Years	Avg Annual TSS Reduction Over 20 Years (lbs)	Avg Annual TP Reduction Over 20 Years (lbs)	Ave Annual TSS Cost (\$/lb)	Ave Annual TP Cost (\$/lb)
SWALE-B4k7	2.0	431	220	1	4	0.0150	D	2	0.60	246	0.9	61.2%	54.9%	0.4	\$176.9	\$5,267.1	4,926	17.21	\$1.1	\$306
SWALE-B4k9	1.8	1,131	643	1	3	0.0100	D	2	0.63	691	1.9	82.1%	78.3%	0.4	\$464.2	\$13,821.6	13,820	38.91	\$1.0	\$355
SWALE-B4l2	17.2	4,062	236	1	4	0.0050	D	2	0.64	8,365	32.3	88.1%	83.9%	0.7	\$1,667.0	\$49,640.6	167,300	646.16	\$0.3	\$77
SWALE-B4l4	9.8	2,879	293	1	4	0.0050	D	2	0.67	1,856	7.4	91.4%	87.8%	0.5	\$1,181.5	\$35,183.5	37,110	148.54	\$0.9	\$237
SWALE-B4l5	13.5	3,542	262	1	4	0.0050	D	2	0.67	2,824	10.4	87.7%	85.1%	0.6	\$1,453.6	\$43,285.8	56,474	207.92	\$0.8	\$208
SWALE-B4m2	1.2	1,309	1,091	1	4	0.0050	D	2	0.67	1,803	7.7	64.6%	55.5%	0.3	\$537.2	\$15,996.9	36,054	154.16	\$0.4	\$104
SWALE-B4m3	22.1	1,056	48	1	4	0.0050	D	2	0.67	1,803	7.7	64.6%	55.5%	0.7	\$433.4	\$12,905.1	36,054	154.16	\$0.4	\$84
SWALE-B4n2	2.4	717	298	1	4	0.0075	D	2	0.62	443	1.5	77.5%	72.6%	0.4	\$294.3	\$8,762.3	8,856	30.99	\$1.0	\$283
SWALE-B4o2	23.0	3,974	173	1	4	0.0100	D	2	0.65	3,066	12.0	79.3%	73.4%	1.0	\$1,630.9	\$48,565.2	61,312	240.54	\$0.8	\$202
SWALE-B4o3	1.6	714	461	1	4	0.0050	D	2	0.60	3,066	12.0	79.3%	73.4%	0.3	\$293.0	\$8,725.6	61,312	240.54	\$0.1	\$36
SWALE-B5a1	12.4	1,662	134	1	4	0.0075	D	2	0.65	3,148	11.9	75.8%	70.7%	0.7	\$682.1	\$20,310.8	62,960	238.26	\$0.3	\$85
SWALE-B5a2	10.8	3,799	353	1	4	0.0100	D	2	0.65	3,148	11.9	75.8%	70.7%	0.8	\$1,559.1	\$46,426.5	62,960	238.26	\$0.7	\$195
SWALE-B6a4	4.6	1,091	236	1	4	0.0100	D	2	0.65	1,448	5.1	73.1%	67.8%	0.6	\$447.7	\$13,332.8	28,952	101.86	\$0.5	\$131
SWALE-B6a5	4.6	1,157	253	1	4	0.0100	D	2	0.67	1,448	5.1	73.1%	67.8%	0.5	\$474.8	\$14,139.4	28,952	101.86	\$0.5	\$139
SWALE-B6b2	3.9	858	220	1	6	0.0050	D	2	0.67	1,005	2.5	75.0%	70.9%	0.4	\$352.1	\$10,485.4	20,108	49.98	\$0.5	\$210
SWALE-B6b4	2.9	689	240	1	3	0.0075	D	2	0.67	398	1.3	68.7%	62.9%	0.4	\$282.8	\$8,420.1	7,964	26.58	\$1.1	\$317
SWALE-B6c1	8.8	1,444	164	1	4	0.0075	D	2	0.65	2,548	10.3	76.1%	71.0%	0.6	\$592.6	\$17,646.7	50,958	205.98	\$0.3	\$86
SWALE-B6c2	6.4	1,419	223	1	4	0.0075	D	2	0.67	2,548	10.3	76.1%	71.0%	0.5	\$582.3	\$17,341.2	50,958	205.98	\$0.3	\$84
SWALE-B6c3	6.9	1,531	222	1	4	0.0050	D	2	0.64	2,548	10.3	76.1%	71.0%	0.4	\$628.3	\$18,709.9	50,958	205.98	\$0.4	\$91
SWALE-B7a2	8.6	2,823	328	1	4	0.0050	D	2	0.60	4,321	16.2	82.8%	78.5%	0.5	\$1,158.5	\$34,499.1	86,426	324.36	\$0.4	\$106
SWALE-B8a1	3.6	1,064	293	1	4	0.0050	D	2	0.67	694	2.5	82.5%	78.4%	0.4	\$436.7	\$13,002.8	13,888	49.27	\$0.9	\$264
SWALE-B8b2	3.3	788	237	1	4	0.0050	D	2	0.67	1,762	3.7	49.2%	44.9%	0.7	\$323.4	\$9,629.9	35,240	74.74	\$0.3	\$129
SWALE-B8b3	3.0	920	312	1	4	0.0050	D	2	0.61	0	0.0	0.0%	0.0%	0.7	\$377.6	\$11,243.1	0	0.00		
SWALE-B8b4	4.2	555	131	1	4	0.0050	D	2	0.02	1,762	3.7	49.2%	44.9%	0.5	\$227.8	\$6,782.5	35,240	74.74	\$0.2	\$91
SWALE-S1a2	9.9	2,099	213	1	4	0.0050	D	2	0.66	1,410	5.5	81.7%	77.2%	0.5	\$861.4	\$25,651.3	28,192	109.94	\$0.9	\$233
SWALE-S1a3	12.2	2,094	172	1	4	0.0050	D	2	0.67	1,610	6.3	76.8%	72.0%	0.6	\$859.4	\$25,590.2	32,200	125.30	\$0.8	\$204
SWALE-S1b2	6.7	1,670	249	1	4	0.0050	D	2	0.67	1,121	4.2	87.2%	82.5%	0.4	\$685.4	\$20,408.6	22,412	84.41	\$0.9	\$242
167			290						0.64	100%	AVERAGES:	77.9%	73.0%						\$0.7	\$177

2025 Condition: 2025 Land Use, 2025 BMP's, 2025 Drainage System with the following Street Sweeping routines: HE Sweeper-Once every 4 weeks-With Parking Controls

TMDL Pollutant Analysis																		
Town of Algoma - 2025 BMP's																		
Sub-Watershed	Catchment ID	BMP Name	Area (acres)	Total Suspended Solids (TSS)							Total Phosphorus (TP)							
				Before Drain System (lbs/yr)	After Drain System (lbs/yr)	Structural BMP Reduct (%)	Composite Structural BMP & Drain System Reduct ² (%)	After Outfall Control (lbs/yr)	Total Load Reduct (%)	Net Gain (lbs/yr)	Before Drain System (lbs/yr)	After Drain System (lbs/yr)	Structural BMP Reduct (%)	Composite Structural BMP & Drain System Reduct ² (%)	After Outfall Control (lbs/yr)	Total Load Reduct (%)	Net Gain (lbs/yr)	
Lake Butte des Morts	No Controls		14.4	2,214	2,214			2,214	0.0%	0		9.1	9.1			9.1	0.0%	0.0
Lake Butte des Morts	Swales		17.3	6,248	2,593			2,593	58.5%	0		19.0	7.9			7.9	58.5%	0.0
Lake Butte des Morts	Sweeping		1.5	1,150	877			877	23.7%	0		2.5	2.1			2.1	19.0%	0.0
Lake Butte des Morts	BMP-B1a1	Bell Ridge Pond C	5.1	1,103	517	85.7%	90.3%	107	90.3%	410		3.8	2.0	62.8%	76.3%	0.9	76.3%	1.1
Lake Butte des Morts	BMP-B1b5	Bellhaven Ln IE Sand Filter	22.6	3,728	765	76.6%	97.1%	110	97.1%	655		15.6	4.1	63.4%	93.7%	1.0	93.7%	3.1
Lake Butte des Morts	BMP-B1c1		9.3	2,008	456			456	77.3%	0		7.6	2.1			2.1	72.2%	0.0
Lake Butte des Morts	BMP-B1d2	Bell Ridge Pond A	14.9	2,409	873	74.2%	92.6%	177	92.6%	695		10.1	4.4	51.7%	80.4%	2.0	80.4%	2.4
Lake Butte des Morts	BMP-B1d3	Bell Ridge Pond B	6.3	1,439	764	69.6%	89.0%	158	89.0%	605		5.0	2.9	51.2%	74.0%	1.3	74.0%	1.6
Lake Butte des Morts	BMP-B1d5		56.0	9,509	3,818			3,818	59.8%	0		38.3	18.7			18.7	51.1%	0.0
Lake Butte des Morts	BMP-B1d7		10.5	1,571	436			436	72.2%	0		6.7	2.3			2.3	65.6%	0.0
Lake Butte des Morts	BMP-B1d8		15.8	3,765	948			948	74.8%	0		13.7	4.2			4.2	69.5%	0.0
Lake Butte des Morts	BMP-B1e1		7.6	1,426	568			568	60.2%	0		5.6	2.6			2.6	53.7%	0.0
Lake Butte des Morts	BMP-B1g3		83.3	12,709	4,430			4,430	65.1%	0		52.5	23.2			23.2	55.8%	0.0
Lake Butte des Morts	BMP-B1h8		27.7	5,079	2,793			2,793	45.0%	0		19.6	12.1			12.1	38.0%	0.0
Lake Butte des Morts	BMP-B2a3	Hunters Court Pond	7.8	1,104	260	83.8%	95.4%	51	95.4%	209		4.9	1.5	57.0%	85.8%	0.7	85.8%	0.8
Lake Butte des Morts	BMP-B2a5		33.8	6,543	1,108			1,108	83.1%	0		25.8	5.5			5.5	78.9%	0.0
Lake Butte des Morts	BMP-B2a7		52.9	10,337	1,491			1,491	85.6%	0		40.7	7.8			7.8	80.9%	0.0
Lake Butte des Morts	BMP-B2a9		3.2	929	268			268	71.1%	0		3.2	1.1			1.1	65.9%	0.0
Lake Butte des Morts	BMP-B3a1	Algoma Self-Storage Pond	6.6	2,055	2,055	87.4%	x	258	87.4%	1,797		5.0	5.0	75.2%	x	1.3	75.2%	3.8
Lake Butte des Morts	BMP-B3a2	Jones Park Pond	14.6	1,878	1,240	82.0%	86.2%	259	86.2%	980		8.4	6.3	60.6%	66.4%	2.8	66.4%	3.5
Lake Butte des Morts	BMP-B3a3	Lakevista Estates South Pond	39.3	6,568	2,891	91.2%	90.9%	595	90.9%	2,297		26.7	13.3	69.3%	77.6%	6.0	77.6%	7.3
Lake Butte des Morts	BMP-B3a4	Lakevista Estates North Pond	7.7	1,480	331	88.3%	95.6%	65	95.6%	266		5.6	1.5	66.6%	87.5%	0.7	87.5%	0.8
Lake Butte des Morts	BMP-B3b1	Butte Des Morts Meadows Pond	53.2	8,888	1,368	61.1%	97.1%	254	97.1%	1,114		37.1	7.4	42.8%	90.9%	3.4	90.9%	4.0
Lake Butte des Morts	BMP-B3b2		42.9	6,548	1,372			1,372	79.1%	0		28.4	7.3			7.3	74.4%	0.0
Lake Butte des Morts	BMP-B3d1		46.1	6,099	1,724			1,724	71.7%	0		27.8	10.1			10.1	63.6%	0.0
Lake Butte des Morts	BMP-B4a7		0.6	218	218			218	0.0%	0		0.5	0.5			0.5	0.0%	0.0
Lake Butte des Morts	BMP-B4a8		1.1	389	389			389	0.0%	0		0.9	0.9			0.9	0.0%	0.0
Lake Butte des Morts	BMP-B4b7	Jones Pond	21.5	5,762	5,161	87.0%	x	748	87.0%	4,414		16.9	15.8	69.9%	x	5.1	69.9%	10.7
Lake Butte des Morts	BMP-B4c1	Rogge STH 21 Pond	1.4	443	443	72.3%	x	123	72.3%	321		1.1	1.1	61.2%	x	0.4	61.2%	0.7
Lake Butte des Morts	BMP-B4c2	Olde Apple Acres West Pond	70.7	14,349	8,636	65.1%	87.5%	1,801	87.5%	6,836		47.8	30.5	46.4%	71.4%	13.7	71.4%	16.8
Lake Butte des Morts	BMP-B4c3	Olde Apple Acres East Pond	33.0	6,425	1,215	66.8%	96.4%	233	96.4%	982		25.3	6.3	46.1%	88.6%	2.9	88.6%	3.5
Lake Butte des Morts	BMP-B4c5		1.5	287	62			62	78.3%	0		1.5	0.4			0.4	73.2%	0.0
Lake Butte des Morts	BMP-B4c6		0.7	179	179			179	0.0%	0		0.7	0.7			0.7	0.0%	0.0
Lake Butte des Morts	BMP-B4c7		0.8	466	134			134	71.2%	0		1.4	0.5			0.5	64.3%	0.0
Lake Butte des Morts	BMP-B4c8		0.0	4	4			4	0.0%	0		0.0	0.0			0.0	0.0%	0.0
Lake Butte des Morts	BMP-B4d1		11.5	1,684	1,492			1,492	11.4%	0		7.5	7.0			7.0	5.9%	0.0
Lake Butte des Morts	BMP-B4d4		30.2	5,661	1,701			1,701	70.0%	0		22.4	8.5			8.5	61.9%	0.0
Lake Butte des Morts	BMP-B4e2		35.9	6,562	1,700			1,700	74.1%	0		26.5	7.8			7.8	70.4%	0.0
Lake Butte des Morts	BMP-B4f5		62.1	11,479	1,458			1,458	87.3%	0		45.7	7.8			7.8	82.9%	0.0
Lake Butte des Morts	BMP-B4f6		23.2	4,187	567			567	86.5%	0		17.1	3.1			3.1	82.0%	0.0
Lake Butte des Morts	BMP-B4g3		44.7	9,348	2,869			2,869	69.3%	0		35.9	12.7			12.7	64.7%	0.0
Lake Butte des Morts	BMP-B4h2	Eden Meadows Pond	8.3	2,108	1,641	88.5%	92.2%	165	92.2%	1,476		6.5	5.7	72.0%	75.0%	1.6	75.0%	4.1
Lake Butte des Morts	BMP-B4h5		6.5	1,410	147			147	89.6%	0		4.9	0.7			0.7	86.0%	0.0
Lake Butte des Morts	BMP-B4i9		42.2	9,706	3,471			3,471	64.2%	0		36.1	14.5			14.5	59.8%	0.0
Lake Butte des Morts	BMP-B4j6		8.1	2,467	939			939	61.9%	0		8.0	3.1			3.1	60.5%	0.0
Lake Butte des Morts	BMP-B4k4		74.4	14,157	2,811			2,811	80.1%	0		56.3	14.2			14.2	74.8%	0.0
Lake Butte des Morts	BMP-B4k8		14.2	3,016	2,054			2,054	31.9%	0		11.4	8.3			8.3	27.4%	0.0
Lake Butte des Morts	BMP-B4m1	Irvine Pond	159.0	28,722	9,816	85.0%	93.1%	1,988	93.1%	7,828		114.2	44.7	64.7%	82.3%	20.2	82.3%	24.6
Lake Butte des Morts	BMP-B4n2		42.1	8,163	2,029			2,029	75.1%	0		32.2	9.8			9.8	69.6%	0.0
Lake Butte des Morts	BMP-B4p1		62.3	10,845	2,840			2,840	73.8%	0		44.5	14.5			14.5	67.5%	0.0
Lake Butte des Morts	BMP-B4q2		11.6	2,496	297			297	88.1%	0		9.5	1.6			1.6	83.5%	0.0
Lake Butte des Morts	BMP-B5a2		23.4	4,254	1,038			1,038	75.6%	0		17.0	5.0			5.0	70.4%	0.0
Lake Butte des Morts	BMP-B6a2	Oakwood Manor SW Pond	3.0	672	672	64.6%	x	237	64.6%	434		2.3	2.3	53.3%	x	1.1	53.3%	1.2
Lake Butte des Morts	BMP-B6a5		19.6	3,318	1,827			1,827	45.0%	0		13.2	8.1			8.1	38.9%	0.0
Lake Butte des Morts	BMP-B6b1	FKC Oshkosh Pond	2.3	416	416	83.7%	x	68	83.7%	348		1.5	1.5	67.6%	x	0.5	67.6%	1.0
Lake Butte des Morts	BMP-B6b6		7.8	647	647			647	0.1%	0		3.9	3.9			3.9	0.0%	0.0
Lake Butte des Morts	BMP-B6b7		11.3	4,011	2,131			2,131	46.9%	0		11.4	6.5			6.5	43.1%	0.0
Lake Butte des Morts	BMP-B6c3		26.9	3,688	1,185			1,185	67.9%	0		16.4	6.4			6.4	60.9%	0.0
Lake Butte des Morts	BMP-B7a1	Coldwell Banker Pond	1.5	444	444	80.1%	x	88	80.1%	356		1.1	1.1	67.5%	x	0.4	67.5%	0.8
Lake Butte des Morts	BMP-B7a2	Willow Springs Pond	10.4	2,190	489	79.7%	95.6%	96	95.6%	394		8.0	2.3	58.4%	87.1%	1.0	87.1%	1.3
Lake Butte des Morts	BMP-B7a3		18.8	3,650	629			629	82.8%	0		14.4	3.1			3.1	78.5%	0.0
Lake Butte des Morts	BMP-B8b1	Tommys Car Wash Biofilter	1.3	454	454	88.3%	x	53	88.3%	401		1.1	1.1	0.0%	x	1.1	0.0%	0.0
Lake Butte des Morts	BMP-B8b4		4.2	2,116	1,085			1,085	48.8%	0		4.5	2.5			2.5	44.5%	0.0
Sawyer Creek	BMP-S1a3		12.1	2,115	492			492	76.8%	0		8.7	2.4			2.4	72.0%	0.0
Sawyer Creek	BMP-S1a4	OSMS Isolator Row	0.9	87	87	84.7%	x	13	84.7%	73		0.5	0.5	70.3%	x	0.1	70.3%	0.3
Sawyer Creek	BMP-S1a5	OSMS Upflow Filter	0.8	80	80	84.7%	x	12	84.7%	68		0.4	0.4	70.3%	x	0.1	70.3%	0.3
Sawyer Creek	BMP-S1a6		25.3	3,999	2,440			2,440	39.0%	0		16.7	11.2			11.2	33.0%	0.0
Sawyer Creek	BMP-S1b1	Wyldewood Baptist Church Pond	2.9	671	671	78.2%	x	146	78.2%	525		2.0	2.0	63.8%	x	0.7	63.8%	1.3
Sawyer Creek	BMP-S1b3		37.5	6,932	3,315			3,315	52.2%	0		26.9	14.4			14.4	46.6%	0.0
Totals:			1,578.1	297,063	106,534			73,050	75.4%	33,484		1,147.8	460.0			365.0	68.2%	95.06

¹Excludes Riparian Areas, M54"A" to "B" Areas, Undeveloped Areas (>5 acres), Other M54 Jurisdictions, Agricultural Areas & Waters of the State

²Based on WinSLAMM modeling of grass swales upstream of wet detention ponds (in series).

x = No upstream grass swales within Structural BMP watershed area

TMDL Pollutant Analysis Summary										
2025 Best Management Practices										
Sub-Watershed	Area (acres)	Total Suspended Solids (TSS)					TMDL Load Redct Req'd (lbs)	*TMDL Load Redct Req'd (lbs)	Addt'l Load Redct Req'd (lbs)	TMDL TSS Redct Satsified (y/n)
		Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Total Load Reduct (lbs)	Total Load Reduct (%)	TMDL Load Redct Req'd (lbs)				
Lake Butte des Morts	1,498.6	283,179	66,632	216,547	76.5%	0.0	0.0%	-216,547	yes	
Sawyer Creek	79.5	13,884	6,418	7,466	53.8%	6,665	48.0%	-802	yes	
Totals:	1,578.1	297,063	73,050	224,013	75.4%	-	-	-	-	

TMDL Pollutant Analysis Summary									
2025 Best Management Practices									
Sub-Watershed	Area (acres)	Total Phosphorus (TP)					TMDL Load Redct Req'd (lbs)	*TMDL Load Redct Req'd (lbs)	Addt'l Load Redct Req'd (lbs)

TMDL Alt 1: 2025 Land Use, Proposed BMP's, 2025 BMP's, 2025 Drainage System with the following Street Sweeping routines: HE Sweeper-Once every 4 weeks-With Parking Controls

TMDL Pollutant Analysis
Town of Algoma - TMDL Alternative 1 (Plan of Action)

Sub-Watershed	Drainage System or BMP Catchment ID	BMP Name	Area (acres)	Urban Study Area ¹							Total Phosphorus (TP)						
				Total Suspended Solids (TSS)				Total Phosphorus (TP)			Total Suspended Solids (TSS)				Total Phosphorus (TP)		
				Before Drain System (lbs/yr)	After Drain System (lbs/yr)	Structural BMP Reduct (%)	Structural BMP & Drain System In-Series Reduct ² (%)	After Outfall Control (lbs/yr)	Total Load Reduct (%)	Net Gain (lbs/yr)	Before Drain System (lbs/yr)	After Drain System (lbs/yr)	Structural BMP Reduct (%)	Structural BMP & Drain System In-Series Reduct ² (%)	After Outfall Control (lbs/yr)	Total Load Reduct (%)	Net Gain (lbs/yr)
Lake Butte des Morts	No Controls		14.4	2,214	2,214			2,214	0.0%	0	9.1	9.1			9.1	0.0%	0.0
Lake Butte des Morts	Swales		17.3	6,248	2,593			2,593	58.5%	0	19.0	7.9			7.9	58.5%	0.0
Lake Butte des Morts	Sweeping		1.5	1,150	877			877	23.7%	0	2.5	2.1			2.1	19.0%	0.0
Lake Butte des Morts	BMP-B1a1	Bell Ridge Pond C	5.1	1,103	517	85.7%	90.3%	107	90.3%	410	3.8	2.0	62.8%	76.3%	0.9	76.3%	1.1
Lake Butte des Morts	BMP-B1b5	Bellhaven Ln IE Sand Filter	22.6	3,728	765	76.6%	97.1%	110	97.1%	655	15.6	4.1	63.4%	93.7%	1.0	93.7%	3.1
Lake Butte des Morts	BMP-B1c1		9.3	2,008	456			456	77.3%	0	7.6	2.1			2.1	72.2%	0.0
Lake Butte des Morts	BMP-B1d2	Bell Ridge Pond A	14.9	2,409	873	74.2%	92.6%	177	92.6%	695	10.1	4.4	51.7%	80.4%	2.0	80.4%	2.4
Lake Butte des Morts	BMP-B1d3	Bell Ridge Pond B	6.3	1,439	764	69.6%	89.0%	158	89.0%	605	5.0	2.9	51.2%	74.0%	1.3	74.0%	1.6
Lake Butte des Morts	BMP-B1d5		56.0	9,509	3,818			3,818	59.8%	0	38.3	18.7			18.7	51.1%	0.0
Lake Butte des Morts	BMP-B1d7		10.5	1,571	436			436	72.2%	0	6.7	2.3			2.3	65.6%	0.0
Lake Butte des Morts	BMP-B1d8		15.8	3,765	948			948	74.8%	0	13.7	4.2			4.2	69.5%	0.0
Lake Butte des Morts	BMP-B1e1		7.6	1,426	568			568	60.2%	0	5.6	2.6			2.6	53.7%	0.0
Lake Butte des Morts	BMP-B1g3	Leonard Point Pond	83.3	12,709	4,430		91.7%	1,057	91.7%	3,374	52.5	23.2		78.0%	11.6	78.0%	11.6
Lake Butte des Morts	BMP-B1h8	Leonard Point Pond	27.7	5,079	2,793		91.7%	422	91.7%	2,371	19.6	12.1		78.0%	4.3	78.0%	7.8
Lake Butte des Morts	BMP-B2a3	Hunters Court Pond	7.8	1,104	260	83.8%	95.4%	51	95.4%	209	4.9	1.5	57.0%	85.8%	0.7	85.8%	0.8
Lake Butte des Morts	BMP-B2a5		33.8	6,543	1,108			1,108	83.1%	0	25.8	5.5			5.5	78.9%	0.0
Lake Butte des Morts	BMP-B2a7		52.9	10,337	1,491			1,491	85.6%	0	40.7	7.8			7.8	80.9%	0.0
Lake Butte des Morts	BMP-B2a9		3.2	929	268			268	71.1%	0	3.2	1.1			1.1	65.9%	0.0
Lake Butte des Morts	BMP-B3a1	Algoma Self-Storage Pond	6.6	2,055	2,055	87.4%	x	258	87.4%	1,797	5.0	5.0	75.2%	x	1.3	75.2%	3.8
Lake Butte des Morts	BMP-B3a2	Jones Park Pond	14.6	1,878	1,240	82.0%	86.2%	259	86.2%	980	8.4	6.3	60.6%	66.4%	2.8	66.4%	3.5
Lake Butte des Morts	BMP-B3a3	Lakevista Estates South Pond	39.3	6,568	2,891	91.2%	90.9%	595	90.9%	2,297	26.7	13.3	69.3%	77.6%	6.0	77.6%	7.3
Lake Butte des Morts	BMP-B3a4	Lakevista Estates North Pond	7.7	1,480	331	88.3%	95.6%	65	95.6%	266	5.6	1.5	66.6%	87.5%	0.7	87.5%	0.8
Lake Butte des Morts	BMP-B3b1	Butte Des Morts Meadows Pond	53.2	8,888	1,368	61.1%	97.1%	254	97.1%	1,114	37.1	7.4	42.8%	90.9%	3.4	90.9%	4.0
Lake Butte des Morts	BMP-B3b2		42.9	6,548	1,372			1,372	79.1%	0	28.4	7.3			7.3	74.4%	0.0
Lake Butte des Morts	BMP-B3d1		46.1	6,099	1,724			1,724	71.7%	0	27.8	10.1			10.1	63.6%	0.0
Lake Butte des Morts	BMP-B4a7	Honey Creek Pond w/Enhanced Settling	0.6	218	218		96.5%	8	96.5%	210	0.5	0.5		92.5%	0.0	92.5%	0.4
Lake Butte des Morts	BMP-B4a8	Honey Creek Pond w/Enhanced Settling	1.1	389	389		96.5%	14	96.5%	375	0.9	0.9		92.5%	0.1	92.5%	0.9
Lake Butte des Morts	BMP-B4b7	Honey Creek Pond w/Enhanced Settling	21.5	5,762	5,161	87.0%	96.5%	203	96.5%	4,958	16.9	15.8	69.9%	92.5%	1.3	92.5%	14.5
Lake Butte des Morts	BMP-B4c1	Honey Creek Pond w/Enhanced Settling	1.4	443	443		96.5%	16	96.5%	428	1.1	1.1	61.2%	92.5%	0.1	92.5%	1.0
Lake Butte des Morts	BMP-B4c2	Honey Creek Pond w/Enhanced Settling	70.7	14,349	8,636	65.1%	96.5%	506	96.5%	8,131	47.8	30.5	46.4%	92.5%	3.6	92.5%	26.9
Lake Butte des Morts	BMP-B4c3	Honey Creek Pond w/Enhanced Settling	33.0	6,425	1,215	66.8%	96.5%	226	96.5%	989	25.3	6.3	46.1%	92.5%	1.9	92.5%	4.4
Lake Butte des Morts	BMP-B4c5	Honey Creek Pond w/Enhanced Settling	1.5	287	62		96.5%	10	96.5%	52	1.5	0.4		92.5%	0.1	92.5%	0.3
Lake Butte des Morts	BMP-B4c6	Honey Creek Pond w/Enhanced Settling	0.7	179	179		96.5%	6	96.5%	173	0.7	0.7		92.5%	0.0	92.5%	0.6
Lake Butte des Morts	BMP-B4c7	Honey Creek Pond w/Enhanced Settling	0.8	466	134		96.5%	16	96.5%	118	1.4	0.5		92.5%	0.1	92.5%	0.4
Lake Butte des Morts	BMP-B4c8	Honey Creek Pond w/Enhanced Settling	0.0	4	4		96.5%	0	96.5%	4	0.0	0.0		92.5%	0.0	92.5%	0.0
Lake Butte des Morts	BMP-B4d1	Honey Creek Pond w/Enhanced Settling	11.5	1,684	1,492		96.5%	59	96.5%	1,432	7.5	7.0		92.5%	0.6	92.5%	6.5
Lake Butte des Morts	BMP-B4d4	Honey Creek Pond w/Enhanced Settling	30.2	5,661	1,701		96.5%	199	96.5%	1,502	22.4	8.5		92.5%	1.7	92.5%	6.9
Lake Butte des Morts	BMP-B4e2	Honey Creek Pond w/Enhanced Settling	35.9	6,562	1,700		96.5%	231	96.5%	1,469	26.5	7.8		92.5%	2.0	92.5%	5.8
Lake Butte des Morts	BMP-B4f5	Honey Creek Pond w/Enhanced Settling	62.1	11,479	1,458		96.5%	404	96.5%	1,054	45.7	7.8		92.5%	3.4	92.5%	4.4
Lake Butte des Morts	BMP-B4f6	Honey Creek Pond w/Enhanced Settling	23.2	4,187	567		96.5%	148	96.5%	420	17.1	3.1		92.5%	1.3	92.5%	1.8
Lake Butte des Morts	BMP-B4g3	Honey Creek Pond w/Enhanced Settling	44.7	9,348	2,869		96.5%	329	96.5%	2,539	35.9	12.7		92.5%	2.7	92.5%	10.0
Lake Butte des Morts	BMP-B4h2	Honey Creek Pond w/Enhanced Settling	8.3	2,108	1,641	88.5%	96.5%	74	96.5%	1,566	6.5	5.7	72.0%	92.5%	0.5	92.5%	5.2
Lake Butte des Morts	BMP-B4h5	Honey Creek Pond w/Enhanced Settling	6.5	1,410	147		96.5%	50	96.5%	97	4.9	0.7		92.5%	0.4	92.5%	0.3
Lake Butte des Morts	BMP-B4i9	Honey Creek Pond w/Enhanced Settling	42.2	9,706	3,471		96.5%	342	96.5%	3,129	36.1	14.5		92.5%	2.7	92.5%	11.8
Lake Butte des Morts	BMP-B4j6		8.1	2,467	939			939	61.9%	0	8.0	3.1			3.1	60.5%	0.0
Lake Butte des Morts	BMP-B4k4		74.4	14,157	2,811			2,811	80.1%	0	56.3	14.2			14.2	74.8%	0.0
Lake Butte des Morts	BMP-B4k8		14.2	3,016	2,054			2,054	31.9%	0	11.4	8.3			8.3	27.4%	0.0
Lake Butte des Morts	BMP-B4m6	Irvine Pond	159.0	28,722	9,816	85.0%	93.1%	1,988	93.1%	7,828	114.2	44.7	64.7%	82.3%	20.2	82.3%	24.6
Lake Butte des Morts	BMP-B4n2		42.1	8,163	2,029			2,029	75.1%	0	32.2	9.8			9.8	69.6%	0.0
Lake Butte des Morts	BMP-B4p1		62.3	10,845	2,840			2,840	73.8%	0	44.5	14.5			14.5	67.5%	0.0
Lake Butte des Morts	BMP-B4q2		11.6	2,496	297			297	88.1%	0	9.5	1.6			1.6	83.5%	0.0
Lake Butte des Morts	BMP-B5a2		23.4	4,254	1,038			1,038	75.6%	0	17.0	5.0			5.0	70.4%	0.0
Lake Butte des Morts	BMP-B6a2	Oakwood Manor SW Pond	3.0	672	672	64.6%	x	237	64.6%	434	2.3	2.3	53.3%	x	1.1	53.3%	1.2
Lake Butte des Morts	BMP-B6a5		19.6	3,318	1,827			1,827	45.0%	0	13.2	8.1			8.1	38.9%	0.0
Lake Butte des Morts	BMP-B6b1	FKC Oshkosh Pond	2.3	416	416	83.7%	x	68	83.7%	348	1.5	1.5	67.6%	x	0.5	67.6%	1.0
Lake Butte des Morts	BMP-B6b6		7.8	647	647			647	0.1%	0	3.9	3.9			3.9	0.0%	0.0
Lake Butte des Morts	BMP-B6b7		11.3	4,011	2,131			2,131	46.9%	0	11.4	6.5			6.5	43.1%	0.0
Lake Butte des Morts	BMP-B6c3		26.9	3,688	1,185			1,185	67.9%	0	16.4	6.4			6.4	60.9%	0.0
Lake Butte des Morts	BMP-B7a1	Coldwell Banker Pond	1.5	444	444	80.1%	x	88	80.1%	356	1.1	1.1	67.5%	x	0.4	67.5%	0.8
Lake Butte des Morts	BMP-B7a2	Willow Springs Pond	10.4	2,190	489	79.7%	95.6%	96	95.6%	394	8.0	2.3	58.4%	87.1%	1.0	87.1%	1.3
Lake Butte des Morts	BMP-B7a3		18.8	3,650	629			629	82.8%	0	14.4	3.1			3.1	78.5%	0.0
Lake Butte des Morts	BMP-B8b1	Tommys Car Wash Biofilter	1.3	454	454	88.3%	x	53	88.3%	401	1.1	1.1	0.0%	x	1.1	0.0%	0.0
Lake Butte des Morts	BMP-B8b4		4.2	2,116	1,085			1,085	48.8%	0	4.5	2.5			2.5	44.5%	0.0
Sawyer Creek	BMP-S1a3		12.1	2,115	492			492	76.8%	0	8.7	2.4			2.4	72.0%	0.0
Sawyer Creek	BMP-S1a4	Mercy Hospital North Pond w/Enhanced Settling	0.9	87	87	84.7%	95.8%	4	95.8%	83	0.5	0.5	70.3%	90.3%	0.0	90.3%	0.4
Sawyer Creek	BMP-S1a5	Mercy Hospital North Pond w/Enhanced Settling	0.8	80	80	84.7%	95.8%	3	95.8%	77	0.4	0.4	70.3%	90.3%	0.0	90.3%	0.4
Sawyer Creek	BMP-S1a6	Mercy Hospital North Pond w/Enhanced Settling	25.3	3,999	2,440			167	95.8%	2,273	16.7	11.2		90.3%	1.6	90.3%	9.6
Sawyer Creek	BMP-S1b1	Town Hall Pond	2.9	671	671	78.2%	90.6%	146									

TMDL Alt 2: 2025 Land Use, Proposed BMPs, 2025 BMP's, 2025 Drainage System with the following Street Sweeping routines: HE Sweeper-Once every 4 weeks-With Parking Controls

TMDL Pollutant Analysis																			
Town of Algoma - TMDL Alternative 2																			
Sub-Watershed	Drainage System or BMP	Catchment ID	BMP Name	Area (acres)	Total Suspended Solids (TSS)							Total Phosphorus (TP)							
					Before Drain System (lbs/yr)	After Drain System (lbs/yr)	Structural BMP Reduct (%)	Structural BMP & Drain System In-Series Reduct ² (%)	After Outfall Control (lbs/yr)	Total Load Reduct (%)	Net Gain (lbs/yr)	Before Drain System (lbs/yr)	After Drain System (lbs/yr)	Structural BMP Reduct (%)	Structural BMP & Drain System In-Series Reduct ² (%)	After Outfall Control (lbs/yr)	Total Load Reduct (%)	Net Gain (lbs/yr)	
Lake Butte des Morts	No Controls			14.4	2,214	2,214			2,214	0.0%	0		9.1	9.1			9.1	0.0%	0.0
Lake Butte des Morts	Swailes			17.3	6,248	2,593			2,593	58.5%	0		19.0	7.9			7.9	58.5%	0.0
Lake Butte des Morts	Sweeping			1.5	1,150	877			877	23.7%	0		2.5	2.1			2.1	19.0%	0.0
Lake Butte des Morts	BMP-B1a1	Bell Ridge Pond C		5.1	1,103	517	85.7%	90.3%	107	90.3%	410		3.8	2.0	62.8%	76.3%	0.9	76.3%	1.1
Lake Butte des Morts	BMP-B1b5	Bellhaven Ln IE Sand Filter		22.6	3,728	765	76.6%	97.1%	110	97.1%	655		15.6	4.1	63.4%	93.7%	1.0	93.7%	3.1
Lake Butte des Morts	BMP-B1c1			9.3	2,008	456			456	77.3%	0		7.6	2.1			2.1	72.2%	0.0
Lake Butte des Morts	BMP-B1d2	Bellhaven Park Pond w/Enhanced Settling		14.9	2,409	873	74.2%	96.6%	83	96.6%	790		10.1	4.4	51.7%	93.1%	0.7	93.1%	3.7
Lake Butte des Morts	BMP-B1d3	Bellhaven Park Pond w/Enhanced Settling		6.3	1,439	764	69.6%	96.6%	49	96.6%	714		5.0	2.9	51.2%	90.0%	0.5	90.0%	2.4
Lake Butte des Morts	BMP-B1d5	Bellhaven Park Pond w/Enhanced Settling		56.0	9,509	3,818		96.6%	326	96.6%	3,492		38.3	18.7		78.0%	8.4	78.0%	10.3
Lake Butte des Morts	BMP-B1d7			10.5	1,571	436			436	72.2%	0		6.7	2.3			2.3	65.6%	0.0
Lake Butte des Morts	BMP-B1d8			15.8	3,765	948			948	74.8%	0		13.7	4.2			4.2	69.5%	0.0
Lake Butte des Morts	BMP-B1e1			7.6	1,426	568			568	60.2%	0		5.6	2.6			2.6	53.7%	0.0
Lake Butte des Morts	BMP-B1g3	Leonard Point Pond w/Enhanced Settling		83.3	12,709	4,430		96.7%	424	96.7%	4,006		52.5	23.2		93.5%	3.4	93.5%	19.8
Lake Butte des Morts	BMP-B1h8	Leonard Point Pond w/Enhanced Settling		27.7	5,079	2,793		96.7%	169	96.7%	2,624		19.6	12.1		93.5%	1.3	93.5%	10.8
Lake Butte des Morts	BMP-B2a3	Hunters Court Pond		7.8	1,104	260	83.8%	95.4%	51	95.4%	209		4.9	1.5	57.0%	85.8%	0.7	85.8%	0.8
Lake Butte des Morts	BMP-B2a5			33.8	6,543	1,108			1,108	83.1%	0		25.8	5.5			5.5	78.9%	0.0
Lake Butte des Morts	BMP-B2a7			52.9	10,337	1,491			1,491	85.6%	0		40.7	7.8			7.8	80.9%	0.0
Lake Butte des Morts	BMP-B2a9			3.2	929	268			268	71.1%	0		3.2	1.1			1.1	65.9%	0.0
Lake Butte des Morts	BMP-B3a1	Algoma Self-Storage Pond		6.6	2,055	2,055	87.4%	x	258	87.4%	1,797		5.0	5.0	75.2%	x	1.3	75.2%	3.8
Lake Butte des Morts	BMP-B3a2	Jones Park Pond		14.6	1,878	1,240	82.0%	86.2%	259	86.2%	980		8.4	6.3	60.6%	66.4%	2.8	66.4%	3.5
Lake Butte des Morts	BMP-B3a3	Lakevista Estates South Pond		39.3	6,568	2,891	91.2%	90.9%	595	90.9%	2,297		26.7	13.3	69.3%	77.6%	6.0	77.6%	7.3
Lake Butte des Morts	BMP-B3a4	Lakevista Estates North Pond		7.7	1,480	331	88.3%	95.6%	65	95.6%	266		5.6	1.5	66.6%	87.5%	0.7	87.5%	0.8
Lake Butte des Morts	BMP-B3b1	Butte Des Morts Meadows Pond		53.2	8,888	1,368	61.1%	97.1%	254	97.1%	1,114		37.1	7.4	42.8%	90.9%	3.4	90.9%	4.0
Lake Butte des Morts	BMP-B3b2			42.9	6,548	1,372			1,372	79.1%	0		28.4	7.3			7.3	74.4%	0.0
Lake Butte des Morts	BMP-B3d1			46.1	6,099	1,724			1,724	71.7%	0		27.8	10.1			10.1	63.6%	0.0
Lake Butte des Morts	BMP-B4a7			0.6	218	218			218	0.0%	0		0.5	0.5			0.5	0.0%	0.0
Lake Butte des Morts	BMP-B4a8			1.1	389	389			389	0.0%	0		0.9	0.9			0.9	0.0%	0.0
Lake Butte des Morts	BMP-B4b7	Jones Pond		21.5	5,762	5,161	87.0%		748	87.0%	4,414		16.9	15.8	69.9%		5.1	69.9%	10.7
Lake Butte des Morts	BMP-B4c1	Sheppard Dr Pond w/Enhanced Settling		1.4	443	443	72.3%	96.3%	16	96.3%	427		1.1	1.1	61.2%	91.1%	0.1	91.1%	1.0
Lake Butte des Morts	BMP-B4c2	Sheppard Dr Pond w/Enhanced Settling		70.7	14,349	8,636	65.1%	96.3%	530	96.3%	8,107		47.8	30.5	46.4%	91.1%	4.2	91.1%	26.2
Lake Butte des Morts	BMP-B4c3	Sheppard Dr Pond w/Enhanced Settling		33.0	6,425	1,215	66.8%	96.3%	237	96.3%	978		25.3	6.3	46.1%	91.1%	2.2	91.1%	4.1
Lake Butte des Morts	BMP-B4c5	Sheppard Dr Pond w/Enhanced Settling		1.5	287	62		96.3%	11	96.3%	52		1.5	0.4		91.1%	0.1	91.1%	0.3
Lake Butte des Morts	BMP-B4c6	Sheppard Dr Pond w/Enhanced Settling		0.7	179	179		96.3%	7	96.3%	173		0.7	0.7		91.1%	0.1	91.1%	0.6
Lake Butte des Morts	BMP-B4c7	Sheppard Dr Pond w/Enhanced Settling		0.8	466	134		96.3%	17	96.3%	117		1.4	0.5		91.1%	0.1	91.1%	0.4
Lake Butte des Morts	BMP-B4c8	Sheppard Dr Pond w/Enhanced Settling		0.0	4	4		96.3%	0	96.3%	4		0.0	0.0		91.1%	0.0	91.1%	0.0
Lake Butte des Morts	BMP-B4d1	Sheppard Dr Pond w/Enhanced Settling		11.5	1,684	1,492		96.3%	62	96.3%	1,430		7.5	7.0		91.1%	0.7	91.1%	6.4
Lake Butte des Morts	BMP-B4d4			30.2	5,661	1,701			1,701	70.0%	0		22.4	8.5			8.5	61.9%	0.0
Lake Butte des Morts	BMP-B4e2	Wyldewood Pond Alt 1 w/Enhanced Settling		35.9	6,562	1,700		96.5%	231	96.5%	1,469		26.5	7.8		92.7%	1.9	92.7%	5.9
Lake Butte des Morts	BMP-B4f5	Trillium Tr Pond Alt 2 w/Enhanced Settling		62.1	11,479	1,458		96.5%	145	96.5%	1,053		45.7	7.8		92.6%	3.4	92.6%	4.4
Lake Butte des Morts	BMP-B4f6	Trillium Tr Pond Alt 2 w/Enhanced Settling		23.2	4,187	567		96.5%	408	96.5%	419		17.1	3.1		92.6%	1.3	92.6%	1.8
Lake Butte des Morts	BMP-B4g3			44.7	9,348	2,869			2,869	69.3%	0		35.9	12.7			12.7	64.7%	0.0
Lake Butte des Morts	BMP-B4h2	Eden Meadows Pond		8.3	2,108	1,641	88.5%	92.2%	165	92.2%	1,476		6.5	5.7	72.0%	75.0%	1.6	75.0%	4.1
Lake Butte des Morts	BMP-B4h5	Wyldewood Pond Alt 1 w/Enhanced Settling		6.5	1,410	147		96.5%	50	96.5%	98		4.9	0.7		97.5	0.7	86.0%	0.0
Lake Butte des Morts	BMP-B4j9			42.2	9,706	3,471			3,471	64.2%	0		36.1	14.5			14.5	59.8%	0.0
Lake Butte des Morts	BMP-B4j6			8.1	2,467	939			939	61.9%	0		8.0	3.1			3.1	60.5%	0.0
Lake Butte des Morts	BMP-B4k4			74.4	14,157	2,811			2,811	80.1%	0		56.3	14.2			14.2	74.8%	0.0
Lake Butte des Morts	BMP-B4k8			14.2	3,016	2,054			2,054	31.9%	0		11.4	8.3			8.3	27.4%	0.0
Lake Butte des Morts	BMP-B4m6	Irvine Pond w/Enhanced Settling		159.0	28,722	9,816	85.0%	96.0%	1,150	96.0%	8,666		114.2	44.7	64.7%	89.6%	11.9	89.6%	32.9
Lake Butte des Morts	BMP-B4n2			42.1	8,163	2,029			2,029	75.1%	0		32.2	9.8			9.8	69.6%	0.0
Lake Butte des Morts	BMP-B4p1			62.3	10,845	2,840			2,840	73.8%	0		44.5	14.5			14.5	67.5%	0.0
Lake Butte des Morts	BMP-B4q2			11.6	2,496	297			297	88.1%	0		9.5	1.6			1.6	83.5%	0.0
Lake Butte des Morts	BMP-B5a2			23.4	4,254	1,038			1,038	75.6%	0		17.0	5.0			5.0	70.4%	0.0
Lake Butte des Morts	BMP-B6a2	Oakwood Manor SW Pond		3.0	672	672	64.6%	x	237	64.6%	434		2.3	2.3	53.3%	x	1.1	53.3%	1.2
Lake Butte des Morts	BMP-B6a5			19.6	3,318	1,827			1,827	45.0%	0		13.2	8.1			8.1	38.9%	0.0
Lake Butte des Morts	BMP-B6b1	FKC Oshkosh Pond		2.3	416	416	83.7%	x	68	83.7%	348		1.5	1.5	67.6%	x	0.5	67.6%	1.0
Lake Butte des Morts	BMP-B6b6			7.8	647	647			647	0.1%	0		3.9	3.9			3.9	0.0%	0.0
Lake Butte des Morts	BMP-B6b7			11.3	4,011	2,131			2,131	46.9%	0		11.4	6.5			6.5	43.1%	0.0
Lake Butte des Morts	BMP-B6c3			26.9	3,688	1,185			1,185	67.9%	0		16.4	6.4			6.4	60.9%	0.0
Lake Butte des Morts	BMP-B7a1	Coldwell Banker Pond		1.5	444	444	80.1%	x	88	80.1%	356		1.1	1.1	67.5%	x	0.4	67.5%	0.8
Lake Butte des Morts	BMP-B7a2	Willow Springs Pond		10.4	2,190	489	79.7%	95.6%	96	95.6%	394		8.0	2.3	58.4%	87.1%	1.0	87.1%	1.3
Lake Butte des Morts	BMP-B7a3			18.8	3,650	629			629	82.8%	0		14.4	3.1			3.1	78.5%	0.0
Lake Butte des Morts	BMP-B8b1	Tommys Car Wash Biofilter		1.3	454	454	88.3%	x	53	88.3%	401		1.1	1.1	0.0%	x	1.1	0.0%	0.0
Lake Butte des Morts	BMP-B8b4			4.2	2,116	1,085			1,085	48.8%	0		4.5	2.5			2.5	44.5%	0.0
Sawyer Creek	BMP-S1a3			12.1	2,115	492			492	76.8%	0		8.7	2.4			2.4	72.0%	0.0
Sawyer Creek	BMP-S1a4	Merc																	

TMDL Alt 3: 2025 Land Use, Proposed BMPs, 2025 BMP's, 2025 Drainage System with the following Street Sweeping routines: HE Sweeper-Once every 4 weeks-With Parking Controls

TMDL Pollutant Analysis																		
Town of Algoma - TMDL Alternative 3																		
Sub-Watershed	Drainage System or BMP	BMP Name	Area (acres)	Total Suspended Solids (TSS)							Total Phosphorus (TP)							
				Before Drain System (lbs/yr)	After Drain System (lbs/yr)	Structural BMP Reduct (%)	Structural BMP & Drain System In-Series Reduct ² (%)	After Outfall Control (lbs/yr)	Total Load Reduct (%)	Net Gain (lbs/yr)	Before Drain System (lbs/yr)	After Drain System (lbs/yr)	Structural BMP Reduct (%)	Structural BMP & Drain System In-Series Reduct ² (%)	After Outfall Control (lbs/yr)	Total Load Reduct (%)	Net Gain (lbs/yr)	
Lake Butte des Morts	No Controls		14.4	2,214	2,214			2,214	0.0%	0	0	9.1	9.1			9.1	0.0%	0.0
Lake Butte des Morts	Swales		17.3	6,248	2,593			2,593	58.5%	0	19.0	7.9	7.9			7.9	58.5%	0.0
Lake Butte des Morts	Sweeping		1.5	1,150	877			877	23.7%	0	2.5	2.1	2.1			2.1	19.0%	0.0
Lake Butte des Morts	BMP-B1a1	Bell Ridge Pond C	5.1	1,103	517	85.7%	90.3%	107	90.3%	410	3.8	2.0	62.8%	76.3%	0.9	76.3%	1.1	
Lake Butte des Morts	BMP-B1b5	Bellhaven Ln IE Sand Filter	22.6	3,728	765	76.6%	97.1%	110	97.1%	655	15.6	4.1	63.4%	93.7%	1.0	93.7%	3.1	
Lake Butte des Morts	BMP-B1c1		9.3	2,008	456			456	77.3%	0	7.6	2.1			2.1	72.2%	0.0	
Lake Butte des Morts	BMP-B1d2	Bellhaven Park Pond w/Enhanced Settling	14.9	2,409	873	74.2%	96.6%	83	96.6%	790	10.1	4.4	51.7%	93.1%	0.7	93.1%	3.7	
Lake Butte des Morts	BMP-B1d3	Bellhaven Park Pond w/Enhanced Settling	6.3	1,439	764	69.6%	96.6%	49	96.6%	714	5.0	2.9	51.2%	90.0%	0.5	90.0%	2.4	
Lake Butte des Morts	BMP-B1d5	Bellhaven Park Pond w/Enhanced Settling	56.0	9,509	3,818			326	96.6%	3,492	38.3	18.7			8.4	78.0%	10.3	
Lake Butte des Morts	BMP-B1d7		10.5	1,571	436			436	72.2%	0	6.7	2.3			2.3	65.6%	0.0	
Lake Butte des Morts	BMP-B1d8		15.8	3,765	948			948	74.8%	0	13.7	4.2			4.2	69.5%	0.0	
Lake Butte des Morts	BMP-B1e1		7.6	1,426	568			568	60.2%	0	5.6	2.6			2.6	53.7%	0.0	
Lake Butte des Morts	BMP-B1g3	Leonard Point Pond w/Enhanced Settling	83.3	12,709	4,430		96.7%	424	96.7%	4,006	52.5	23.2		93.5%	3.4	93.5%	19.8	
Lake Butte des Morts	BMP-B1h8	Leonard Point Pond w/Enhanced Settling	27.7	5,079	2,793		96.7%	169	96.7%	2,624	19.6	12.1		93.5%	1.3	93.5%	10.8	
Lake Butte des Morts	BMP-B2a3	Hunters Court Pond	7.8	1,104	260	83.8%	95.4%	51	95.4%	209	4.9	1.5	57.0%	85.8%	0.7	85.8%	0.8	
Lake Butte des Morts	BMP-B2a5		33.8	6,543	1,108			1,108	83.1%	0	25.8	5.5			5.5	78.9%	0.0	
Lake Butte des Morts	BMP-B2a7		52.9	10,337	1,491			1,491	85.6%	0	40.7	7.8			7.8	80.9%	0.0	
Lake Butte des Morts	BMP-B2a9		3.2	929	268			268	71.1%	0	3.2	1.1			1.1	65.9%	0.0	
Lake Butte des Morts	BMP-B3a1	Lakevista Estates Ponds w/Enhanced Settling	6.6	2,055	2,055	87.4%	95.7%	88	95.7%	1,967	5.0	5.0	75.2%	89.9%	0.5	89.9%	4.5	
Lake Butte des Morts	BMP-B3a2	Lakevista Estates Ponds w/Enhanced Settling	14.6	1,878	1,240	82.0%	95.7%	80	95.7%	1,159	8.4	6.3	60.6%	89.9%	0.8	89.9%	5.4	
Lake Butte des Morts	BMP-B3a3	Lakevista Estates Ponds w/Enhanced Settling	39.3	6,568	2,891	91.2%	95.7%	281	95.7%	2,611	26.7	13.3	69.3%	89.9%	2.7	89.9%	10.6	
Lake Butte des Morts	BMP-B3a4	Lakevista Estates Ponds w/Enhanced Settling	7.7	1,480	331	88.3%	95.7%	63	95.7%	268	5.6	1.5	66.6%	89.9%	0.6	89.9%	1.0	
Lake Butte des Morts	BMP-B3b1	Butte Des Morts Meadows Pond	53.2	8,888	1,368	61.1%	97.1%	254	97.1%	1,114	37.1	7.4	42.8%	90.9%	3.4	90.9%	4.0	
Lake Butte des Morts	BMP-B3b2		42.9	6,548	1,372			1,372	79.1%	0	28.4	7.3			7.3	74.4%	0.0	
Lake Butte des Morts	BMP-B3d1	Our Lady Church Pond w/Enhanced Settling	46.1	6,099	1,724		96.8%	197	96.8%	1,527	27.8	10.1		94.0%	1.7	94.0%	8.4	
Lake Butte des Morts	BMP-B4a7		0.6	218	218			218	0.0%	0	0.5	0.5			0.5	0.0%	0.0	
Lake Butte des Morts	BMP-B4a8		1.1	389	389			389	0.0%	0	0.9	0.9			0.9	0.0%	0.0	
Lake Butte des Morts	BMP-B4b7	Jones Pond	21.5	5,762	5,161	87.0%		748	87.0%	4,414	16.9	15.8	69.9%		5.1	69.9%	10.7	
Lake Butte des Morts	BMP-B4c1	Sheppard Dr Pond w/Enhanced Settling	1.4	443	443	72.3%	96.3%	16	96.3%	427	1.1	1.1	61.2%	91.1%	0.1	91.1%	1.0	
Lake Butte des Morts	BMP-B4c2	Sheppard Dr Pond w/Enhanced Settling	70.7	14,349	8,636	65.1%	96.3%	530	96.3%	8,107	47.8	30.5	46.4%	91.1%	4.2	91.1%	26.2	
Lake Butte des Morts	BMP-B4c3	Sheppard Dr Pond w/Enhanced Settling	33.0	6,425	1,215	66.8%	96.3%	237	96.3%	978	25.3	6.3	46.1%	91.1%	2.2	91.1%	4.1	
Lake Butte des Morts	BMP-B4c5	Sheppard Dr Pond w/Enhanced Settling	1.5	287	62		96.3%	11	96.3%	52	1.5	0.4		91.1%	0.1	91.1%	0.3	
Lake Butte des Morts	BMP-B4c6	Sheppard Dr Pond w/Enhanced Settling	0.7	179	179		96.3%	7	96.3%	173	0.7	0.7		91.1%	0.1	91.1%	0.6	
Lake Butte des Morts	BMP-B4c7	Sheppard Dr Pond w/Enhanced Settling	0.8	466	134		96.3%	17	96.3%	117	1.4	0.5		91.1%	0.1	91.1%	0.4	
Lake Butte des Morts	BMP-B4c8	Sheppard Dr Pond w/Enhanced Settling	0.0	4	4		96.3%	0	96.3%	4	0.0	0.0		91.1%	0.0	91.1%	0.0	
Lake Butte des Morts	BMP-B4d1	Sheppard Dr Pond w/Enhanced Settling	11.5	1,684	1,492		96.3%	62	96.3%	1,430	7.5	7.0		91.1%	0.7	91.1%	6.4	
Lake Butte des Morts	BMP-B4d4		30.2	5,661	1,701			1,701	70.0%	0	22.4	8.5			8.5	61.9%	0.0	
Lake Butte des Morts	BMP-B4e2	Wyldewood Pond Alt 2 w/Enhanced Settling	35.9	6,562	1,700		96.5%	230	96.5%	1,470	26.5	7.8		92.8%	1.9	92.8%	5.9	
Lake Butte des Morts	BMP-B4f5	Trillium Tr Pond Alt 2 w/Enhanced Settling	62.1	11,479	1,458		96.5%	405	96.5%	1,053	45.7	7.8		92.6%	3.4	92.6%	4.4	
Lake Butte des Morts	BMP-B4f6	Trillium Tr Pond Alt 2 w/Enhanced Settling	23.2	4,187	567		96.5%	148	96.5%	419	17.1	3.1		92.6%	1.3	92.6%	1.8	
Lake Butte des Morts	BMP-B4g3		44.7	9,348	2,869			2,869	69.3%	0	35.9	12.7			12.7	64.7%	0.0	
Lake Butte des Morts	BMP-B4h2	Eden Meadows Pond	8.3	2,108	1,641	88.5%	92.2%	165	92.2%	1,476	6.5	5.7	72.0%	75.0%	1.6	75.0%	4.1	
Lake Butte des Morts	BMP-B4h5		6.5	1,410	147			147	89.6%	0	4.9	0.7			0.7	86.0%	0.0	
Lake Butte des Morts	BMP-B4i9		42.2	9,706	3,471			3,471	64.2%	0	36.1	14.5			14.5	59.8%	0.0	
Lake Butte des Morts	BMP-B4j6		8.1	2,467	939			939	61.9%	0	8.0	3.1			3.1	60.5%	0.0	
Lake Butte des Morts	BMP-B4k4	Sheldon Pond w/Enhanced Settling	74.4	14,157	2,811		96.5%	489	96.5%	2,322	56.3	14.2		92.9%	4.0	92.9%	10.2	
Lake Butte des Morts	BMP-B4k8	Valley Road Pond w/Enhanced Settling	14.2	3,016	2,054		96.6%	102	96.6%	1,953	11.4	8.3		93.1%	0.8	93.1%	7.5	
Lake Butte des Morts	BMP-B4m6	Irvine Pond w/Enhanced Settling	159.0	28,722	9,816	85.0%	96.0%	1,150	96.0%	8,666	114.2	44.7	64.7%	89.6%	11.9	89.6%	32.9	
Lake Butte des Morts	BMP-B4n2	Oakwood Circle Pond	42.1	8,163	2,029		95.1%	401	95.1%	1,629	32.2	9.8		86.2%	4.4	86.2%	5.4	
Lake Butte des Morts	BMP-B4p1	Prairie Wood Pond w/Enhanced Settling	62.3	10,845	2,840		96.5%	378	96.5%	2,462	44.5	14.5		93.2%	3.0	93.2%	11.4	
Lake Butte des Morts	BMP-B4q2		11.6	2,496	297			297	88.1%	0	9.5	1.6			1.6	83.5%	0.0	
Lake Butte des Morts	BMP-B5a2		23.4	4,254	1,038			1,038	75.6%	0	17.0	5.0			5.0	70.4%	0.0	
Lake Butte des Morts	BMP-B6a2	Oakwood Manor SW Pond	3.0	672	672	64.6%	x	237	64.6%	434	2.3	2.3	53.3%	x	1.1	53.3%	1.2	
Lake Butte des Morts	BMP-B6a5		19.6	3,318	1,827			1,827	45.0%	0	13.2	8.1			8.1	38.9%	0.0	
Lake Butte des Morts	BMP-B6b1	FKC Oshkosh Pond	2.3	416	416	83.7%	x	68	83.7%	348	1.5	1.5	67.6%	x	0.5	67.6%	1.0	
Lake Butte des Morts	BMP-B6b6		7.8	647	647			647	0.1%	0	3.9	3.9			3.9	0.0%	0.0	
Lake Butte des Morts	BMP-B6b7		11.3	4,011	2,131			2,131	46.9%	0	11.4	6.5			6.5	43.1%	0.0	
Lake Butte des Morts	BMP-B6c3		26.9	3,688	1,185			1,185	67.9%	0	16.4	6.4			6.4	60.9%	0.0	
Lake Butte des Morts	BMP-B7a1	Coldwell Banker Pond	1.5	444	444	80.1%	x	88	80.1%	356	1.1	1.1	67.5%	x	0.4	67.5%	0.8	
Lake Butte des Morts	BMP-B7a2	Willow Springs Pond	10.4	2,190	489	79.7%	95.6%	96	95.6%	394	8.0	2.3	58.4%	87.1%	1.0	87.1%	1.3	
Lake Butte des Morts	BMP-B7a3		18.8	3,650	629			629	82.8%	0	14.4	3.1			3.1	78.5%	0.0	
Lake Butte des Morts	BMP-B8b1	Tommys Car Wash Biofilter	1.3	454	454	88.3%	x	53	88.3%	401	1.1	1.1	0.0%	x	1.1	0.0%	0.0	
Lake Butte des Morts	BMP-B8b4		4.2	2,116	1,085			1,085	48.8%	0	4.5	2.5			2.5	44.5%	0.0	
Sawyer Creek	BMP-S1a3		12.1	2,115	492			492	76.8%	0	8.7	2.4			2.4	72.0%	0.0	
Sawyer Creek	BMP-S1a4	Mercy Hospital North Pond w/Enhanced Settling	0.9	87	87	84.7%	95.8%	4	95.8%	83	0.5	0.5	70.3%	90.3%	0.0	90.3%	0.4	
Sawyer Creek	BMP-S1a5	Mercy Hospital North Pond w/Enhanced Settling	0.8	80	80	84.7%	95.8%	3										

TMDL Alt 4: 2025 Land Use, Proposed BMP's, 2025 BMP's, 2025 Drainage System with the following Street Sweeping routines: HE Sweeper-Once every 4 weeks-With Parking Controls

TMDL Pollutant Analysis																		
Town of Algoma - TMDL Alternative 4																		
Sub-Watershed	Drainage System or BMP Catchment ID	BMP Name	Area (acres)	Urban Study Area ¹							Total Phosphorus (TP)							
				Total Suspended Solids (TSS)							Total Phosphorus (TP)							
				Before Drain System (lbs/yr)	After Drain System (lbs/yr)	Structural BMP Reduct (%)	Structural BMP & Drain System In-Series Reduct ² (%)	After Outfall Control (lbs/yr)	Total Load Reduct (%)	Net Gain (lbs/yr)	Before Drain System (lbs/yr)	After Drain System (lbs/yr)	Structural BMP Reduct (%)	Structural BMP & Drain System In-Series Reduct ² (%)	After Outfall Control (lbs/yr)	Total Load Reduct (%)	Net Gain (lbs/yr)	
Lake Butte des Morts	No Controls		14.4	2,214	2,214				2,214	0.0%	0	9.1	9.1			9.1	0.0%	0.0
Lake Butte des Morts	Swales		17.3	6,248	2,593				2,593	58.5%	0	19.0	7.9			7.9	58.5%	0.0
Lake Butte des Morts	Sweeping		1.5	1,150	877				877	23.7%	0	2.5	2.1			2.1	19.0%	0.0
Lake Butte des Morts	BMP-B1a1	Bell Ridge Pond C	5.1	1,103	517	85.7%	90.3%		107	90.3%	410	3.8	2.0	62.8%	76.3%	0.9	76.3%	1.1
Lake Butte des Morts	BMP-B1b5	Bellhaven Ln IE Sand Filter	22.6	3,728	765	76.6%	97.1%		110	97.1%	655	15.6	4.1	63.4%	93.7%	1.0	93.7%	3.1
Lake Butte des Morts	BMP-B1c1		9.3	2,008	456				456	77.3%	0	7.6	2.1			2.1	72.2%	0.0
Lake Butte des Morts	BMP-B1d2	Bellhaven Park Pond w/Enhanced Settling	14.9	2,409	873	74.2%	96.6%		83	96.6%	790	10.1	4.4	51.7%	93.1%	0.7	93.1%	3.7
Lake Butte des Morts	BMP-B1d3	Bellhaven Park Pond w/Enhanced Settling	6.3	1,439	764	69.6%	96.6%		49	96.6%	714	5.0	2.9	51.2%	90.0%	0.5	90.0%	2.4
Lake Butte des Morts	BMP-B1d5	Bellhaven Park Pond w/Enhanced Settling	56.0	9,509	3,818		96.6%		326	96.6%	3,492	38.3	18.7	78.0%	8.4	78.0%	10.3	
Lake Butte des Morts	BMP-B1d7		10.5	1,571	436				436	72.2%	0	6.7	2.3			2.3	65.6%	0.0
Lake Butte des Morts	BMP-B1d8		15.8	3,765	948				948	74.8%	0	13.7	4.2			4.2	69.5%	0.0
Lake Butte des Morts	BMP-B1e1		7.6	1,426	568				568	60.2%	0	5.6	2.6			2.6	53.7%	0.0
Lake Butte des Morts	BMP-B1g3	Leonard Point Pond w/Enhanced Settling	83.3	12,709	4,430		96.7%		424	96.7%	4,006	52.5	23.2		93.5%	3.4	93.5%	19.8
Lake Butte des Morts	BMP-B1h8	Leonard Point Pond w/Enhanced Settling	27.7	5,079	2,793		96.7%		169	96.7%	2,624	19.6	12.1		93.5%	1.3	93.5%	10.8
Lake Butte des Morts	BMP-B2a3	Hunters Court Pond	7.8	1,104	260	83.8%	95.4%		51	95.4%	209	4.9	1.5	57.0%	85.8%	0.7	85.8%	0.8
Lake Butte des Morts	BMP-B2a5		33.8	6,543	1,108				1,108	83.1%	0	25.8	5.5			5.5	78.9%	0.0
Lake Butte des Morts	BMP-B2a7		52.9	10,337	1,491				1,491	85.6%	0	40.7	7.8			7.8	80.9%	0.0
Lake Butte des Morts	BMP-B2a9		3.2	929	268				268	71.1%	0	3.2	1.1			1.1	65.9%	0.0
Lake Butte des Morts	BMP-B3a1	Lakevista Estates Ponds w/Enhanced Settling	6.6	2,055	2,055	87.4%	95.7%		88	95.7%	1,967	5.0	5.0	75.2%	89.9%	0.5	89.9%	4.5
Lake Butte des Morts	BMP-B3a2	Lakevista Estates Ponds w/Enhanced Settling	14.6	1,878	1,240	82.0%	95.7%		80	95.7%	1,159	8.4	6.3	60.6%	89.9%	0.8	89.9%	5.4
Lake Butte des Morts	BMP-B3a3	Lakevista Estates Ponds w/Enhanced Settling	39.3	6,568	2,891	91.2%	95.7%		281	95.7%	2,611	26.7	13.3	69.3%	89.9%	2.7	89.9%	10.6
Lake Butte des Morts	BMP-B3a4	Lakevista Estates Ponds w/Enhanced Settling	7.7	1,480	331	88.3%	95.7%		63	95.7%	268	5.6	1.5	66.6%	89.9%	0.6	89.9%	1.0
Lake Butte des Morts	BMP-B3b1	Butte Des Morts Meadows Pond	53.2	8,888	1,368	61.1%	97.1%		254	97.1%	1,114	37.1	7.4	42.8%	90.9%	3.4	90.9%	4.0
Lake Butte des Morts	BMP-B3b2		42.9	6,548	1,372				1,372	79.1%	0	28.4	7.3			7.3	74.4%	0.0
Lake Butte des Morts	BMP-B3d1	Our Lady Church Pond w/Enhanced Settling	46.1	6,099	1,724		96.8%		197	96.8%	1,527	27.8	10.1		94.0%	1.7	94.0%	8.4
Lake Butte des Morts	BMP-B4a7		0.6	218	218				218	0.0%	0	0.5	0.5			0.5	0.0%	0.0
Lake Butte des Morts	BMP-B4a8		1.1	389	389				389	0.0%	0	0.9	0.9			0.9	0.0%	0.0
Lake Butte des Morts	BMP-B4b7	Jones Pond w/Enhanced Settling	21.5	5,762	5,161	87.0%	95.9%		239	95.9%	4,922	16.9	15.8	69.9%	86.6%	2.3	86.6%	13.5
Lake Butte des Morts	BMP-B4c1	Sheppard Dr Pond w/Enhanced Settling	1.4	443	443	72.3%	96.3%		16	96.3%	427	1.1	1.1	61.2%	91.1%	0.1	91.1%	1.0
Lake Butte des Morts	BMP-B4c2	Sheppard Dr Pond w/Enhanced Settling	70.7	14,349	8,636	65.1%	96.3%		530	96.3%	8,107	47.8	30.5	46.4%	91.1%	4.2	91.1%	26.2
Lake Butte des Morts	BMP-B4c3	Sheppard Dr Pond w/Enhanced Settling	33.0	6,425	1,215	66.8%	96.3%		237	96.3%	978	25.3	6.3	46.1%	91.1%	2.2	91.1%	4.1
Lake Butte des Morts	BMP-B4c5	Sheppard Dr Pond w/Enhanced Settling	1.5	287	62		96.3%		11	96.3%	52	1.5	0.4		91.1%	0.1	91.1%	0.3
Lake Butte des Morts	BMP-B4c6	Sheppard Dr Pond w/Enhanced Settling	0.7	179	179		96.3%		7	96.3%	173	0.7	0.7		91.1%	0.1	91.1%	0.6
Lake Butte des Morts	BMP-B4c7	Sheppard Dr Pond w/Enhanced Settling	0.8	466	134		96.3%		17	96.3%	117	1.4	0.5		91.1%	0.1	91.1%	0.4
Lake Butte des Morts	BMP-B4c8	Sheppard Dr Pond w/Enhanced Settling	0.0	4	4		96.3%		0	96.3%	4	0.0	0.0		91.1%	0.0	91.1%	0.0
Lake Butte des Morts	BMP-B4d1	Sheppard Dr Pond w/Enhanced Settling	11.5	1,684	1,492		96.3%		62	96.3%	1,430	7.5	7.0		91.1%	0.7	91.1%	6.4
Lake Butte des Morts	BMP-B4d4		30.2	5,661	1,701				1,701	70.0%	0	22.4	8.5			8.5	61.9%	0.0
Lake Butte des Morts	BMP-B4e2	Wyldewood Pond Alt 2 w/Enhanced Settling	35.9	6,562	1,700		96.5%		230	96.5%	1,470	26.5	7.8		92.8%	1.9	92.8%	5.9
Lake Butte des Morts	BMP-B4f5	Trillium Tr Pond Alt 2 w/Enhanced Settling	62.1	11,479	1,458		96.5%		405	96.5%	1,053	45.7	7.8		92.6%	3.4	92.6%	4.4
Lake Butte des Morts	BMP-B4f6	Trillium Tr Pond Alt 2 w/Enhanced Settling	23.2	4,187	567		96.5%		148	96.5%	419	17.1	3.1		92.6%	1.3	92.6%	1.8
Lake Butte des Morts	BMP-B4g3	Forest View Pond w/Enhanced Settling	44.7	9,348	2,869		96.4%		338	96.4%	2,530	35.9	12.7		92.3%	2.8	92.3%	9.9
Lake Butte des Morts	BMP-B4h2	Eden Meadows Pond	8.3	2,108	1,641	88.5%	92.2%		165	92.2%	1,476	6.5	5.7	72.0%	75.0%	1.6	75.0%	4.1
Lake Butte des Morts	BMP-B4h5		6.5	1,410	147				147	89.6%	0	4.9	0.7			0.7	86.0%	0.0
Lake Butte des Morts	BMP-B4i9		42.2	9,706	3,471				3,471	64.2%	0	36.1	14.5			14.5	59.8%	0.0
Lake Butte des Morts	BMP-B4j6		8.1	2,467	939				939	61.9%	0	8.0	3.1			3.1	60.5%	0.0
Lake Butte des Morts	BMP-B4k4	Sheldon Pond w/Enhanced Settling	74.4	14,157	2,811		96.5%		489	96.5%	2,322	56.3	14.2		92.9%	4.0	92.9%	10.2
Lake Butte des Morts	BMP-B4k8	Valley Road Pond w/Enhanced Settling	14.2	3,016	2,054		96.6%		102	96.6%	1,953	11.4	8.3		93.1%	0.8	93.1%	7.5
Lake Butte des Morts	BMP-B4m6	Irvine Pond w/Enhanced Settling	159.0	28,722	9,816	85.0%	96.0%		1,150	96.0%	8,666	114.2	44.7	64.7%	89.6%	11.9	89.6%	32.9
Lake Butte des Morts	BMP-B4n2	Oakwood Circle Pond w/Enhanced Settling	42.1	8,163	2,029		96.4%		292	96.4%	1,737	32.2	9.8		92.5%	2.4	92.5%	7.4
Lake Butte des Morts	BMP-B4p1	Prairie Wood Pond w/Enhanced Settling	62.3	10,845	2,840		96.5%		378	96.5%	2,462	44.5	14.5		93.2%	3.0	93.2%	11.4
Lake Butte des Morts	BMP-B4q2		11.6	2,496	297				297	88.1%	0	9.5	1.6			1.6	83.5%	0.0
Lake Butte des Morts	BMP-B5a2		23.4	4,254	1,038				1,038	75.6%	0	17.0	5.0			5.0	70.4%	0.0
Lake Butte des Morts	BMP-B6a2	Oakwood Manor SW Pond	3.0	672	672	64.6%	x		237	64.6%	434	2.3	2.3	53.3%	x	1.1	53.3%	1.2
Lake Butte des Morts	BMP-B6a5		19.6	3,318	1,827				1,827	45.0%	0	13.2	8.1			8.1	38.9%	0.0
Lake Butte des Morts	BMP-B6b1	FKC Oshkosh Pond	2.3	416	416	83.7%	x		68	83.7%	348	1.5	1.5	67.6%	x	0.5	67.6%	1.0
Lake Butte des Morts	BMP-B6b6		7.8	647	647				647	0.1%	0	3.9	3.9			3.9	0.0%	0.0
Lake Butte des Morts	BMP-B6b7		11.3	4,011	2,131				2,131	46.9%	0	11.4	6.5			6.5	43.1%	0.0
Lake Butte des Morts	BMP-B6c3		26.9	3,688	1,185				1,185	67.9%	0	16.4	6.4			6.4	60.9%	0.0
Lake Butte des Morts	BMP-B7a1	Coldwell Banker Pond	1.5	444	444	80.1%	x		88	80.1%	356	1.1	1.1	67.5%	x	0.4	67.5%	0.8
Lake Butte des Morts	BMP-B7a2	Willow Springs Pond	10.4	2,190	489	79.7%	95.6%		96	95.6%	394	8.0	2.3	58.4%	87.1%	1.0	87.1%	1.3
Lake Butte des Morts	BMP-B7a3		18.8	3,650	629				629	82.8%	0	14.4	3.1			3.1	78.5%	0.0
Lake Butte des Morts	BMP-B8b1	Tommys Car Wash Biofilter	1.3	454	454	88.3%	x		53	88.3%	401	1.1	1.1	0.0%	x	1.1	0.0%	0.0
Lake Butte des Morts	BMP-B8b4		4.2	2,116	1,085				1,085	48.8%	0	4.5	2.5			2.5	44.5%	0.0
Sawyer Creek	BMP-S1a3		12.1	2,115	492				492	76.8%	0	8.7	2.4			2.4	72.0%	0.0
Sawyer Creek	BMP-S1a4	Mercy Hospital North Pond w/Enhanced Settling	0.9	87	87	84.7%	95.8%		4	95.8%	83	0.5	0.5	70.3%	90.3%	0.0	90.3%	0.4
Sawyer Creek	BMP-S1a5	Mercy Hospital North Pond w/Enhanced Settling	0.8	80	80	84												

TOWN OF ALGOMA

25-YEAR STORMWATER CAPITAL IMPROVEMENT PLAN (CIP)

Revenues	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	Totals	
1 STORM WATER FEES (FUTURE STORM WATER UTILITY)	\$0	\$428,000	\$432,280	\$436,603	\$440,969	\$445,379	\$449,832	\$454,331	\$458,874	\$463,463	\$468,097	\$472,778	\$477,506	\$482,281	\$487,104	\$491,975	\$496,895	\$501,864	\$506,882	\$511,951	\$517,071	\$522,241	\$527,464	\$532,738	\$538,066	\$11,544,643	
2 GENERAL FUND	\$225,210	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$225,210
3 CULVERT PERMITS	\$6,400	\$6,464	\$6,529	\$6,594	\$6,660	\$6,726	\$6,794	\$6,862	\$6,930	\$7,000	\$7,070	\$7,140	\$7,212	\$7,284	\$7,357	\$7,430	\$7,505	\$7,580	\$7,655	\$7,732	\$7,809	\$7,887	\$7,966	\$8,046	\$8,126	\$180,756	
4 DNR CONSTRUCTION OR PLANNING GRANT ¹	\$55,700	\$200,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$150,000	\$0	\$0	\$0	\$0	\$50,000	\$0	\$0	\$150,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$765,200	
5 DEBT ISSUED FOR CAPITAL PROJECT	\$1,247,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,247,000	
Total Revenues	\$1,534,310	\$634,464	\$438,809	\$443,197	\$447,629	\$452,105	\$456,626	\$461,192	\$465,804	\$470,462	\$475,167	\$479,919	\$484,718	\$489,565	\$494,461	\$499,405	\$504,399	\$509,443	\$514,538	\$519,683	\$524,880	\$530,129	\$535,430	\$540,684	\$545,992	\$13,962,809	
NOTE: FUTURE REVENUES ASSUME ANNUAL INCREASE OF 1.00%																											
Expenditures	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	Totals	
Capital Projects - TMDL Plan of Action - Pond Construction / Enhancement																											
1 Leonard Point Pond	\$260,000	\$940,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,200,000
2 Town Hall Pond	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$439,519	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$439,519
3 Honey Creek Pond w/Enhanced Settling	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,857,368	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,857,368	
4 Mercy Hospital Pond w/Enhanced Settling	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$204,937	\$0	\$204,937	
Pond Construction / Enhancement Totals	\$260,000	\$940,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$439,519	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,857,368	\$0	\$0	\$0	\$0	\$0	\$0	\$204,937	\$3,701,824	
Capital Projects - Pond Maintenance/Ecological																											
1 Bellhaven Ln IE Sand Filter	\$3,900	\$4,017	\$4,138	\$4,262	\$4,389	\$4,521	\$4,657	\$4,797	\$4,940	\$5,089	\$5,241	\$5,399	\$5,560	\$5,727	\$5,899	\$6,076	\$6,258	\$6,446	\$6,639	\$6,839	\$7,044	\$7,255	\$7,473	\$7,697	\$7,928	\$142,191	
2 Jones Park Pond	\$5,150	\$5,305	\$5,464	\$5,628	\$5,796	\$5,970	\$6,149	\$6,334	\$6,524	\$6,720	\$6,921	\$7,129	\$7,343	\$7,563	\$7,790	\$8,024	\$8,264	\$8,512	\$8,768	\$9,031	\$9,301	\$9,581	\$9,868	\$10,164	\$10,469	\$187,765	
3 Nelson Pond	\$5,050	\$5,202	\$5,358	\$5,518	\$5,684	\$5,854	\$6,030	\$6,211	\$6,397	\$6,589	\$6,787	\$6,990	\$7,200	\$7,416	\$7,639	\$7,868	\$8,104	\$8,347	\$8,597	\$8,855	\$9,121	\$9,394	\$9,676	\$9,967	\$10,266	\$184,119	
4 Jones Pond	\$4,950	\$5,099	\$5,251	\$5,409	\$5,571	\$5,738	\$5,911	\$6,088	\$6,271	\$6,459	\$6,652	\$6,852	\$7,058	\$7,269	\$7,487	\$7,712	\$7,943	\$8,182	\$8,427	\$8,680	\$8,940	\$9,208	\$9,485	\$9,769	\$10,062	\$180,473	
5 Irvine Pond	\$10,600	\$10,918	\$11,246	\$11,583	\$11,930	\$12,288	\$12,657	\$13,037	\$13,428	\$13,831	\$14,246	\$14,673	\$15,113	\$15,566	\$16,033	\$16,514	\$17,010	\$17,520	\$18,046	\$18,587	\$19,145	\$19,719	\$20,311	\$20,920	\$21,548	\$386,468	
6 Leonard Point Pond (after 2027)	\$0	\$0	\$6,000	\$6,180	\$6,365	\$6,556	\$6,753	\$6,956	\$7,164	\$7,379	\$7,601	\$7,829	\$8,063	\$8,305	\$8,555	\$8,811	\$9,076	\$9,348	\$9,628	\$9,917	\$10,215	\$10,521	\$10,837	\$11,162	\$11,497	\$194,717	
7 Town Hall Pond (after 2035)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$6,000	\$6,180	\$6,365	\$6,556	\$6,753	\$6,956	\$7,164	\$7,379	\$7,601	\$7,829	\$8,063	\$8,305	\$8,555	\$8,811	\$9,076	\$9,348	\$111,593	
8 Honey Creek Pond w/Enhanced Settling (after 2043)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$10,000	\$10,300	\$10,609	\$10,927	\$11,255	\$11,593	\$11,941	\$76,625		
9 Mercy Hospital Pond w/Enhanced Settling (after 2049)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$8,000	\$8,240	\$16,240	
Pond Maintenance/Ecological Totals	\$29,650	\$30,540	\$31,456	\$32,399	\$33,371	\$34,372	\$35,404	\$36,466	\$37,560	\$38,687	\$39,847	\$41,043	\$42,274	\$43,542	\$44,848	\$46,194	\$47,580	\$49,007	\$50,477	\$51,991	\$53,551	\$55,158	\$56,812	\$58,517	\$60,272	\$1,081,017	
Capital Projects - Drainage Improvements/Culvert Replacements																											
1 Annual Culvert Replacement Program (with paving locations)	\$0	\$15,300	\$15,759	\$16,232	\$16,719	\$17,220	\$17,737	\$18,269	\$18,817	\$19,382	\$19,963	\$20,562	\$21,179	\$21,814	\$22,469	\$23,143	\$23,837	\$24,552	\$25,289	\$26,047	\$26,829	\$27,634	\$28,463	\$29,316	\$30,196	\$526,725	
2 Butte de Morts Meadows Pond Culvert	\$0	\$0	\$50,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$50,000	
Drainage Improvements/Culvert Replacements Totals	\$0	\$15,300	\$65,759	\$16,232	\$16,719	\$17,220	\$17,737	\$18,269	\$18,817	\$19,382	\$19,963	\$20,562	\$21,179	\$21,814	\$22,469	\$23,143	\$23,837	\$24,552	\$25,289	\$26,047	\$26,829	\$27,634	\$28,463	\$29,316	\$30,196	\$576,725	
Wages/Insurance & Professional Services																											
1 NEWSC ANNUAL FEES	\$1,370	\$1,505	\$1,656	\$1,820	\$1,875	\$1,931	\$1,989	\$2,049	\$2,110	\$2,174	\$2,239	\$2,306	\$2,375	\$2,446	\$2,520	\$2,595	\$2,673	\$2,754	\$2,836	\$2,921	\$3,009	\$3,099	\$3,192	\$3,288	\$3,386	\$60,119	
2 STREET SWEEPING/LEAF COLLECTION	\$94,000	\$96,820	\$99,725	\$102,716	\$105,798	\$108,972	\$112,241	\$115,608	\$119,076	\$122,649	\$126,328	\$130,118	\$134,022	\$138,042	\$142,183	\$146,449	\$150,842	\$155,368	\$160,029	\$164,830	\$169,774	\$174,868	\$180,114	\$185,517	\$191,083	\$3,427,171	
3 WAGES & BENEFITS	\$77,250	\$79,568	\$81,955	\$84,413	\$86,946	\$89,554	\$92,241	\$95,008	\$97,858	\$100,794	\$103,818	\$106,932	\$110,140	\$113,444	\$116,848	\$120,353	\$123,964	\$127,682	\$131,513	\$135,458	\$139,522	\$143,708	\$148,019	\$152,460	\$157,033	\$2,816,478	
4 STORM SEWER/ CULVERT MAINTENANCE	\$20,000	\$20,600	\$21,218	\$21,855	\$22,510	\$23,185	\$23,881	\$24,597	\$25,335	\$26,095	\$26,878	\$27,685	\$28,515	\$29,371	\$30,252	\$31,159	\$32,094	\$33,057	\$34,049	\$35,070	\$36,122	\$37,206	\$38,322	\$39,472	\$40,656	\$729,185	
5 GIS ANNUAL MAINTENANCE/UPGRADES/DATA	\$2,000	\$2,060	\$2,122	\$2,185	\$2,251	\$2,319	\$2,388	\$2,460	\$2,534	\$2,610	\$2,688	\$2,768	\$2,852	\$2,937	\$3,025	\$3,116	\$3,209	\$3,306	\$3,405	\$3,507	\$3,612	\$3,721	\$3,832	\$3,947	\$4,066	\$72,919	
6 ENGINEERING - GENERAL PLANNING	\$10,000	\$10,300	\$10,609	\$10,927	\$11,255	\$11,593	\$11,941	\$12,299	\$12,668	\$13,048	\$13,439	\$13,842	\$14,258	\$14,685	\$15,126	\$15,580	\$16,047	\$16,528	\$17,024	\$17,535	\$18,061	\$18,603	\$19,161	\$19,736	\$20,328	\$364,593	
7 ENGINEERING - OUTFALL SCREENINGS	\$5,000	\$5,150	\$5,305	\$5,464	\$5,628	\$5,796	\$5,970	\$6,149	\$6,334	\$6,524	\$6,720	\$6,921	\$7,129	\$7,343	\$7,563	\$7,790	\$8,024	\$8,264	\$8,512	\$8,768	\$9,031	\$9,301	\$9,581	\$9,868	\$10,164	\$182,296	
8 ENGINEERING - POND DESIGN/CONSTRUCTION ²	\$47,000	\$28,200	\$0	\$0	\$0	\$0	\$0	\$0	\$43,952	\$21,976	\$0	\$0	\$0	\$0	\$0	\$185,737	\$92,868	\$0	\$0	\$0	\$0	\$20,494	\$10,247	\$0	\$450,474		
9 ENGINEERING - GENERAL - DNR GRANT APPLICATIONS	\$5,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$6,000	\$0	\$0	\$0	\$0	\$7,000	\$0	\$0	\$7,000	\$0	\$0	\$0	\$0	\$0	\$8,000	\$8,000	\$0	\$41,000	
10 ENGINEERING - GENERAL - SWMP UPDATE	\$43,040	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$100,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$243,040	
Wages, Insurance & Professional Services Totals	\$304,660	\$244,203	\$222,588	\$229,380	\$236,262	\$243,350	\$250,651	\$258,170	\$315,867	\$295,869	\$282,109	\$290,573	\$299,290	\$315,269	\$417,517	\$327,042	\$529,590	\$439,827	\$357,368	\$368,089	\$379,131	\$390,505	\$430,714	\$432,534	\$526,716	\$8,387,275	
Total Expenditures	\$594,310	\$1,230,042	\$319,803	\$278,012	\$286,352	\$294,943	\$303,791	\$312,905	\$372,244	\$793,456	\$341,920	\$352,177	\$362,742	\$380,625	\$484,834	\$396,379	\$601,007	\$2,370,754	\$433,133	\$446,128	\$459,511	\$473,297	\$515,989	\$725,305	\$617,184	\$13,746,841	
Total Fund Balance Applied or Surplus	\$940,000	(\$595,578)	\$119,006	\$165,185	\$161,276	\$157,162	\$152,835	\$148,287	\$93,560	(\$172,994)	\$133,247	\$127,741	\$121,975	\$108,940	\$59,627	\$103,027	(\$96,607)	(\$1,711,311)	\$81,404	\$73,556	\$65,369	\$56,832					

APPENDIX D

BMP Conceptual Drawings

POTENTIAL STORMWATER BMP RETROFIT

BMP CATCHMENT ID: BMP-B1d5

McM PROJECT NO: A0018-09-23-00721

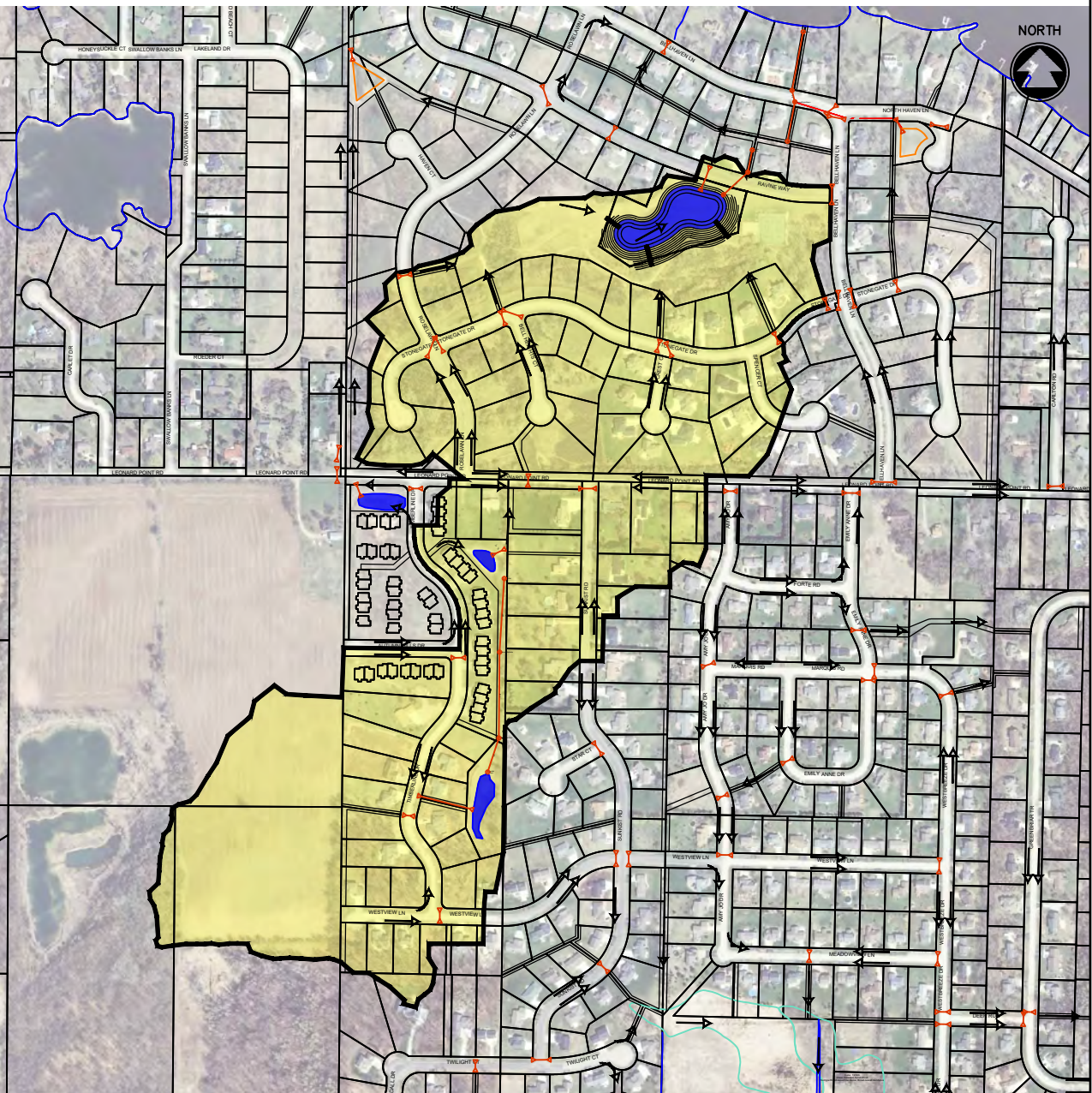
SITE INFORMATION:

Municipality: TOWN OF ALGOMA	Date: NOV, 2025
Proposed BMP Name: BELLHAVEN PARK POND	Initials: PTK

DRAINAGE AREA:

Sub-watershed ID: LAKE BUTTE DES MORTS	Catchment Area IDs: B1d2, B1d3, B1d5	Total Drainage Area: 92.0 acres
Imperviousness (Future): 25.3%	Runoff Curve Number (Future): 81	Water Quality Volume (Future): 3.19 ac-ft

Drainage Area / Site Location Map:



pldeman, W:\PROJECTS\A0018_092300721\Dept\Storm\03-MS4 Mapping\BMP Concepts\BMP-B1d5.dwg, bmp-b1d5, Plot Date: 1/9/2026 11:36 AM, xrefs: k-hydra-line_co-winnipeg

bkdemar, W:\PROJECTS\A0016\092300721\Dept\Storm\03-MS4 Mapping\BMP Concepts\BMP-B1d5_B.dwg, bmp-b1d5_b, Plot Date: 1/9/2026 11:37 AM, xrefs: k-wetland.dwg 2007,

PROPOSED BMP RETROFIT:

Type of proposed BMP retrofit (e.g. wet pond, bioretention, proprietary device, etc.):
 Wet Detention Pond

Initial BMP Screening

Remediation:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Wetland:	<input checked="" type="checkbox"/> Potential <input type="checkbox"/> Yes <input type="checkbox"/> No
Historical:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Public Well < 400 ft:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
100-Year Floodplain:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Private Well < 100 ft:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

BMP Outfall (storm sewer, stream, wetland, groundwater, etc.):
 Pond to discharge to existing outlet structure on north side of pond

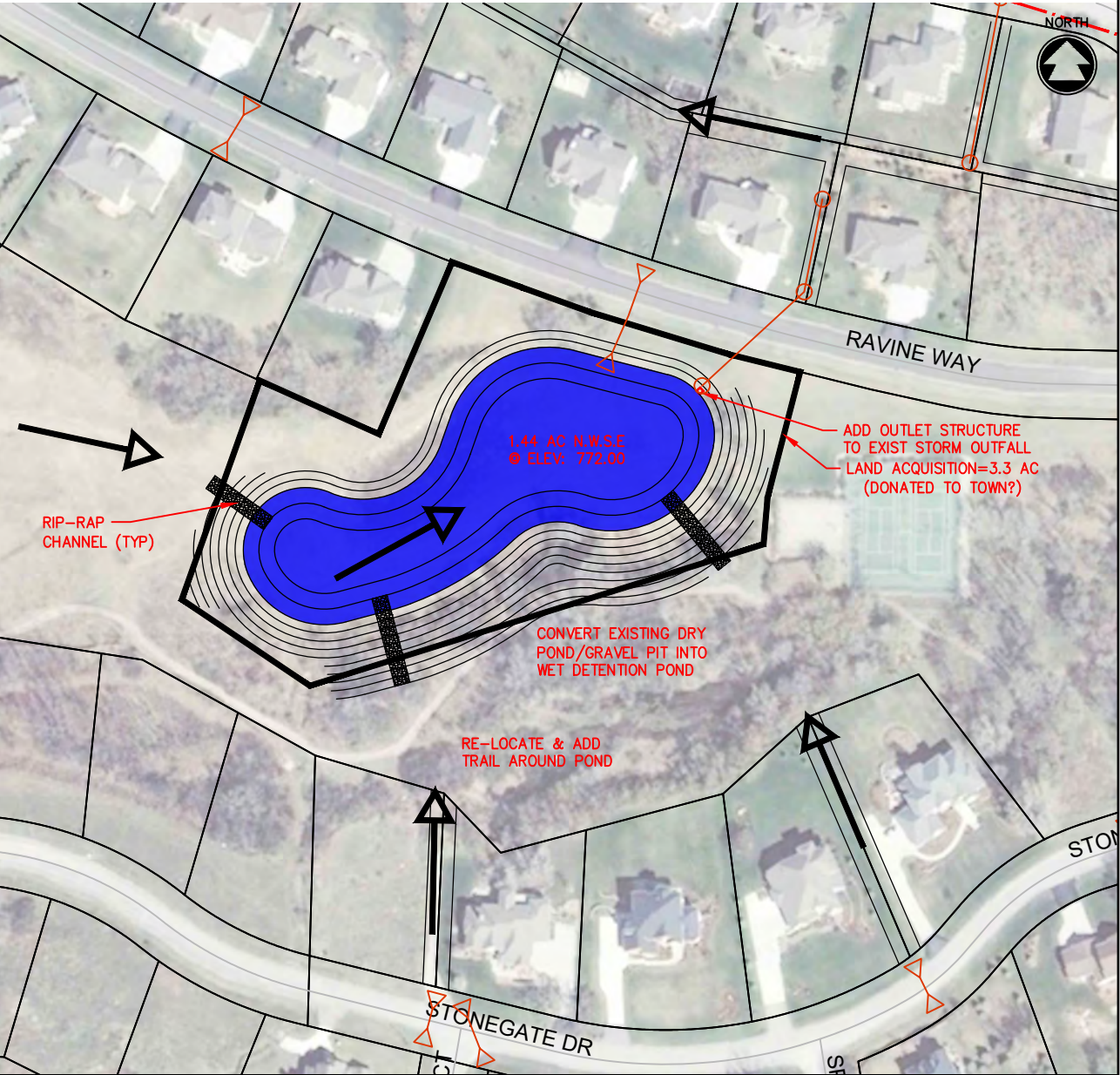
Infrastructure modifications or flow diversions required for retrofit:
 Convert existing dry pond to wet pond.

Site access for future BMP maintenance:
 Good. Access from adjacent roads.

Site constraints that require further investigation (e.g. utility conflicts, wetlands, groundwater, etc.):
 May require blasting to install clay liner due to shallow bedrock in vicinity. Artificial wetland exemption?

Approx. Size of BMP Retrofit: 1.44 acre permanent pool	Approx. Land Required (ac): 3.3 acres	Estimated Cost: \$915,800 (\$1,007,100 w/E.S.)
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Sketch of Proposed BMP Retrofit:



POTENTIAL STORMWATER BMP RETROFIT

BMP CATCHMENT ID: BMP-B1d7

McM PROJECT NO: A0018-09-23-00721

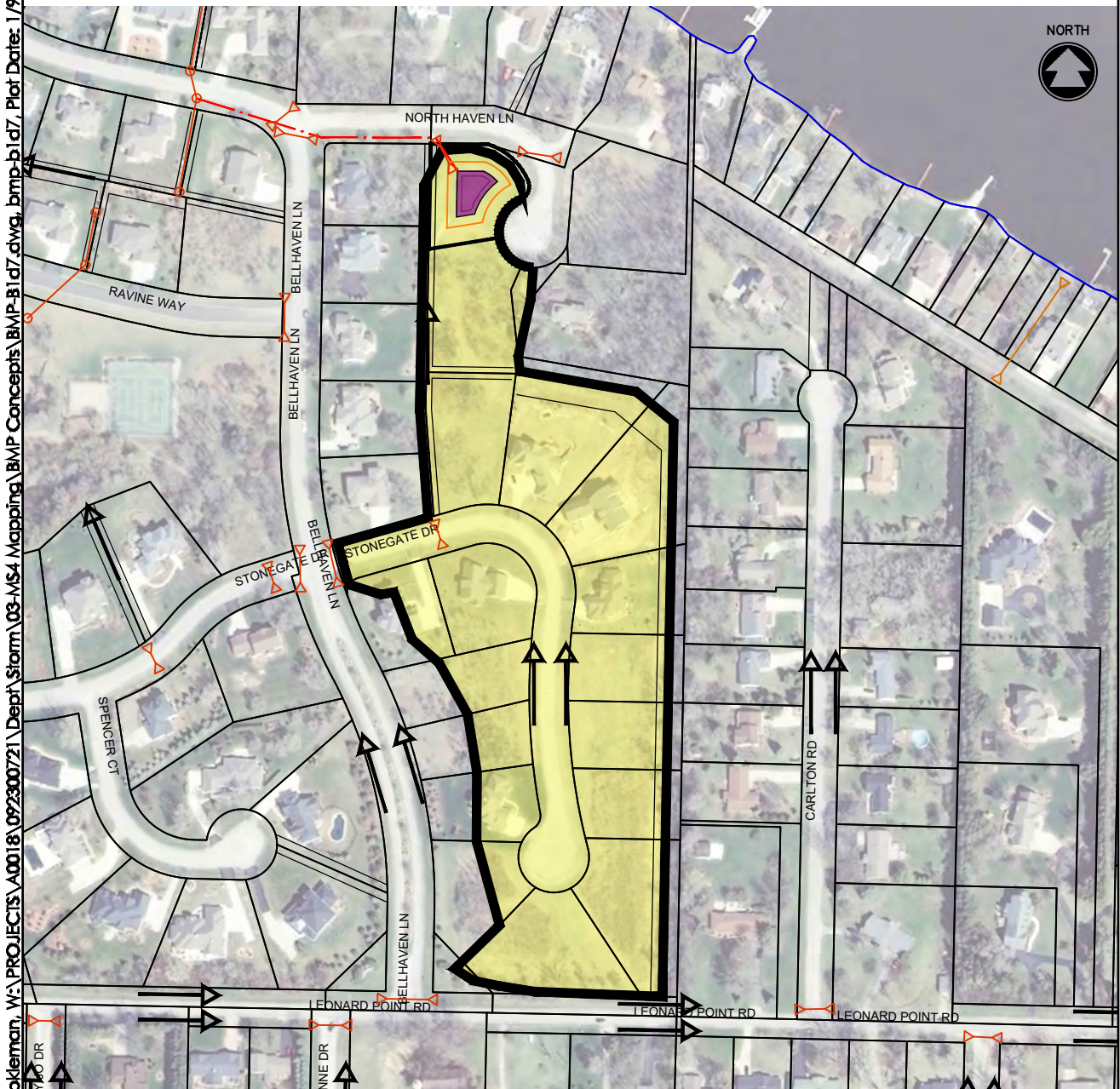
SITE INFORMATION:

Municipality: TOWN OF ALGOMA	Date: NOV, 2025
Proposed BMP Name: 3rd Addn to Bellhaven IE Sand Filter	Initials: PTK

DRAINAGE AREA:

Sub-watershed ID: LAKE BUTTE DES MORTS	Catchment Area IDs: B1d7	Total Drainage Area: 10.5 acres
Imperviousness (Future): 19.5%	Runoff Curve Number (Future): 77	Water Quality Volume (Future): 0.30 ac-ft

Drainage Area / Site Location Map:



W:\PROJECTS\A0018_092300721\Dept\Storm\03-MS4 Mapping\BMP Concepts\BMP-B1d7.dwg, bmp-b1d7, Plot Date: 1/9/2026 11:38 AM, xrefs: k-hydrainline_co-winnipeg

pldeman, W:\PROJECTS\A0018_092300721\Dept\Storm\03-MS4 Mapping\BMP Concepts\BMP-Bld7_Bldvgs_bmp-bld7_b, Plot Date: 1/9/2026 11:39 AM, xrefs: k-wetland.dmr 2007,

PROPOSED BMP RETROFIT:

Type of proposed BMP retrofit (e.g. wet pond, bioretention, proprietary device, etc.):
 Iron Enhance (IE) Sand Filter

Initial BMP Screening

Remediation:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Wetland:	<input checked="" type="checkbox"/> Potential <input type="checkbox"/> Yes <input type="checkbox"/> No
Historical:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Public Well < 400 ft:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
100-Year Floodplain:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Private Well < 100 ft:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

BMP Outfall (storm sewer, stream, wetland, groundwater, etc.):
 Pond to discharge via existing discharge pipe. May need to add an outlet structure

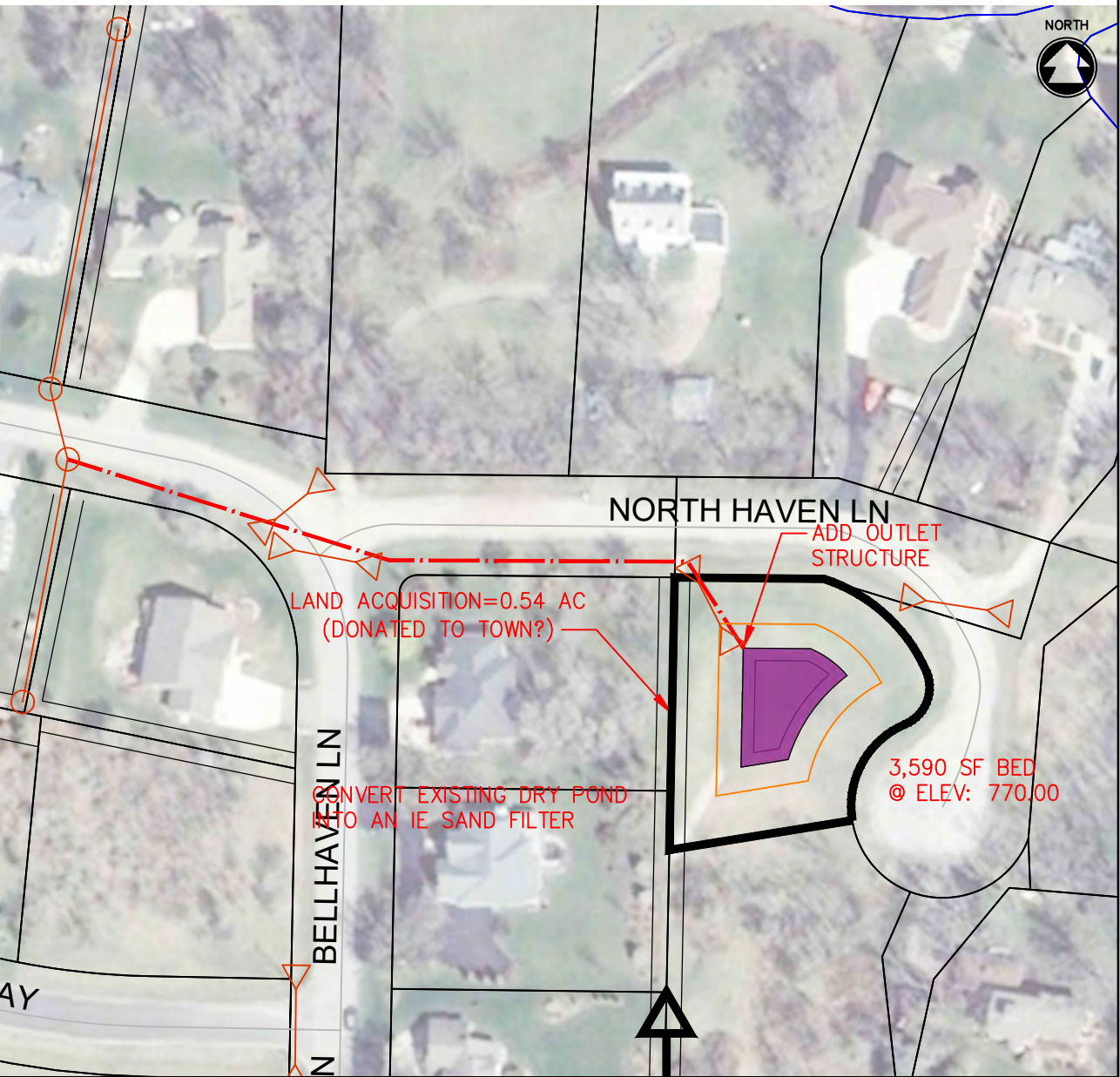
Infrastructure modifications or flow diversions required for retrofit:
 Convert existing dry pond to an IE Sand Filter

Site access for future BMP maintenance:
 Good. Access from adjacent roads.

Site constraints that require further investigation (e.g. utility conflicts, wetlands, groundwater, etc.):
 Groundwater, wetlands (artificial?), utility conflicts associated with new storm sewer outfall

Approx. Size of BMP Retrofit: 3,590 sf Bed Area	Approx. Land Required (ac): 0.5 acres	Estimated Cost: \$314,125
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Sketch of Proposed BMP Retrofit:



POTENTIAL STORMWATER BMP RETROFIT

BMP CATCHMENT ID: BMP-B1g3

McM PROJECT NO: A0018-09-23-00721

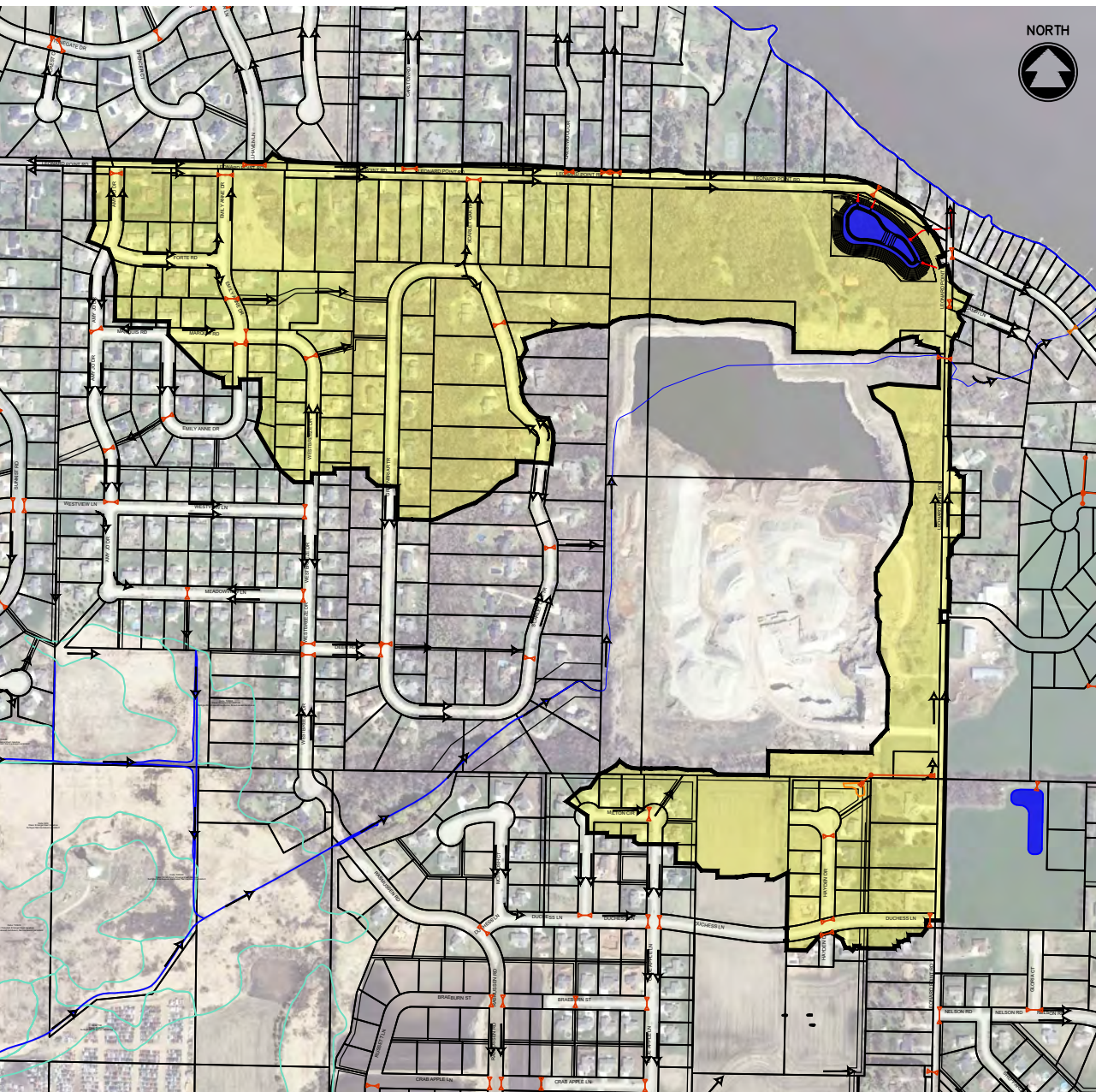
SITE INFORMATION:

Municipality: TOWN OF ALGOMA	Date: NOV, 2025
Proposed BMP Name: Leonard Point Pond	Initials: PTK

DRAINAGE AREA:

Sub-watershed ID: LAKE BUTTE DES MORTS	Catchment Area IDs: B1h8, B1g3	Total Drainage Area: 115.2 acres
Imperviousness (Future): 23.3%	Runoff Curve Number (Future): 81	Water Quality Volume (Future): 3.74 ac-ft

Drainage Area / Site Location Map:



pkeman, W:\PROJECTS\A0018_092300721\Dept\Storm\03-MS4 Mapping\BMP Concepts\BMP-B1g3.dwg, bmp-b1g3, Plot Date: 1/9/2026 11:40 AM, xrefs: fx-hydratline_co-winnebag

pkleman, W:\PROJECTS\A0016\092300721\Dept\Storm\03-MS4 Mapping\BMP Concepts\BMP-B1\g3_B.dwg, bmp-b1\g3_b, Plot Date: 1/9/2026 11:41 AM, xrefs: k-wetland.dnr.2007

PROPOSED BMP RETROFIT:

Type of proposed BMP retrofit (e.g. wet pond, bioretention, proprietary device, etc.):
 Wet Detention Pond

Initial BMP Screening

Remediation:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Wetland:	<input checked="" type="checkbox"/> Potential <input type="checkbox"/> Yes <input type="checkbox"/> No
Historical:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Public Well < 400 ft:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
100-Year Floodplain:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Private Well < 100 ft:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

BMP Outfall (storm sewer, stream, wetland, groundwater, etc.):
 Pond to discharge via new 42" outfall storm sewer to Lake Butte des Morts

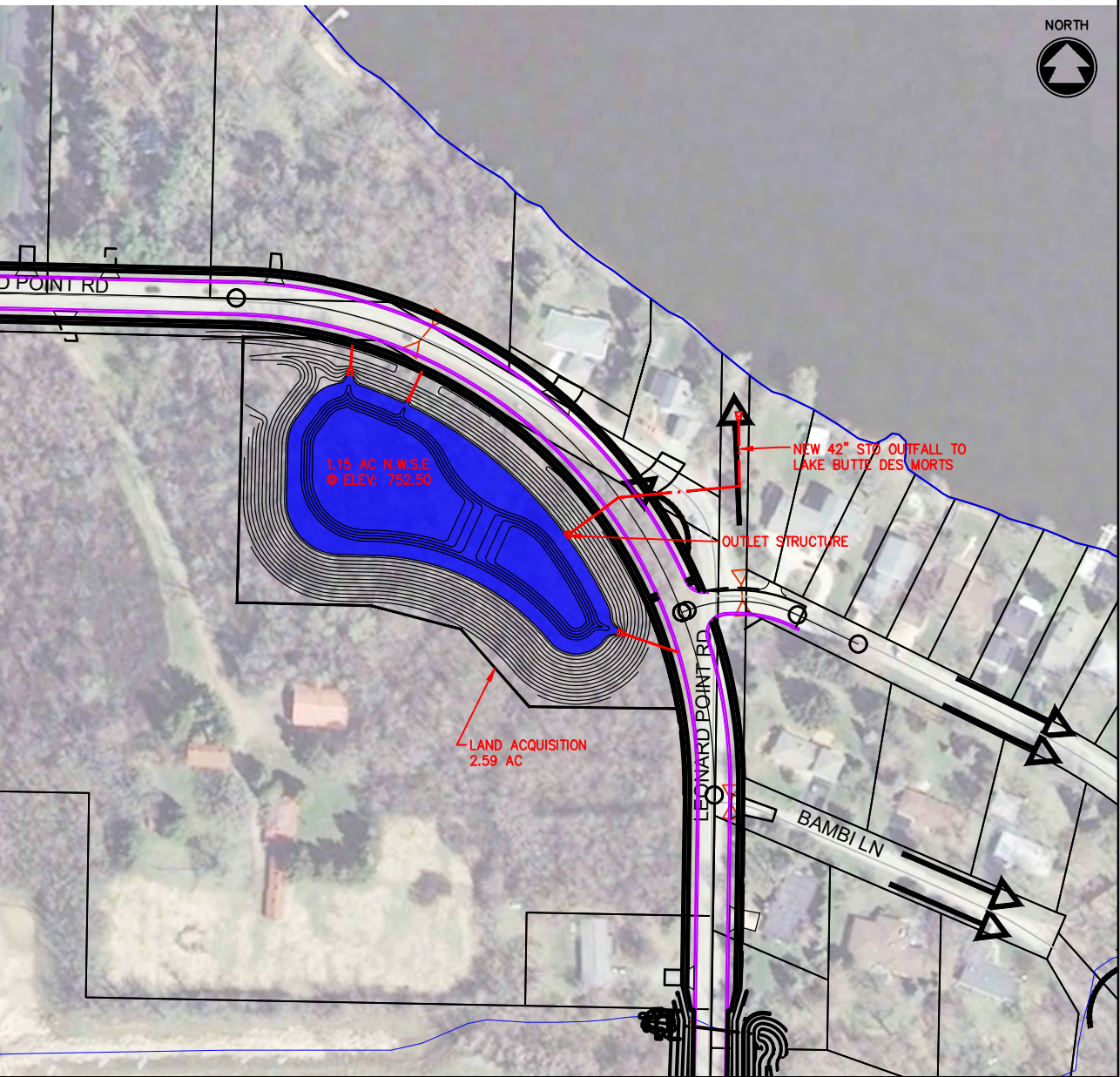
Infrastructure modifications or flow diversions required for retrofit:
 Storm sewer from future Leonard Point Road urbanization project will convey stormwater runoff from watershed to pond.

Site access for future BMP maintenance:
 Good. Access from Leonard Point Road

Site constraints that require further investigation (e.g. utility conflicts, wetlands, groundwater, etc.):
 Groundwater, bedrock, wetlands, utility conflicts associated with new storm sewer outfall

Approx. Size of BMP Retrofit: 1.15 ac Permanent Pool	Approx. Land Required (ac): 2.6 acres	Estimated Cost: \$1,265,200 (\$1,359,900 w/E.S.)
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Sketch of Proposed BMP Retrofit:



POTENTIAL STORMWATER BMP RETROFIT

BMP CATCHMENT ID: BMP-B2a5

McM PROJECT NO: A0018-09-23-00721

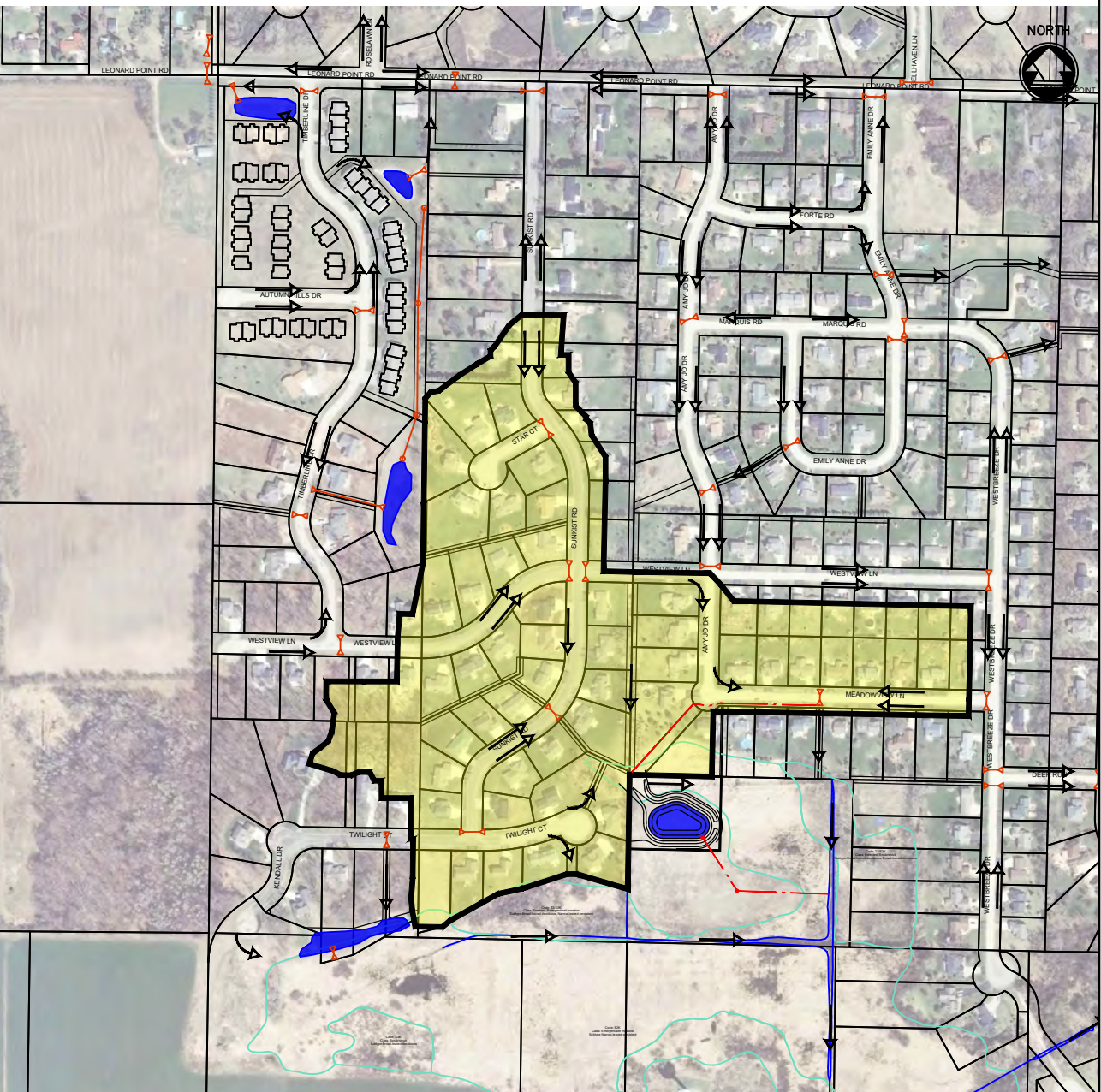
SITE INFORMATION:

Municipality: TOWN OF ALGOMA	Date: NOV, 2025
Proposed BMP Name: Sunray Pond	Initials: PTK

DRAINAGE AREA:

Sub-watershed ID: LAKE BUTTE DES MORTS	Catchment Area IDs: B2a5	Total Drainage Area: 36.1 acres
Imperviousness (Future): 32.0%	Runoff Curve Number (Future): 84	Water Quality Volume (Future): 1.53 ac-ft

Drainage Area / Site Location Map:



pkdeman, W:\PROJECTS\A0018_092300721\Dept\Storm\03-MS4 Mapping\BMP Concepts\BMP-B2a5.dwg, bmp-b2a5, Plot Date: 1/9/2026 11:42 AM, xrefs: k-hydraulic_co-winnipeg

bklemm, W:\PROJECTS\A0016\092300721\Dept\Storm\03-MS4 Mapping\BMP Concepts\BMP-B2a5_B.dwg, bmp-b2a5_b, Plot Date: 1/9/2026 11:43 AM, xrefs: k-wetland.dnr.2007,

PROPOSED BMP RETROFIT:

Type of proposed BMP retrofit (e.g. wet pond, bioretention, proprietary device, etc.):
 Wet Detention Pond

Initial BMP Screening

Remediation:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Wetland:	<input checked="" type="checkbox"/> Potential <input type="checkbox"/> Yes <input type="checkbox"/> No
Historical:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Public Well < 400 ft:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
100-Year Floodplain:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Private Well < 100 ft:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

BMP Outfall (storm sewer, stream, wetland, groundwater, etc.):
 Pond to discharge via new storm sewer outfall to the wetlands/ditch to the west.

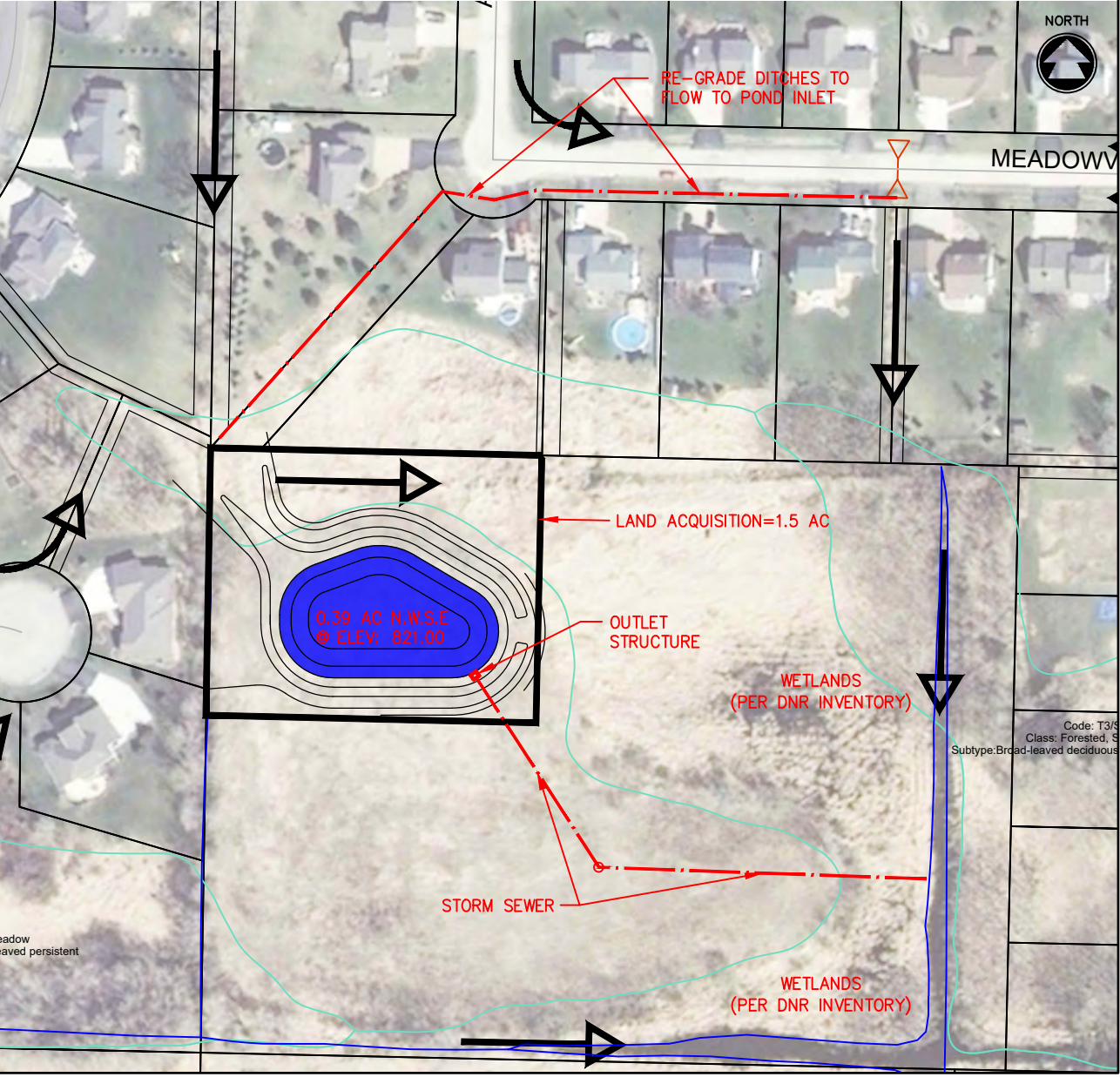
Infrastructure modifications or flow diversions required for retrofit:
 South ditch along Meadowview Ln to be re-graded to drain towards pond.

Site access for future BMP maintenance:
 Average. Access from Meadowview Ln & drainage easements

Site constraints that require further investigation (e.g. utility conflicts, wetlands, groundwater, etc.):
 Groundwater, wetlands, utility conflicts associated with re-ditching

Approx. Size of BMP Retrofit: 0.39 ac Permanent Pool	Approx. Land Required (ac): 1.5 acres	Estimated Cost: \$388,150 (\$467,000 w/E.S.)
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Sketch of Proposed BMP Retrofit:



POTENTIAL STORMWATER BMP RETROFIT

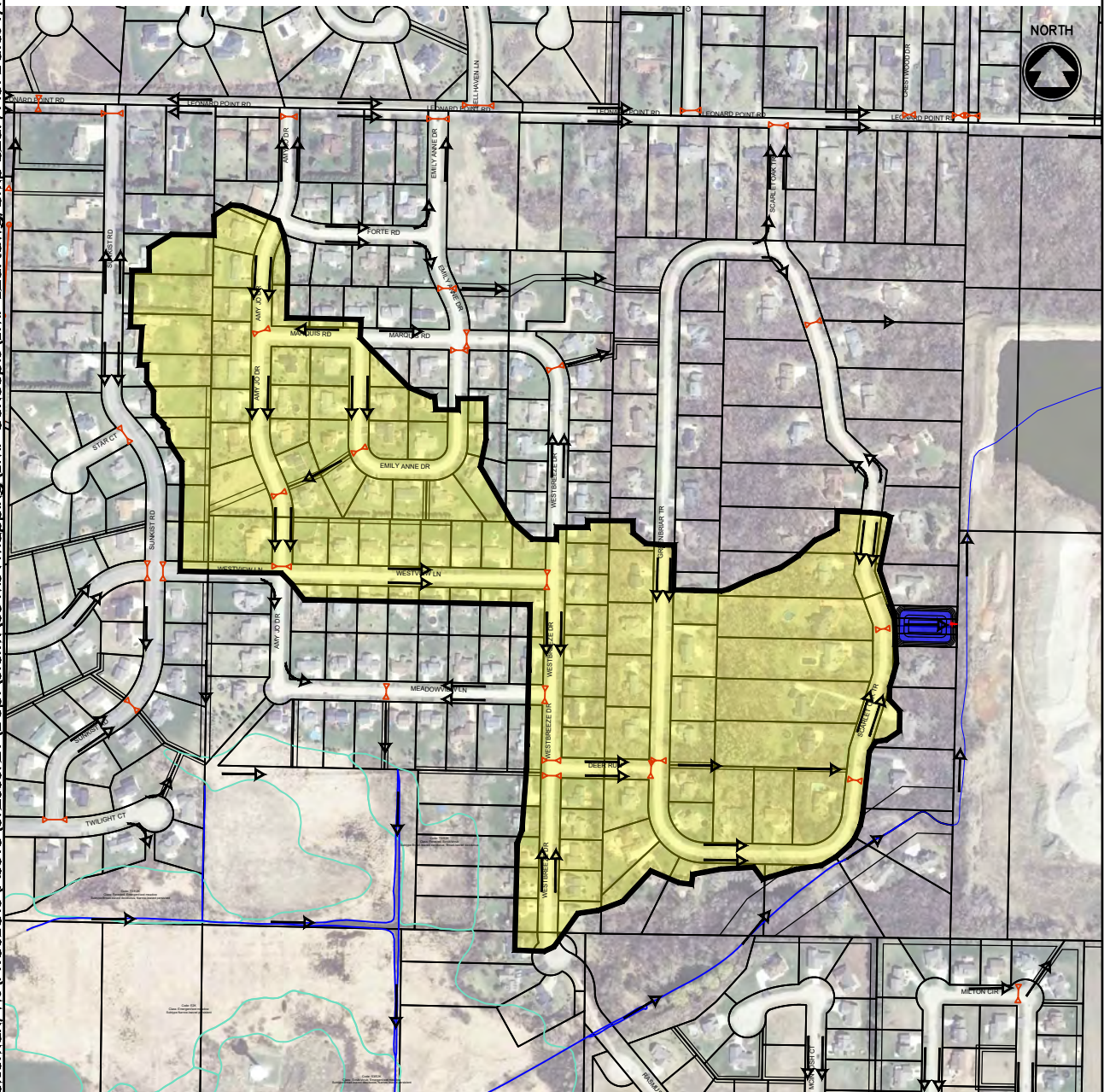
BMP CATCHMENT ID: BMP-B2a7

McM PROJECT NO: A0018-09-23-00721

SITE INFORMATION:	
Municipality: TOWN OF ALGOMA	Date: NOV, 2025
Proposed BMP Name: Scarlet Oak Pond	Initials: PTK

DRAINAGE AREA:		
Sub-watershed ID: LAKE BUTTE DES MORTS	Catchment Area IDs: B2a7	Total Drainage Area: 52.9 acres
Imperviousness (Future): 29.4%	Runoff Curve Number (Future): 83	Water Quality Volume (Future): 2.08 ac-ft

Drainage Area / Site Location Map:



pldeman, W:\PROJECTS\A0018_092300721\Dept\Storm\03-MS4 Mapping\BMP Concepts\BMP-B2a7.dwg, bmp-b2a7, Plot Date: 1/9/2026 11:44 AM, xrefs: k-hydraline_co-winnebag

pldeman, W:\PROJECTS\A0016\092300721\Dept\Storm\03-MS4 Mapping\BMP Concepts\BMP-B2a7_B.dwg, bmp-b2a7_b, Plot Date: 1/9/2026 11:45 AM, xrefs: k-wetland.dnr.2007

PROPOSED BMP RETROFIT:

Type of proposed BMP retrofit (e.g. wet pond, bioretention, proprietary device, etc.):
 Wet Detention Pond

Initial BMP Screening

Remediation:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Wetland:	<input checked="" type="checkbox"/> Potential <input type="checkbox"/> Yes <input type="checkbox"/> No
Historical:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Public Well < 400 ft:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
100-Year Floodplain:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Private Well < 100 ft:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

BMP Outfall (storm sewer, stream, wetland, groundwater, etc.):
 Pond to discharge via new storm sewer outfall to the waterway to the east.

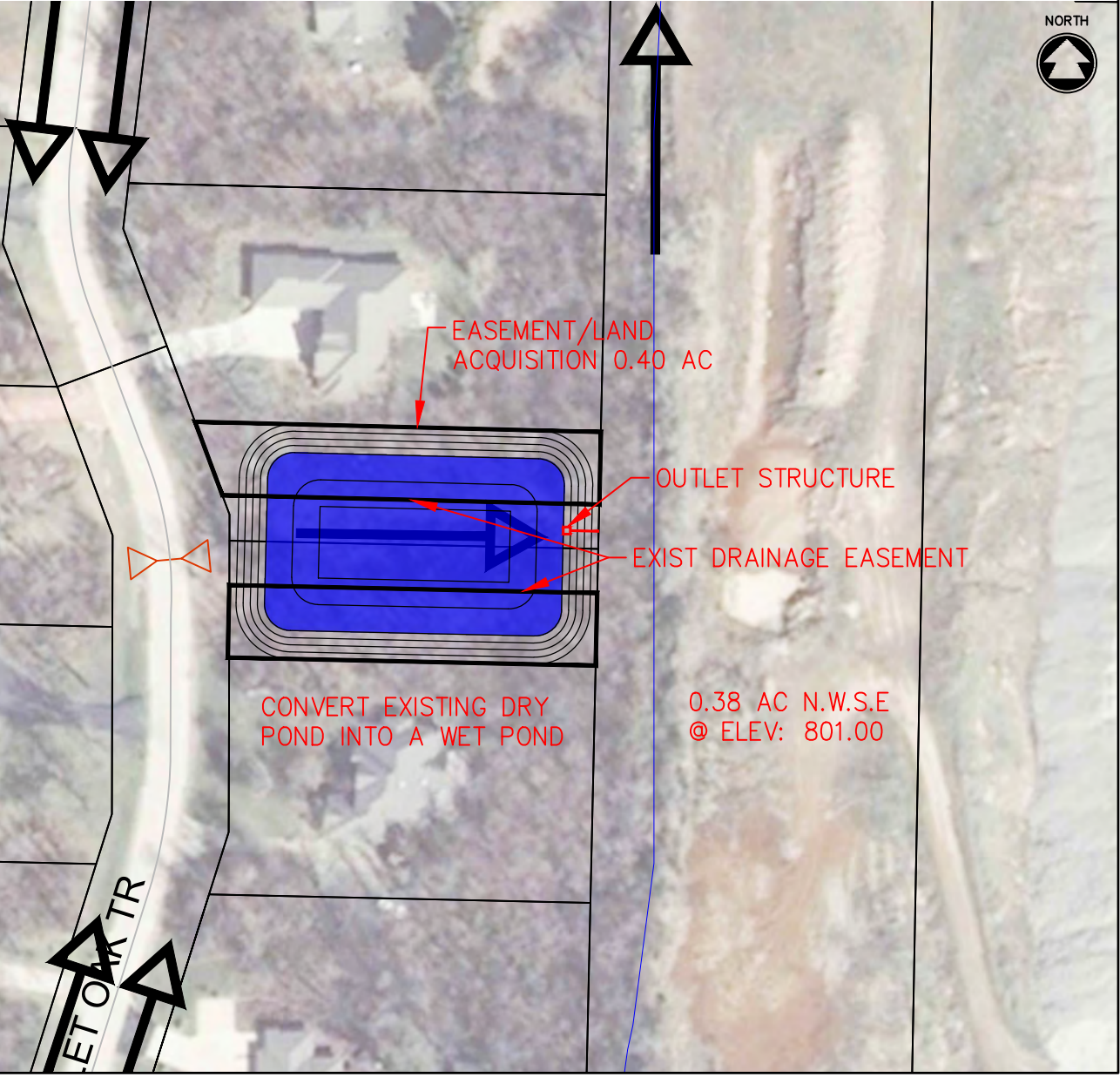
Infrastructure modifications or flow diversions required for retrofit:
 Convert and expand existing dry pond to a wet detention pond.

Site access for future BMP maintenance:
 Good. Access from Scarlet Oak Tr.

Site constraints that require further investigation (e.g. utility conflicts, wetlands, groundwater, etc.):
 Bedrock, groundwater, wetlands

Approx. Size of BMP Retrofit: 0.38 ac Permanent Pool	Approx. Land Required (ac): 0.40 acres (dry pond w/in easement)	Estimated Cost: \$244,900 (\$327,600 w/E.S.)
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Sketch of Proposed BMP Retrofit:



POTENTIAL STORMWATER BMP RETROFIT

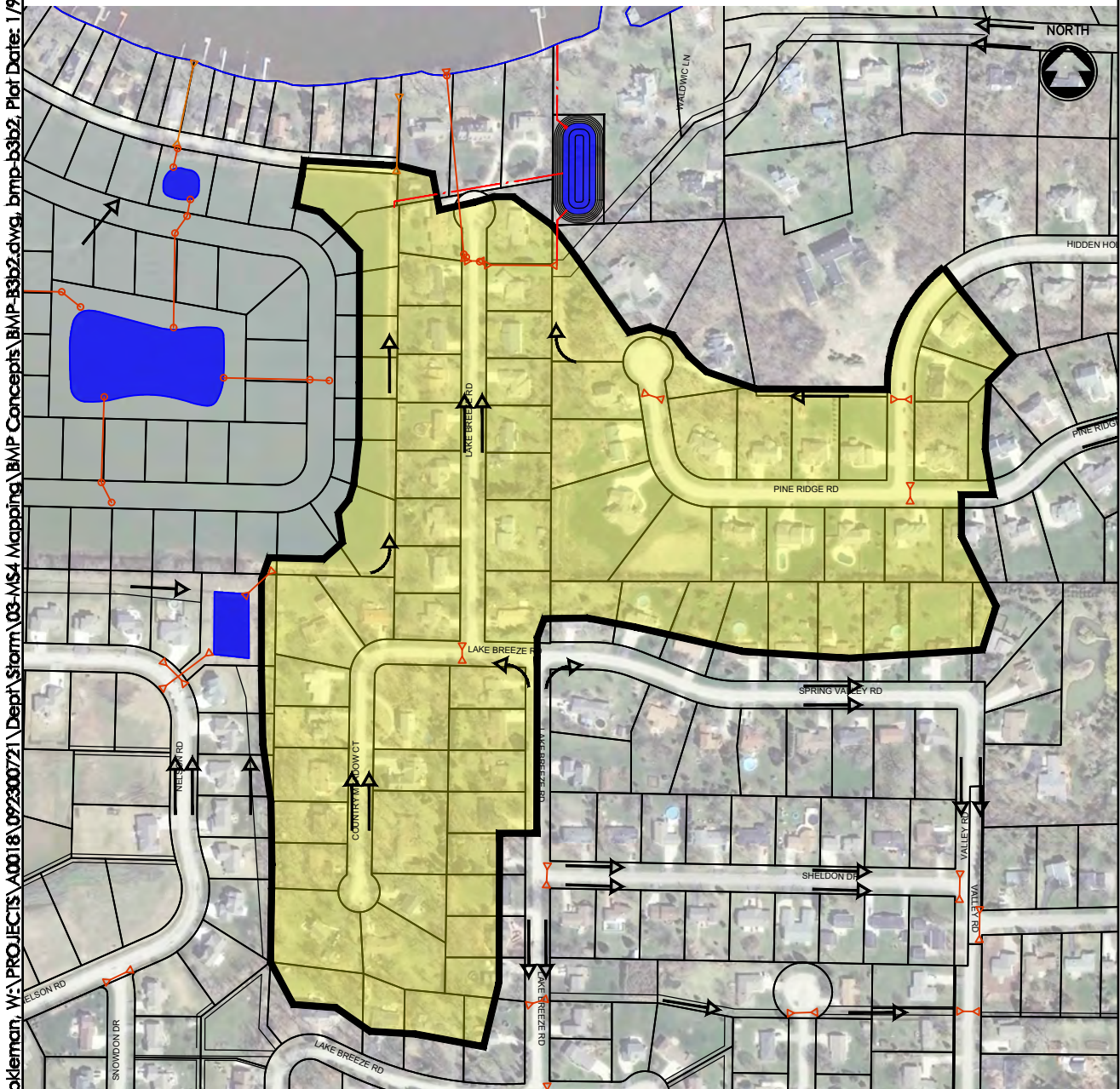
BMP CATCHMENT ID: BMP-B3b2

McM PROJECT NO: A0018-09-23-00721

SITE INFORMATION:	
Municipality: TOWN OF ALGOMA	Date: NOV, 2025
Proposed BMP Name: Lake Breeze Pond	Initials: PTK

DRAINAGE AREA:		
Sub-watershed ID: LAKE BUTTE DES MORTS	Catchment Area IDs: B3b2	Total Drainage Area: 43.7 acres
Imperviousness (Future): 27.3%	Runoff Curve Number (Future): 84	Water Quality Volume (Future): 1.61 ac-ft

Drainage Area / Site Location Map:



pldeman, W:\PROJECTS\A0018_092300721\Dept\Storm\03-MS4 Mapping\BMP Concepts\BMP-B3b2.dwg, bmp-b3b2, Plot Date: 1/9/2026 11:46 AM, xrefs: k-hydratline_co-winnipeg

pkleman, W:\PROJECTS\A0016\092300721\Dept\Storm\03-MS4 Mapping\BMP Concepts\BMP-B3b2_B.dwg, bmp-b3b2_b, Plot Date: 1/9/2026 11:47 AM, xrefs: k-wetland.dwg 2007,

PROPOSED BMP RETROFIT:

Type of proposed BMP retrofit (e.g. wet pond, bioretention, proprietary device, etc.):
 Wet Detention Pond

Initial BMP Screening

Remediation:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Wetland:	<input checked="" type="checkbox"/> Potential <input type="checkbox"/> Yes <input type="checkbox"/> No
Historical:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Public Well < 400 ft:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
100-Year Floodplain:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Private Well < 100 ft:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

BMP Outfall (storm sewer, stream, wetland, groundwater, etc.):
 Pond to discharge via new storm sewer outfall to Lake Butte des Morts

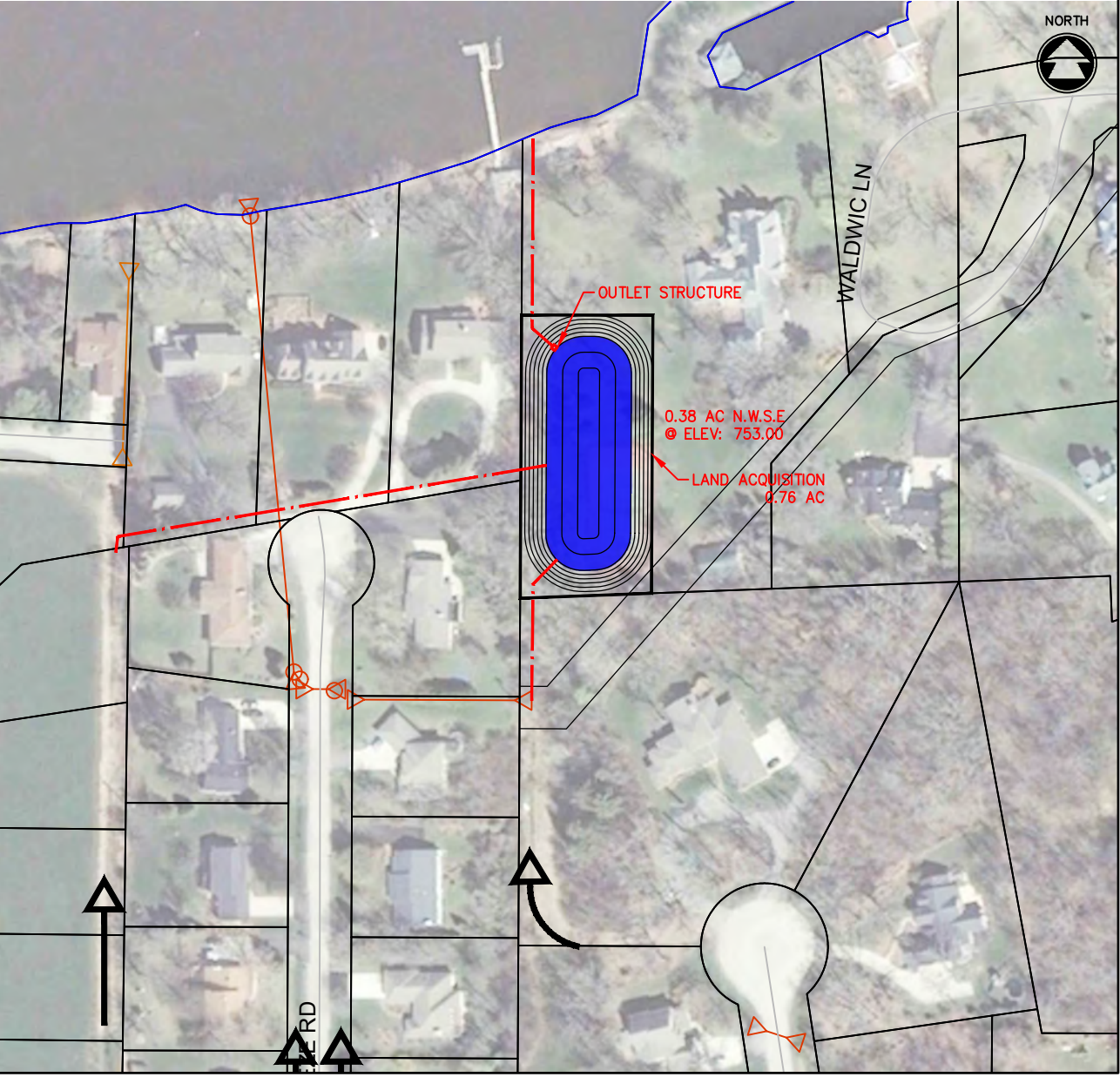
Infrastructure modifications or flow diversions required for retrofit:
 Storm sewer to be installed to convey flows from contributing watershed to the proposed pond.

Site access for future BMP maintenance:
 Average. Access from Lake Breeze Road & proposed storm sewer/drainage easements.

Site constraints that require further investigation (e.g. utility conflicts, wetlands, groundwater, etc.):
 Bedrock, groundwater, wetlands, utility conflicts associated with proposed storm sewer.

Approx. Size of BMP Retrofit: 0.38 ac Permanent Pool	Approx. Land Required (ac): 0.76 acres	Estimated Cost: \$384,500 (\$463,900 w/E.S.)
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Sketch of Proposed BMP Retrofit:



POTENTIAL STORMWATER BMP RETROFIT

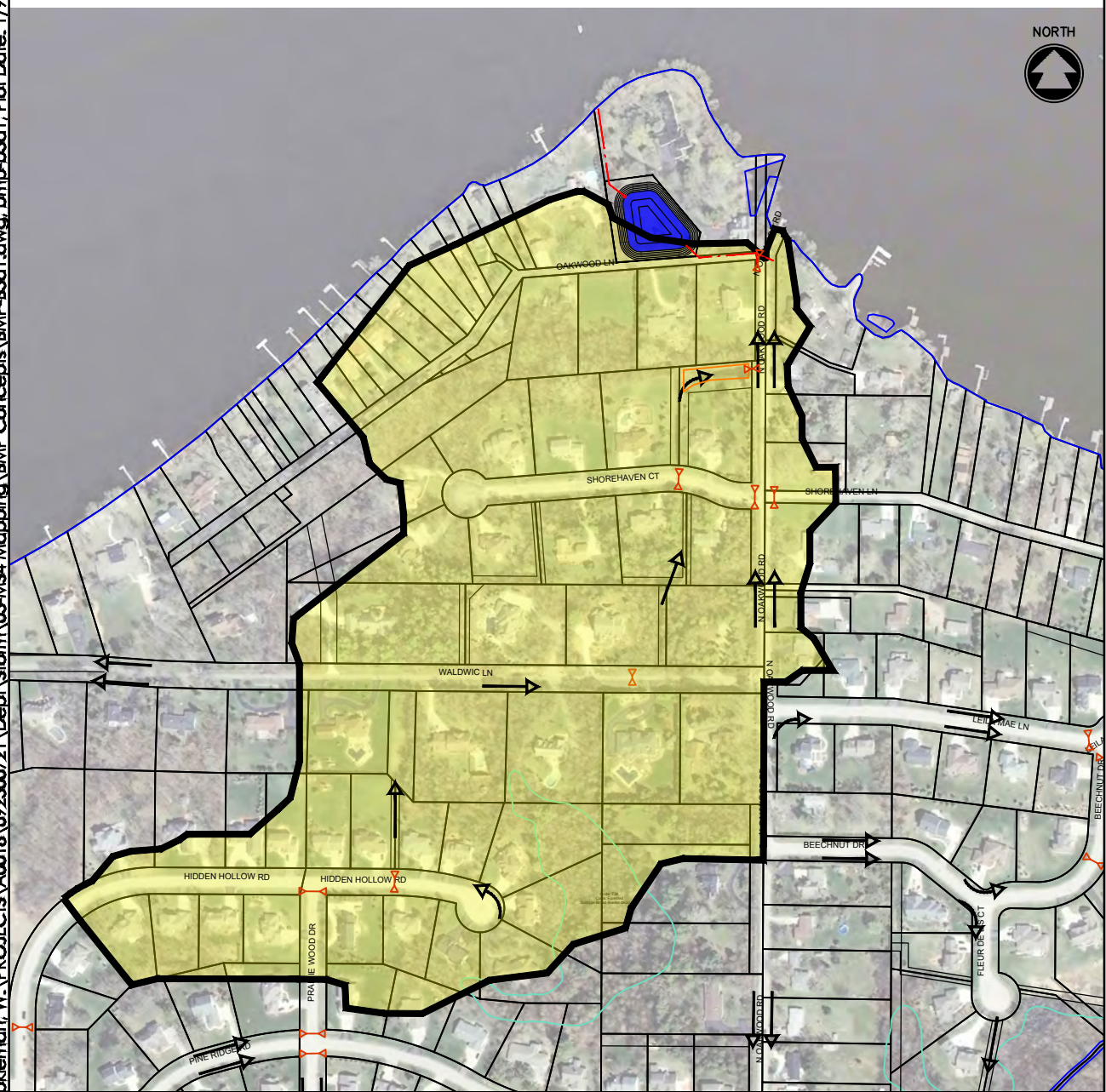
BMP CATCHMENT ID: BMP-B3d1

McM PROJECT NO: A0018-09-23-00721

SITE INFORMATION:	
Municipality: TOWN OF ALGOMA	Date: NOV, 2025
Proposed BMP Name: Our Lady Church Pond	Initials: PTK

DRAINAGE AREA:		
Sub-watershed ID: LAKE BUTTE DES MORTS	Catchment Area IDs: B3d1	Total Drainage Area: 50.1 acres
Imperviousness (Future): 19.3%	Runoff Curve Number (Future): 81	Water Quality Volume (Future): 1.40 ac-ft

Drainage Area / Site Location Map:



pldeman, W:\PROJECTS\A0018\092300721\Dept\Storm\03-MS4 Mapping\BMP Concepts\BMP-B3d1.dwg, bmp-b3d1, Plot Date: 1/9/2026 11:48 AM, xrefs: k-hydrainline_co-winnipeg

pkleman, W:\PROJECTS\A0016\092300721\Dept\Storm\03-MS4 Mapping\BMP Concepts\BMP-B3d1_B.dwg, bmp-b3d1_b, Plot Date: 1/9/2026 11:49 AM, xrefs: k-wetland.dnr.2007,

PROPOSED BMP RETROFIT:

Type of proposed BMP retrofit (e.g. wet pond, bioretention, proprietary device, etc.):
Wet Detention Pond

Initial BMP Screening

Remediation:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Wetland:	<input checked="" type="checkbox"/> Potential <input type="checkbox"/> Yes <input type="checkbox"/> No
Historical:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Public Well < 400 ft:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
100-Year Floodplain:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Private Well < 100 ft:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

BMP Outfall (storm sewer, stream, wetland, groundwater, etc.):
Pond to discharge via new storm sewer outfall to Lake Butte des Morts

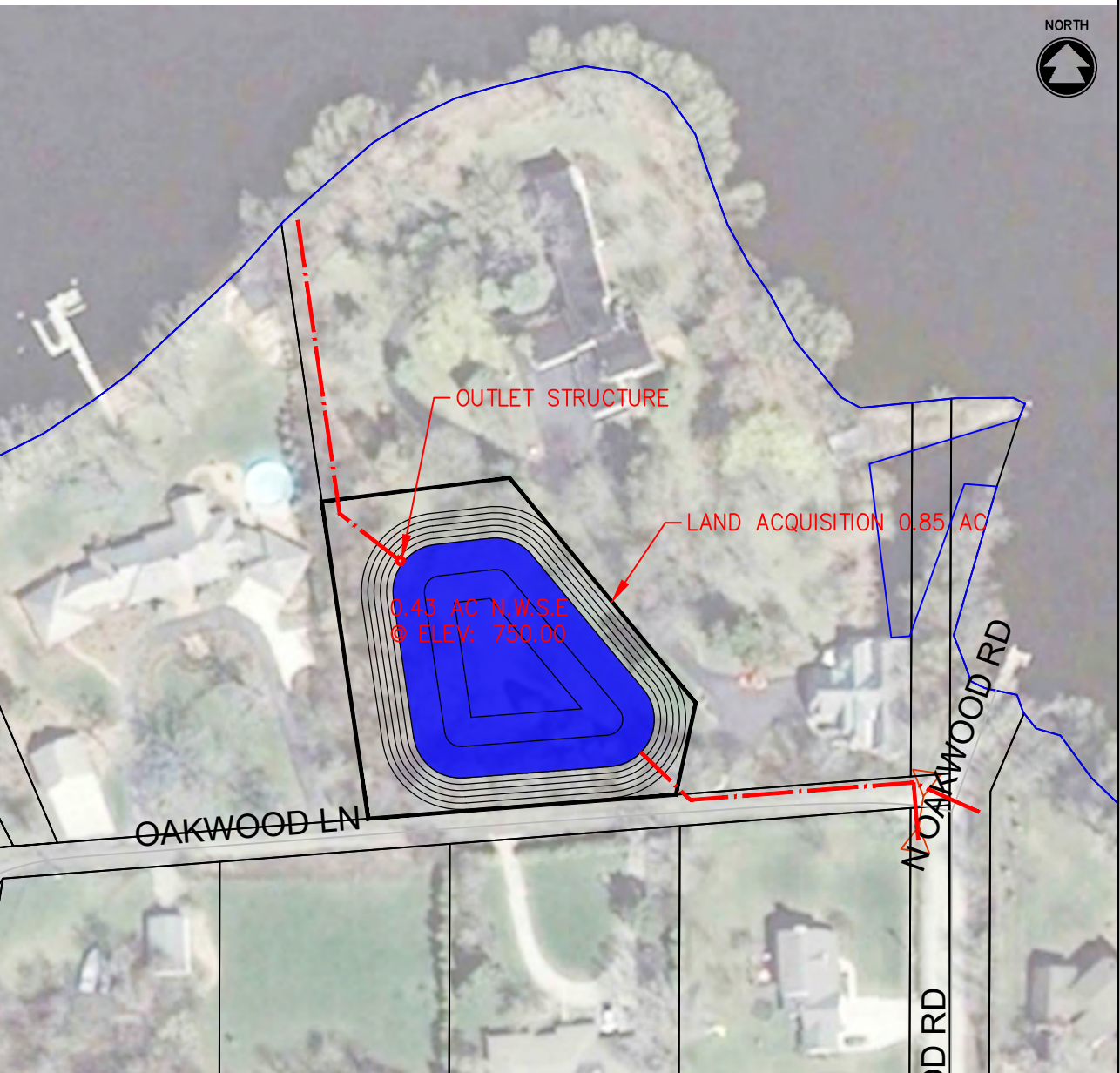
Infrastructure modifications or flow diversions required for retrofit:
Storm sewer to be installed to convey flows from contributing watershed to the proposed pond.

Site access for future BMP maintenance:
Good Access from Oakwood Ln.

Site constraints that require further investigation (e.g. utility conflicts, wetlands, groundwater, etc.):
Bedrock, groundwater, wetlands, utility conflicts associated with proposed storm sewer, archeological

Approx. Size of BMP Retrofit: 0.43 ac Permanent Pool	Approx. Land Required (ac): 0.85 acres	Estimated Cost: \$421,400 (\$499,700 w/E.S.)
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Sketch of Proposed BMP Retrofit:



POTENTIAL STORMWATER BMP RETROFIT

BMP CATCHMENT ID: BMP-B4a3

McM PROJECT NO: A0018-09-23-00721

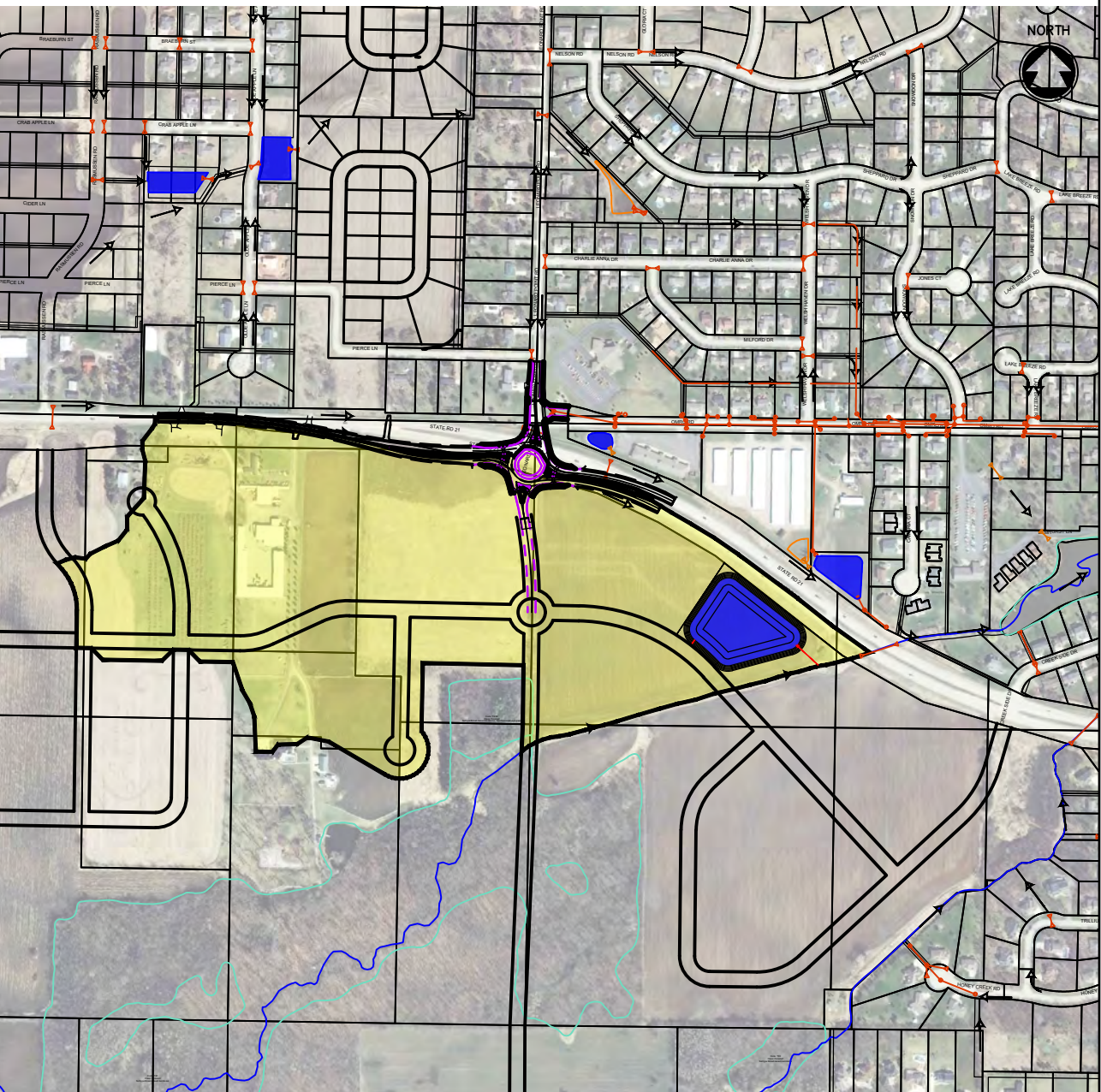
SITE INFORMATION:

Municipality: TOWN OF ALGOMA	Date: NOV, 2025
Proposed BMP Name: Town Square West Pond	Initials: PTK

DRAINAGE AREA:

Sub-watershed ID: LAKE BUTTE DES MORTS	Catchment Area IDs: B4a2, B4a3	Total Drainage Area: 73.4 acres
Imperviousness (Future): 71.1%	Runoff Curve Number (Future): 92	Water Quality Volume (Future): 6.32 ac-ft

Drainage Area / Site Location Map:



bklemm, W:\PROJECTS\A0018_092300721\Dept\Storm\03-MS4 Mapping\BMP Concepts\BMP-B4a3.dwg, bmp-b4a3, Plot Date: 1/9/2026 11:50 AM, xrefs: k-hydratline_co-winnipeg

pldeman, W:\PROJECTS\A0016\092300721\Dept\Storm\03-MS4 Mapping\BMP Concepts\BMP-B4a3_B.dwg, bmp-b4a3_b, Plot Date: 1/9/2026 11:51 AM, xrefs: k-wetland.dnr.2007,

PROPOSED BMP RETROFIT:

Type of proposed BMP retrofit (e.g. wet pond, bioretention, proprietary device, etc.):
 Wet Detention Pond

Initial BMP Screening

Remediation:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Wetland:	<input checked="" type="checkbox"/> Potential <input type="checkbox"/> Yes <input type="checkbox"/> No
Historical:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Public Well < 400 ft:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
100-Year Floodplain:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Private Well < 100 ft:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

BMP Outfall (storm sewer, stream, wetland, groundwater, etc.):
 Pond to discharge via new storm sewer outfall to Honey Creek

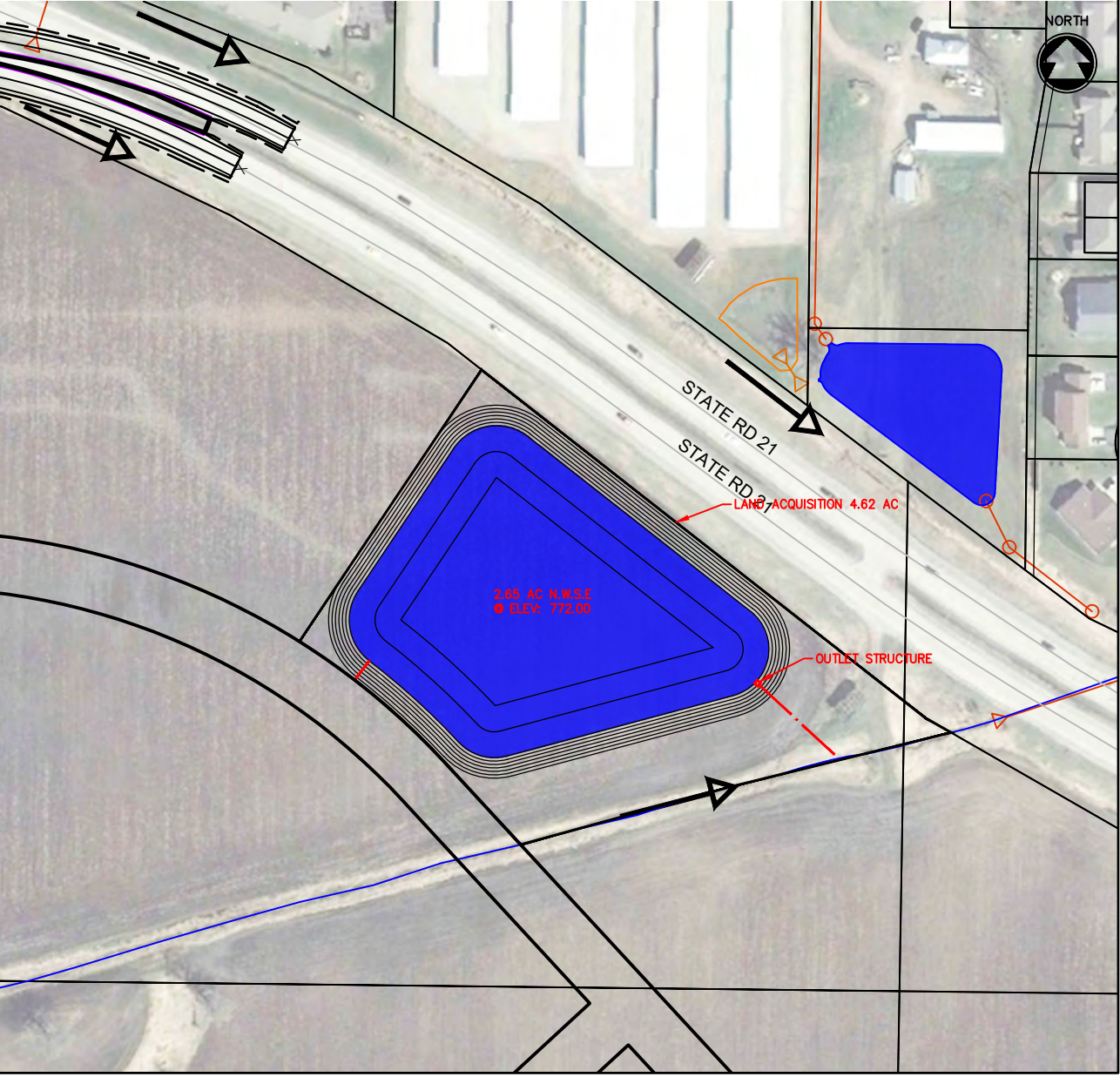
Infrastructure modifications or flow diversions required for retrofit:
 Storm sewer to be installed to convey flows from contributing watershed to the proposed pond.

Site access for future BMP maintenance:
 Good Access from future road.

Site constraints that require further investigation (e.g. utility conflicts, wetlands, groundwater, etc.):
 Bedrock, groundwater, wetlands, utility conflicts associated with proposed storm sewer, floodplain

Approx. Size of BMP Retrofit: 2.65 ac Permanent Pool	Approx. Land Required (ac): 4.62 acres	Estimated Cost: \$757,900 (\$878,200 w/E.S.)
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Sketch of Proposed BMP Retrofit:



POTENTIAL STORMWATER BMP RETROFIT

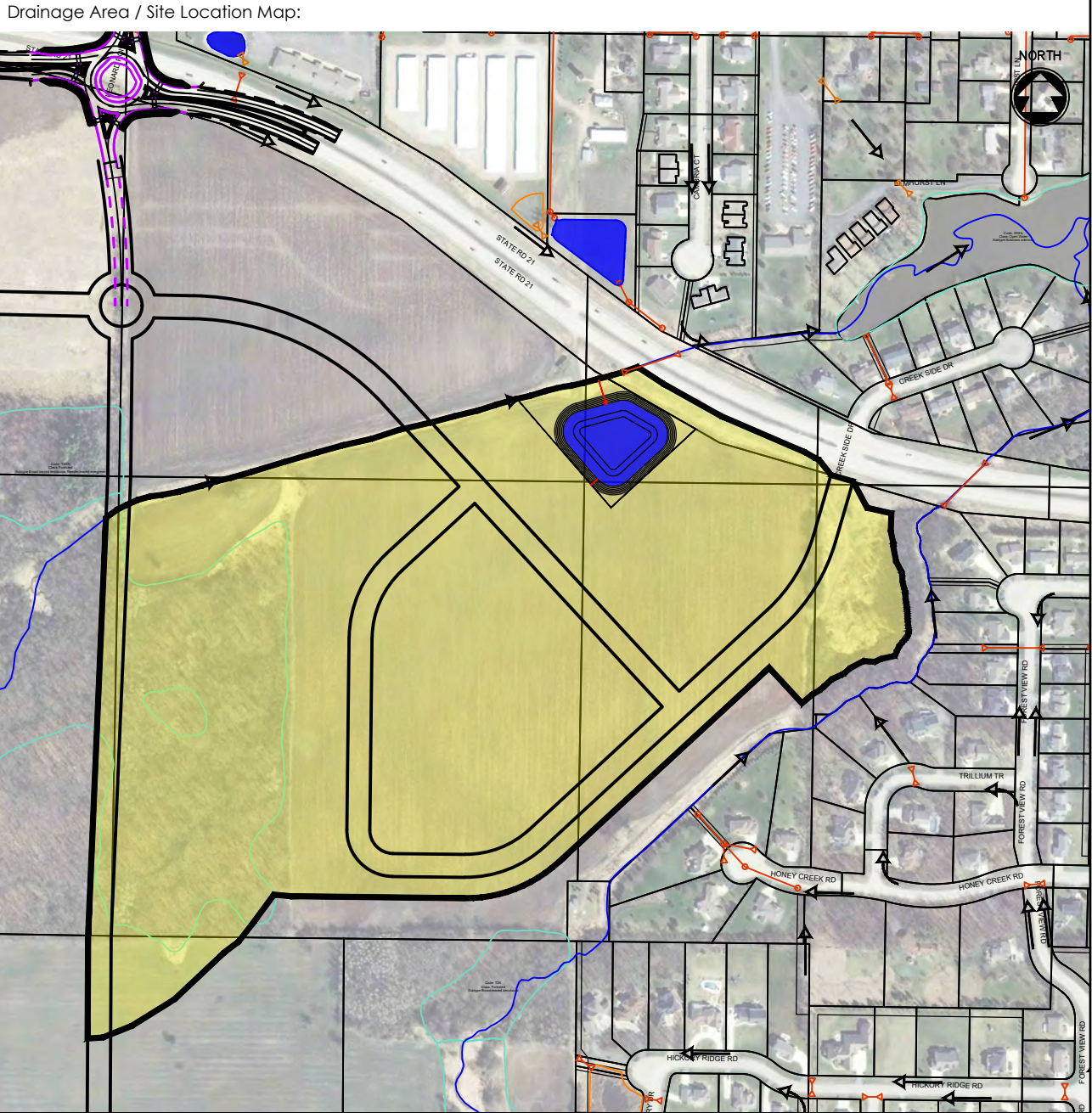
BMP CATCHMENT ID: BMP-B4a4

McM PROJECT NO: A0018-09-23-00721

pkdeman, W:\PROJECTS\A0018_092300721\Dept\Storm\03-MS4 Mapping\BMP Concepts\BMP-B4a4.dwg, bmp-b4a4, Plot Date: 1/9/2026 11:52 AM, xrefs: k-hydratline_co-winnipeg

SITE INFORMATION:	
Municipality: TOWN OF ALGOMA	Date: NOV, 2025
Proposed BMP Name: Town Square East Pond	Initials: PTK

DRAINAGE AREA:		
Sub-watershed ID: LAKE BUTTE DES MORTS	Catchment Area IDs: B4a4	Total Drainage Area: 61.7 acres
Imperviousness (Future): 50.1%	Runoff Curve Number (Future): 88	Water Quality Volume (Future): 3.87 ac-ft



pkleiman, W:\PROJECTS\A0016\092300721\Dept\Storm\03-MS4 Mapping\BMP Concepts\BMP-B4a4_B.dwg, bmp-b4a4_b, Plot Date: 1/9/2026 11:53 AM, xrefs: k-wetland.dnr.2007,

PROPOSED BMP RETROFIT:

Type of proposed BMP retrofit (e.g. wet pond, bioretention, proprietary device, etc.):
Wet Detention Pond

Initial BMP Screening

Remediation:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Wetland:	<input checked="" type="checkbox"/> Potential <input type="checkbox"/> Yes <input type="checkbox"/> No
Historical:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Public Well < 400 ft:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
100-Year Floodplain:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Private Well < 100 ft:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

BMP Outfall (storm sewer, stream, wetland, groundwater, etc.):
Pond to discharge via new storm sewer outfall to Honey Creek

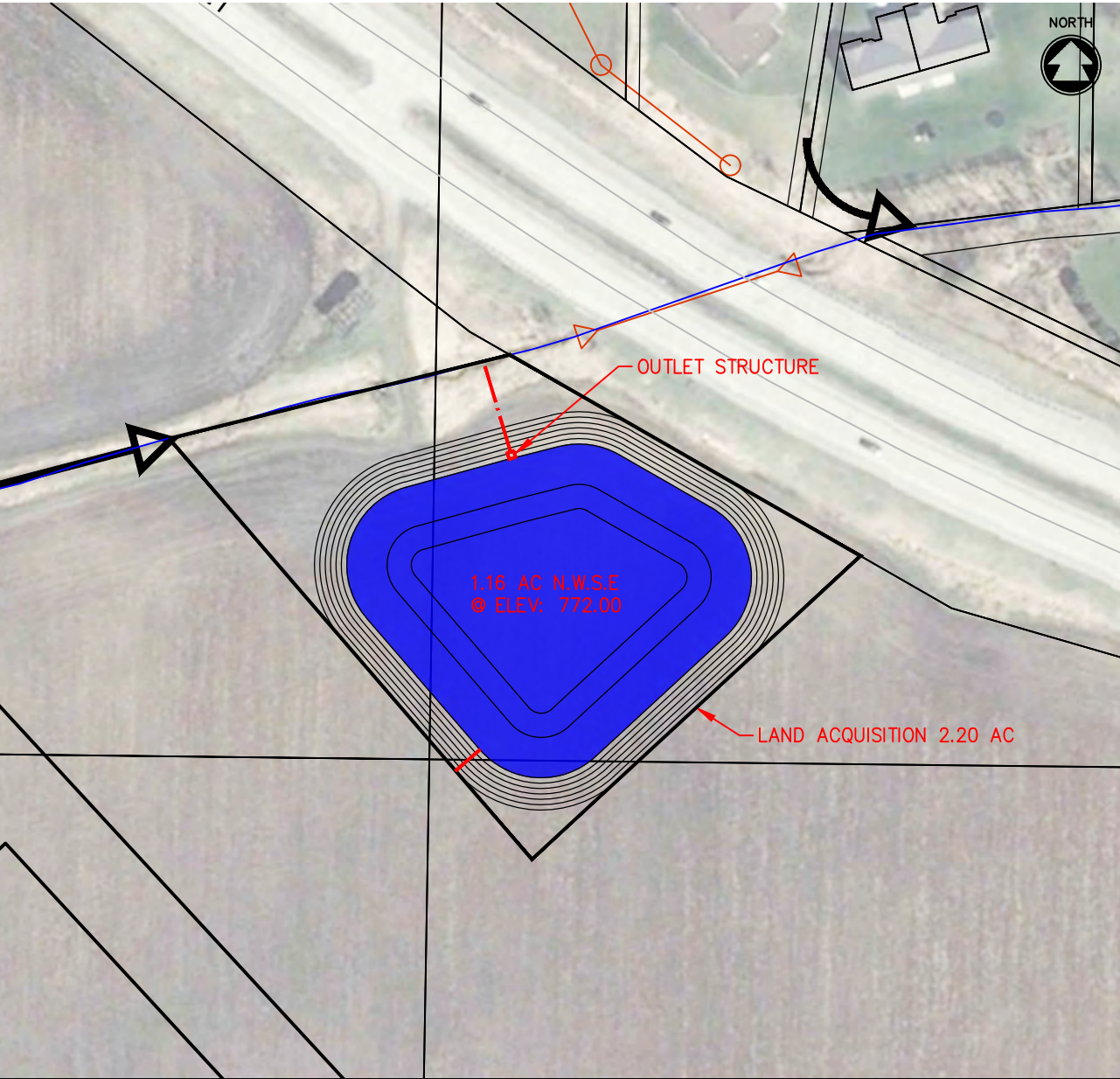
Infrastructure modifications or flow diversions required for retrofit:
Storm sewer to be installed to convey flows from contributing watershed to the proposed pond.

Site access for future BMP maintenance:
Good Access from future road.

Site constraints that require further investigation (e.g. utility conflicts, wetlands, groundwater, etc.):
Bedrock, groundwater, wetlands, utility conflicts associated with proposed storm sewer, floodplain

Approx. Size of BMP Retrofit: 1.16 ac Permanent Pool	Approx. Land Required (ac): 2.20 acres	Estimated Cost: \$450,550 (\$550,100 w/E.S.)
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Sketch of Proposed BMP Retrofit:



POTENTIAL STORMWATER BMP RETROFIT
BMP CATCHMENT ID: BMP-B4c2

McM PROJECT NO: A0018-09-23-00721

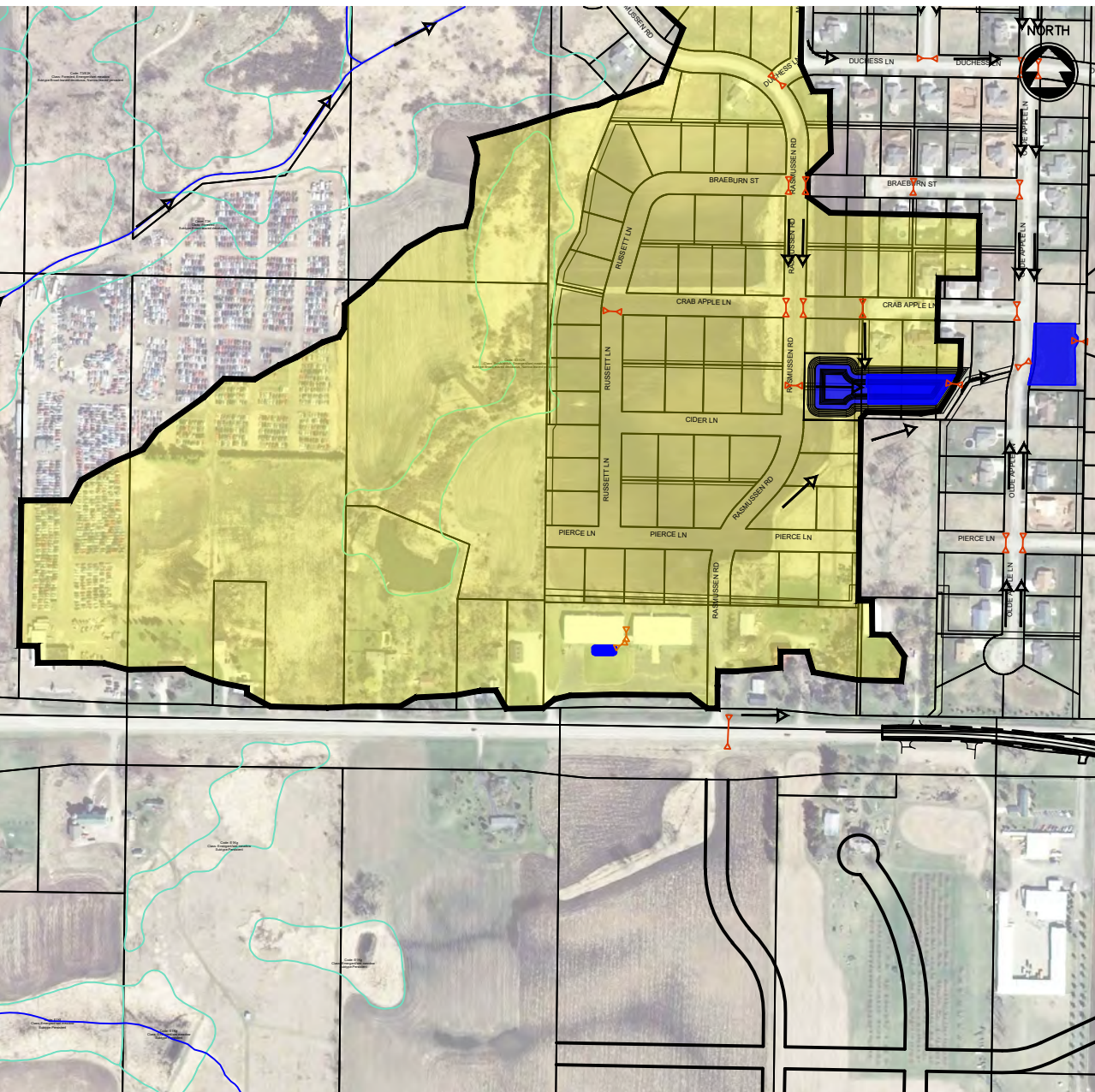
SITE INFORMATION:

Municipality: TOWN OF ALGOMA	Date: NOV, 2025
Proposed BMP Name: Olde Apple Acres West Pond Expansion	Initials: PTK

DRAINAGE AREA:

Sub-watershed ID: LAKE BUTTE DES MORTS	Catchment Area IDs: B4c1, B4c2	Total Drainage Area: 84.4 acres
Imperviousness (Future): 42.3%	Runoff Curve Number (Future): 85	Water Quality Volume (Future): 4.47 ac-ft

Drainage Area / Site Location Map:



pkleman, W:\PROJECTS\A0018\092300721\Dept\Storm\03-MS4 Mapping\BMP Concepts\BMP-B4c2.dwg, bmp-b4c2, Plot Date: 3/25/2026 2:08 PM, xrefs: jk-hydroline_co-winnebagc

pkleman, W:\PROJECTS\A0018\092300721\Dept\Storm\03-MS4 Mapping\BMP Concepts\BMP-B4c2_B.dwg, bmp-b4c2_b, Plot Date: 3/25/2026 1:55 PM, xrefs: x-wetland.dwg 2007.1

PROPOSED BMP RETROFIT:

Type of proposed BMP retrofit (e.g. wet pond, bioretention, proprietary device, etc.):
 Wet Detention Pond

Initial BMP Screening

Remediation:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Wetland:	<input checked="" type="checkbox"/> Potential <input type="checkbox"/> Yes <input type="checkbox"/> No
Historical:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Public Well < 400 ft:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
100-Year Floodplain:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Private Well < 100 ft:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

BMP Outfall (storm sewer, stream, wetland, groundwater, etc.):
 Pond to discharge via existing storm sewer outfall to drainage way.

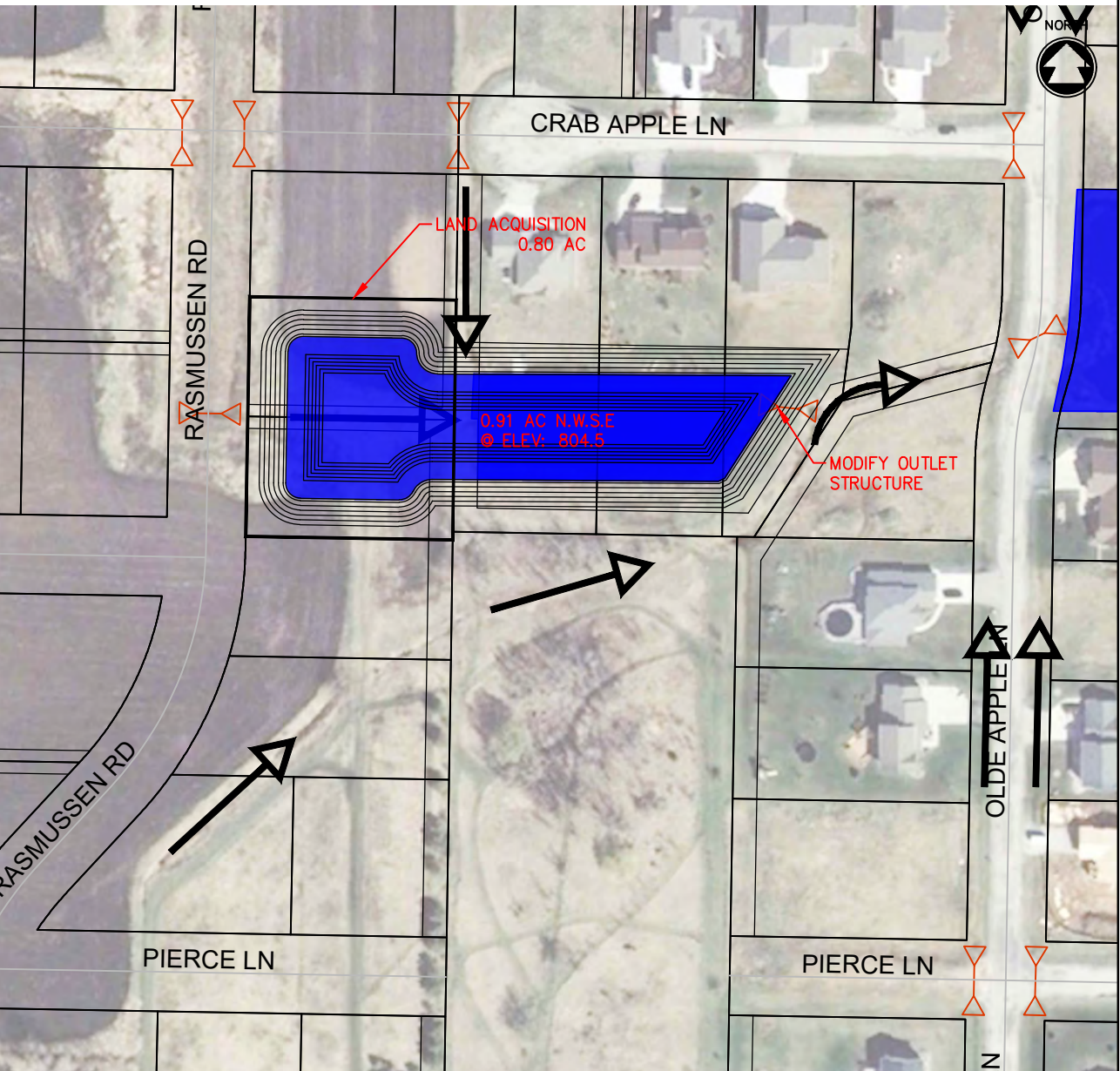
Infrastructure modifications or flow diversions required for retrofit:
 Pond to be expanded to the west to achieve 80% TSS reduction. Modify outlet structure.

Site access for future BMP maintenance:
 Good Access from future road and storm sewer / drainage easement.

Site constraints that require further investigation (e.g. utility conflicts, wetlands, groundwater, etc.):
 Bedrock, groundwater, wetlands

Approx. Size of BMP Retrofit: 0.91 ac Permanent Pool	Approx. Land Required (ac): 0.80 acres	Estimated Cost: \$446,500
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Sketch of Proposed BMP Retrofit:



POTENTIAL STORMWATER BMP RETROFIT
BMP CATCHMENT ID: BMP-B4c3

McM PROJECT NO: A0018-09-23-00721

bklemm, W:\PROJECTS\A0018\092300721\Dept\Storm\03-MS4 Mapping\BMP Concepts\BMP-B4c3.dwg, bmp-b4c3, Plot Date: 3/25/2026 2:09 PM, xrefs: fx-hydraline_co-winnebag

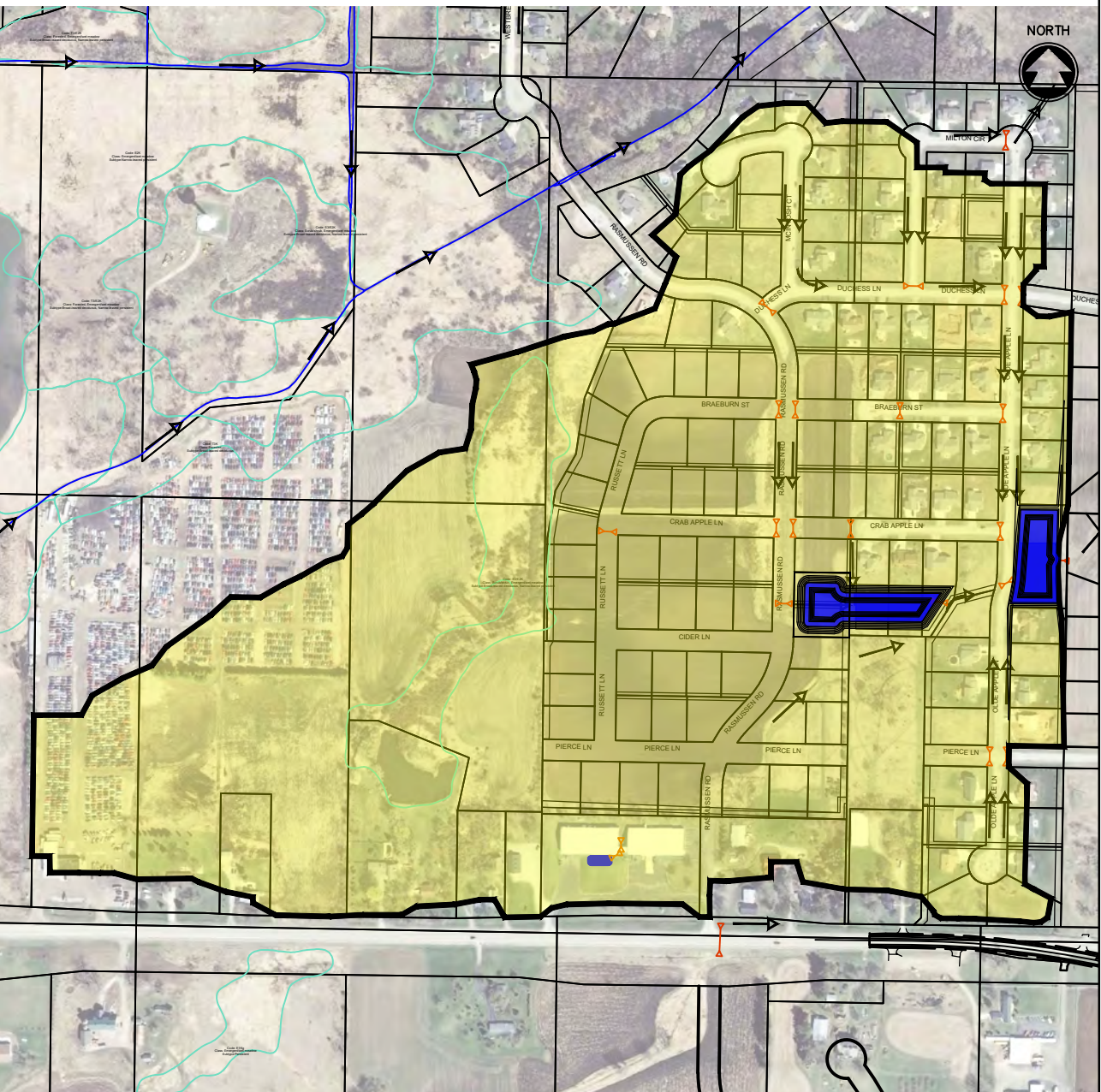
SITE INFORMATION:

Municipality: TOWN OF ALGOMA	Date: NOV, 2025
Proposed BMP Name: Olde Apple Acres East Pond Expansion	Initials: PTK

DRAINAGE AREA:

Sub-watershed ID: LAKE BUTTE DES MORTS	Catchment Area IDs: B4c1, B4c2, B4c3	Total Drainage Area: 117.5 acres
Imperviousness (Future): 39.8%	Runoff Curve Number (Future): 84	Water Quality Volume (Future): 5.94 ac-ft

Drainage Area / Site Location Map:



W:\PROJECTS\A0018\092300721\Dept\Storm\03-MS4 Mapping\BMP Concepts\BMP-B4c3_B.dwg, bmp-b4c3_b, Plot Date: 3/25/2026 2:14 PM, xrefs: x-wetland.dwg 2007.1

PROPOSED BMP RETROFIT:

Type of proposed BMP retrofit (e.g. wet pond, bioretention, proprietary device, etc.):
 Wet Detention Pond

Initial BMP Screening

Remediation:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Wetland:	<input checked="" type="checkbox"/> Potential <input type="checkbox"/> Yes <input type="checkbox"/> No
Historical:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Public Well < 400 ft:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
100-Year Floodplain:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Private Well < 100 ft:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

BMP Outfall (storm sewer, stream, wetland, groundwater, etc.):
 Pond to discharge via existing storm sewer outfall to drainage way.

Infrastructure modifications or flow diversions required for retrofit:
 Pond to be expanded to the north to achieve 80% TSS reduction.

Site access for future BMP maintenance:
 Good Access from future road and storm sewer / drainage easement.

Site constraints that require further investigation (e.g. utility conflicts, wetlands, groundwater, etc.):
 Bedrock, groundwater, wetlands

Approx. Size of BMP Retrofit: 0.82 ac Permanent Pool	Approx. Land Required (ac): N/A	Estimated Cost: \$262,500
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Sketch of Proposed BMP Retrofit:



POTENTIAL STORMWATER BMP RETROFIT

BMP CATCHMENT ID: BMP-B4c6

McM PROJECT NO: A0018-09-23-00721

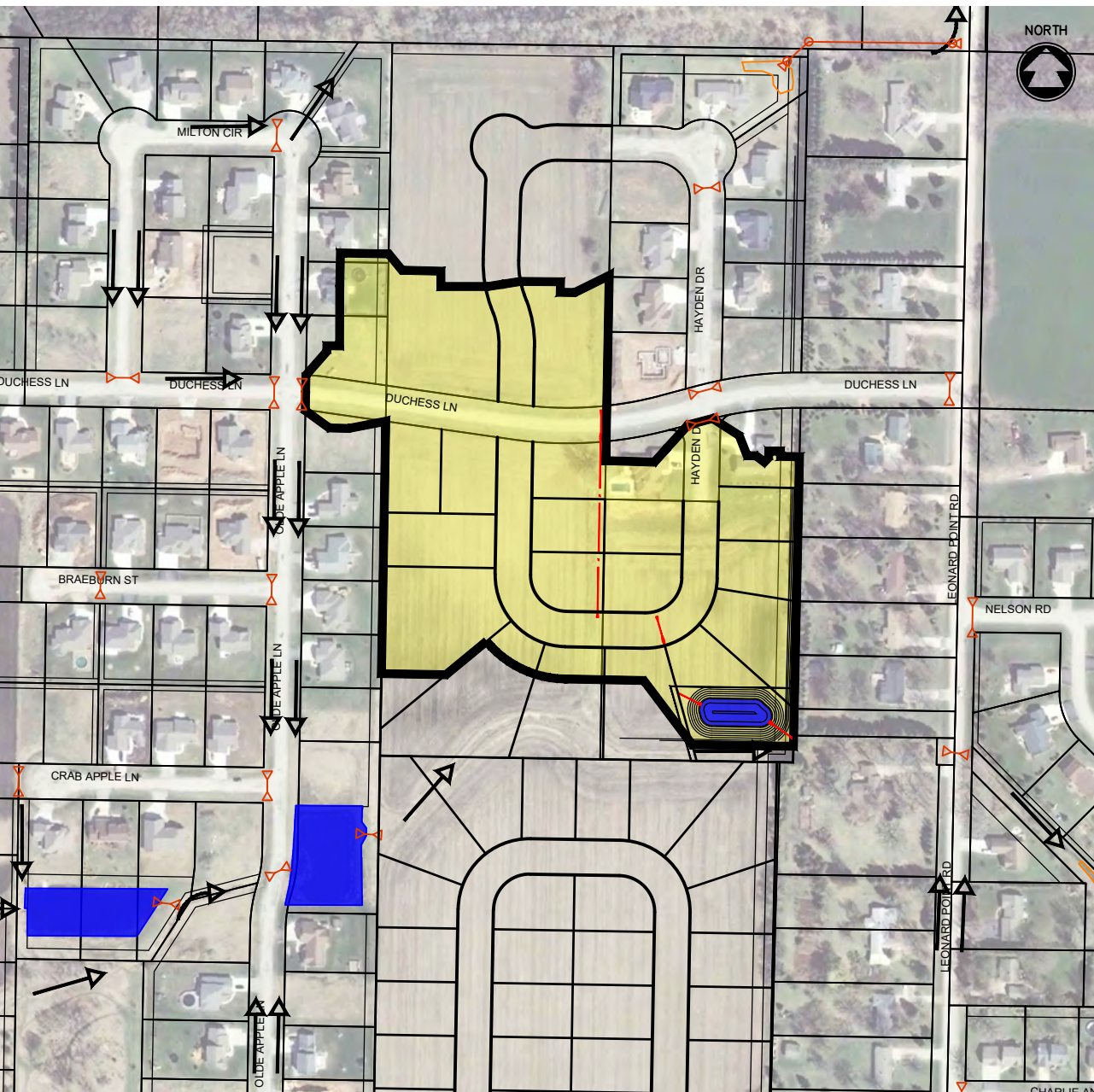
SITE INFORMATION:

Municipality: TOWN OF ALGOMA	Date: NOV, 2025
Proposed BMP Name: Hayden Dr North Pond	Initials: PTK

DRAINAGE AREA:

Sub-watershed ID: LAKE BUTTE DES MORTS	Catchment Area IDs: B4c5, B4c6	Total Drainage Area: 11.9 acres
Imperviousness (Future): 37.7%	Runoff Curve Number (Future): 85	Water Quality Volume (Future): 0.58 ac-ft

Drainage Area / Site Location Map:



pldeman, W:\PROJECTS\A0018-09-23-00721\Dept\Storm\03-MS4 Mapping\BMP Concepts\BMP-B4c6.dwg, bmp-b4c6, Plot Date: 1/9/2026 11:54 AM, xrefs: fx-hydraline_co-winnebag

bklemm, W:\PROJECTS\A0018\092300721\Dept\Storm\03-MS4 Mapping\BMP Concepts\BMP-B4c6_B.dwg, bmp-b4c6_b, Plot Date: 1/9/2026 11:55 AM, xrefs: k-wetland.dwg 2007.1

PROPOSED BMP RETROFIT:

Type of proposed BMP retrofit (e.g. wet pond, bioretention, proprietary device, etc.):
 Wet Detention Pond

Initial BMP Screening

Remediation:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Wetland:	<input checked="" type="checkbox"/> Potential <input type="checkbox"/> Yes <input type="checkbox"/> No
Historical:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Public Well < 400 ft:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
100-Year Floodplain:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Private Well < 100 ft:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

BMP Outfall (storm sewer, stream, wetland, groundwater, etc.):
 Pond to discharge via new storm sewer outfall to drainage way.

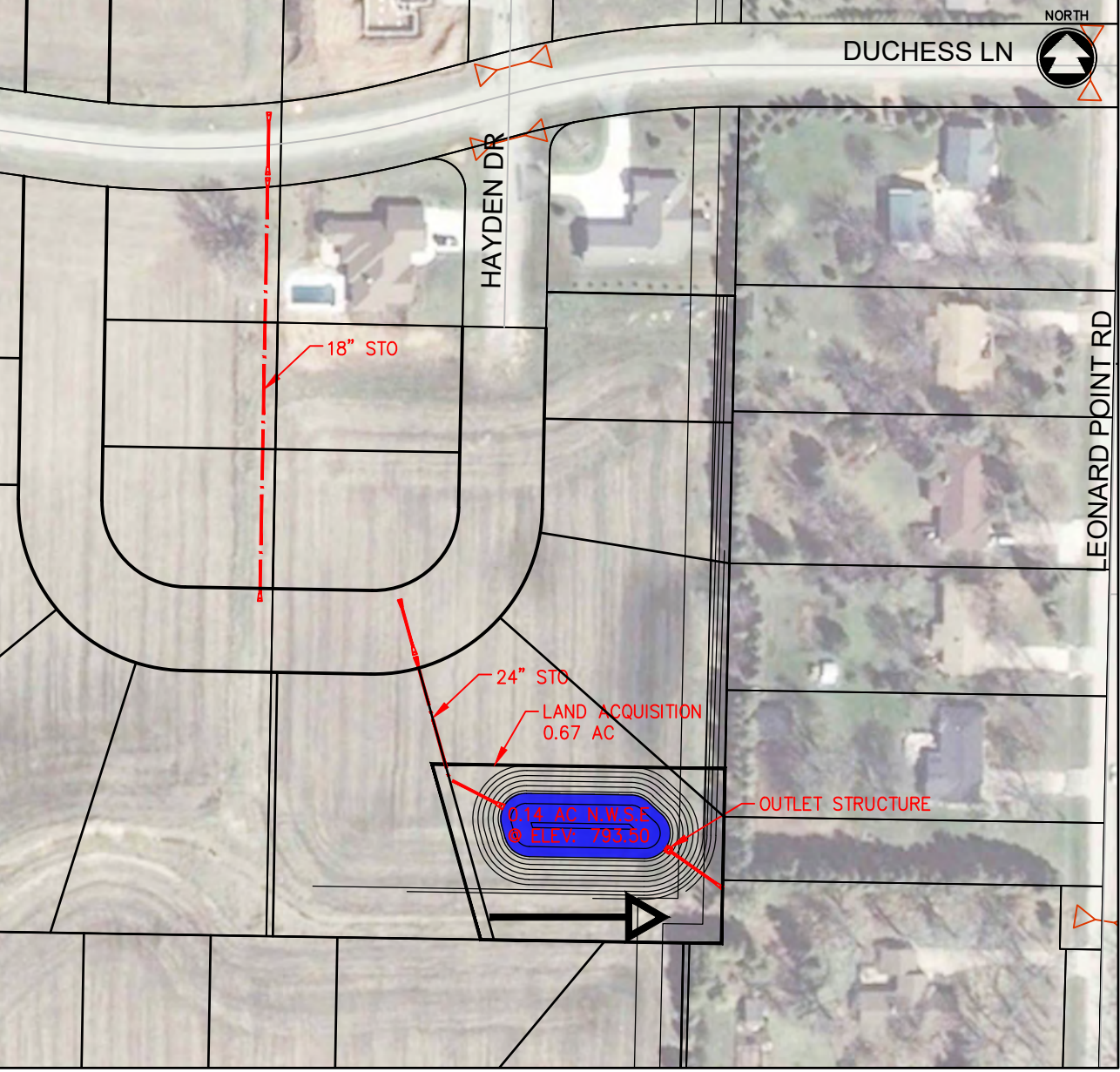
Infrastructure modifications or flow diversions required for retrofit:
 Storm sewer & swales to be installed to convey flows from contributing watershed to the proposed pond.

Site access for future BMP maintenance:
 Good Access from future road and storm sewer / drainage easement.

Site constraints that require further investigation (e.g. utility conflicts, wetlands, groundwater, etc.):
 Bedrock, groundwater, wetlands, utility conflicts associated with proposed storm sewer

Approx. Size of BMP Retrofit: 0.14 ac Permanent Pool	Approx. Land Required (ac): 0.67 acres	Estimated Cost: \$276,000
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Sketch of Proposed BMP Retrofit:



POTENTIAL STORMWATER BMP RETROFIT

BMP CATCHMENT ID: BMP-B4c8

McM PROJECT NO: A0018-09-23-00721

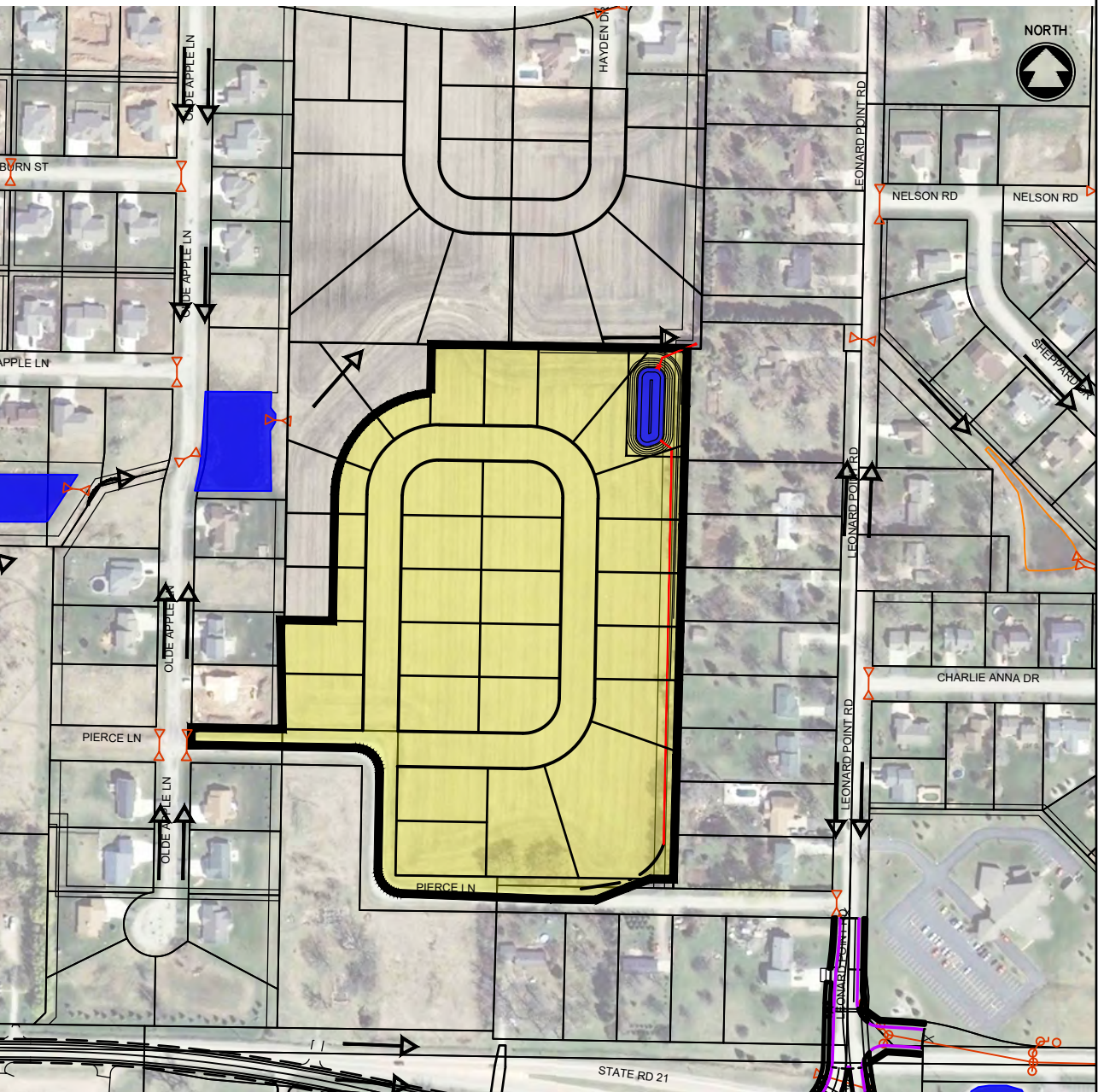
SITE INFORMATION:

Municipality: TOWN OF ALGOMA	Date: NOV, 2025
Proposed BMP Name: Hayden Dr South Pond	Initials: PTK

DRAINAGE AREA:

Sub-watershed ID: LAKE BUTTE DES MORTS	Catchment Area IDs: B4c7, B4c8	Total Drainage Area: 14.8 acres
Imperviousness (Future): 36.9%	Runoff Curve Number (Future): 83	Water Quality Volume (Future): 0.71 ac-ft

Drainage Area / Site Location Map:



pldeman, W:\PROJECTS\A0018_092300721\Dept\Storm\03-MS4 Mapping\BMP Concepts\BMP-B4c8.dwg, bmp-b4c8, Plot Date: 1/9/2026 11:56 AM, xrefs: fx-hydratline_co-winnebag

pkleman, W:\PROJECTS\A0016\092300721\Dept\Storm\03-MS4 Mapping\BMP Concepts\BMP-B4c8_B.dwg, bmp-b4c8_b, Plot Date: 1/9/2026 11:57 AM, xrefs: k-wetland.dwg 2007.1

PROPOSED BMP RETROFIT:

Type of proposed BMP retrofit (e.g. wet pond, bioretention, proprietary device, etc.):
 Wet Detention Pond

Initial BMP Screening

Remediation:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Wetland:	<input checked="" type="checkbox"/> Potential <input type="checkbox"/> Yes <input type="checkbox"/> No
Historical:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Public Well < 400 ft:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
100-Year Floodplain:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Private Well < 100 ft:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

BMP Outfall (storm sewer, stream, wetland, groundwater, etc.):
 Pond to discharge via new storm sewer outfall to drainage way.

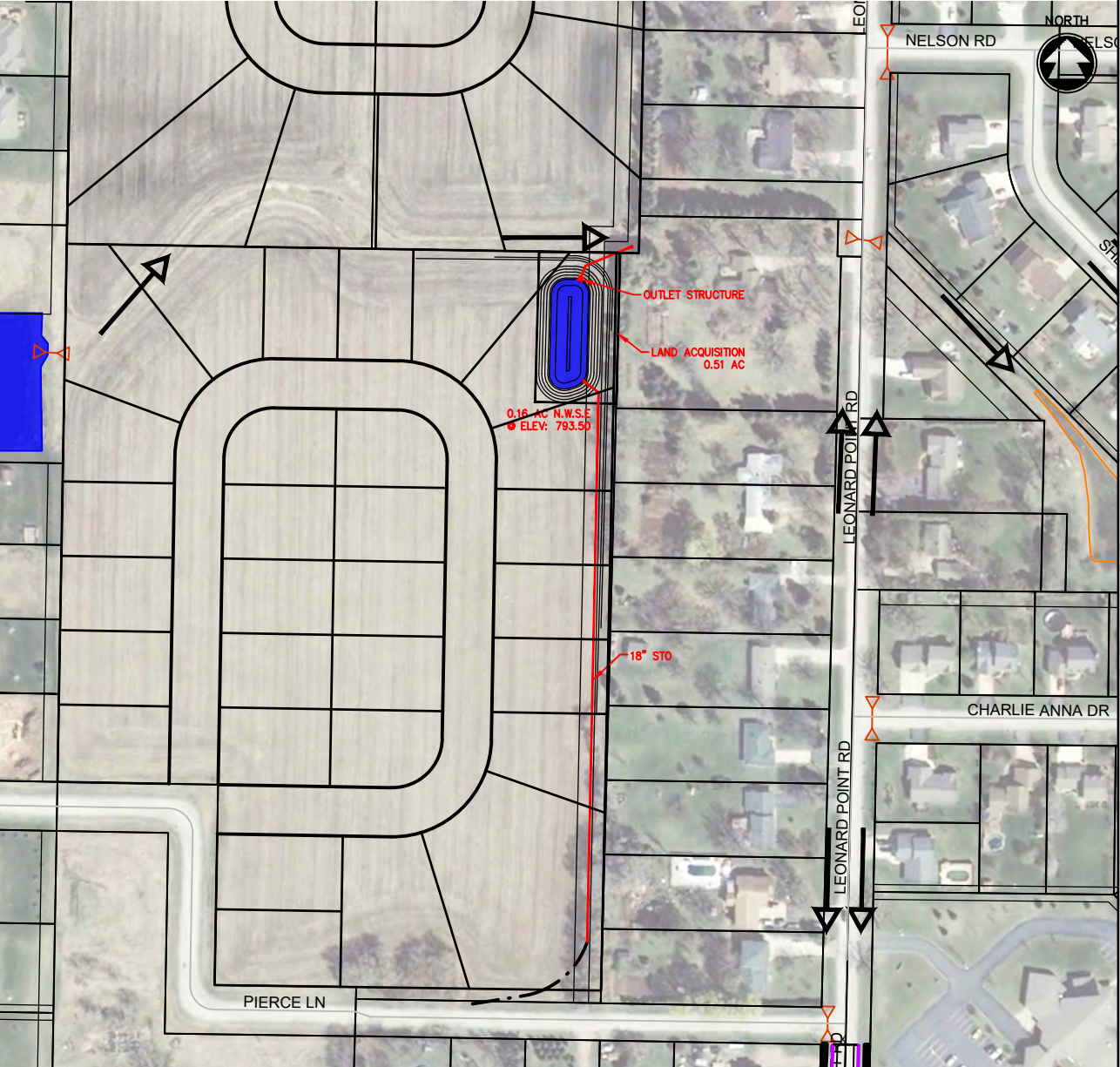
Infrastructure modifications or flow diversions required for retrofit:
 Storm sewer & swales to be installed to convey flows from contributing watershed to the proposed pond.

Site access for future BMP maintenance:
 Good Access from future road and storm sewer / drainage easement.

Site constraints that require further investigation (e.g. utility conflicts, wetlands, groundwater, etc.):
 Bedrock, groundwater, wetlands, utility conflicts associated with proposed storm sewer

Approx. Size of BMP Retrofit: 0.16 ac Permanent Pool	Approx. Land Required (ac): 0.51 acres	Estimated Cost: \$290,000
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Sketch of Proposed BMP Retrofit:



POTENTIAL STORMWATER BMP RETROFIT

BMP CATCHMENT ID: BMP-B4d1

McM PROJECT NO: A0018-09-23-00721

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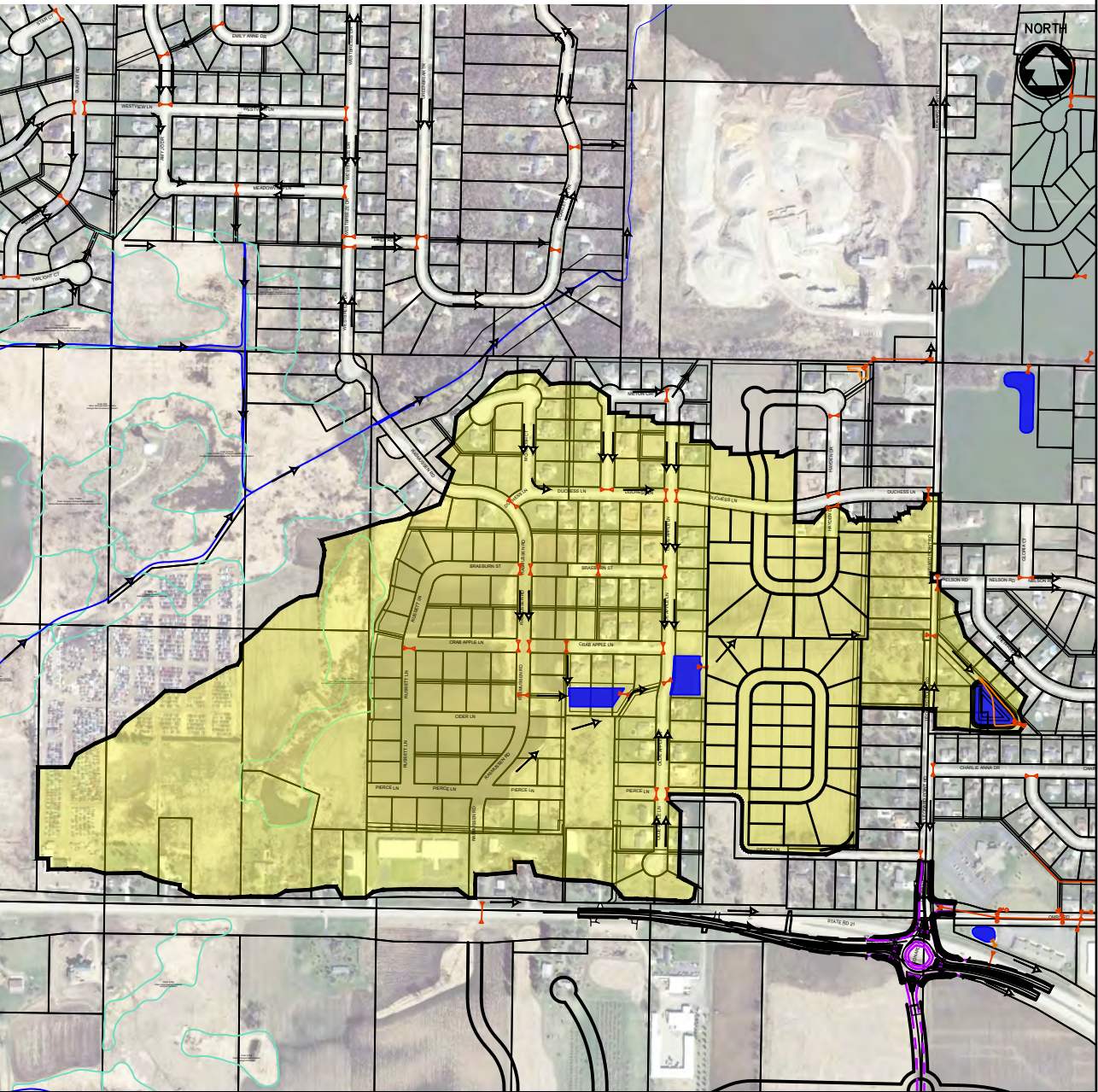
SITE INFORMATION:

Municipality: TOWN OF ALGOMA	Date: NOV, 2025
Proposed BMP Name: Sheppard Dr Pond	Initials: PTK

DRAINAGE AREA:

Sub-watershed ID: LAKE BUTTE DES MORTS	Catchment Area IDs: B4c1-B4c3, B4c5-B4c8, B4d1	Total Drainage Area: 159.4 acres
Imperviousness (Future): 38.1%	Runoff Curve Number (Future): 84	Water Quality Volume (Future): 7.83 ac-ft

Drainage Area / Site Location Map:



pldeman, W:\PROJECTS\A0018\092300721\Dept\Storm\03-MS4 Mapping\BMP Concepts\BMP-B4d1_B.dwg, bmp-b4d1_b, Plot Date: 1/9/2026 11:59 AM, xrefs: k-wetland.dwg, 2007,

PROPOSED BMP RETROFIT:

Type of proposed BMP retrofit (e.g. wet pond, bioretention, proprietary device, etc.):
 Wet Detention Pond

Initial BMP Screening

Remediation:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Wetland:	<input checked="" type="checkbox"/> Potential <input type="checkbox"/> Yes <input type="checkbox"/> No
Historical:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Public Well < 400 ft:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
100-Year Floodplain:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Private Well < 100 ft:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

BMP Outfall (storm sewer, stream, wetland, groundwater, etc.):
 Pond to discharge via new storm sewer outfall to drainage way.

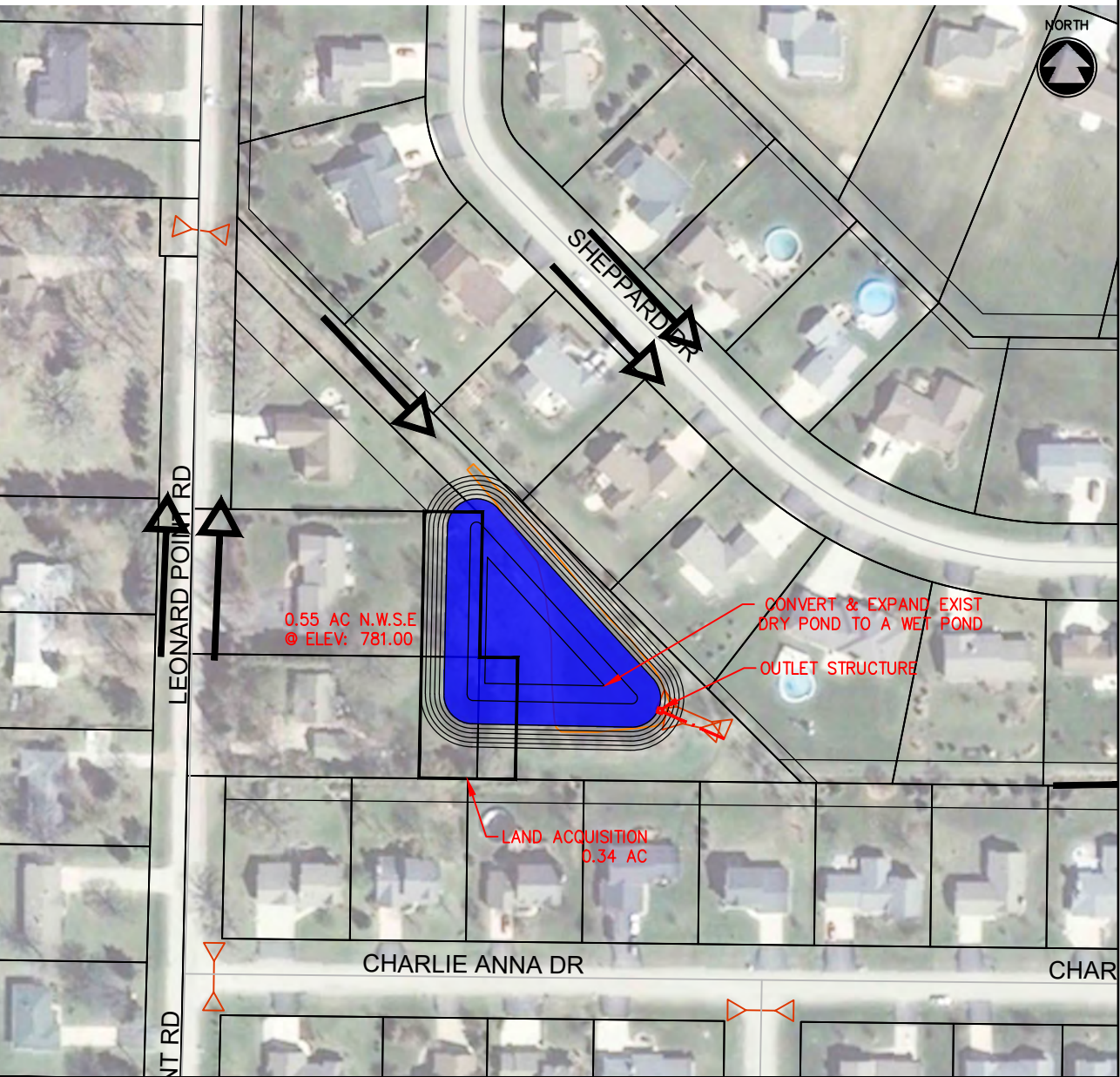
Infrastructure modifications or flow diversions required for retrofit:
 Convert & expand existing dry pond to a wet detention pond.

Site access for future BMP maintenance:
 Average. Access from Leonard Point Rd and drainage easement.

Site constraints that require further investigation (e.g. utility conflicts, wetlands, groundwater, etc.):
 Bedrock, groundwater, wetlands, utility conflicts associated with expanded pond

Approx. Size of BMP Retrofit: 0.55 ac Permanent Pool	Approx. Land Required (ac): 0.34 acres	Estimated Cost: \$306,200 (\$431,400 w/E.S.)
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Sketch of Proposed BMP Retrofit:



POTENTIAL STORMWATER BMP RETROFIT

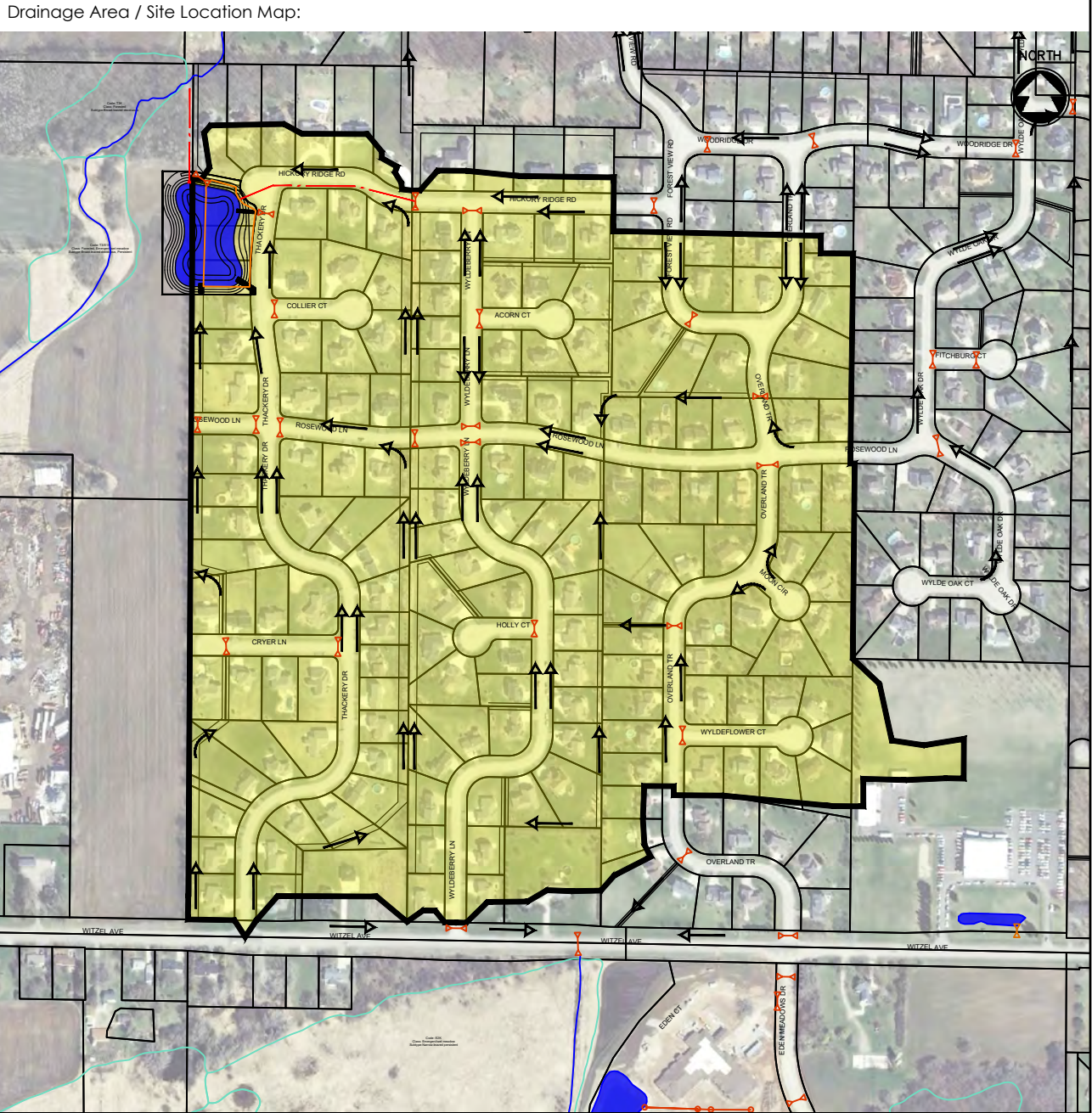
BMP CATCHMENT ID: BMP-B4e2_Alt 1

McM PROJECT NO: A0018-09-23-00721

pldeman, W:\PROJECTS\A0018-09-23-00721\Dept\Storm\03-MS4 Mapping\BMP Concepts\BMP-B4e2_Alt 1.dwg, bmp-b4e2_alt 1, Plot Dates: 1/9/2026 12:00 PM, xrefs: h-hydraflow_co-

SITE INFORMATION:	
Municipality: TOWN OF ALGOMA	Date: NOV, 2025
Proposed BMP Name: Wyldewood Pond - Alt 1	Initials: PTK

DRAINAGE AREA:		
Sub-watershed ID: LAKE BUTTE DES MORTS	Catchment Area IDs: B4e2, B4f5	Total Drainage Area: 98.0 acres
Imperviousness (Future): 32.3%	Runoff Curve Number (Future): 82	Water Quality Volume (Future): 4.17 ac-ft



pkleman, W:\PROJECTS\A0016\092300721\Dept\Storm\03-MS4 Mapping\BMP Concepts\BMP-B4e2_B_Alt 1.dwg, bmp-b4e2_b alt 1, Plot Date: 1/9/2026 12:02 PM, xrefs: k-wetland

PROPOSED BMP RETROFIT:

Type of proposed BMP retrofit (e.g. wet pond, bioretention, proprietary device, etc.):
 Wet Detention Pond

Initial BMP Screening

Remediation:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Wetland:	<input checked="" type="checkbox"/> Potential <input type="checkbox"/> Yes <input type="checkbox"/> No
Historical:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Public Well < 400 ft:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
100-Year Floodplain:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Private Well < 100 ft:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

BMP Outfall (storm sewer, stream, wetland, groundwater, etc.):
 Pond to discharge via new storm sewer outfall to Honey Creek.

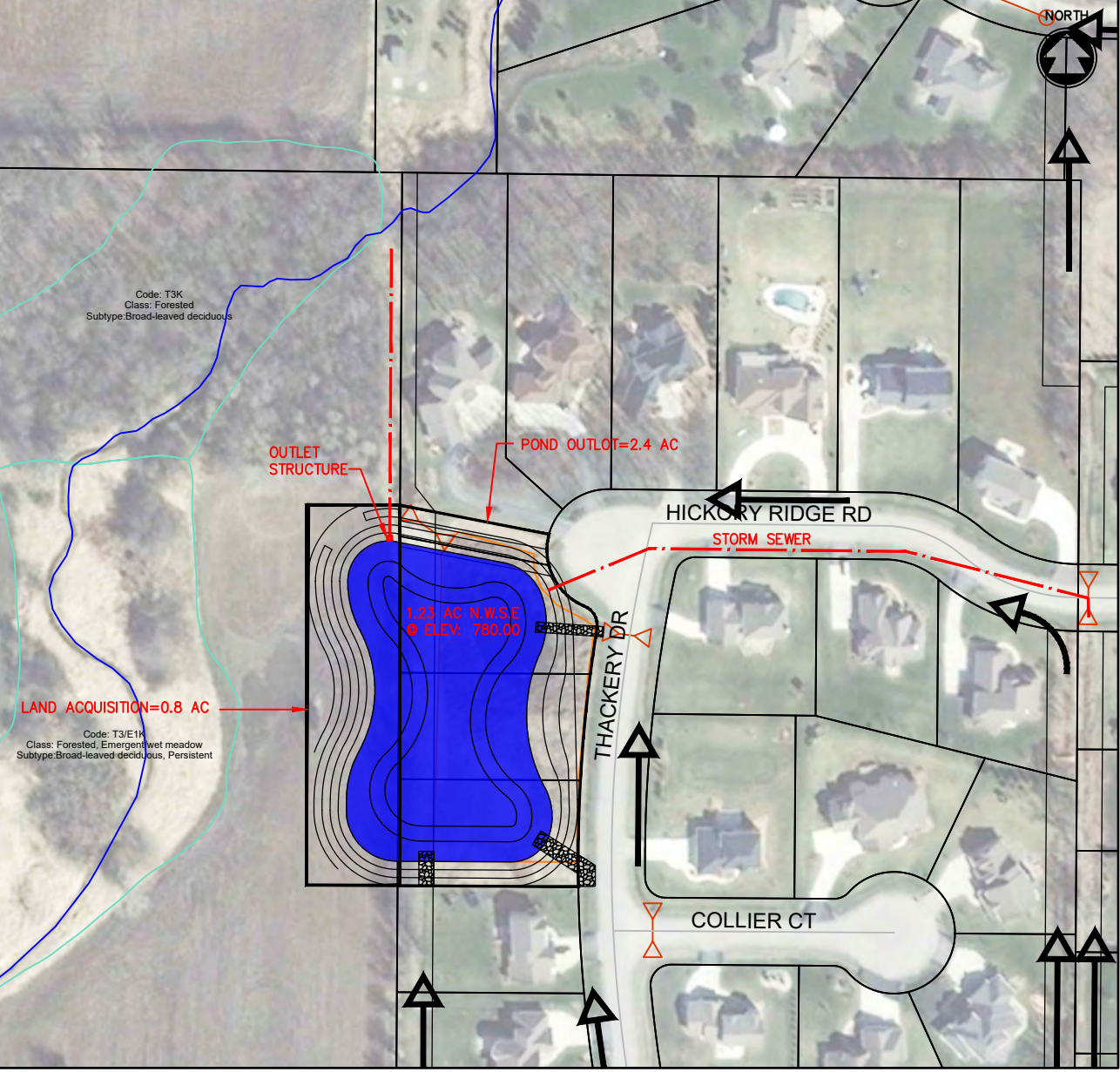
Infrastructure modifications or flow diversions required for retrofit:
 Convert & expand existing dry pond to a wet detention pond. Install storm sewer to convey flows from watershed to pond.

Site access for future BMP maintenance:
 Good. Access from Thackery Dr.

Site constraints that require further investigation (e.g. utility conflicts, wetlands, groundwater, etc.):
 Bedrock, groundwater, wetlands, utility conflicts associated with expanded pond

Approx. Size of BMP Retrofit: 1.23 ac Permanent Pool	Approx. Land Required (ac): 0.80 acres	Estimated Cost: \$594,500 (\$691,900 w/E.S.)
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Sketch of Proposed BMP Retrofit:



POTENTIAL STORMWATER BMP RETROFIT

BMP CATCHMENT ID: BMP-B4e2_Alt 2

McM PROJECT NO: A0018-09-23-00721

pldeman, W:\PROJECTS\A0018-092300721\Dept\Storm\03-MS4 Mapping\BMP Concepts\BMP-B4e2_Alt 2.dwg, bmp-b4e2_alt 2, Plot Dates: 1/9/2026 12:03 PM, xrefs: h-hydraflow_co-

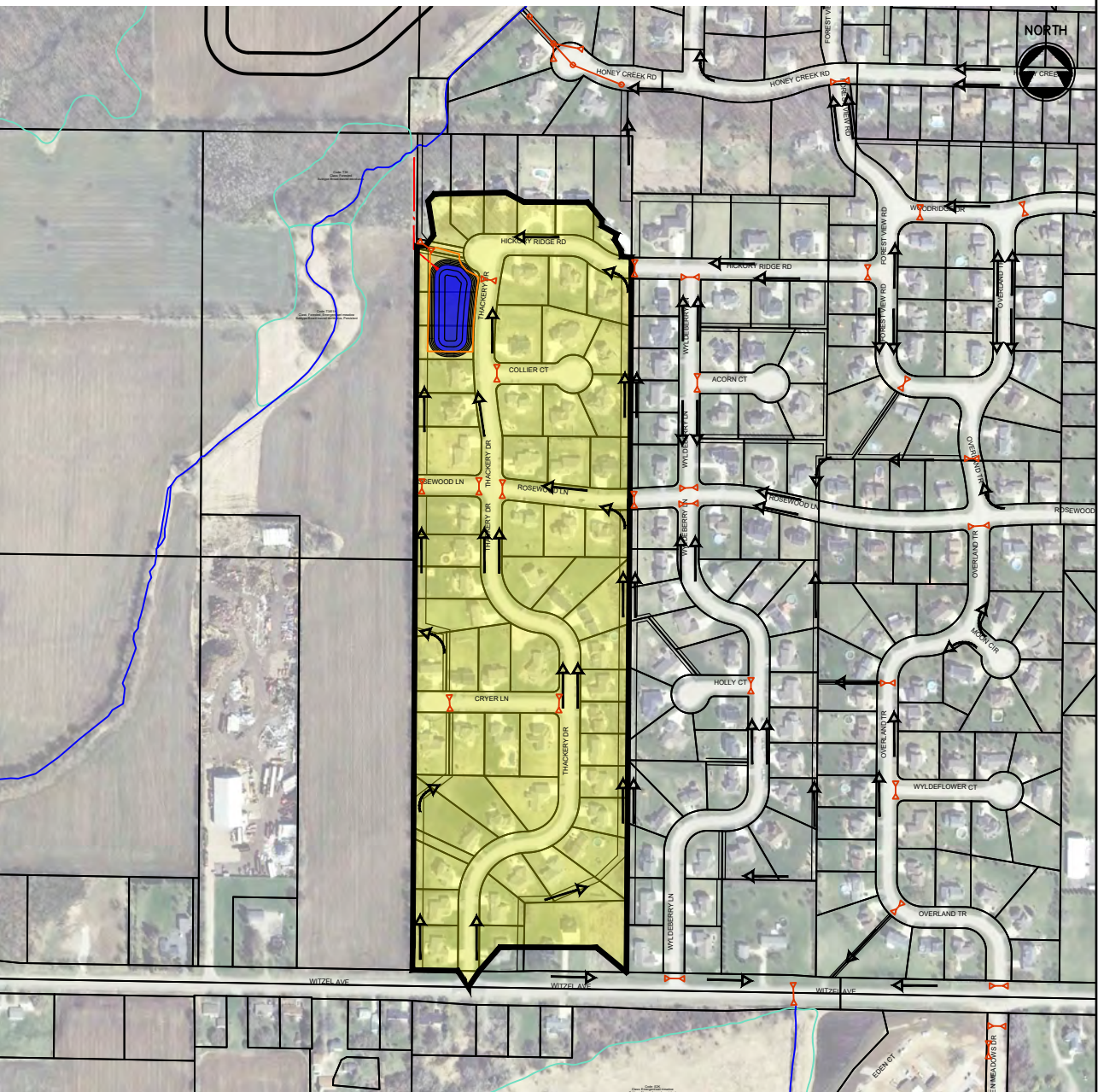
SITE INFORMATION:

Municipality: TOWN OF ALGOMA	Date: NOV, 2025
Proposed BMP Name: Wyldewood Pond - Alt 2	Initials: PTK

DRAINAGE AREA:

Sub-watershed ID: LAKE BUTTE DES MORTS	Catchment Area IDs: B4e2	Total Drainage Area: 35.9 acres
Imperviousness (Future): 31.1%	Runoff Curve Number (Future): 82	Water Quality Volume (Future): 1.48 ac-ft

Drainage Area / Site Location Map:



pkleman, W:\PROJECTS\A0016\092300721\Dept\Storm\03-MS4 Mapping\BMP Concepts\BMP-B4e2_B_Alt2.dwg, bmp-b4e2_b_alt2, Plot Date: 1/9/2026 12:04 PM, xrefs: k-wetland

PROPOSED BMP RETROFIT:

Type of proposed BMP retrofit (e.g. wet pond, bioretention, proprietary device, etc.):
 Wet Detention Pond

Initial BMP Screening

Remediation:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Wetland:	<input checked="" type="checkbox"/> Potential <input type="checkbox"/> Yes <input type="checkbox"/> No
Historical:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Public Well < 400 ft:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
100-Year Floodplain:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Private Well < 100 ft:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

BMP Outfall (storm sewer, stream, wetland, groundwater, etc.):
 Pond to discharge via new storm sewer outfall to Honey Creek.

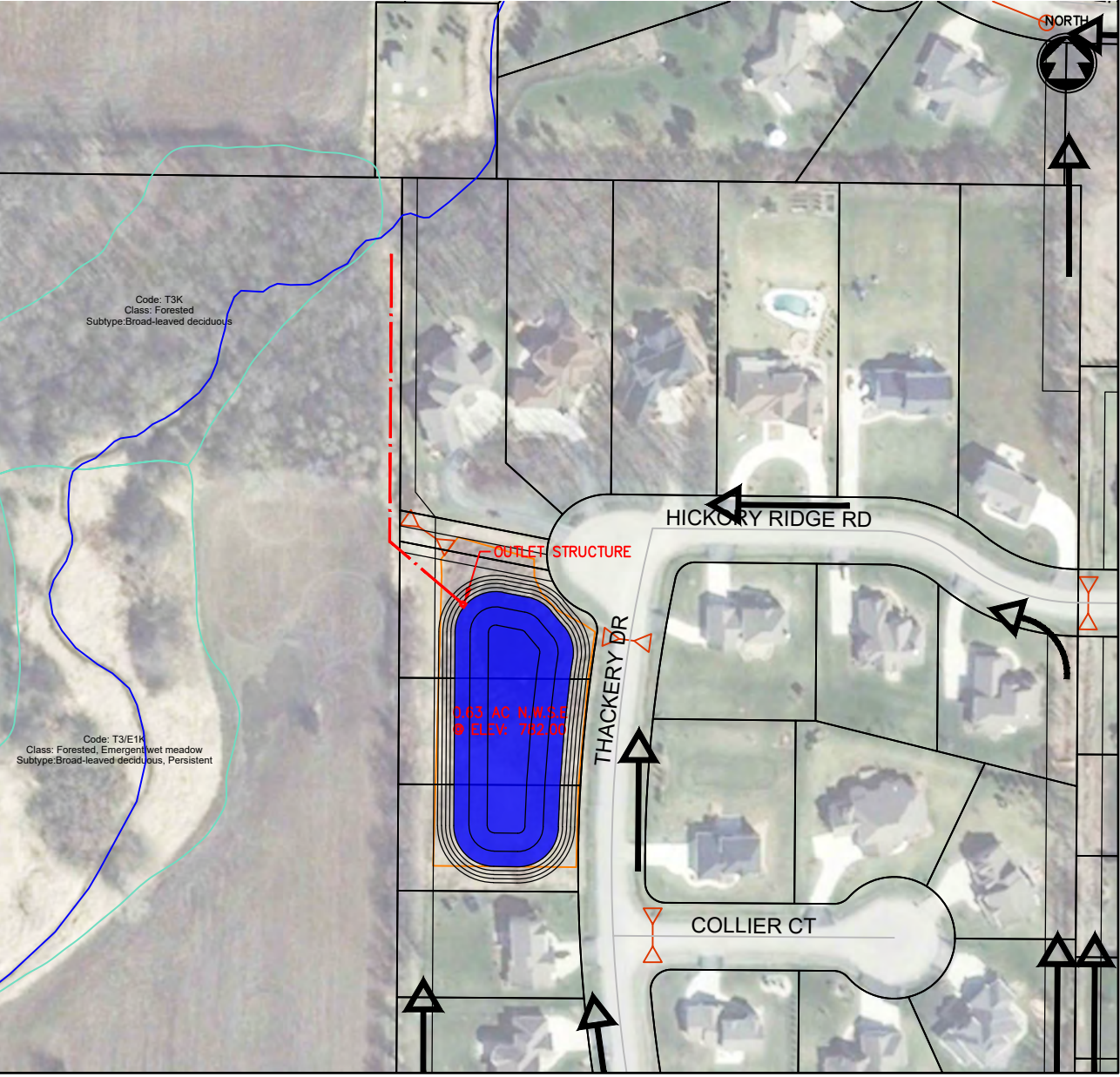
Infrastructure modifications or flow diversions required for retrofit:
 Convert & expand existing dry pond to a wet detention pond.

Site access for future BMP maintenance:
 Good. Access from Thackery Dr.

Site constraints that require further investigation (e.g. utility conflicts, wetlands, groundwater, etc.):
 Bedrock, groundwater, wetlands, utility conflicts associated with expanded pond

Approx. Size of BMP Retrofit: 0.63 ac Permanent Pool	Approx. Land Required (ac): N/A (Town owns parcel)	Estimated Cost: \$258,100 (\$336,700 w/E.S.)
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Sketch of Proposed BMP Retrofit:



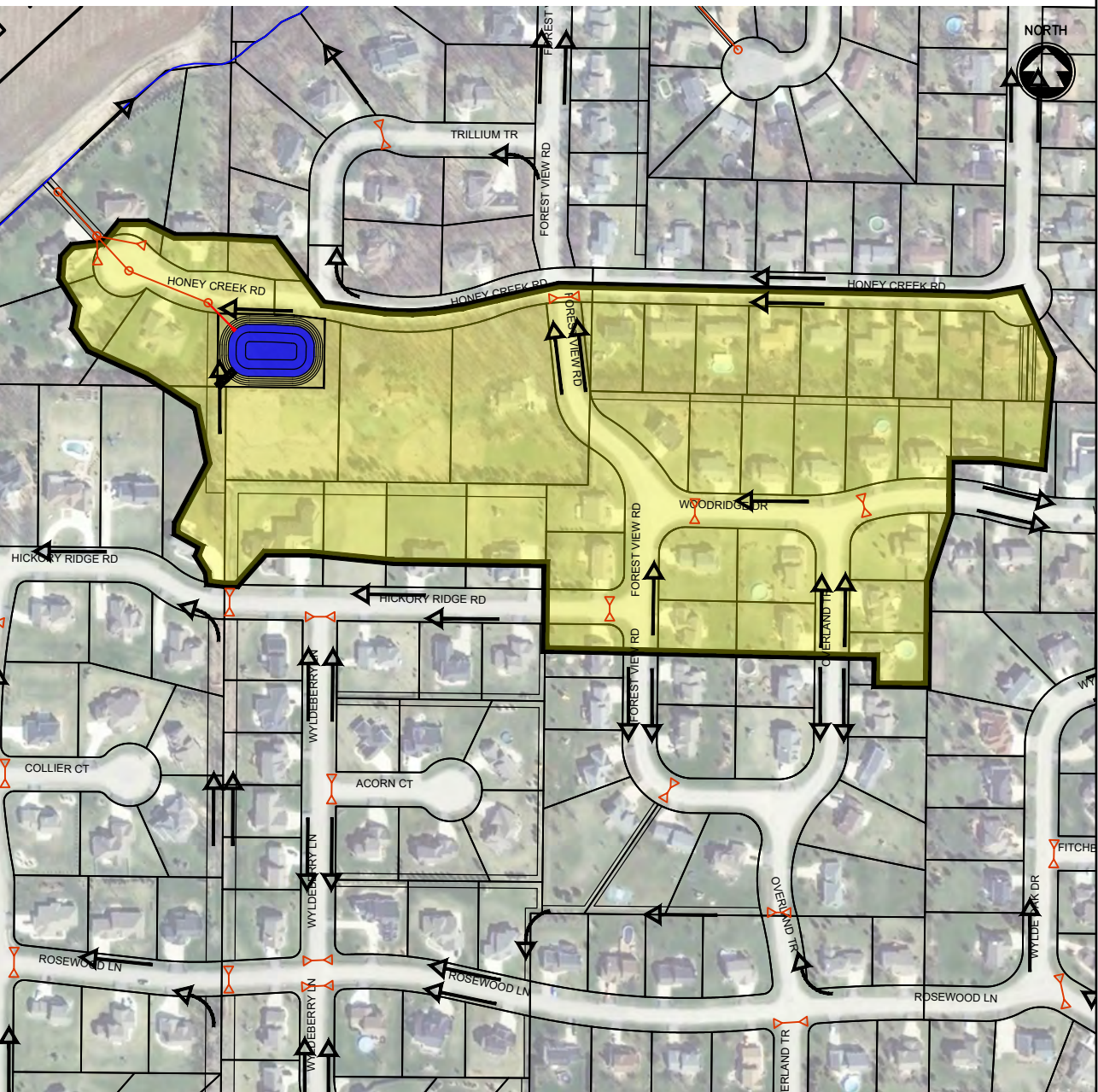
POTENTIAL STORMWATER BMP RETROFIT
BMP CATCHMENT ID: BMP-B4f6_Alt 1

McM PROJECT NO: A0018-09-23-00721

SITE INFORMATION:	
Municipality: TOWN OF ALGOMA	Date: NOV, 2025
Proposed BMP Name: Trillium Tr Pond - Alt 1	Initials: PTK

DRAINAGE AREA:		
Sub-watershed ID: LAKE BUTTE DES MORTS	Catchment Area IDs: B4f6	Total Drainage Area: 23.3 acres
Imperviousness (Future): 31.2%	Runoff Curve Number (Future): 84	Water Quality Volume (Future): 0.96 ac-ft

Drainage Area / Site Location Map:



pldeman, W:\PROJECTS\A0018_092300721\Dept\Storm\03-MS4 Mapping\BMP Concepts\BMP-B4f6_Alt 1.dwg, bmp-b4f6_alt 1, Plot Date: 1/9/2026 12:05 PM, xrefs: f-hydraline.co-w

pldeman, W:\PROJECTS\A0016\092300721\Dept\Storm\03-MS4 Mapping\BMP Concepts\BMP-B4f6_B_Alt1.dwg, bmp-b4f6_b_alt1, Plot Dates: 1/9/2026 12:06 PM, xrefs: [x-wetland.d

PROPOSED BMP RETROFIT:

Type of proposed BMP retrofit (e.g. wet pond, bioretention, proprietary device, etc.):
 Wet Detention Pond

Initial BMP Screening

Remediation:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Wetland:	<input checked="" type="checkbox"/> Potential <input type="checkbox"/> Yes <input type="checkbox"/> No
Historical:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Public Well < 400 ft:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
100-Year Floodplain:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Private Well < 100 ft:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

BMP Outfall (storm sewer, stream, wetland, groundwater, etc.):
 Pond to discharge via new storm sewer outfall to existing storm sewer system within Honey Creek Rd.

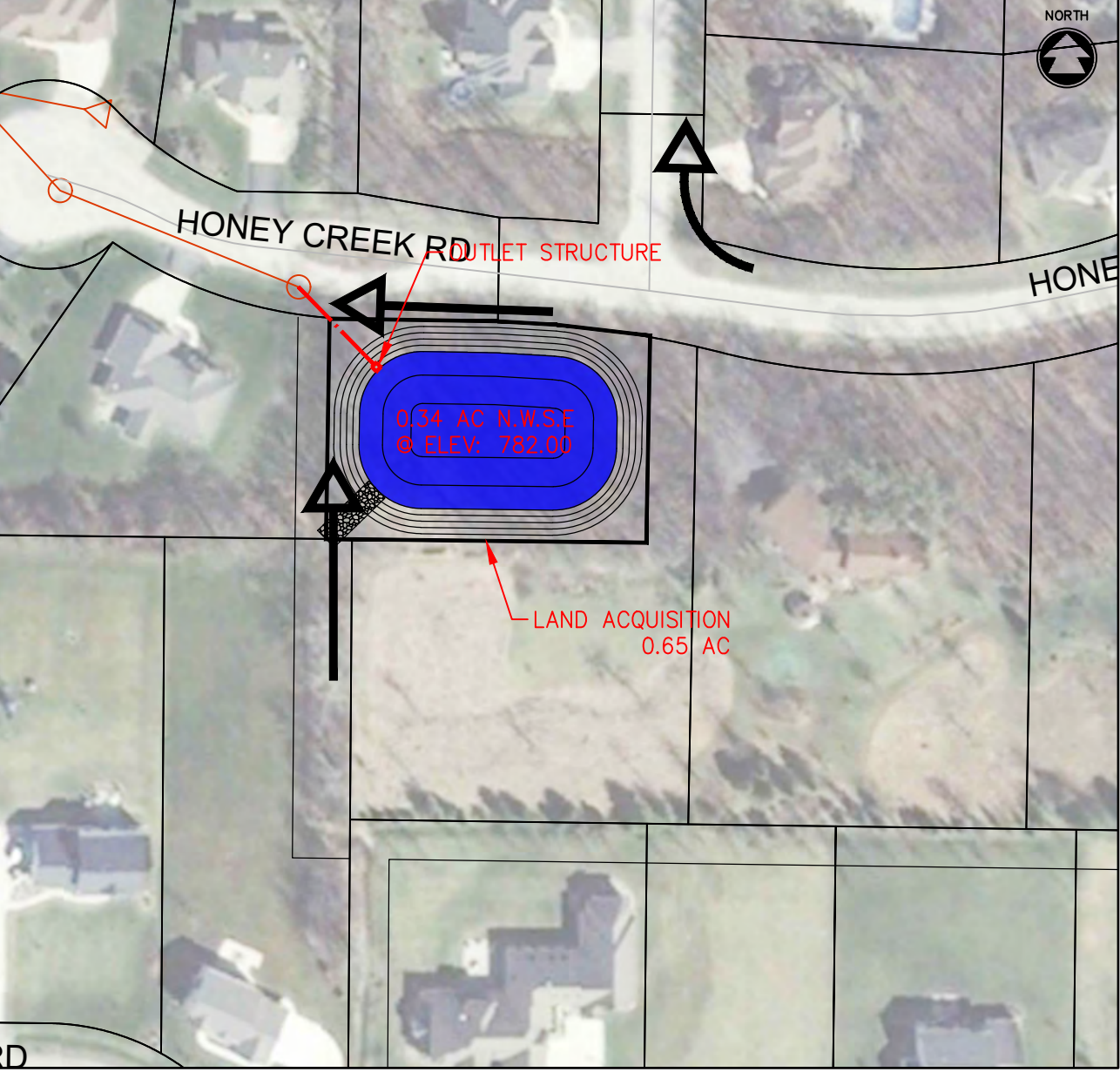
Infrastructure modifications or flow diversions required for retrofit:
 Divert drainage swale from south and Honey Creek Rd road swale into pond.

Site access for future BMP maintenance:
 Good. Access from Honey Creek Rd.

Site constraints that require further investigation (e.g. utility conflicts, wetlands, groundwater, etc.):
 Bedrock, groundwater, wetlands, utility conflicts associated with storm sewer outfall

Approx. Size of BMP Retrofit: 0.34 ac Permanent Pool	Approx. Land Required (ac): 0.65 acres	Estimated Cost: \$250,400 (\$325,400 w/E.S.)
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Sketch of Proposed BMP Retrofit:



POTENTIAL STORMWATER BMP RETROFIT

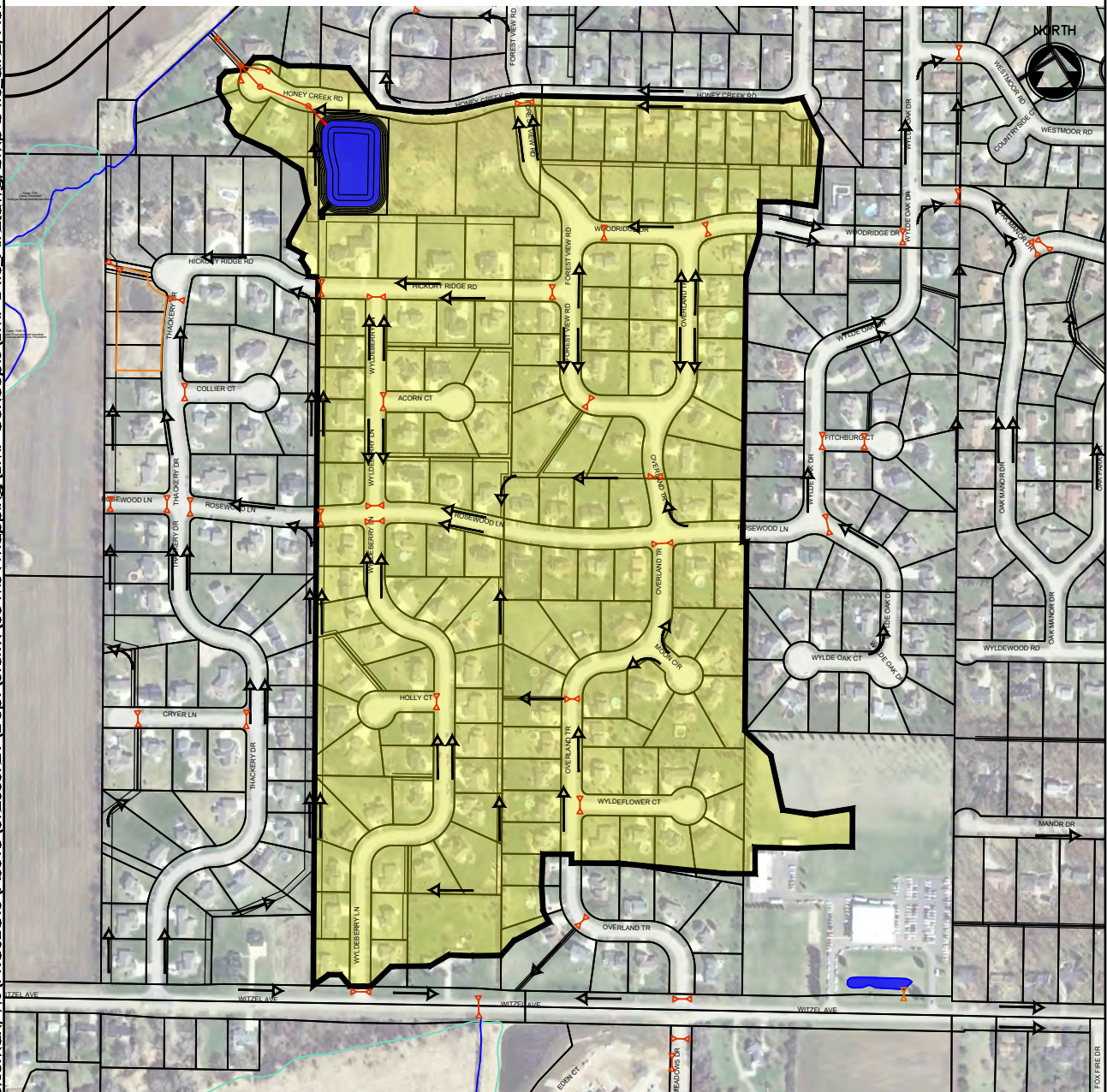
BMP CATCHMENT ID: BMP-B4f6_Alt 2

McM PROJECT NO: A0018-09-23-00721

SITE INFORMATION:	
Municipality: TOWN OF ALGOMA	Date: NOV, 2025
Proposed BMP Name: Trillium Tr Pond - Alt 2	Initials: PTK

DRAINAGE AREA:		
Sub-watershed ID: LAKE BUTTE DES MORTS	Catchment Area IDs: B4f5, B4f6	Total Drainage Area: 85.4 acres
Imperviousness (Future): 32.5%	Runoff Curve Number (Future): 82	Water Quality Volume (Future): 3.65 ac-ft

Drainage Area / Site Location Map:



pldeman, W:\PROJECTS\A0018_092300721\Dept\Storm\03-MS4 Mapping\BMP Concepts\BMP-B4f6_Alt 2.dwg, bmp-b4f6_alt 2, Plot Date: 1/9/2026 12:07 PM, xrefs: f-hydraine.co-w

pldeman, W:\PROJECTS\A0016\092300721\Dept\Storm\03-MS4 Mapping\BMP Concepts\BMP-B4f6_B_Alt2.dwg, bmp-b4f6_b_alt2, Plot Dates: 1/9/2026 12:08 PM, xrefs: [x-wetland.d

PROPOSED BMP RETROFIT:

Type of proposed BMP retrofit (e.g. wet pond, bioretention, proprietary device, etc.):
 Wet Detention Pond

Initial BMP Screening

Remediation:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Wetland:	<input checked="" type="checkbox"/> Potential <input type="checkbox"/> Yes <input type="checkbox"/> No
Historical:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Public Well < 400 ft:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
100-Year Floodplain:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Private Well < 100 ft:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

BMP Outfall (storm sewer, stream, wetland, groundwater, etc.):
 Pond to discharge via new storm sewer outfall to existing storm sewer system within Honey Creek Rd.

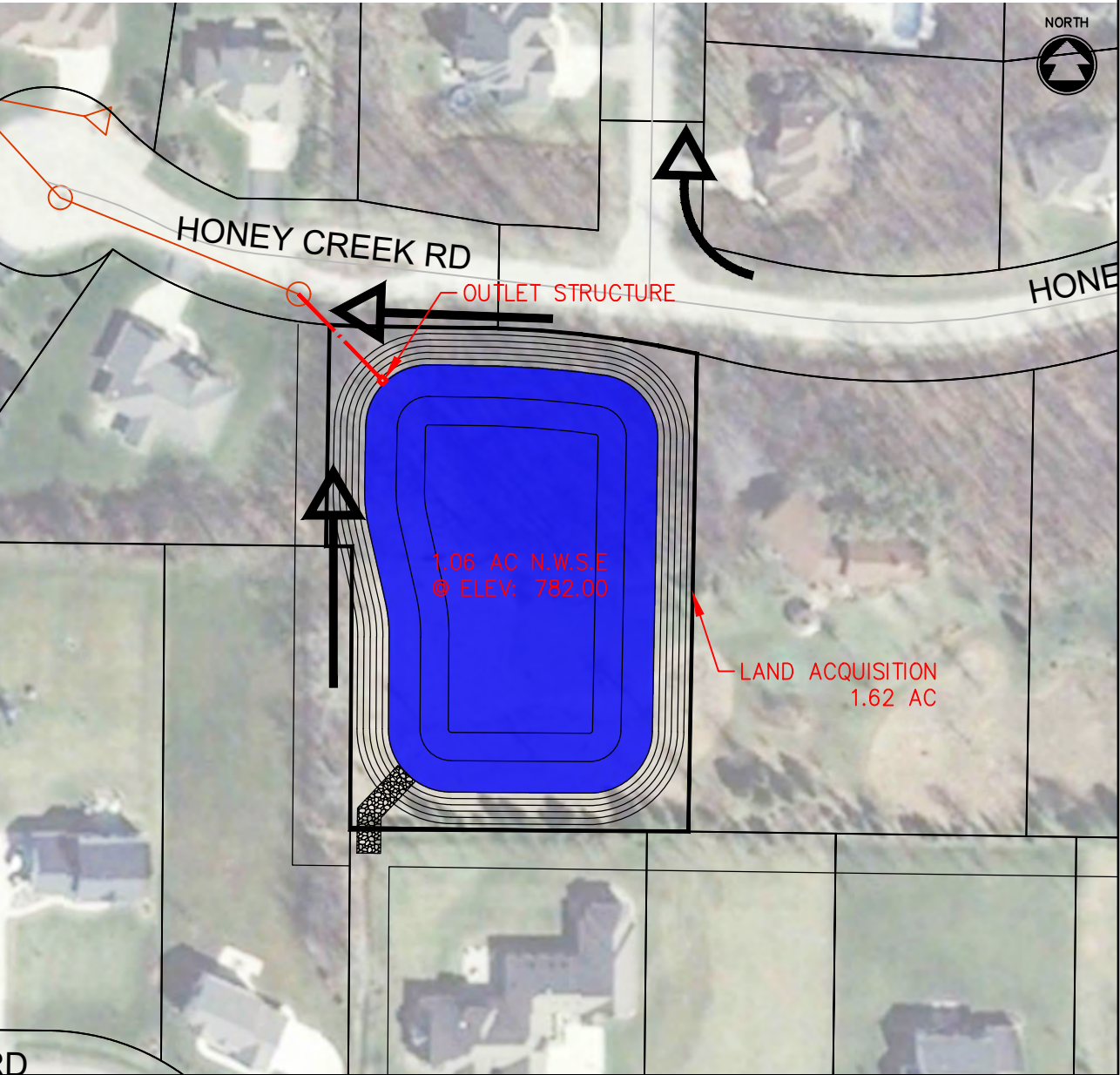
Infrastructure modifications or flow diversions required for retrofit:
 Divert drainage swale from south and Honey Creek Rd swale into pond.

Site access for future BMP maintenance:
 Good. Access from Honey Creek Rd.

Site constraints that require further investigation (e.g. utility conflicts, wetlands, groundwater, etc.):
 Bedrock, groundwater, wetlands, utility conflicts associated with storm sewer outfall

Approx. Size of BMP Retrofit: 1.06 ac Permanent Pool	Approx. Land Required (ac): 1.62 acres	Estimated Cost: \$545,800 (\$639,600 w/E.S.)
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Sketch of Proposed BMP Retrofit:



POTENTIAL STORMWATER BMP RETROFIT

BMP CATCHMENT ID: BMP-B4g3

McM PROJECT NO: A0018-09-23-00721

Alderman, W:\PROJECTS\A0018-09-23-00721\Dept\Storm\03-MS4 Mapping\BMP Concepts\BMP-B4g3.dwg, bmp-b4g3, Plot Date: 1/9/2026 12:09 PM, xrefs: k-hydrafile_co-winnebag

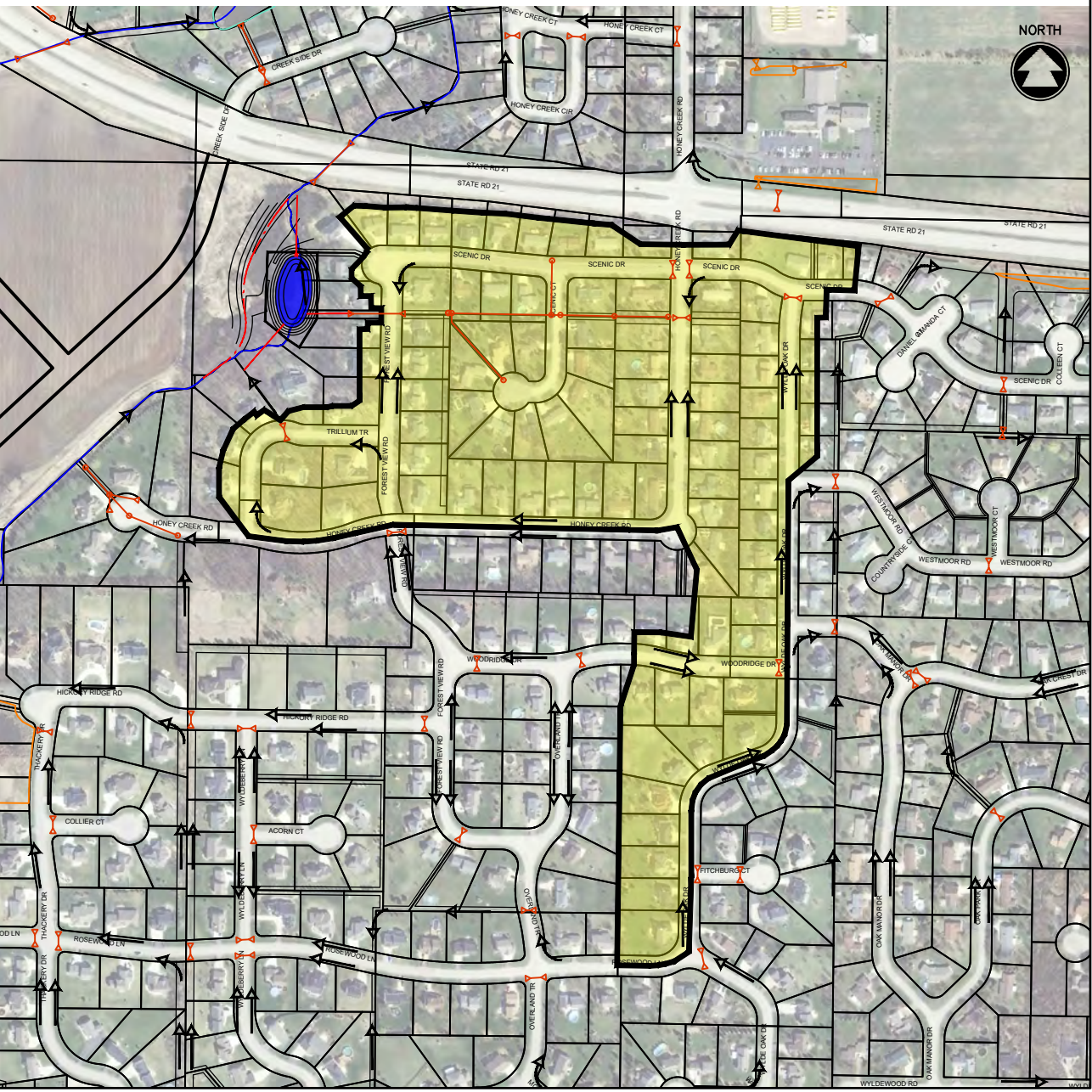
SITE INFORMATION:

Municipality: TOWN OF ALGOMA	Date: NOV, 2025
Proposed BMP Name: Forest View Pond	Initials: PTK

DRAINAGE AREA:

Sub-watershed ID: LAKE BUTTE DES MORTS	Catchment Area IDs: B4g3	Total Drainage Area: 44.7 acres
Imperviousness (Future): 36.3%	Runoff Curve Number (Future): 85	Water Quality Volume (Future): 2.11 ac-ft

Drainage Area / Site Location Map:



bkdemman, W:\PROJECTS\A0016\092300721\Dept\Storm\03-MS4 Mapping\BMP Concepts\BMP-B-463_B.dwg, bmp-b-463_b, Plot Date: 1/9/2026 12:10 PM, xrefs: x-wetland.dwg 2007.1

PROPOSED BMP RETROFIT:

Type of proposed BMP retrofit (e.g. wet pond, bioretention, proprietary device, etc.):
Wet Detention Pond

Initial BMP Screening

Remediation:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Wetland:	<input checked="" type="checkbox"/> Potential <input type="checkbox"/> Yes <input type="checkbox"/> No
Historical:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Public Well < 400 ft:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
100-Year Floodplain:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Private Well < 100 ft:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

BMP Outfall (storm sewer, stream, wetland, groundwater, etc.):
Pond to discharge via new storm sewer outfall to Honey Creek

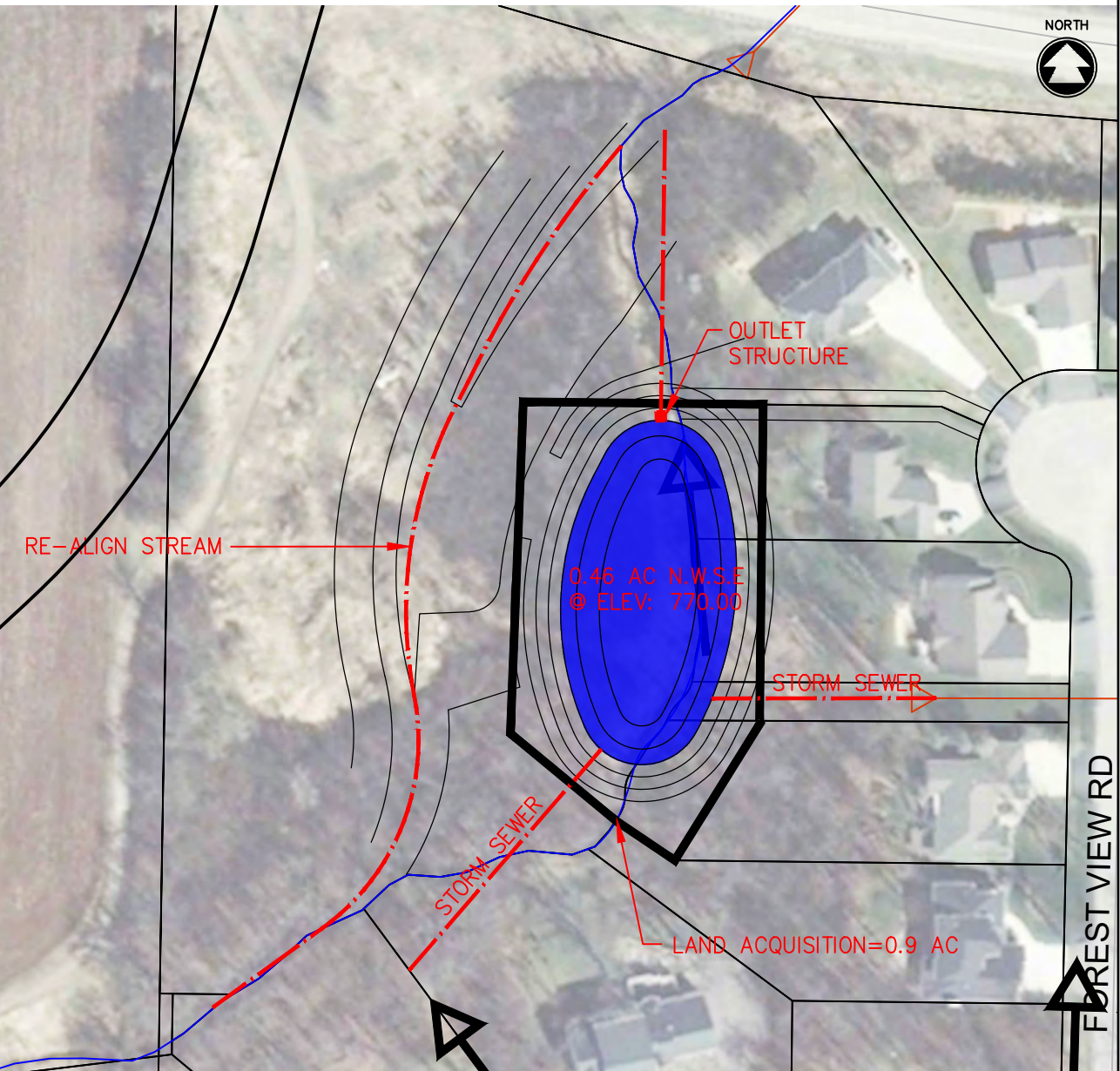
Infrastructure modifications or flow diversions required for retrofit:
Re-align Honey Creek to the west to accommodate the pond construction. Divert existing storm sewer into pond.

Site access for future BMP maintenance:
Average. Access from Forest View Rd and drainage/storm sewer easements.

Site constraints that require further investigation (e.g. utility conflicts, wetlands, groundwater, etc.):
Floodplain (stream realignment), Bedrock, groundwater, wetlands, utility conflicts associated with storm sewer outfall

Approx. Size of BMP Retrofit: 0.45 ac Permanent Pool	Approx. Land Required (ac): 0.90 acres	Estimated Cost: \$537,100 (\$620,000 w/E.S.)
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Sketch of Proposed BMP Retrofit:



POTENTIAL STORMWATER BMP RETROFIT

BMP CATCHMENT ID: BMP-B4i9

McM PROJECT NO: A0018-09-23-00721

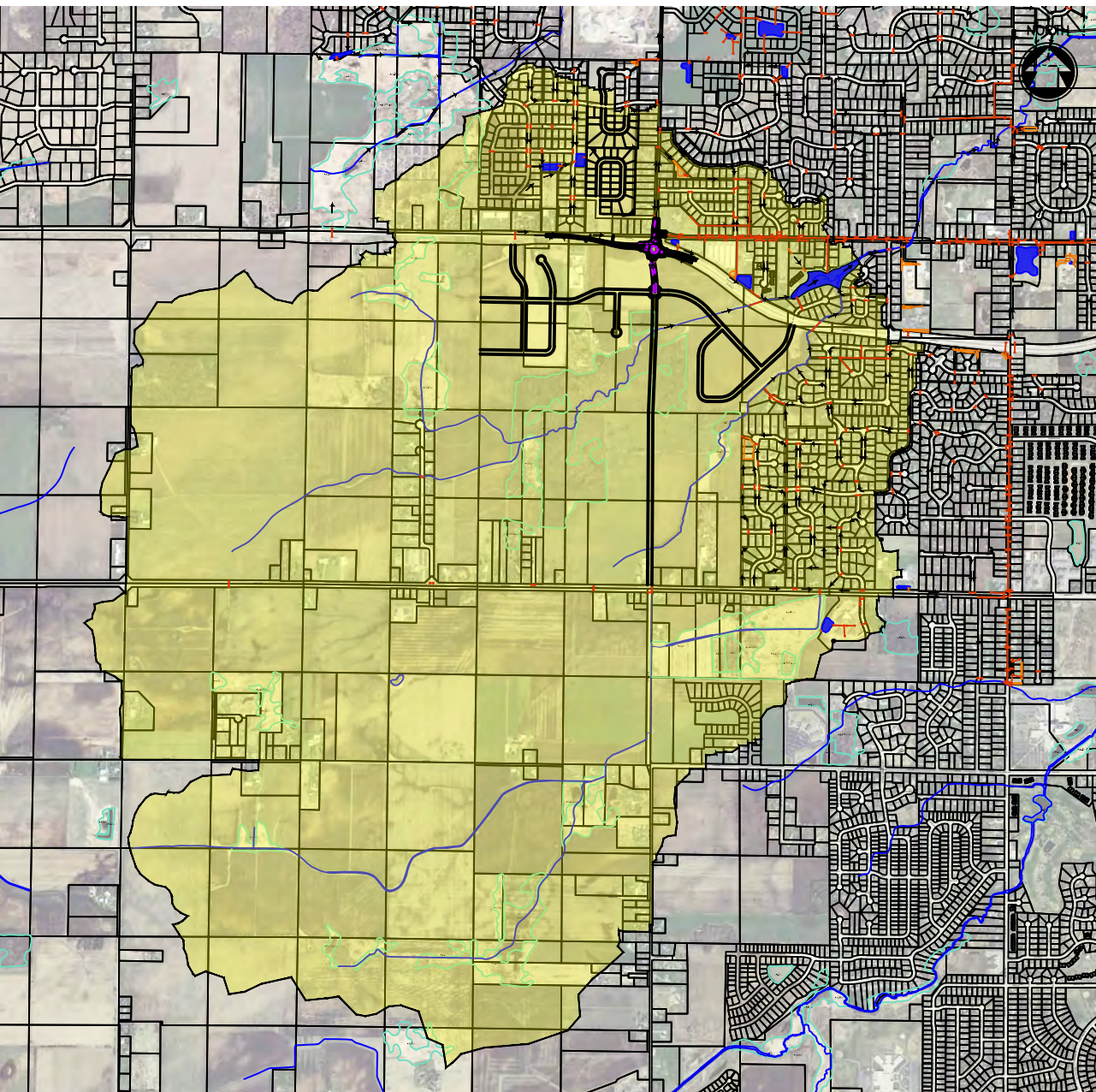
SITE INFORMATION:

Municipality: TOWN OF ALGOMA	Date: NOV, 2025
Proposed BMP Name: Honey Creek Pond	Initials: PTK

DRAINAGE AREA:

Sub-watershed ID: LAKE BUTTE DES MORTS	Catchment Area IDs: B4a1-B4a4, B4a7-B4a8, B4b7, B4c1-B4c3, B3c5-B3c8, B4d1, B4d4, B4e2, B4f5, B4f6, B4g3, B4h2, B4h5, B4i9	Total Drainage Area: 2,817.0 acres
Imperviousness (Future): 26.8%	Runoff Curve Number (Future): 82	Water Quality Volume (Future): 102.52 ac-ft

Drainage Area / Site Location Map:



pldeman, W:\PROJECTS\A0018_092300721\Dept\Storm\03-MS4 Mapping\BMP Concepts\BMP-B4i9.dwg, bmp-b4i9, Plot Date: 1/9/2026 12:11 PM, xrefs: j-hydrafire, co-winebago

POTENTIAL STORMWATER BMP RETROFIT

BMP CATCHMENT ID: BMP-B4k4

McM PROJECT NO: A0018-09-23-00721

sldeman, W:\PROJECTS\A0018_092300721\Dept\Storm\03-MS4 Mapping\BMP Concepts\BMP-B4k4.dwg, bmp-b4k4, Plot Date: 1/9/2026 12:13 PM, xrefs: f-hydrainline-co-winebago

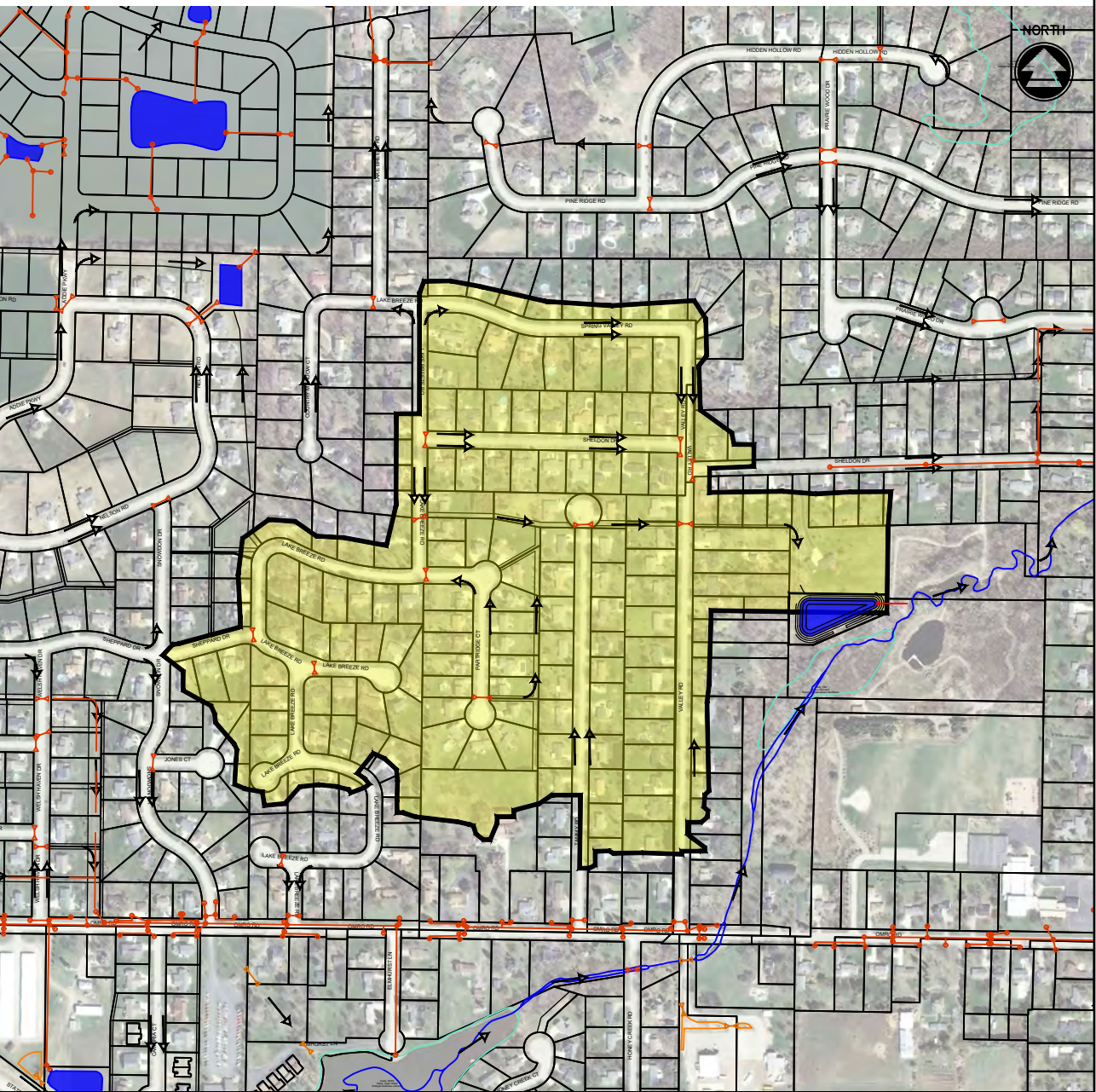
SITE INFORMATION:

Municipality: TOWN OF ALGOMA	Date: NOV, 2025
Proposed BMP Name: Sheldon Pond	Initials: PTK

DRAINAGE AREA:

Sub-watershed ID: LAKE BUTTE DES MORTS	Catchment Area IDs: B4k4	Total Drainage Area: 80.8 acres
Imperviousness (Future): 30.5%	Runoff Curve Number (Future): 83	Water Quality Volume (Future): 3.27 ac-ft

Drainage Area / Site Location Map:



pkleman, W:\PROJECTS\A0018\092300721\Dept\Storm\03-MS4 Mapping\BMP Concepts\BMP-B4k4_B.dwg, bmp-b4k4_b, Plot Dates: 1/9/2026 12:14 PM, xrefs: k-wetland.dwg 2007.X

PROPOSED BMP RETROFIT:

Type of proposed BMP retrofit (e.g. wet pond, bioretention, proprietary device, etc.):
 Wet Detention Pond

Initial BMP Screening

Remediation:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Wetland:	<input checked="" type="checkbox"/> Potential <input type="checkbox"/> Yes <input type="checkbox"/> No
Historical:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Public Well < 400 ft:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
100-Year Floodplain:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Private Well < 100 ft:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

BMP Outfall (storm sewer, stream, wetland, groundwater, etc.):
 Pond to discharge via new storm sewer to Honey Creek.

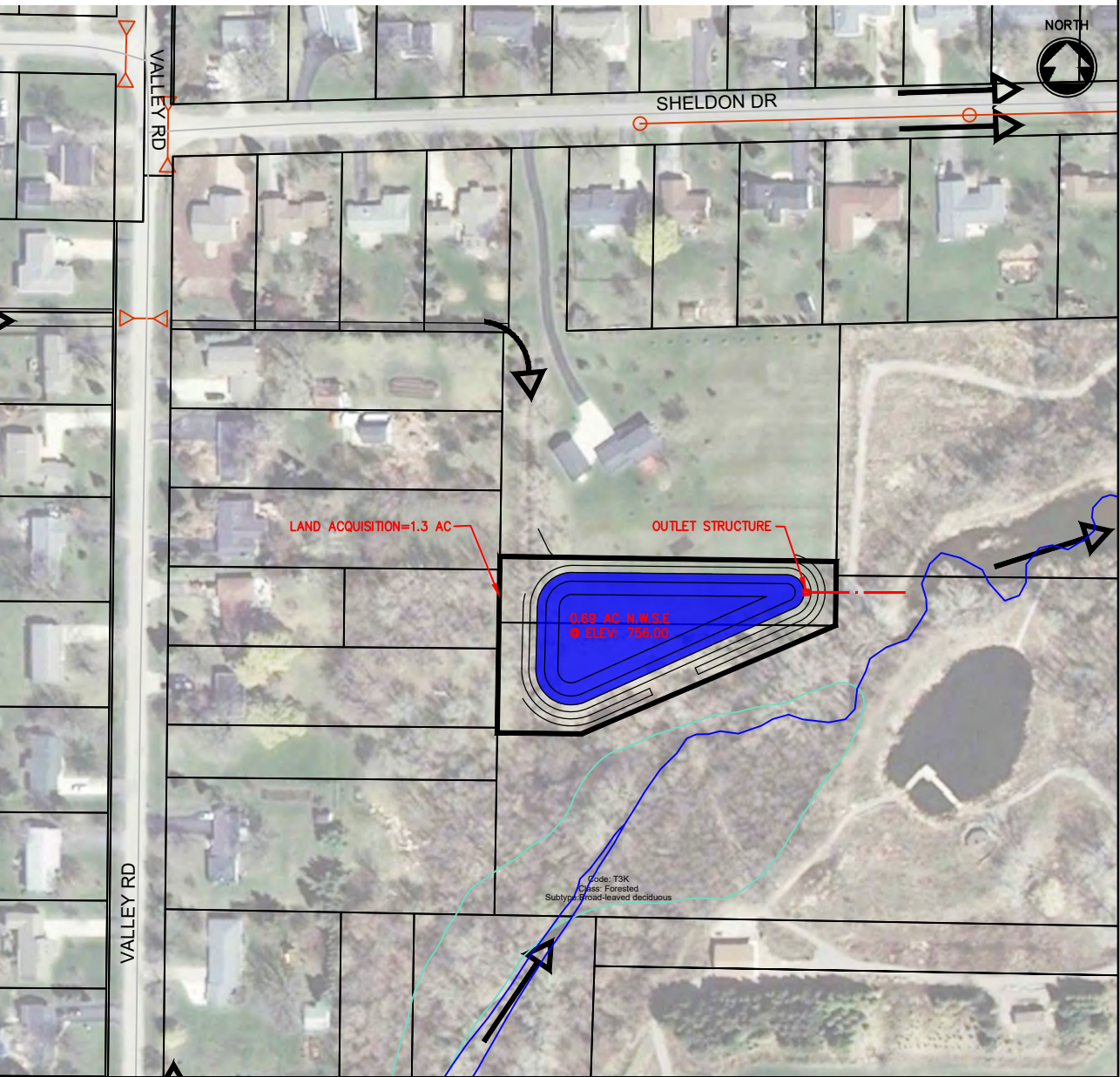
Infrastructure modifications or flow diversions required for retrofit:
 Divert drainage swale from the north into the proposed pond.

Site access for future BMP maintenance:
 Average. Access from Valley Rd and drainage easements.

Site constraints that require further investigation (e.g. utility conflicts, wetlands, groundwater, etc.):
 Floodplain, bedrock, groundwater, wetlands, utility conflicts associated with new pond

Approx. Size of BMP Retrofit: 0.69 ac Permanent Pool	Approx. Land Required (ac): 1.3 acres	Estimated Cost: \$431,600 (\$522,800 w/E.S.)
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Sketch of Proposed BMP Retrofit:



POTENTIAL STORMWATER BMP RETROFIT

BMP CATCHMENT ID: BMP-B4k8

McM PROJECT NO: A0018-09-23-00721

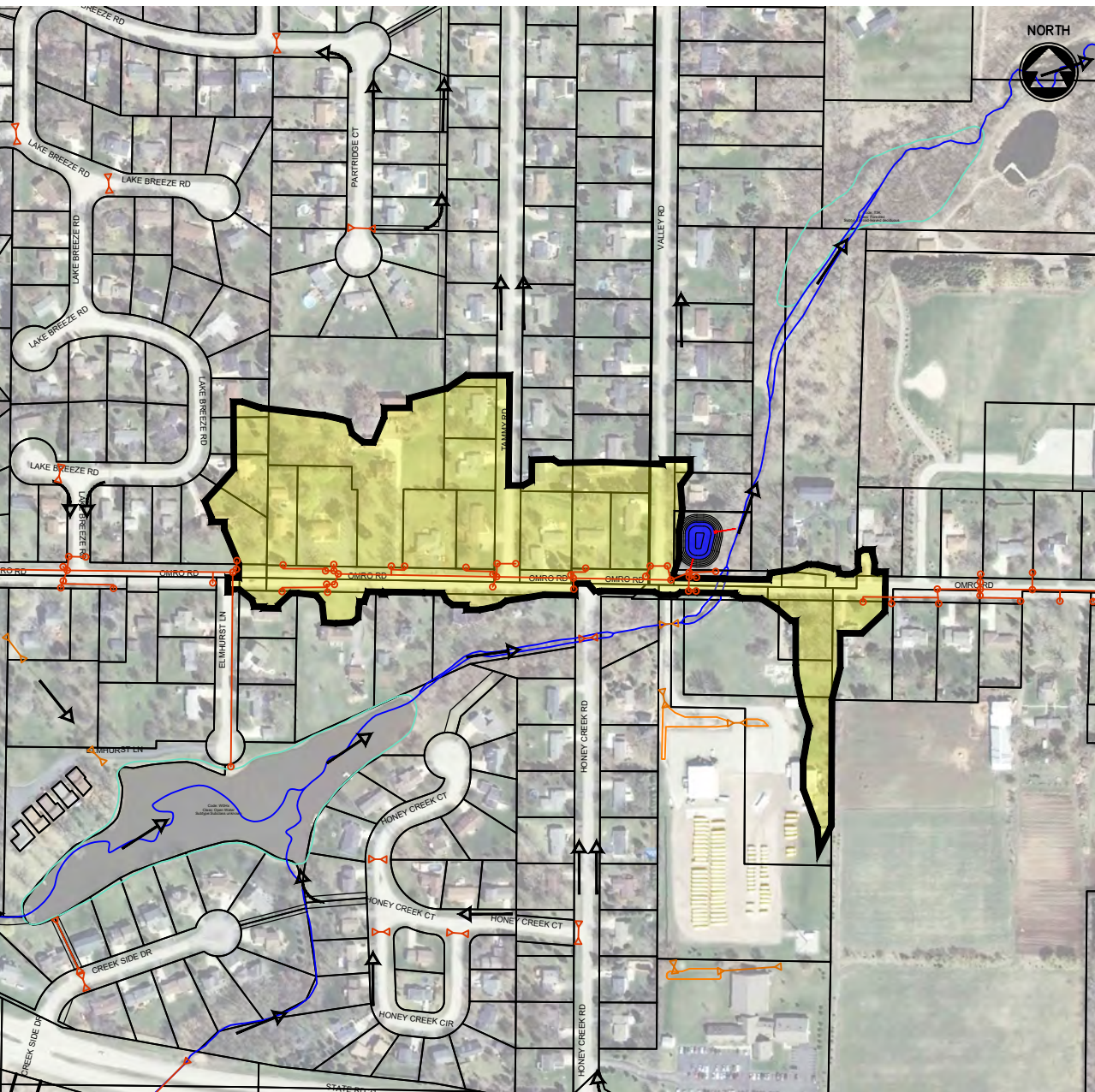
SITE INFORMATION:

Municipality: TOWN OF ALGOMA	Date: NOV, 2025
Proposed BMP Name: Valley Road Pond	Initials: PTK

DRAINAGE AREA:

Sub-watershed ID: LAKE BUTTE DES MORTS	Catchment Area IDs: B4k8	Total Drainage Area: 14.2 acres
Imperviousness (Future): 26.3%	Runoff Curve Number (Future): 82	Water Quality Volume (Future): 0.51 ac-ft

Drainage Area / Site Location Map:



sldeman, W:\PROJECTS\A0018_092300721\Dept\Storm\03-MS4 Mapping\BMP Concepts\BMP-B4k8.dwg, bmp-b4k8, Plot Date: 1/9/2026 12:16 PM, xrefs: h-hydrafile.co-winebago

pldeman, W:\PROJECTS\A0016\092300721\Dept\Storm\03-MS4 Mapping\BMP Concepts\BMP-B4\8_B.dwg, bmp-b4\8_b, Plot Dates: 1/9/2026 12:17 PM, xrefs: k-wetland.dwg 2007.X

PROPOSED BMP RETROFIT:

Type of proposed BMP retrofit (e.g. wet pond, bioretention, proprietary device, etc.):
Wet Detention Pond

Initial BMP Screening

Remediation:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Wetland:	<input checked="" type="checkbox"/> Potential <input type="checkbox"/> Yes <input type="checkbox"/> No
Historical:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Public Well < 400 ft:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
100-Year Floodplain:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Private Well < 100 ft:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

BMP Outfall (storm sewer, stream, wetland, groundwater, etc.):
Pond to discharge via new storm sewer to Honey Creek.

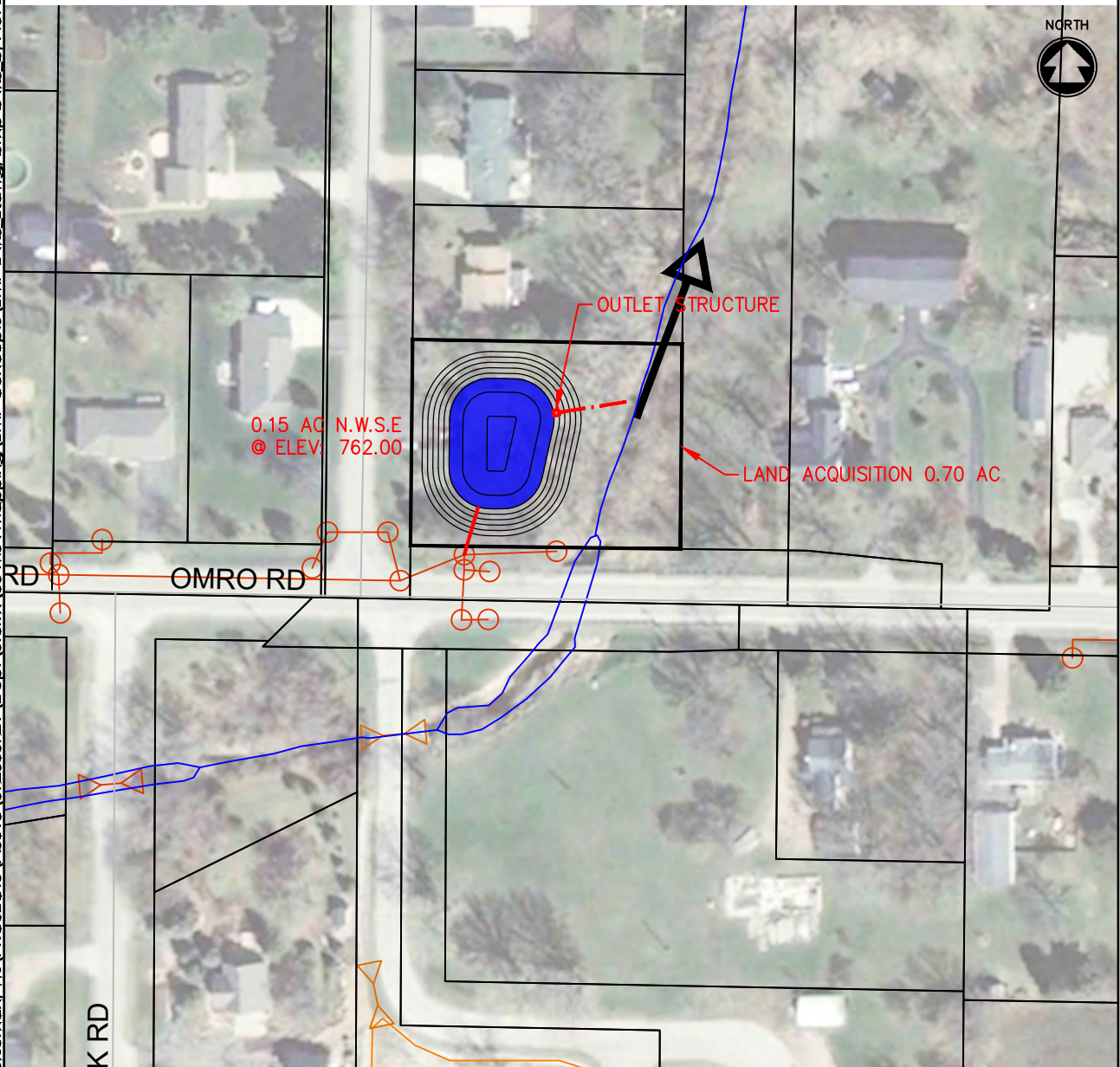
Infrastructure modifications or flow diversions required for retrofit:
Demo existing house. Divert existing storm sewer from Omro Road into the proposed pond.

Site access for future BMP maintenance:
Good. Access from Valley Rd.

Site constraints that require further investigation (e.g. utility conflicts, wetlands, groundwater, etc.):
House demo, floodplain, bedrock, groundwater, wetlands, utility conflicts associated with new pond

Approx. Size of BMP Retrofit: 0.15 ac Permanent Pool	Approx. Land Required (ac): 0.70 acres	Estimated Cost: \$494,500 (\$566,400 w/E.S.)
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Sketch of Proposed BMP Retrofit:



POTENTIAL STORMWATER BMP RETROFIT

BMP CATCHMENT ID: BMP-B4n2

McM PROJECT NO: A0018-09-23-00721

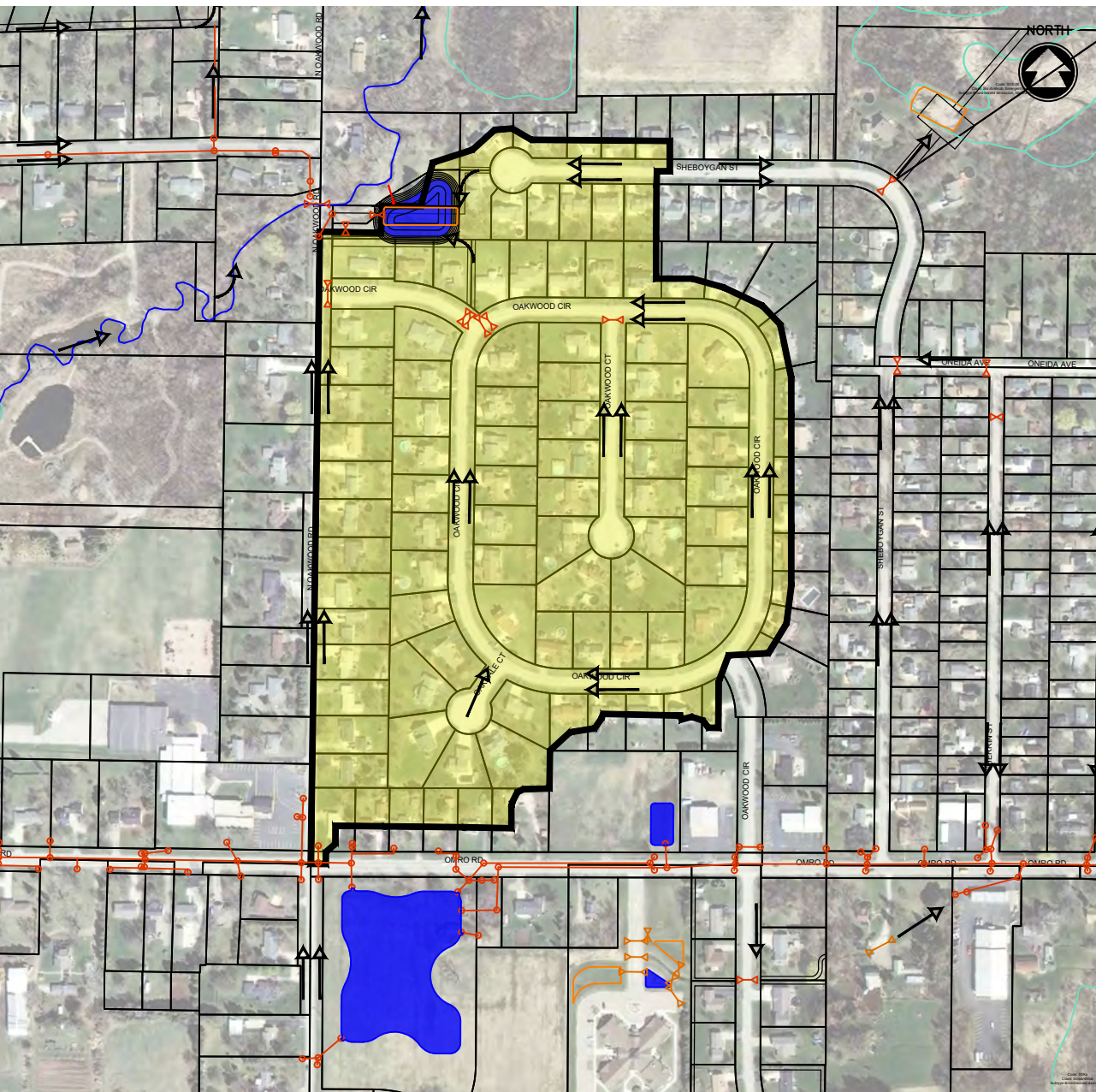
SITE INFORMATION:

Municipality: TOWN OF ALGOMA	Date: NOV, 2025
Proposed BMP Name: Oakwood Circle Pond	Initials: PTK

DRAINAGE AREA:

Sub-watershed ID: LAKE BUTTE DES MORTS	Catchment Area IDs: B4n2	Total Drainage Area: 42.1 acres
Imperviousness (Future): 34.4%	Runoff Curve Number (Future): 85	Water Quality Volume (Future): 1.89 ac-ft

Drainage Area / Site Location Map:



pldeman, W:\PROJECTS\A0018_092300721\Dept\Storm\03-MS4 Mapping\BMP Concepts\BMP-B4n2.dwg, bmp-b4n2, Plot Date: 1/9/2026 12:18 PM, xrefs: fx-hydralline_co-winnebagc

pldeman, W:\PROJECTS\A0016\092300721\Dept\Storm\03-MS4 Mapping\BMP Concepts\BMP-B4n2_B.dwg, bmp-b4n2_b, Plot Date: 1/9/2026 12:19 PM, xref: x-wetland.dnr_2007.r

PROPOSED BMP RETROFIT:

Type of proposed BMP retrofit (e.g. wet pond, bioretention, proprietary device, etc.):
 Wet Detention Pond

Initial BMP Screening

Remediation:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Wetland:	<input checked="" type="checkbox"/> Potential <input type="checkbox"/> Yes <input type="checkbox"/> No
Historical:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Public Well < 400 ft:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
100-Year Floodplain:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Private Well < 100 ft:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

BMP Outfall (storm sewer, stream, wetland, groundwater, etc.):
 Pond to discharge via new storm sewer to Honey Creek.

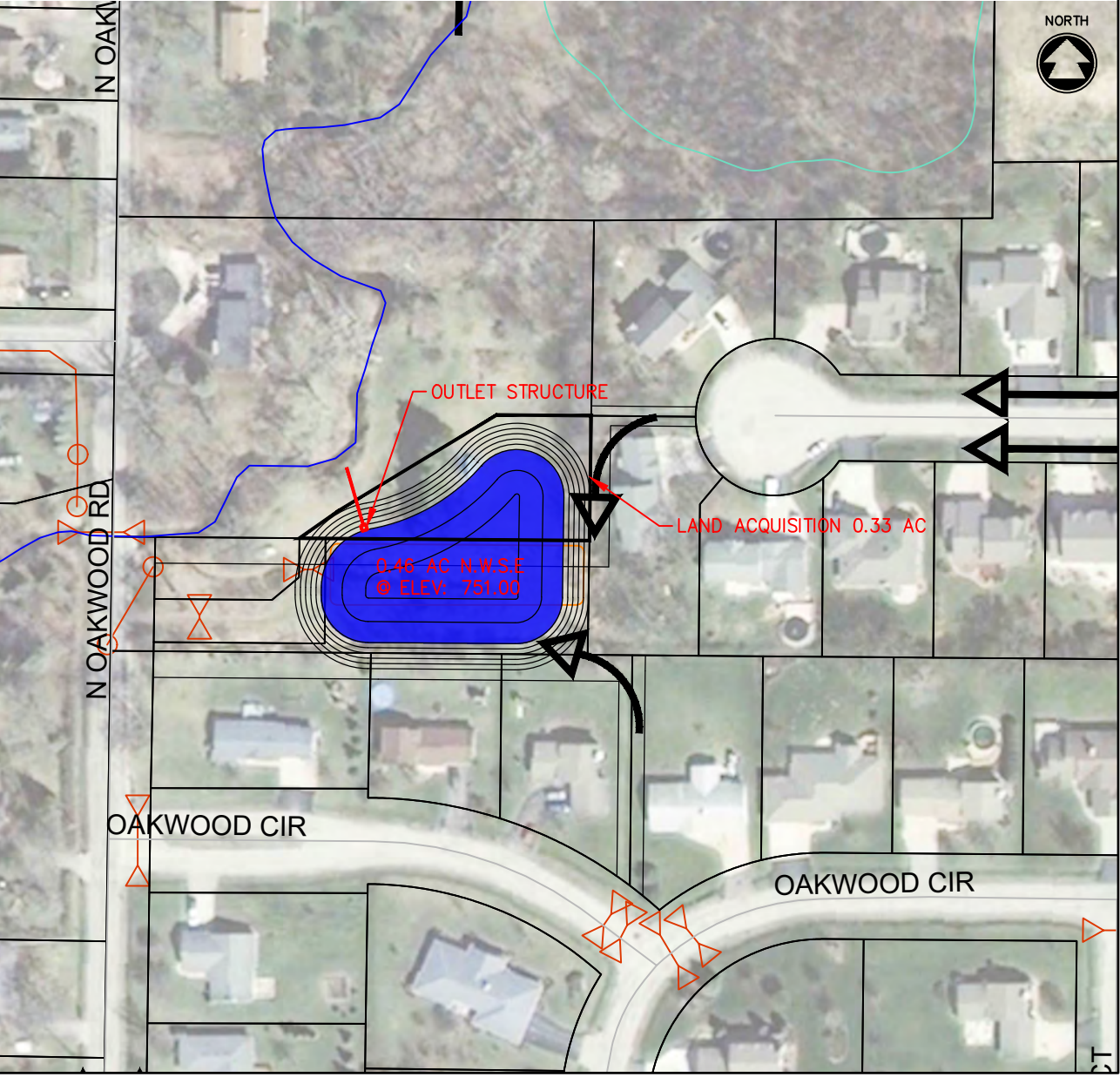
Infrastructure modifications or flow diversions required for retrofit:
 Convert and expand existing dry pond to a wet detention pond. Divert existing drainage swales into proposed pond.

Site access for future BMP maintenance:
 Good. Access from Oakwood Rd.

Site constraints that require further investigation (e.g. utility conflicts, wetlands, groundwater, etc.):
 Floodplain, bedrock, groundwater, wetlands, utility conflicts associated with expanded pond

Approx. Size of BMP Retrofit: 0.46 ac Permanent Pool	Approx. Land Required (ac): 0.33 acres	Estimated Cost: \$258,000 (\$339,500 w/E.S.)
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Sketch of Proposed BMP Retrofit:



POTENTIAL STORMWATER BMP RETROFIT

BMP CATCHMENT ID: BMP-B4p1

McM PROJECT NO: A0018-09-23-00721

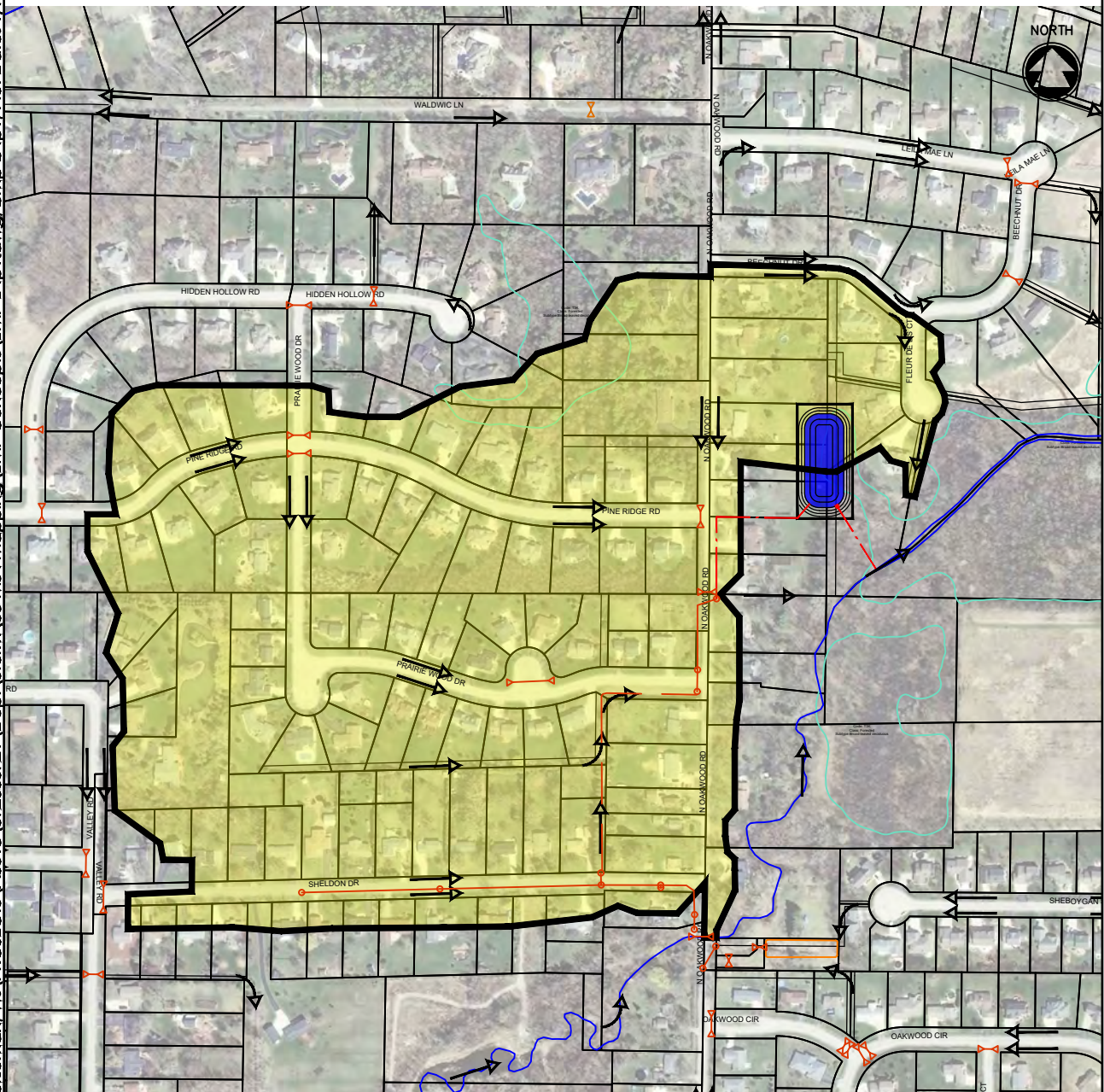
SITE INFORMATION:

Municipality: TOWN OF ALGOMA	Date: NOV, 2025
Proposed BMP Name: Prairie Wood Pond	Initials: PTK

DRAINAGE AREA:

Sub-watershed ID: LAKE BUTTE DES MORTS	Catchment Area IDs: B4p1	Total Drainage Area: 64.6 acres
Imperviousness (Future): 24.9%	Runoff Curve Number (Future): 82	Water Quality Volume (Future): 2.21 ac-ft

Drainage Area / Site Location Map:



pldeman, W:\PROJECTS\A0018\092300721\Dept\Storm\03-MS4 Mapping\BMP Concepts\BMP-B4p1.dwg, bmp-b4p1, Plot Date: 1/9/2026 12:20 PM, xrefs: k-hydrafile_co-winnebag

pkleman, W:\PROJECTS\A0018\092300721\Dept\Storm\03-MS4 Mapping\BMP Concepts\BMP-B4p1_B.dwg, bmp-b4p1_b, Plot Date: 1/9/2026 12:21 PM, xrefs: x-wetland.dwg 2007.1

PROPOSED BMP RETROFIT:

Type of proposed BMP retrofit (e.g. wet pond, bioretention, proprietary device, etc.):
 Wet Detention Pond

Initial BMP Screening

Remediation:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Wetland:	<input checked="" type="checkbox"/> Potential <input type="checkbox"/> Yes <input type="checkbox"/> No
Historical:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Public Well < 400 ft:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
100-Year Floodplain:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Private Well < 100 ft:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

BMP Outfall (storm sewer, stream, wetland, groundwater, etc.):
 Pond to discharge via new storm sewer to Honey Creek.

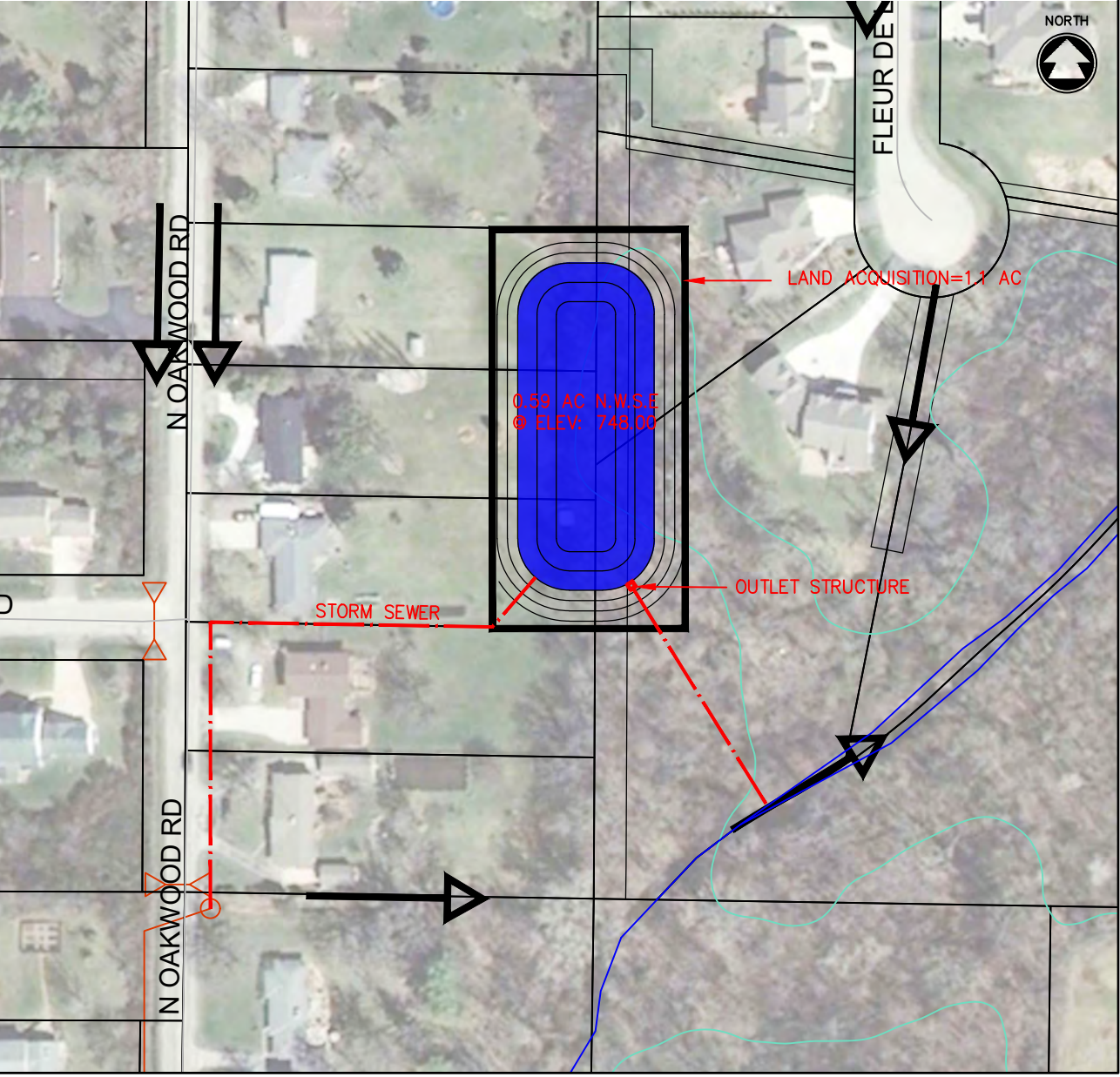
Infrastructure modifications or flow diversions required for retrofit:
 Divert existing storm sewer into proposed pond.

Site access for future BMP maintenance:
 Average. Access from Oakwood Rd or Fleur De Lis Ct & drainage/storm sewer easements.

Site constraints that require further investigation (e.g. utility conflicts, wetlands, groundwater, etc.):
 Floodplain, bedrock, groundwater, wetlands, utility conflicts associated with new pond

Approx. Size of BMP Retrofit: 0.59 ac Permanent Pool	Approx. Land Required (ac): 1.1 acres	Estimated Cost: \$482,600 (\$566,700 w/E.S.)
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Sketch of Proposed BMP Retrofit:



POTENTIAL STORMWATER BMP RETROFIT

BMP CATCHMENT ID: BMP-B4q2

McM PROJECT NO: A0018-09-23-00721

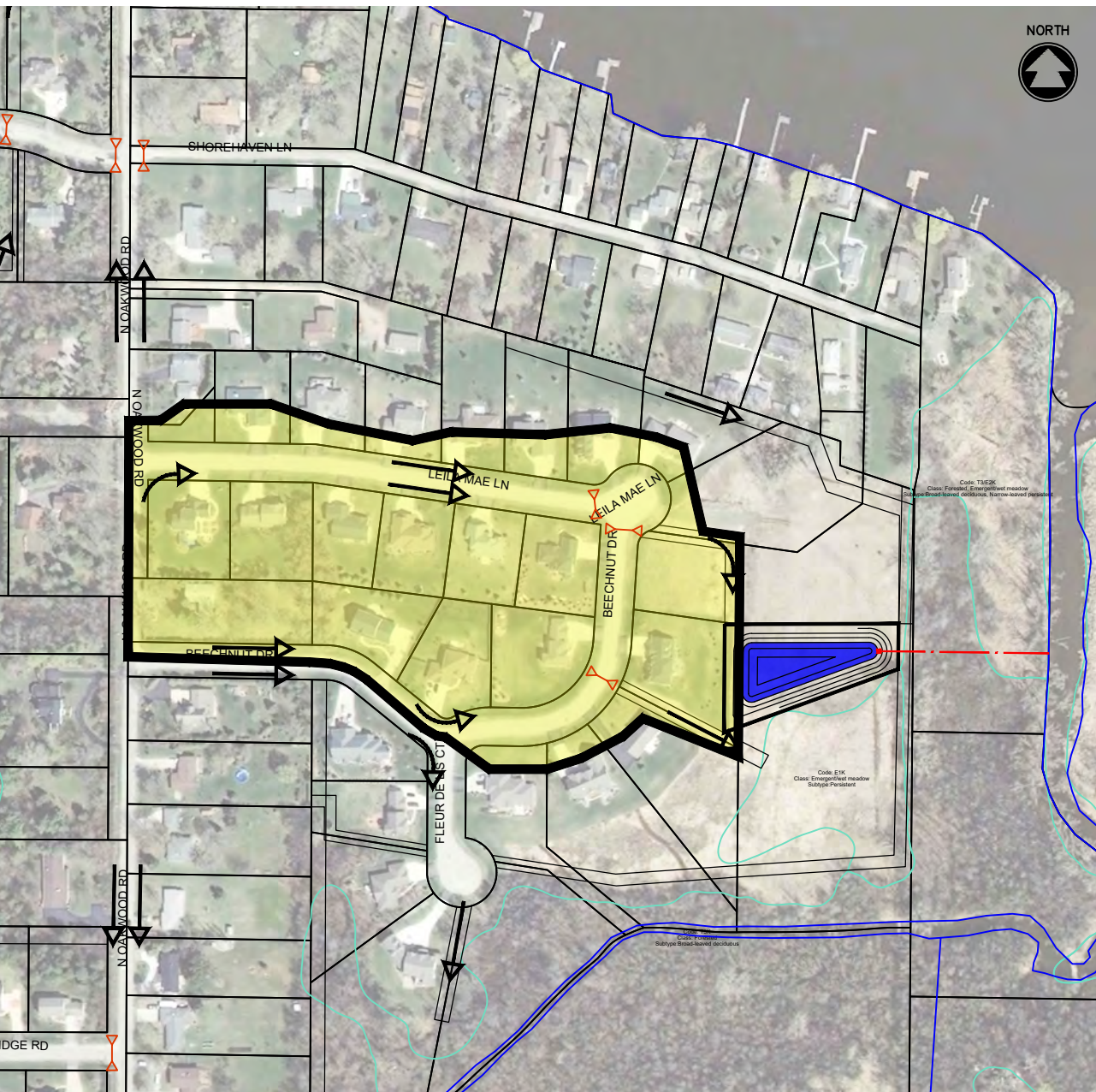
SITE INFORMATION:

Municipality: TOWN OF ALGOMA	Date: NOV, 2025
Proposed BMP Name: Hecker Hollow Pond	Initials: PTK

DRAINAGE AREA:

Sub-watershed ID: LAKE BUTTE DES MORTS	Catchment Area IDs: B4q2	Total Drainage Area: 11.6 acres
Imperviousness (Future): 25.5%	Runoff Curve Number (Future): 84	Water Quality Volume (Future): 0.40 ac-ft

Drainage Area / Site Location Map:



W:\PROJECTS\A0018_092300721\Dept\Storm\03-MS4 Mapping\BMP Concepts\BMP-B4q2.dwg, bmp-b4q2, Plot Date: 1/9/2026 12:22 PM, xrefs: k-hydrafile_co-winnebag

pldemann, W:\PROJECTS\A0016\092300721\Dept\Storm\03-MS4 Mapping\BMP Concepts\BMP-B4a2_B.dwg, bmp-b4a2_b, Plot Date: 1/9/2026 12:23 PM, xrefs: x-wetland.dwg 2007.1

PROPOSED BMP RETROFIT:

Type of proposed BMP retrofit (e.g. wet pond, bioretention, proprietary device, etc.):
 Wet Detention Pond

Initial BMP Screening

Remediation:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Wetland:	<input checked="" type="checkbox"/> Potential <input type="checkbox"/> Yes <input type="checkbox"/> No
Historical:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Public Well < 400 ft:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
100-Year Floodplain:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Private Well < 100 ft:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

BMP Outfall (storm sewer, stream, wetland, groundwater, etc.):
 Pond to discharge via new storm sewer to Honey Creek.

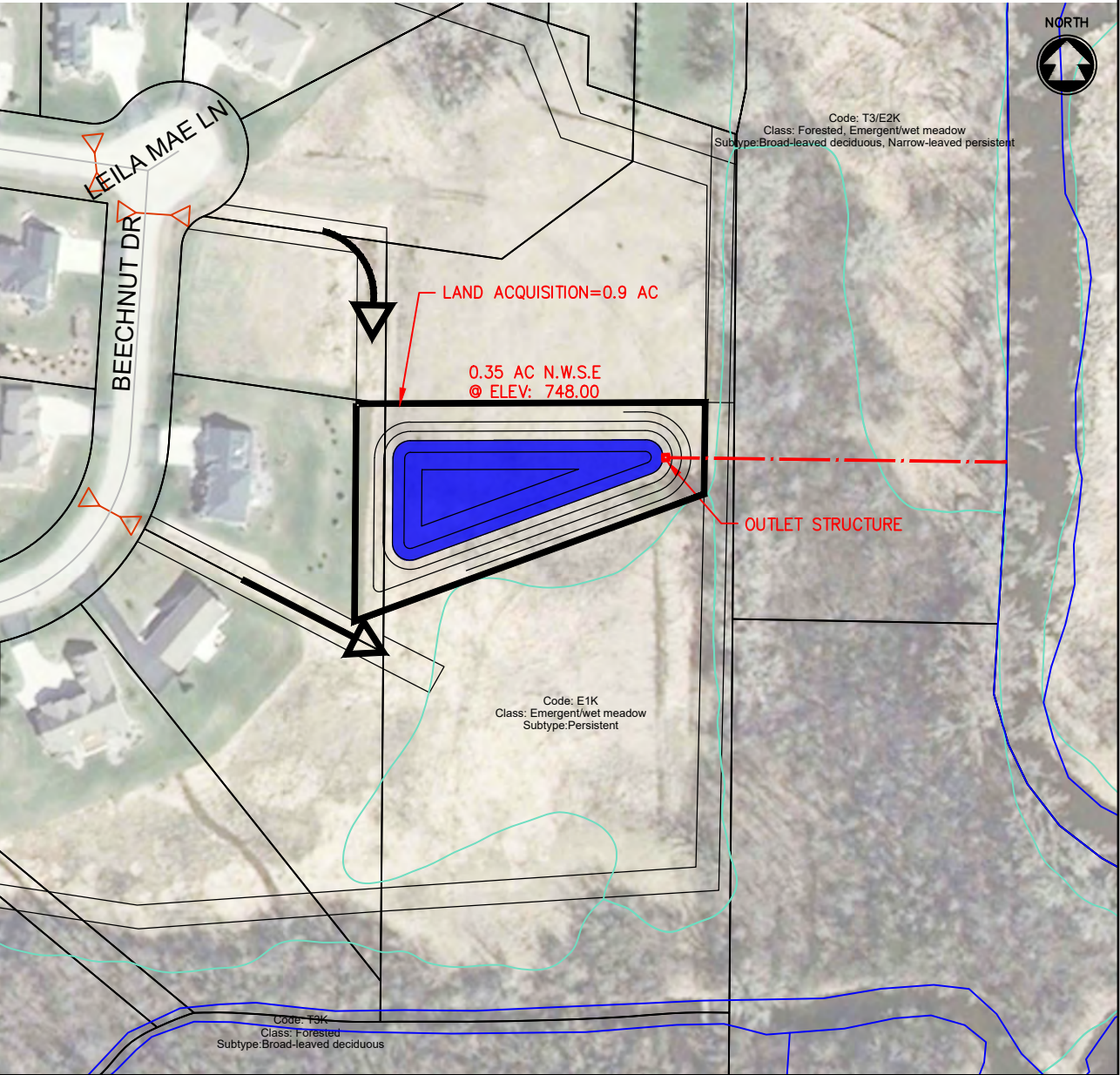
Infrastructure modifications or flow diversions required for retrofit:
 Divert existing drainage swales into proposed pond.

Site access for future BMP maintenance:
 Average. Access from Beechnut Dr & drainage/storm sewer easements.

Site constraints that require further investigation (e.g. utility conflicts, wetlands, groundwater, etc.):
 Bedrock, groundwater, wetlands, utility conflicts associated with new pond

Approx. Size of BMP Retrofit: 0.35 ac Permanent Pool	Approx. Land Required (ac): 0.9 acres	Estimated Cost: \$305,800
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Sketch of Proposed BMP Retrofit:



POTENTIAL STORMWATER BMP RETROFIT

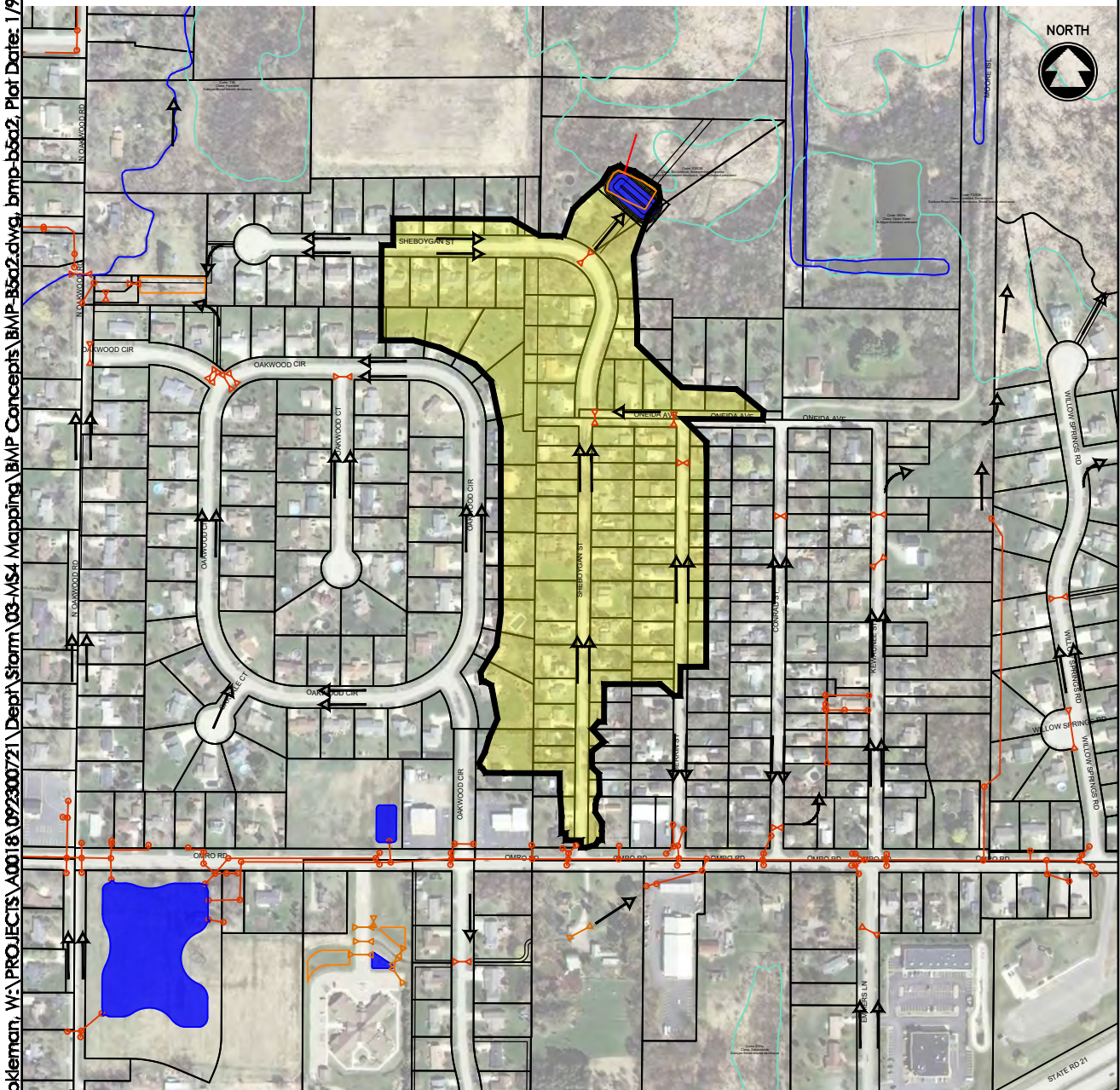
BMP CATCHMENT ID: BMP-B5a2

McM PROJECT NO: A0018-09-23-00721

SITE INFORMATION:	
Municipality: TOWN OF ALGOMA	Date: NOV, 2025
Proposed BMP Name: Red Bird Meadows Pond	Initials: PTK

DRAINAGE AREA:		
Sub-watershed ID: LAKE BUTTE DES MORTS	Catchment Area IDs: B5a2	Total Drainage Area: 23.7 acres
Imperviousness (Future): 36.5%	Runoff Curve Number (Future): 86	Water Quality Volume (Future): 1.10 ac-ft

Drainage Area / Site Location Map:



pldeman, W:\PROJECTS\A0018_092300721\Dept Storm\03-MS4 Mapping\BMP Concepts\BMP-B5a2.dwg, bmp-b5a2, Plot Date: 1/9/2026 12:24 PM, xrefs: k-hydrafile_co-winnebag

pldeman, W:\PROJECTS\A0018\092300721\Dept\Storm\03-MS4 Mapping\BMP Concepts\BMP-B5a2_B.dwg, bmp-b5a2_b, Plot Date: 1/9/2026 12:25 PM, xrefs: x-wetland.dwg 2007.1

PROPOSED BMP RETROFIT:

Type of proposed BMP retrofit (e.g. wet pond, bioretention, proprietary device, etc.):
 Wet Detention Pond

Initial BMP Screening

Remediation:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Wetland:	<input checked="" type="checkbox"/> Potential <input type="checkbox"/> Yes <input type="checkbox"/> No
Historical:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Public Well < 400 ft:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
100-Year Floodplain:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Private Well < 100 ft:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

BMP Outfall (storm sewer, stream, wetland, groundwater, etc.):
 Pond to discharge via new storm sewer to wetland / drainage way to the north.

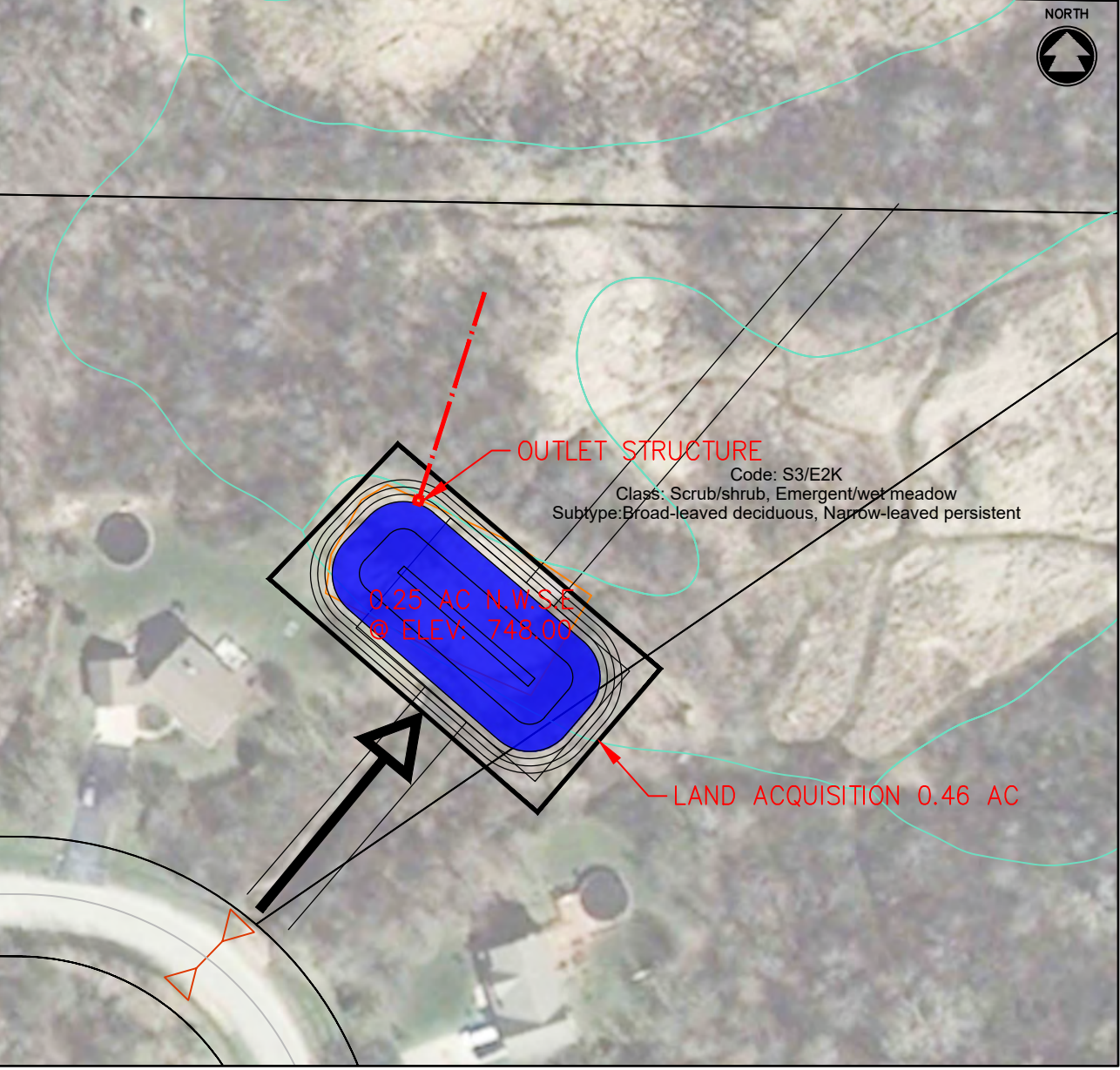
Infrastructure modifications or flow diversions required for retrofit:
 Convert and expand existing dry pond to a wet detention pond. Divert existing drainage swales into proposed pond.

Site access for future BMP maintenance:
 Average. Access from Sheboygan St & drainage easement.

Site constraints that require further investigation (e.g. utility conflicts, wetlands, groundwater, etc.):
 Bedrock, groundwater, wetlands, utility conflicts associated with new pond

Approx. Size of BMP Retrofit: 0.25 ac Permanent Pool	Approx. Land Required (ac): 0.46 acres	Estimated Cost: \$236,500 (\$312,500 w/E.S.)
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Sketch of Proposed BMP Retrofit:



POTENTIAL STORMWATER BMP RETROFIT

BMP CATCHMENT ID: BMP-B6b6

McM PROJECT NO: A0018-09-23-00721

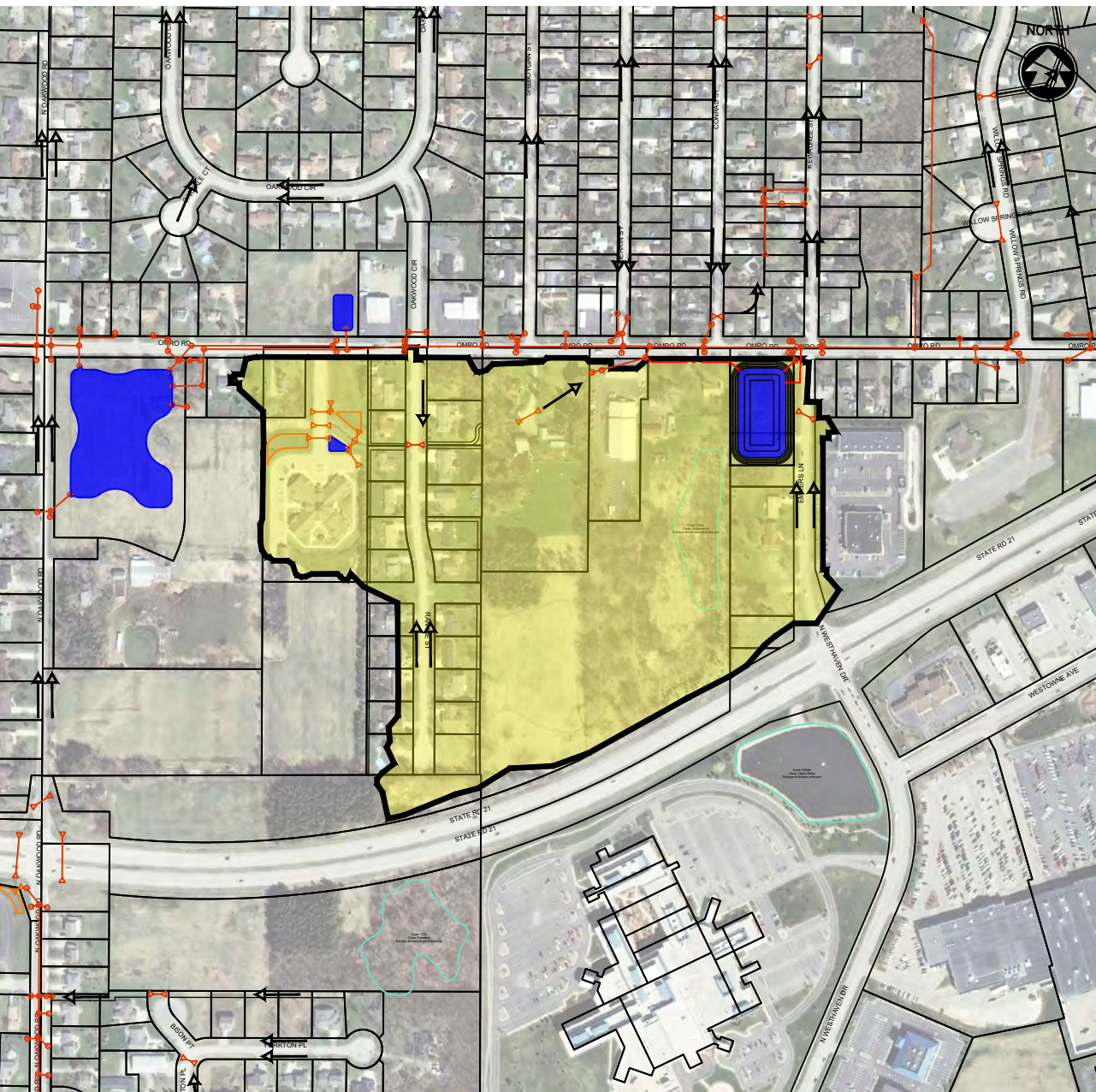
SITE INFORMATION:

Municipality: TOWN OF ALGOMA	Date: NOV, 2025
Proposed BMP Name: Elmers Lane Pond	Initials: PTK

DRAINAGE AREA:

Sub-watershed ID: LAKE BUTTE DES MORTS	Catchment Area IDs: B6a2, B6a5, B6b6	Total Drainage Area: 41.4 acres
Imperviousness (Future): 66.1%	Runoff Curve Number (Future): 91	Water Quality Volume (Future): 3.34 ac-ft

Drainage Area / Site Location Map:



W:\PROJECTS\A0018_092300721\Dept\Storm\03-MS4 Mapping\BMP Concepts\BMP-B6b6.dwg, bmp-b6b6, Plot Date: 1/9/2026 12:26 PM, xrefs: k-hydraflow_co-winnebag

pkleman, W:\PROJECTS\A0018\092300721\Dept\Storm\03-MS4 Mapping\BMP Concepts\BMP-B6b6_Bolwa, bmp-b6b6_b, Plot Date: 1/9/2026 12:27 PM_xrefs: x-wetland.dmr 2007.1

PROPOSED BMP RETROFIT:

Type of proposed BMP retrofit (e.g. wet pond, bioretention, proprietary device, etc.):
 Wet Detention Pond

Initial BMP Screening

Remediation:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Wetland:	<input checked="" type="checkbox"/> Potential <input type="checkbox"/> Yes <input type="checkbox"/> No
Historical:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Public Well < 400 ft:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
100-Year Floodplain:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Private Well < 100 ft:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

BMP Outfall (storm sewer, stream, wetland, groundwater, etc.):
 Pond to discharge via new storm sewer to existing Omro Road storm sewer.

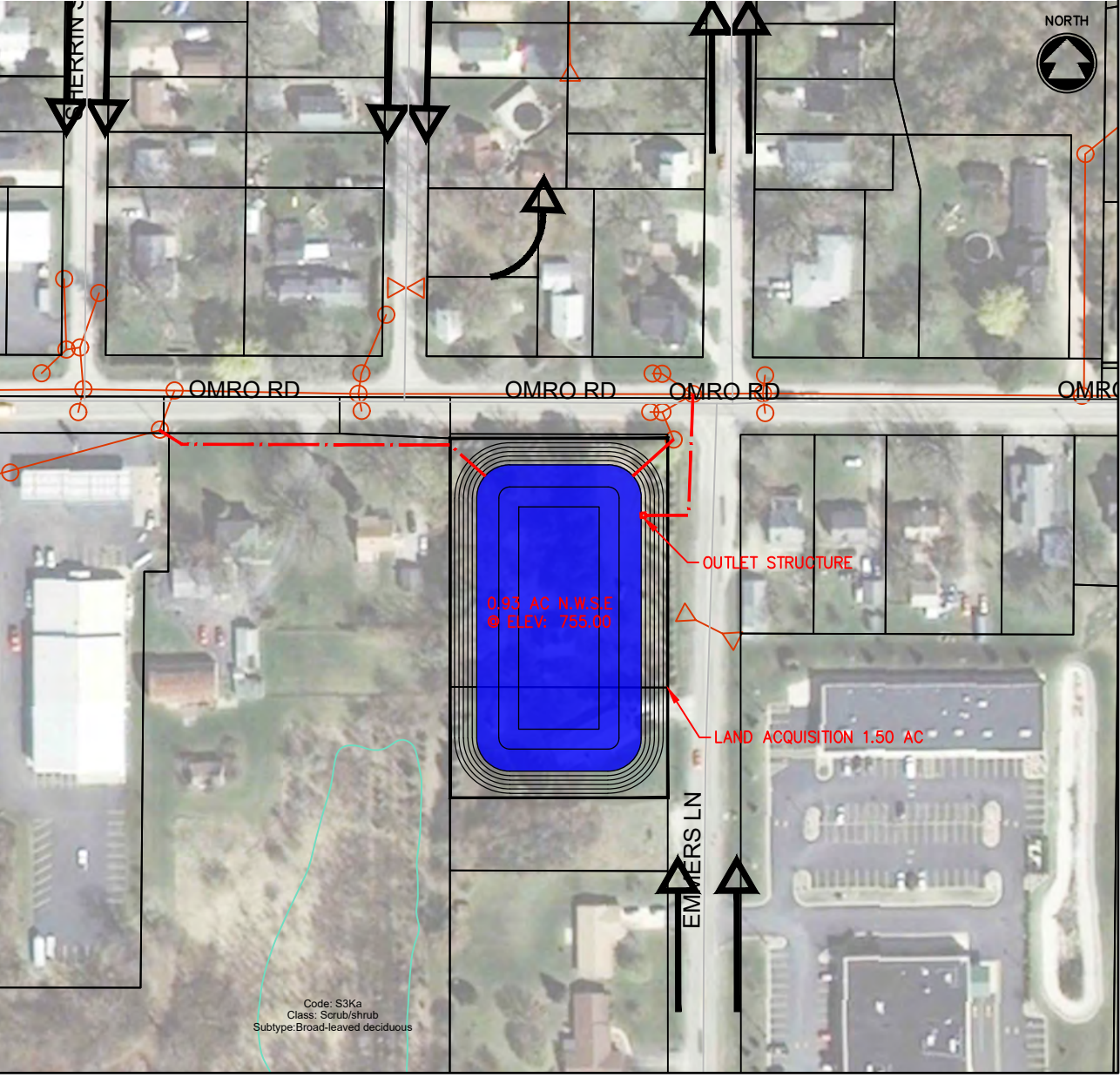
Infrastructure modifications or flow diversions required for retrofit:
 Demo 2 existing houses. Divert existing storm sewer into proposed pond.

Site access for future BMP maintenance:
 Good. Access from Omro Rd or Elmers Ln.

Site constraints that require further investigation (e.g. utility conflicts, wetlands, groundwater, etc.):
 Bedrock, groundwater, wetlands, utility conflicts associated with new pond

Approx. Size of BMP Retrofit: 0.93 ac Permanent Pool	Approx. Land Required (ac): 1.50 acres	Estimated Cost: \$1,241,000 (\$1,386,900 w/E.S.)
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Sketch of Proposed BMP Retrofit:



POTENTIAL STORMWATER BMP RETROFIT

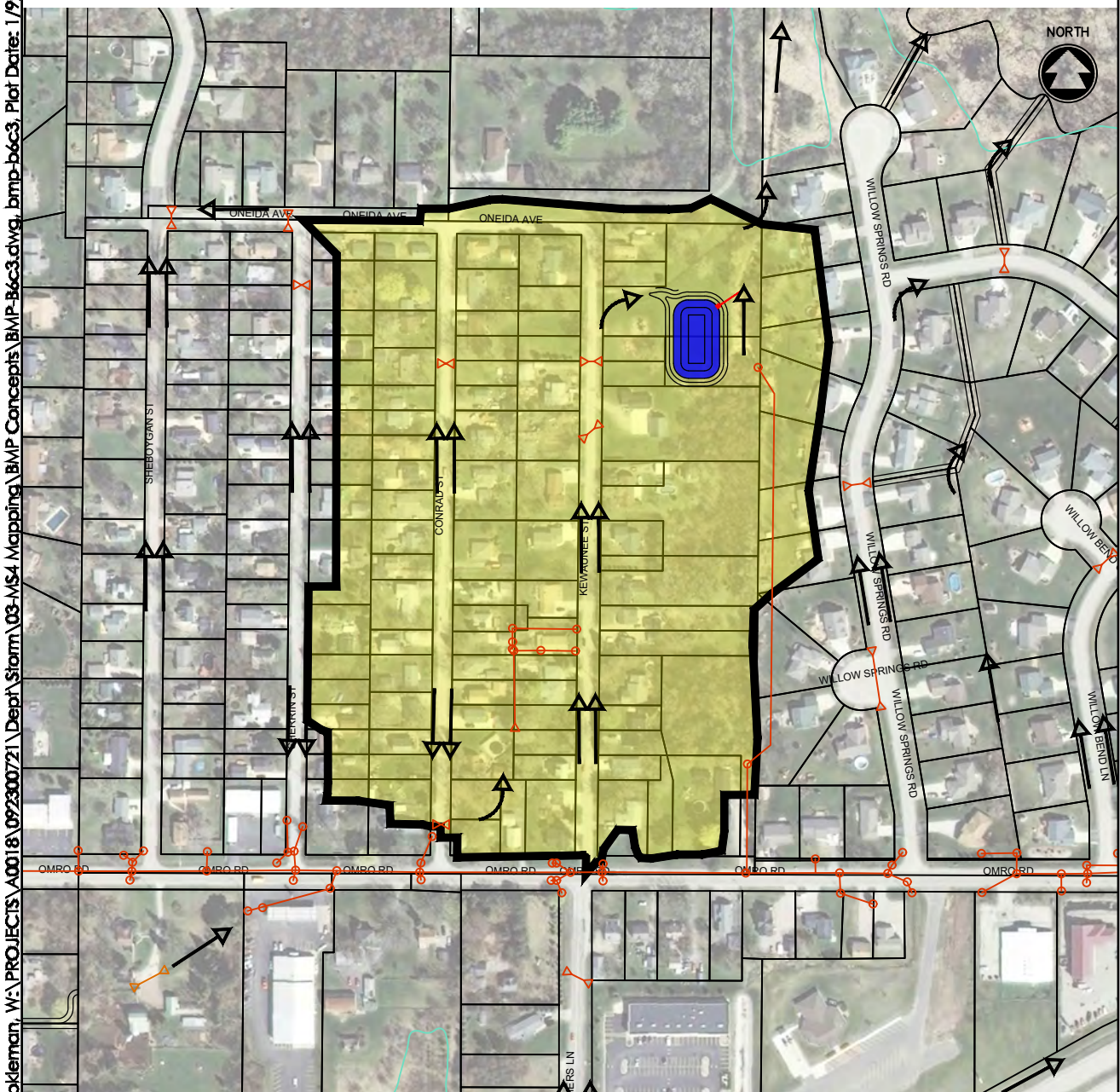
BMP CATCHMENT ID: BMP-B6c3

McM PROJECT NO: A0018-09-23-00721

SITE INFORMATION:	
Municipality: TOWN OF ALGOMA	Date: NOV, 2025
Proposed BMP Name: Kewaunee Park Pond	Initials: PTK

DRAINAGE AREA:		
Sub-watershed ID: LAKE BUTTE DES MORTS	Catchment Area IDs: B6c3	Total Drainage Area: 26.9 acres
Imperviousness (Future): 31.0%	Runoff Curve Number (Future): 84	Water Quality Volume (Future): 1.11 ac-ft

Drainage Area / Site Location Map:



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bkdemman, W:\PROJECTS\A0018\092300721\Dept\Storm\03-MS4 Mapping\BMP Concepts\BMP-B6c3_B.dwg, bmp-b6c3_b, Plot Date: 1/9/2026 12:29 PM, xrefs: k-wetland.dnr 2007.r

PROPOSED BMP RETROFIT:

Type of proposed BMP retrofit (e.g. wet pond, bioretention, proprietary device, etc.):
 Wet Detention Pond

Initial BMP Screening

Remediation:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Wetland:	<input checked="" type="checkbox"/> Potential <input type="checkbox"/> Yes <input type="checkbox"/> No
Historical:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Public Well < 400 ft:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
100-Year Floodplain:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Private Well < 100 ft:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

BMP Outfall (storm sewer, stream, wetland, groundwater, etc.):
 Pond to discharge via new storm sewer to existing drainage swale to the northeast.

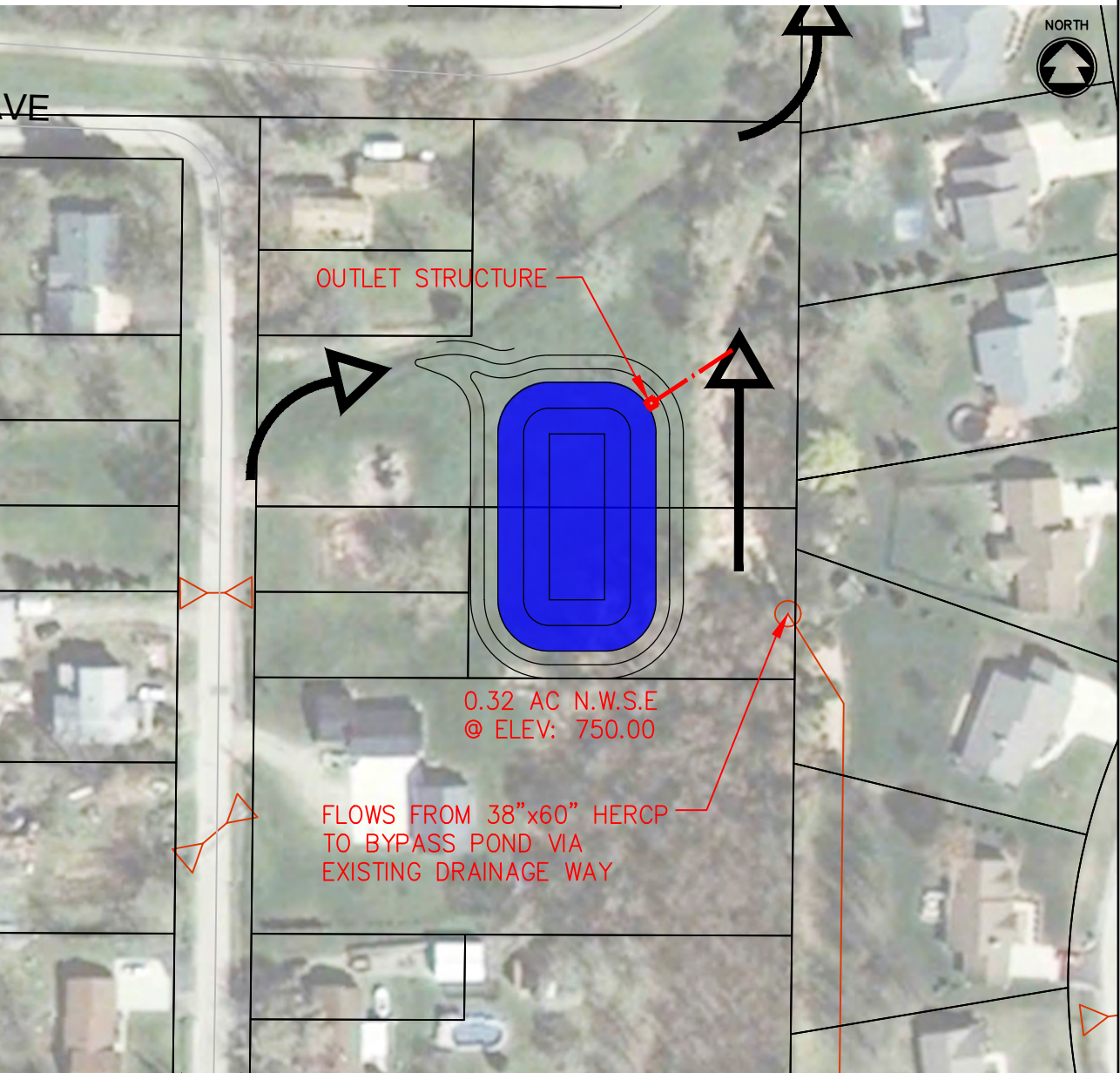
Infrastructure modifications or flow diversions required for retrofit:
 Divert existing drainage swales from Kewaunee St into proposed pond.

Site access for future BMP maintenance:
 Good. Access from Kewaunee St.

Site constraints that require further investigation (e.g. utility conflicts, wetlands, groundwater, etc.):
 Bedrock, groundwater, wetlands, utility conflicts associated with new pond

Approx. Size of BMP Retrofit: 0.32 ac Permanent Pool	Approx. Land Required (ac): N/A (Currently Town-Owned)	Estimated Cost: \$159,800 (\$235,900 w/E.S.)
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Sketch of Proposed BMP Retrofit:



POTENTIAL STORMWATER BMP RETROFIT

BMP CATCHMENT ID: BMP-B8b4

McM PROJECT NO: A0018-09-23-00721

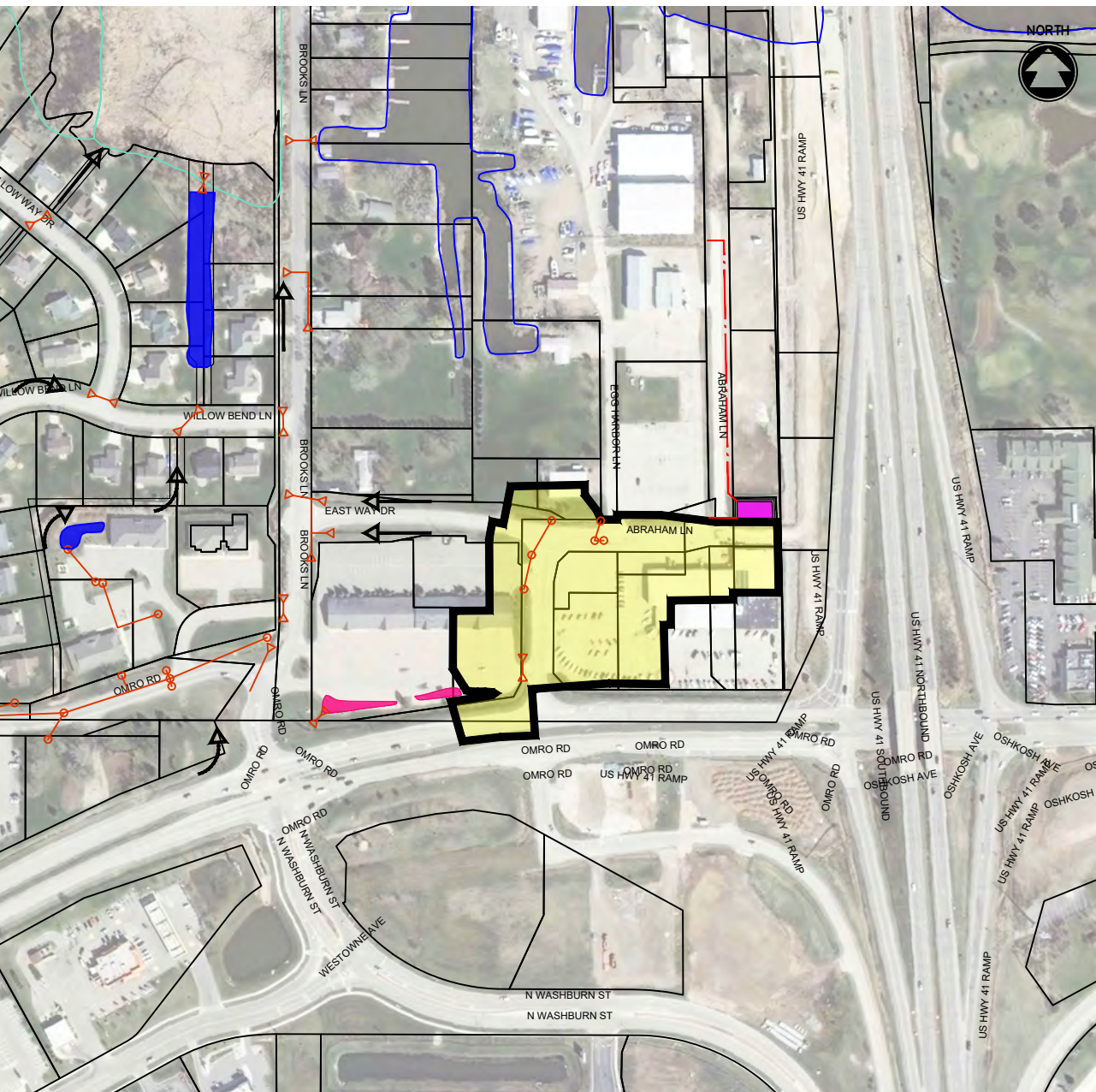
SITE INFORMATION:

Municipality: TOWN OF ALGOMA	Date: NOV, 2025
Proposed BMP Name: Abraham Ln IE Sand Filter	Initials: PTK

DRAINAGE AREA:

Sub-watershed ID: LAKE BUTTE DES MORTS	Catchment Area IDs: B8b4	Total Drainage Area: 4.6 acres
Imperviousness (Future): 88.7%	Runoff Curve Number (Future): 96	Water Quality Volume (Future): 0.48 ac-ft

Drainage Area / Site Location Map:



pldeman, W:\PROJECTS\A0018\092300721\Dept\Storm\03-MS4 Mapping\BMP Concepts\BMP-B8b4.dwg, bmp-b8b4, Plot Date: 1/9/2026 12:30 PM, xrefs: k-hydrafile_co-winnebag

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PROPOSED BMP RETROFIT:

Type of proposed BMP retrofit (e.g. wet pond, bioretention, proprietary device, etc.):
 Iron Enhanced (IE) Sand Filter

Initial BMP Screening

Remediation:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Wetland:	<input checked="" type="checkbox"/> Potential <input type="checkbox"/> Yes <input type="checkbox"/> No
Historical:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Public Well < 400 ft:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
100-Year Floodplain:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Private Well < 100 ft:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

BMP Outfall (storm sewer, stream, wetland, groundwater, etc.):
 Pond to discharge via new storm sewer to existing Abraham Ln road swale.

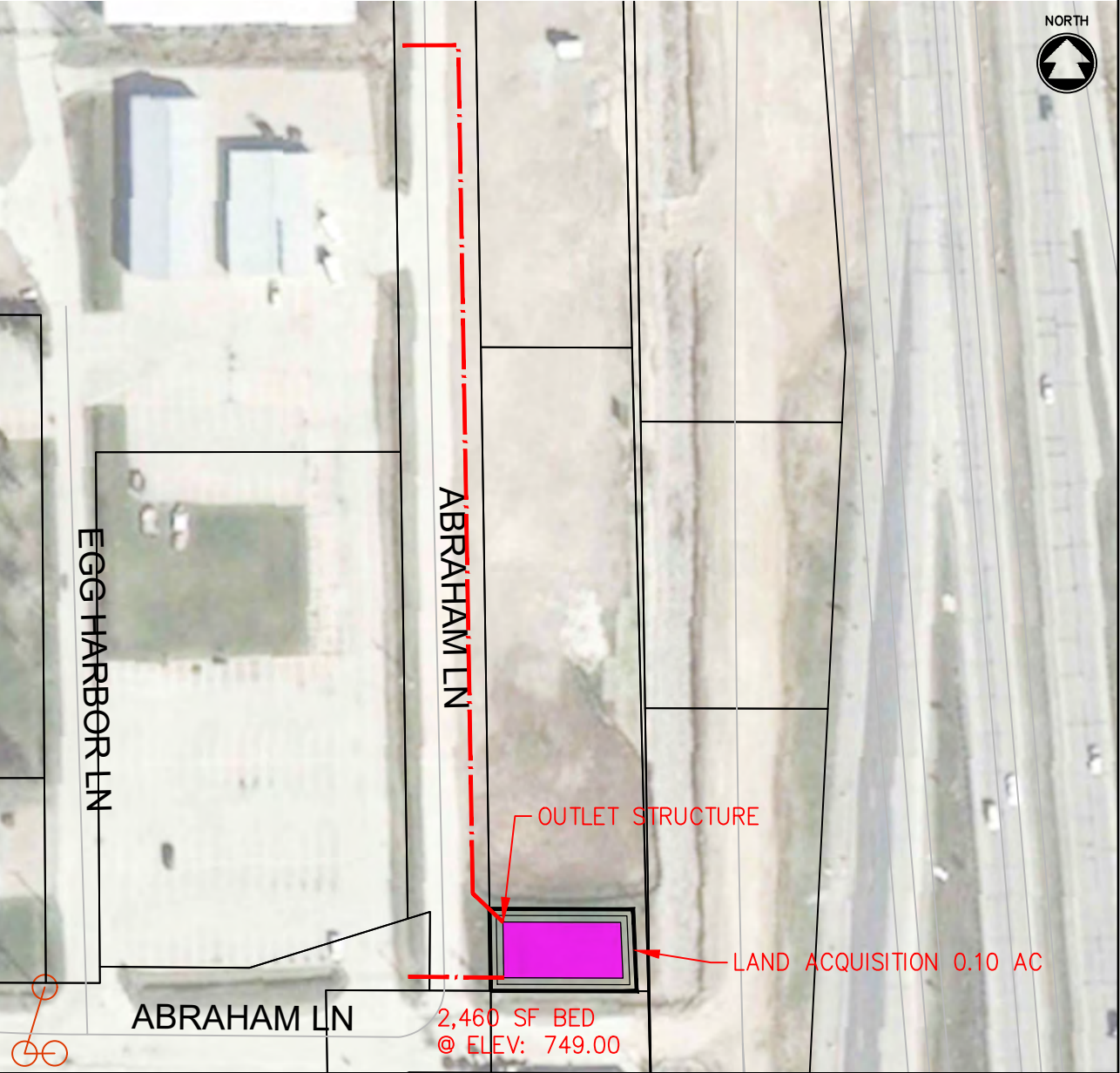
Infrastructure modifications or flow diversions required for retrofit:
 Divert existing drainage swales from Abraham Ln into proposed IE Sand filter.

Site access for future BMP maintenance:
 Good. Access from Abraham Ln.

Site constraints that require further investigation (e.g. utility conflicts, wetlands, groundwater, etc.):
 Bedrock, groundwater, wetlands, utility conflicts associated with new pond

Approx. Size of BMP Retrofit: 2,460 sf Bed	Approx. Land Required (ac): 0.10 acres	Estimated Cost: \$215,250
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Sketch of Proposed BMP Retrofit:



POTENTIAL STORMWATER BMP RETROFIT

BMP CATCHMENT ID: BMP-S1a3

McM PROJECT NO: A0018-09-23-00721

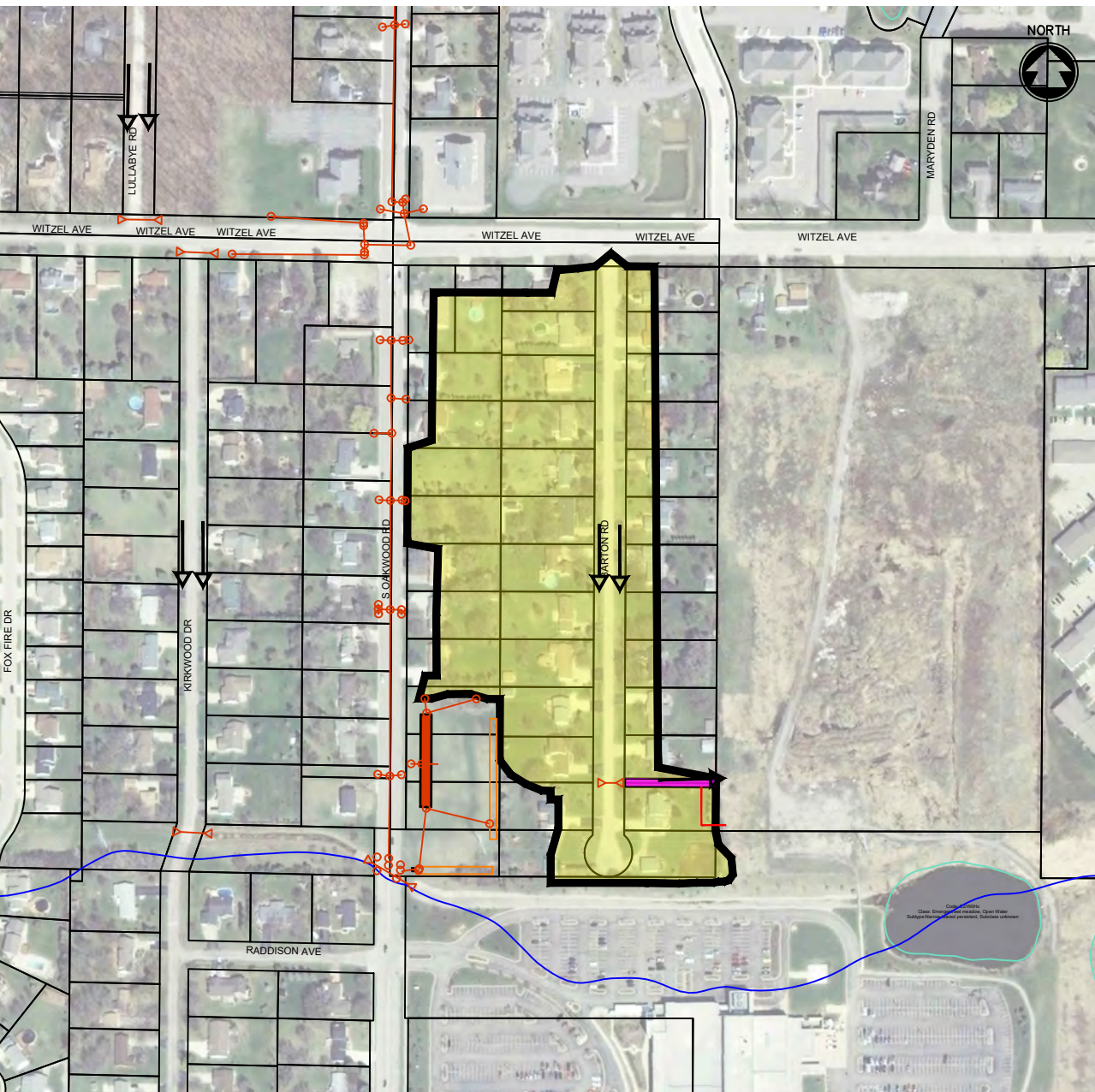
SITE INFORMATION:

Municipality: TOWN OF ALGOMA	Date: NOV, 2025
Proposed BMP Name: Barton Road IE Sand Filter	Initials: PTK

DRAINAGE AREA:

Sub-watershed ID: SAWYER CREEK	Catchment Area IDs: S1a3	Total Drainage Area: 12.7 acres
Imperviousness (Future): 37.8%	Runoff Curve Number (Future): 87	Water Quality Volume (Future): 0.62 ac-ft

Drainage Area / Site Location Map:



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PROPOSED BMP RETROFIT:

Type of proposed BMP retrofit (e.g. wet pond, bioretention, proprietary device, etc.):
 Iron Enhanced (IE) Sand Filter

Initial BMP Screening

Remediation:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Wetland:	<input checked="" type="checkbox"/> Potential <input type="checkbox"/> Yes <input type="checkbox"/> No
Historical:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Public Well < 400 ft:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
100-Year Floodplain:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Private Well < 100 ft:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

BMP Outfall (storm sewer, stream, wetland, groundwater, etc.):
 Pond to discharge via new storm sewer to existing drainage swale to the southeast.

Infrastructure modifications or flow diversions required for retrofit:
 Divert existing drainage swales from Barton Rd into proposed IE Sand filter.

Site access for future BMP maintenance:
 Good. Access from Barton Rd & drainage easement.

Site constraints that require further investigation (e.g. utility conflicts, wetlands, groundwater, etc.):
 Bedrock, groundwater, wetlands, utility conflicts associated with new pond

Approx. Size of BMP Retrofit: 3,010 sf Bed	Approx. Land Required (ac): N/A (w/in existing drainage easement)	Estimated Cost: \$263,375
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Sketch of Proposed BMP Retrofit:



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PROPOSED BMP RETROFIT:

Type of proposed BMP retrofit (e.g. wet pond, bioretention, proprietary device, etc.):
 Wet Detention Pond

Initial BMP Screening

Remediation:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Wetland:	<input type="checkbox"/> Potential <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Historical:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Public Well < 400 ft:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
100-Year Floodplain:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Private Well < 100 ft:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

BMP Outfall (storm sewer, stream, wetland, groundwater, etc.):
 Pond to discharge via new storm sewer to existing storm sewer within Witzel Ave

Infrastructure modifications or flow diversions required for retrofit:
 Divert existing drainage swales & storm sewer from Witzel Ave and N. Oakwood Rd into proposed pond.

Site access for future BMP maintenance:
 Good. Access from Town Hall or Witzel Ave.

Site constraints that require further investigation (e.g. utility conflicts, wetlands, groundwater, etc.):
 Bedrock, groundwater, wetlands, utility conflicts associated with new pond

Approx. Size of BMP Retrofit: 0.47 ac Permanent Pool	Approx. Land Required (ac): N/A (Currently Town-Owned)	Estimated Cost: \$396,300 (\$479,700 w/E.S.)
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Sketch of Proposed BMP Retrofit:

