

City of Fitchburg TMDL Stormwater Quality Management Update

Final Report
Last Revised: January 10, 2025
Project Number 60691622

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Executive Summary

The City of Fitchburg is subject to stormwater pollution regulations as described in the State of Wisconsin Administrative Code sections NR 216 and NR 151 and Wisconsin State Statutes 281 and 283. Both NR 151 and the City's current WPDES permit contain conditions relating to stormwater quality management. Starting in 2004, NR 151 and the City's WPDES permit included a provision to implement stormwater quality management practices necessary to achieve a 20% reduction in the annual average mass of total suspended solids (TSS) discharging from its MS4 by 2008. The reduction requirement was anticipated to be increased to 40% by 2013, but the increase was later removed.

The current guiding stormwater quality requirements have been changed for the City, identifying new targets for TSS as well as adding targets for Total Phosphorus (TP), for areas discharging to the Rock River basin, with the establishment of a TMDL for the Rock River basin in 2011 approved by EPA.

With these changes in mind, in 2021 the City, with the assistance of AECOM, applied for an Urban Non-Point Source & Storm Water Planning Grant to the WDNR to prepare an updated stormwater quality management plan. Following the award of that grant, the City contracted with AECOM to conduct this 2024 TMDL WinSLAMM Report to reevaluate the Citywide loads associated with the Rock River TMDL. This report was developed to evaluate and summarize the City's current TSS and TP reductions based on existing BMPs compared to the required TMDL reduction targets.

Findings and Results

Using the computer software program WinSLAMM, pollutant loads associated with stormwater for TSS and TP were computed for conditions called no-controls (no BMPs) and with-controls (with BMPs) for the three reachsheds within the City of Fitchburg's study area. The loading results were computed based on 2022 land use conditions and in accordance with WDNR modeling guidance. Existing best management practices (BMPs) including structural BMPs such as wet ponds, dry ponds, bioretention basins, and swales, and non-structural BMPs such as catch basin sump cleaning and street cleaning were included in the with-controls analysis.

The results of the pollution modeling are summarized in Table 1, showing the results of the no-controls and with-controls modeling for the TMDL analysis as well as the percent reductions.

Table 1. Annual Loading Results for Existing Conditions

TMDL Reachshed	Common Name	Modeled Area (ac)	TSS (tons)			TP (lbs)		
			No Controls	With Controls	Percent Reduction	No Controls	With Controls	Percent Reduction
64	Lake Wingra	132	27	13	53%	128	70	45%
65	Nine Springs Creek	3,611	480	231	52%	3,154	1,828	42%
66	Swan Creek	1,169	133	42	69%	946	384	59%
Total		4,912	640	285	55%	4,229	2,282	46%

Conclusions and Recommendations

One of the three TMDL reachsheds within the City of Fitchburg's study area meets the TMDL targets for TSS and TP. Table 2 lists the required TMDL targets versus the calculated loading

results from existing BMPs. Red shading represents a percent difference that is in deficit compared to the target percent reduction and green shading represents a percent difference that is in excess of the requirements.

Table 2. TMDL Target Reductions compared with Reductions from Existing BMPs

TMDL Reachshed	Common Name	TSS (%)			TP (%)		
		Target Percent Reduction	Actual Percent Reduction	Percent Difference	Target Percent Reduction	Actual Percent Reduction	Percent Difference
64	Lake Wingra	73%	53%	20%	61%	45%	16%
65	Nine Springs Creek	68%	52%	16%	63%	42%	21%
66	Swan Creek	62%	69%	-6%	54%	59%	-5%

Although the City does not meet their TSS and TP reduction targets for two of the reachsheds, the City achieves TMDL compliance through participating in an approved Adaptive Management Plan called Yahara Watershed Improvement Network (WINS). The City will continue to participate in this program and also seek ways to progress closer to their TMDL targets to reduce the costs of the Adaptive Management Plan. This report also includes evaluation of potential future BMPs along with recommendations and an implementation plan.

1. Introduction

Federal and state regulations require communities in Wisconsin to manage the pollution from their municipal separate storm sewer system (MS4). The Wisconsin Department of Natural Resources (WDNR) is delegated the responsibility of the United States Environmental Protection Agency (USEPA) to permit and oversee compliance with water quality regulations. All communities with a population greater than 10,000 people or in urbanized areas with a population density of at least 1,000 persons per square mile are subject to stormwater quality management regulations as administered by the WDNR. The United States Census Bureau reports the City of Fitchburg's 2020 population at 29,609.

Specifically, the City of Fitchburg is subject to stormwater pollution regulations as described in the State of Wisconsin Administrative Code sections NR 216 and NR 151 and Wisconsin State Statutes 281 and 283. The regulations require the City to apply for and receive coverage under a Wisconsin Pollutant Discharge Elimination System (WPDES) permit. The purpose of these regulations is to reduce pollutants associated with stormwater that would otherwise enter the State's lakes, rivers, streams, wetlands, or other surface waters.

Starting in 2004, NR 151 and the City's WPDES permit included a provision to implement stormwater quality management practices necessary to achieve a 20% reduction in the annual average mass of total suspended solids (TSS) discharging from its MS4 by 2008.

The report "2007 Source Loading and Management Model Results" (City of Fitchburg, 2007) was developed to comply with these regulations and assess the City's TSS load against the 20% TSS reduction requirement at that time. The reduction requirement was anticipated to be increased to 40% by 2013, but the increase was later removed. Through water quality modeling of City stormwater discharges and best management practices (BMPs), it was estimated that BMPs in place at the time were reducing the City's TSS pollutant loading by 40.2% and Total Phosphorous (TP) by 26.2%, showing that the City was in compliance with WDNR water quality discharge requirements at the time.

In 2013, MSA completed stormwater quality modeling for the Nine Springs Creek (Reach 65) watershed, also referred to as a reachshed. However, final Total Maximum Daily Load (TMDL) modeling guidance from the DNR became available in October 2014 after the project was complete. Additionally, with the establishment of a TMDL for the Rock River basin in 2011 approved by EPA, the current guiding stormwater quality requirements have been changed for the City, identifying new targets for TSS as well as adding targets for TP, for areas discharging to the Rock River basin. In all, since the 2007 and 2013 analyses, numerous updates were made to regulations, guidance documents, and the computer modeling software used for water quality analyses.

With these changes in mind, in 2021 the City, with the assistance of AECOM, applied for an Urban Non-Point Source & Storm Water Planning Grant to the WDNR to prepare an updated stormwater quality management plan. Following the award of that grant, the City contracted with AECOM to conduct this 2024 TMDL WinSLAMM Report to reevaluate the Citywide loads associated with the Rock River TMDL. This report was developed to evaluate and summarize the City's current TSS and TP reductions based on existing BMPs compared to the required TMDL reduction targets.

1.1 WPDES Permit Requirements for Water Quality

The City was issued a WPDES Permit No. WI-S058416-4 effective July 1, 2019 through June 30, 2024. A copy of the permit is available in **Attachment H**. The permit defines the actions

required of the City for MS4 compliance. The City will continue operating under the most recent permit until a new permit is released by the WDNR.

1.1.1 WPDES Permit Annual Activities

The WPDES permit includes conditions that must be fulfilled annually. It requires written stormwater quality management program documents describing how the permittee will comply with six minimum control measures which are included with the City's report submitted to the WDNR annually. The minimum control measures include:

1. Public Education and Outreach
2. Public Involvement and Participation
3. Illicit Discharge Detection and Elimination
4. Construction Site Pollution Control
5. Post-Construction Storm Water Management
6. Pollution Prevention

Each of these items requires some level of program development and implementation, all of which are geared towards improving stormwater runoff and water quality for receiving water bodies.

The WPDES permit contains additional requirements for permittees subject to TMDL requirements, which includes the City of Fitchburg. Section 1.8 of the permit describes the additional TMDL requirements and Appendix A of the permit explains the TMDL provisions for discharge into the Rock River Basin, summarized below.

1.2 TMDL Requirements for Water Quality

1.2.1 Background on TMDLs

A TMDL places a limit on the amount of pollution that can be discharged into an impaired waterbody. The WDNR is responsible for the development and implementation of TMDLs within the State of Wisconsin as delegated by the EPA. As the WDNR develops and implements the TMDL pollution reduction targets they are incorporated into the WPDES permit.

TMDLs are developed for impaired waterbodies throughout the State of Wisconsin. To identify impaired waters, the WDNR monitors waterways and compares the results to the water quality standards. A water is considered impaired if it "does not support full use by humans, wildlife, fish, and other aquatic life and it is shown that one or more of the pollutant criteria are not met" ([WDNR, 2024](#)). Once identified, these waters are listed on the state's 303(d) impaired waters list. According to the EPA, "law requires that states establish a prioritized schedule for waters on the lists and develop Total Maximum Daily Loads (TMDLs)" ([EPA, 2009](#)).

A TMDL is defined by the WDNR as "the amount of a pollutant a waterbody can receive and still meet the water quality standard," ([WDNR, 2024](#)). TMDLs are established for impaired waters to identify pollutant loads and reductions necessary to remove the conditions causing the impairment to make them "fishable and swimmable" as defined by the Clean Water Act.

The first TMDL in Wisconsin was developed in 2000, and as of the date of this study, 35 TMDLs have been developed and approved in Wisconsin ([WDNR, 2024](#)). The development process is still ongoing for several waterbodies throughout the state. The Rock River TMDL, which this report update is in response to, was completed and accepted by the EPA in July 2011.

1.2.1.1 TMDL Development Process

The development of a TMDL begins with a data collection period, during which the waterbody is monitored to identify the current pollution loadings and water flow, along with other pertinent data. Using the monitoring data, a computer model is used to simulate the processes in the waterbody, determine the existing pollution loads, and calculate the load reductions needed to meet the water quality standards for the waterbody.

From this point the TMDL can be broken into allocations of pollutants that are assigned to pollutant generators. This process is often expressed as a formula:

$$\text{TMDL} = \text{Waste Load Allocation (WLA)} + \text{Load Allocation (LA)} + \text{Margin of Safety (MOS)} + \text{Reserve Capacity (RC)}$$

The WLA is the total allowable pollutant load from point sources, such as wastewater treatment plants, industrial facilities, concentrated animal feeding operations, and MS4s. The LA is the total allowable pollutant load from non-point sources, such as agricultural runoff and non-regulated urban areas. A margin of safety, as well as some reserve capacity for new development areas, is included in the TMDL. Within the total WLA, individual contributors (such as the City of Fitchburg MS4) are assigned a specific allocation.

As part of a TMDL, a waterbody may also be broken into segments or reaches. Each reach is assigned its own waste load and load allocations for tributary areas.

1.2.1.2 TMDL Implementation

The TMDL implementation process begins following the development of a TMDL. The WDNR developed guidance documents for the implementation of TMDLs within MS4s. These documents provide general guidance for MS4s regarding steps to be taken for planning, implementing, and stormwater pollution modeling related to TMDLs.

The pollution reduction requirements included in the TMDL have been incorporated into the City's WPDES permit. The schedule for meeting TMDL target reduction requirements is not a fixed date, and it is anticipated that multiple permit cycles will be needed to achieve compliance with a TMDL. During this time, continual progress towards meeting the TMDL is expected through the establishment and achievement of goals also referred to as benchmarking. The City will need to track this progress and provide periodic submittals to the WDNR, most likely through the current annual reporting process.

The goal of implementing a TMDL is to improve water quality so that the waterbody meets the applicable water quality standards. This is determined by on-going monitoring and assessment of the waterbody. If a TMDL is implemented and water quality standards are not met, additional evaluation will be needed, and further pollutant reductions may be required.

1.2.1.3 TMDL Compliance

Appendix A of the City's WPDES permit explains steps to comply with the TMDL requirements. The following compliance track options are available (numbered according to the permit):

- A.2 Full TMDL Compliance
- A.3 Participation in an approved Adaptive Management Plan
- A.4 Compliance during the term of this permit
- A.5 Compliance over multiple permit terms

The City of Fitchburg currently participates in an approved Adaptive Management Plan called Yahara WINS. As a part of this compliance strategy, the City contributes monetarily to the

project proportionate to the amount of phosphorus they need to reduce under the TMDL. The Intergovernmental Agreement for the Adaptive Management Plan is included in **Attachment J**.

The City plans to continue to participate in the implementation of this adaptive management project to maintain compliance. The City also continues to seek ways to progress closer to their TMDL targets to reduce the costs of the Adaptive Management Plan and towards gaining full TMDL compliance.

1.2.2 City of Fitchburg's TMDL Reachsheds

The majority of the City of Fitchburg is located within the Lower Rock Watershed Management Unit (WMU), based on the Wisconsin Department of Natural Resources' (WDNR's) classification system. The remainder of the City is in the Sugar-Pecatonica WMU which currently does not have a TMDL established and therefore was excluded as part of this analysis.

Four Rock River TMDL reachsheds pass through the City of Fitchburg, but only three overlap with the study area. **Figure 1** displays the project area and reachsheds.

The three reaches and their common names are as follows:

1. Lake Wingra – Reach 64
2. Nine Springs Creek – Reach 65
3. Swan Creek – Reach 66

Sources of pollution in the Rock River Basin include point sources such as municipal and industrial wastewater treatment facilities, stormwater, and concentrated animal feeding operations (CAFOs), and nonpoint sources such as polluted runoff from urban, rural, and agricultural areas (Rock River TMDL report, 2011). The following sections describe the reachsheds in greater detail.

1.2.2.1 Nine Springs Creek Reachshed

Nine Springs Creek is located near the western boundary of the Rock River Basin and encompasses much of the northern portion of the City of Fitchburg. It drains into the Yahara River at Upper Mud Lake between Lake Monona and Lake Waubesa. Portions of the stream have been channelized and much of the stream runs through an urbanizing area. Additionally, there have been events where pollutants were released into the creek and required dredging, namely heavy sediment loading during a Dane County Highway Department project in Fitchburg during the summer of 1989 and when Madison Metropolitan Sewerage District dikes have given away in the past which released water and sludge into the stream ([WDNR, 2024](#)).

The City of Fitchburg includes two branches of Nine Springs Creek (804400 and 804200). 804200 is listed on the State of Wisconsin Impaired Waters 303(d) List, whereas 804400 is not. The identified impairments for 804200 are elevated water temperature and low dissolved oxygen (DO) level. The identified pollutants are TP and TSS.

1.2.2.2 Lake Wingra Reachshed

Lake Wingra is located to the north of the City of Fitchburg in the City of Madison. According to the WDNR, Lake Wingra is a shallow 345-acre lake which is fed by seeps and springs. The lake has a maximum depth of 21 feet and mean depth of 8 feet ([WDNR, 2024](#)). Portions of the City of Fitchburg study area drain to Lake Wingra.

Lake Wingra is listed on the State of Wisconsin Impaired Waters 303(d) List. The identified impairments are PCBs and contaminated fish tissue. The identified pollutants are TP and PCBs.

1.2.2.3 Swan Creek Reachshed

Much of the east half of the City of Fitchburg drains to Swan Creek which eventually flows into the southwest tip of Lake Waubesa. According to the WDNR, the stream is fed by marsh seepage, runoff, and springs. The stream has been extensively channelized.

Swan Creek is listed on the State of Wisconsin Impaired Waters 303(d) List. The identified impairments are unknown. The identified pollutants are TP and sediment/TSS.

1.2.3 TMDL Water Quality Targets

This 2024 TMDL WinSLAMM Report evaluates where the City currently stands regarding the TSS and TP reduction requirements associated with the current WPDES permit and the TMDL targets for the Rock River TMDL.

Table 3 lists both the annual reductions from the Rock River TMDL report and the adjusted reductions which are the reduction targets for the City. The adjusted TSS and TP reductions are higher than those listed in the final Rock River TMDL report due to how the TMDL report defines baseline, or starting conditions, for the analysis.

The City’s WPDES permit provides a calculation to adjust the targets provided in the TMDL report to find the City’s percent reduction targets. For TMDLs approved prior to January 1, 2012, which includes the Rock River TMDL, the baseline is considered 40% for TSS and 27% for TP, as explained in the WDNR’s modeling guidance document “MS4 Modeling - NR 151.13 (20/40% TSS Standard) Addendum A”.

Pages from the Rock River TMDL Report showing the City’s TMDL TSS and TP targets are provided in **Attachment F**. The adjusted reduction can be found in Appendix A of the WPDES permit which is included in **Attachment H** of this report.

Table 3. Rock River TMDL Targets

TMDL Reachshed	Common Name	Target TSS % Reduction		Target TP % Reduction	
		Avg Annual % Reduction of TSS from Baseline Load (40%) (as shown in TMDL report)	Adjusted TMDL TSS Target % Reduction (as shown in WPDES permit)	Avg Annual % Reduction of TP from Baseline Load (27%) (as shown in TMDL report)	Adjusted TMDL TP Target % Reduction (as shown in WPDES permit)
64	Lake Wingra	55%	73%	47%	61%
65	Nine Springs Creek	46%	68%	49%	63%
66	Swan Creek	37%	62%	37%	54%

1.3 Summary of Previous Water Quality Modeling for the City of Fitchburg

In 2004 and 2007 the City of Fitchburg completed water quality modeling using WinSLAMM modeling software to evaluate the City’s TSS and TP reductions based on existing BMPs at the time. For these studies, the reductions were based on City-wide performance instead of being broken down further into reachsheds. Table 4 lists the reductions that were previously modeled. At the time of the 2007 report, the NR151 and the City’s WPDES permit included a provision to implement stormwater quality management practices necessary to achieve a 20% reduction of the annual average mass of total suspended solids (TSS) discharging from its MS4 by 2008 and a 40% reduction by 2013. The report “2007 Source Loading and Management Model Results”

and its associated Memo, included in **Attachment C**, were developed by the City of Fitchburg to comply with these regulations and assess the City's loadings against the TSS reduction requirements. The 40% reduction requirement was later removed.

Table 4. Previous Fitchburg Modeled Reductions and Targets

Modeling Year	Calculated TSS % Reduction	Calculated TP % Reduction
2004	37.5%	25.0%
2007	40.2%	26.2%

The Rock River TMDL Report was approved by the USEPA in September 2011. This document, titled "Total Maximum Daily Loads for Total Phosphorus and Total Suspended Solids in the Rock River Basin", specifies target load reductions for each reachshed within the City. With the establishment of TMDLs for the Rock River watershed, the current guiding stormwater quality requirements became more stringent for the City. The Rock River TMDL identified new targets for TSS and added additional targets for TP.

In 2012 the Yahara Watershed Improvement Network (Yahara WINS) collaborative adaptive management strategy was formed to achieve clean water goals for the Yahara Watershed based on standards set by the WDNR. This effort was and continues to be led by the Madison Metropolitan Sewerage District and includes cities, villages, towns, county agencies, including land conservation, wastewater treatment plants, agricultural producers, environmental groups and others ([Yahara WINS, 2024](#)). The strategy addresses water pollution by watershed, prioritizing the most effective and least expensive options for reducing pollutant loading through a joint effort. The City of Fitchburg is a signatory to the Intergovernmental Agreement (IGA) as a part of the effort and is therefore required to contribute to the project "proportionate to the amount of phosphorus they need to reduce under the TMDL" according to the 2023 Yahara WINS Annual Report, included in **Attachment I**. Therefore, the results of water quality analysis for the City have a direct connection to the total amount the City is required to pay into Yahara WINS. The funds from the strategy are then used for watershed activities such as implementing conservation practices and conducting watershed monitoring.

In 2013, MSA completed stormwater quality modeling for the Nine Springs Creek (Reach 65) reachshed (included in **Attachment E**); however, final TMDL modeling guidance from the DNR became available in October 2014 after the project was complete. The results showed a 30.1% TSS reduction for the Nine Springs Creek reachshed. The updated stormwater modeling found the City's Nine Springs Creek reachshed was not in compliance with the required TMDL reductions at the time. The report documented several potential BMPs to work towards pollutant load removal compliance within the reachshed.

Since the 2007 and 2013 analyses, numerous updates have been made to regulations, guidance documents, and WinSLAMM, a computer model used for water quality analyses. With these pending changes in mind at the time, in 2021 the City, with the assistance of AECOM, submitted an application to the WDNR for an Urban Non-Point Source Water Quality Planning Grant to conduct an update to prior City-wide stormwater quality planning. Following the award of that grant, the City contracted with AECOM to conduct this Stormwater Quality Management Plan Update.

2. Stormwater Pollution Analysis

This report documents the water quality analysis conducted for the City of Fitchburg following the TMDL analysis guidelines prescribed by the WDNR for a municipal-wide stormwater quality management plan. The analysis develops water quality loading estimates using the WinSLAMM computer software model to calculate loads under no-controls conditions and with-controls conditions.

The WinSLAMM Version 10.5 was used to analyze stormwater pollution loads for the City's study area following WDNR guidance documents to meet the compliance requirements of Administrative Code NR 216.07(6)(b). WinSLAMM is the most widely used model in Wisconsin to assess urban stormwater pollution loads. The software was used to calculate the overall City-wide loadings and percent removals to compare with the targets set by the WDNR for TSS and TP for each reachshed.

WinSLAMM utilizes several different land characteristics, management practices, and pollutant and rainfall database files to complete the simulation. Each WinSLAMM standard land use has a designated proportion of land uses including roofs, parking lots, driveways/sidewalks, streets, and open space areas. This approach eliminates the need to delineate all the different types of pervious and impervious areas for each individual parcel within the study area. The pollutant files are based on United States Geological Survey (USGS) and WDNR runoff monitoring that, with the site-specific land characteristics and other files, results in statistical pollutant loadings under various conditions.

The following parameter files were loaded into WinSLAMM for evaluation of the City of Fitchburg's stormwater system:

- Rain file: WisReg - Madison Five Year Rainfall.ran – Approved rainfall distributions for the Madison area. The five year rainfall was used for the standard land use files to calculate loadings, as a single year does not accurately represent the effects of street cleaning. A winter range of December 2 through March 12 has been included in the model.
- Particulate Solids Concentration file: WI_AVG01.pscx
- Runoff Coefficient file: WI_SL06 Dec06.rsvx
- Pollutant Probability Distribution File: WI_GEO03.ppdx
- Street Delivery file: WI_Res and Other Urban Dec06.std
- Source Area PSD and Peak to Average Flow Ratio File: NURP Source Area PSD Files.csv

2.1 Preparation of Data for WinSLAMM Software

A variety of municipal specific input data is required to conduct the WinSLAMM water quality modeling analysis. Information includes, but is not limited to:

1. Study Limits
2. Reachsheds
3. Soil Type

4. 2022 Land Use
5. Excluded Areas
6. Drainage Conditions
7. Street Cleaning Schedule
8. Catch Basin Sump Cleaning Schedule
9. Existing Structural BMPs and their TSS and TP load reduction efficiencies

Geographic Information System (GIS) software was used to compile, store, and manage this information. Once the information was collected and input into GIS, it was merged into a single geodatabase that could be analyzed by WinSLAMM to produce TSS and TP loadings. The merged data creates polygons of various sizes that describes each unique combination of data that will be needed for the analyses.

The following sections describe the data sets managed and prepared for this analysis.

2.1.1 Study Area

The City of Fitchburg municipal area, including the recent annexation of portions of the Town of Madison along the northern municipal boundary, totals 22,680 acres. Since the City is relatively rural in the southern half of the municipality, it was agreed with WDNR that the City's study area would only include the urban service area for the City as opposed to the entire City limits. The 2020 census urbanized area was used as a starting point for designating the study area. Additional "adjacent developed and developing areas whose runoff is connected or will connect to their MS4" were also incorporated into the study area per the WDNR's 2014 document MS4 TMDL Implementation Guidance. The entire study area totals 6,896 acres. **Figure 1** shows the study area.

2.1.2 Hydrologic Basins

The reachsheds from the Rock River TMDL study were provided by the WDNR for use in individual municipal planning efforts. A reachshed represents the drainage area associated with a specific segment, or reach, of a waterway. The reachshed boundaries provided were imported into GIS for reference then modified to reflect the more-accurate topographic mapping and storm sewer system information from the City. Differences between the Rock River TMDL reachsheds and more local based boundaries are common because local municipalities typically have more current and refined system data than the data used during the initial TMDL analysis. Current WDNR guidance is that the City-derived boundaries guide the local TMDL water quality planning analysis.

Figure 1 shows the refined TMDL reachsheds for this study. There are four TMDL reachsheds from the Rock River water management unit that overlap with the City of Fitchburg municipal area, and three that overlap with the study area. The remainder of the City's municipal area drains to the Sugar-Pecatonica water management unit, which has been excluded since it is not part of the Rock River TMDL and does not have a TMDL established. Table 5 summarizes the City's TMDL reachsheds within the study limits.

Table 5. City of Fitchburg Reachsheds

Reachshed	Common Name	Area (ac)	Percent of Study Area (%)
64	Lake Wingra	133	2%
65	Nine Springs Creek	5,028	73%
66	Swan Creek	1,735	25%
69	Badfish Creek	0	0%
Sugar – Pecatonica WMU		0	0%
Total		6,896	100%

2.1.3 Soils

Soil properties influence the volume and rate of runoff generated from rainfall events. Sandy soils allow rainfall to infiltrate into the ground at a higher rate and result in lower runoff rates and volumes. Clay soils restrict the infiltration of rainfall into the ground and cause higher runoff rates and volumes. The United States Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) classifies soils based on their runoff potential into Hydrologic Groups A, B, C, or D. Soils in Hydrologic Group A have a high infiltration capacity and low runoff potential (generally sandy or gravelly soils), whereas Group D soils have a low infiltration capacity and a high runoff potential (generally soils with high clay content). The NRCS Soil Surveys were developed to summarize soil characteristics. Actual soil conditions for a specific location can vary from the general (mapped) condition.

WinSLAMM requires inputs characterizing the soil type of the study area. Allowable inputs in the WinSLAMM model are “Sandy,” “Silty,” or “Clayey.” Typically, soils in Group A are assumed to align with the “Sandy” soils designation in WinSLAMM, soils in Group B are classified as “Silty” and soils in Groups C or D are classified as “Clayey.”

The USDA NRCS soils survey classifies most of the City’s study area as silty soils with clayey soils interspersed throughout, especially in wetter areas near Nine Springs Creek. The distribution of soil types is shown on **Figure 2**.

2.1.4 Land Use

The type and distribution of land use has a major impact on the hydrology and urban stormwater pollution within a watershed. The volume and rate of stormwater runoff increases as the percentage of impervious surfaces (streets, parking lots, roofs, etc.) increases. The amount of impervious surface, in turn, is related to land use. As development occurs, the impervious area generally increases, often significantly. Land use also plays an important role in determining the types and amounts of pollutants that are carried by runoff.

Highly urbanized commercial and industrial areas usually contain a large percentage of impervious area and generate high amounts of pollutants such as sediment, nutrients, bacteria, metals, and toxic substances. Less intensive development, such as low to medium density residential development, contains a moderate amount of impervious area and generates lower levels of most pollutants. Park and open space/undeveloped land uses generally have little impervious area and generate low levels of pollutants.

One overall land use condition was developed for this analysis, documenting the land use conditions as of approximately 2022, the year of Dane County’s most recent aerial imagery made available from the County. This represents the existing condition at the time of this study, respecting that actual land use is a changing condition and that, while this is not expected to line up exactly with the land use of the TMDL analysis, it represents the approximate land use conditions at the time.

The land use coverage created for the 2013 analysis by MSA was used as a starting point for the Nine Springs reachshed, since it was already organized into land use categories that aligned with the standard land use types available in WinSLAMM. This land use data was then revised as needed based on 2022 aerial photos and the City and AECOM staff's knowledge of the area.

Figure 3 shows existing land use conditions within the study area used for the existing pollution analysis for the TMDL. Table 6 summarizes the existing land uses within the study area.

Table 6. 2022 Land Use Summary within Study Area

Land Use	Area (ac)	Area (%)
Open Space Undeveloped	2,042	30%
Medium Density Residential without Alleys	1,684	24%
Park	573	8%
Multi-Family Residential without Alleys	553	8%
Light Industrial	480	7%
Agricultural	381	6%
Low Density Residential	291	4%
Shopping Center	251	4%
Freeway	140	2%
Institutional	122	2%
Duplex	102	1%
Water	84	1%
High Density Residential without Alleys	84	1%
Medium Industrial	47	1%
Office Park	34	0.5%
School	22	0.3%
Downtown	2	0.03%
Suburban	2	0.03%
Strip Commercial	2	0.03%
Total	6,896	100%

2.1.5 Excluded Areas

The project area for purposes of the stormwater pollution analysis is based on the regulatory requirements of NR 216 and WDNR guidance documents. The guidance document "TMDL Guidance for MS4 Permits: Planning, Implementation, and Modeling Guidance", October 20, 2014, describes the optional areas for exclusion.

The following list describes pollutant loads that are optional for an MS4 to include according to the WDNR Guidance:

1. *Area that never passes through a permittee's MS4 such as a riparian area.*

Lands that drain to waters of the state without passing through the City's MS4 were excluded for this reason.

2. *Land zoned for agricultural use and operating as such.*

Lands that were identified as agricultural fields, livestock rearing, or other farming/husbandry use were excluded for this reason.

3. *Manufacturing, outside storage and vehicle maintenance areas of industrial facilities permitted under subch. II or ch. NR 216, Wis. Adm. Code, are optional to include. This does not include industrial facilities that have certified a condition of “no exposure” pursuant to s. NR 216.21(3), Wis. Adm. Code.*

At the time of this study there were no industrial permitted sites within the study limits.

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.*

For this study no areas were excluded for discharging to another municipality’s MS4 without first passing through the City of Fitchburg’s MS4.

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).*

This does not apply to Fitchburg since it is a City.

Additionally, the WDNR Guidance Document also specifies the following regarding 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.”

The City of Fitchburg does not have any connecting highways. Therefore, all WisDOT and County-owned rights-of-way have been excluded from the City’s modeling, including Verona Road, US Highway 14, County Road MM, and Rimrock Road (see **Attachment G** for Dane County Highway Map).

Figure 4 displays the excluded areas identified for the TMDL analysis. **Table 7** summarizes the excluded areas within the City’s study area. After removing excluded areas from the study area 4,912 acres remained and were modeled.

Table 7. 2022 TMDL Excluded Areas within Study Area

Excluded Type	Area (ac)	Area (%)
DOT and state-owned	628	32%
County-owned	452	23%
Internally drained	213	11%
Agricultural	370	19%
Riparian	322	16%
Total Area Excluded	1,985	100%

2.1.6 Drainage Conditions

The WinSLAMM modeling software uses drainage conditions as a factor in the delivery of stormwater pollutants from roadways to receiving waters. Curb and gutter and swale areas were determined using 2022 aerial imagery and Google Street View. If a parcel was adjacent to a curb and guttered street, then that entire parcel was assigned as curb and gutter drainage. If a parcel was adjacent to a street with swales and no curb and gutter, then that entire parcel was assigned as swale drainage. **Figure 5** shows the designated drainage conditions for the study area. Most of the study area has curb and gutter with a few interspersed roads with swales especially along McCoy Road, Clayton Road, and Larsen Road towards the east side of the City.

2.1.7 Existing Best Management Practices

The City has both non-structural and structural BMPs, both of which have the potential to reduce pollutant loading. Information regarding non-structural BMPs has been gathered and summarized in the below section. This information was then used to prepare datasets as described in Section 2.2.

Information for structural BMPs has been gathered, drainage areas have been delineated, and BMPs have been modeled as described below. The resulting efficiencies from the models then become part of the geodatabase and are applied later on in the analysis.

Figure 6 shows the City's Stormwater Conveyance Map including structural BMPs, their associated drainage areas, or subwatersheds, and 2023 storm sewer data.

2.1.7.1 Non-Structural Best Management Practices

The City currently has two primary existing non-structural BMPs: street cleaning and catch basin sump cleaning. The City will also qualify for the leaf management credit starting in 2025.

The City estimates public streets are cleaned approximately eight times per year. Street cleaning is performed using a vacuum type-high efficiency street sweeper, with all major streets being swept every six weeks as soon as weather allows, typically March or April, until September when a second sweeper is deployed. At that point, all public streets are swept every three weeks through fall.

To best represent this in WinSLAMM, a frequency of one pass every four weeks was used, assuming streets are not swept during the winter season. The actual number of times the City cleans the streets in any given year depends on weather and available resources.

Additionally, the City does not have street parking controls in place, therefore the street parking control was defined as "no" for all land uses in WinSLAMM. Parking densities were described as light. **Figure 5** shows drainage conditions for the study area. Street cleaning has been added to all areas that are designated as curb and gutter.

Catch basins and manholes with sumps are part of the City's stormwater infrastructure and are installed in areas with storm sewers to capture surface runoff. The sumps of these structures trap solids that wash off during rain events. These sumps also capture fine particles that might have been left behind from street cleaning. Without regular removal of the solids, particles can become re-suspended and flushed through the storm sewer system. The particle sizes captured by sumps overlap somewhat with those of street cleaning. Past water quality model versions were not able to clearly evaluate the two practices; generally street cleaning was used to estimate TSS and TP capture and catch basin cleaning was not included in the analysis. More recent model versions, including the software version used for this analysis, can evaluate catch basin cleaning effectiveness with a street cleaning program in series.

To model sump cleaning, WinSLAMM requires information on the density of structures with sumps in a given land use as well as the structure size. According to the City's GIS data, there are approximately 60 structures with 3-foot-deep sumps along Lacy Road which are evenly distributed geographically and among land uses. The approximate drainage area for these structures is 44 acres which calculates to a density of approximately 1.4 sumps per acre. The City currently cleans their catch basins once each year, which was assigned as the cleaning frequency to all catch basins for this analysis.

The City of Fitchburg administers a brush and yard waste collection program for their residents. Starting in 2025, the City plans to modify their program to meet the requirements for numeric credit outlined in the WDNR's [Municipal Phosphorus Reduction Credit for Leaf Management Programs](#) document, dated February 17, 2022. The City will administer leaf collection at least 3 times throughout the fall followed by street cleaning weekly with a regenerative air street cleaner or vacuum-assisted street cleaner. Credit for this updated program has been included in the modeling.

The guidance includes the following conditions:

1. *Land use: Residential land use without alleys. Residential land use with alleys may be included if the alleys receive the same level of leaf collection and street cleaning as the streets.*
2. *Street Section: Curb and gutter streets with storm sewer drainage systems and light parking densities during street cleaning activities.*
3. *Tree Canopy: High level of tree canopy determined by one of the following approaches:*
 - a. *An average of one or more medium to large canopy trees located between the sidewalk and the curb for every 80 linear feet of curb. Where sidewalk is not present, trees within 15 feet of the curb may be counted toward tree cover.*
 - b. *An average of 40% or greater leaf canopy over the pavement or 45% tree canopy or greater over the right-of-way determined using leaf-on aerial photography.*

In addition, the following legal authorities and policies must also be in place:

1. *The municipality has an ordinance prohibiting residents from placement of leaves in the street.*
2. *The municipality has a policy stating that residents may place leaves on the terrace in bags or piles for collection and that they will be removed at the*

specified frequency and timing. Leaves may be pushed, vacuumed, or manually loaded into a fully enclosed vehicle, such as a garbage truck or covered dump truck. No leaf piles are left in the street overnight. Regular collection limits the volume of leaves that may blow into the street from adjacent areas.

- 3. If on-street parking densities are typically greater than light (defined as significant spacing between parked cars so that street cleaners can easily get to the curb for most of the curb length), then an ordinance or enforceable policy to restrict parking during leaf collection and street cleaning activities is needed.*

Areas that meet the above requirements may have a 25% TP reduction applied.

The current guidance states that “further evaluation is required to determine how leaf management may reduce loading to structural best management practices (BMPs) such as ponds. Therefore, this credit may not be taken in addition to phosphorus reductions from other BMPs in the drainage area at this time.” However, a neighboring MS4, the City of Madison, reported in their 2020 TMDL Report that partial credit had been applied for leaf management in areas that flow to other BMPs. The report explains that the justification for this stems from a Madison USGS leaf study by Selbig titled “Evaluation of leaf removal as a means to reduce nutrient concentrations and loads in urban stormwater” which showed that phosphorus content in stormwater runoff from leaf leaching is mostly dissolved phosphorus. Moreover, it also showed that the TP content of stormwater runoff is approximately 50% dissolved phosphorus and 50% particulate phosphorus. Since other BMPs such as wet ponds and catch basins primarily remove particulate phosphorus and leaf management controls for dissolved phosphorus, it was determined that an approach of taking half of the permissible full credit would be appropriate to apply to areas already served by structural BMP(s). A similar approach has been applied for the City of Fitchburg. Areas that meet the above requirements and are already served by another BMP have a 12.5% TP reduction applied (half of the full 25% reduction).

To model the leaf management credit, all residential land use areas that have curb and gutter drainage were isolated. The City provided an inventory point shapefile of City trees. Using this shapefile as a base, evergreen trees and any trees with a diameter less than 10 inches were removed so that only medium and large canopy deciduous trees remained. A 40-foot buffer was created around the trees shapefile to identify areas that had 80 feet or less spacing. Segments of the Right of Way were identified that met the spacing criteria. Additional segments of Right of Way were added if they had 45% tree canopy or greater over the Right of Way determined using leaf-on aerial photography. Finally, a leaf credit polygon shapefile was prepared by combining the Right of Way segments with any parcels that shared an edge with those qualified Right of Way segments. Later on in the analysis, the shapefile was combined into the geodatabase and the 12.5% and 25% reductions were applied where appropriate. **Figure 5** shows the areas where leaf credit has been applied.

2.1.7.2 Structural Best Management Practices

Structural best management practices (BMPs) within the City of Fitchburg include wet detention basins, bioretention devices, rain gardens, dry ponds, swales, underground storage, proprietary devices such as up-flo filters, and treatment trains which include more than one BMP in series. All BMPs that are owned, operated, and maintained by the City are eligible for inclusion in the analyses along with privately owned BMPs where the City has a recorded maintenance agreement with the owner. The City’s BMPs were extensively inventoried to determine which BMPs were eligible and had sufficient information for inclusion in the modeling.

Pond 4 is a BMP located outside of the City of Fitchburg limits but it accepts runoff from a portion of the City and from other agencies. The City entered into an Intergovernmental Agreement, dated November 19, 2008, with the Wisconsin Department of Transportation, the City of Madison, the Town of Madison, and the University of Wisconsin-Madison. Together, these agencies jointly manage several BMPs located in the University of Wisconsin-Madison Arboretum, including Pond 4. As a part of the Agreement, the City of Fitchburg is allowed to take credit for water quality treatment according to the volume of runoff contributed to the BMP. To model this in WinSLAMM, the City of Fitchburg obtained the City of Madison’s water quality model for Pond 4 and modified the source areas to represent the loads and volume of runoff coming from the City of Fitchburg as well as the volume of runoff from the remaining agencies with loads “turned off” using an Other Device. The resulting load reduction efficiencies, as shown in **Table 8**, are for the City of Fitchburg only.

Some existing BMPs were excluded from this analysis based on different factors such as BMP ownership and maintenance, BMP stormwater quality benefits, and BMP location. BMPs that were omitted include those that lacked sufficient modeling data and/or did not have a recorded maintenance agreement. During future updates of this TMDL water quality management analysis, the City should consider obtaining maintenance agreements for BMPs excluded from this analysis and continue to inventory existing BMPs throughout the City for which additional information is required.

Some BMPs that treat a large area and/or may have the required modeling data obtained in the near future were modeled as placeholders using an Other Device showing no pollutant load removals. This was if the BMP was located in series with several other BMPs. It is intended that the Other Device can be exchanged for the appropriate BMP in the model once data has been acquired. Approximately 40 small BMPs that meet the applicability requirements were omitted from the modeling since they treat a small drainage area.

Overall, of the City’s over 300 BMPs within the study limits, approximately 180 were either fully modeled or modeled as a placeholder for this study. **Figure 6** shows the location of the City’s existing structural BMPs included in this analysis and shows the drainage area for the most downstream BMP in each series.

All existing BMPs that have been modeled are listed in **Table 8** with their treatment efficiencies for the most downstream BMP in a series. Since most of the BMPs throughout the City are in series with other BMPs, the efficiencies could not be pulled directly from documentation such as a Stormwater Management Plan (SWMP). Rather, the efficiencies needed to be generated by modeling the BMP in WinSLAMM as part of this study.

For BMPs that were modeled in 2013, the BMP data was brought forward. For the remaining BMPs that were either reconstructed since 2013, new or not previously modeled, data was gathered from SWMPs, plans, and GIS. **Attachment B** includes Fitchburg’s Stormwater BMP Tracker which lists additional information about all modeled and unmodeled BMPs such as BMP Type, ownership, and whether a maintenance agreement has been recorded for the site.

Once calculated, resulting efficiencies from the models then become part of the geodatabase and are applied later on in the analysis.

Table 8. Structural BMP Effectiveness

Name of Most-Downstream BMP in Series	Overall Annual TSS Load Reduction (%) for Series	Overall Annual TP Load Reduction (%) for Series	Name of Individual BMP within Series	Direct Drainage Area for Individual BMP (Acres)
Reach 64 (Lake Wingra)				
Lake George	93%	65%	Lake George	41.4
Pond 4	71%	81%	Pond 4	49.0
			Maple Lawn Infiltration Trench	7.3
			Zimbrick Honda BMPs	1.1
			Park Bank BioBasin B	1.1
			Einstein North BioBasin	0.5

Reach 65 (Nine Springs Creek)			Einstein West BioBasin	0.3
Apache Pond	76%	53%	Apache Pond	34.4
Arrowhead Pond East	58%	42%	Arrowhead Pond East	45.7
Artisan Village BioBasin	98%	91%	Artisan Village South Pond	4.6
			Artisan Village BioBasin	0.9
Artisan Village Infiltration	96%	92%	Artisan Village North Wet Pond	3.3
			Artisan Village Infiltration	0.1
Ashbourne Pond	78%	54%	Ashbourne Pond	27.5
Avalon	90%	71%	Avalon	12.4
			Ochalla Pond	7.3
			Ochalla BioBasin	2.1
Casa del Sol	55%	44%	Casa del Sol West	17.6
			Qdoba Wet Pond	13.5
			GHC North	3.7
			Casa del Sol East	3.0
			Hatchery Hill South	2.6
			Hatchery Hill North	1.8
			GHC South	1.3
			Elderly Apts	0.9
			Qdoba Dry Pond	0.6
Chapel Valley - East	72%	52%	Chapel Valley - West	98.5
			Bosshard Pond	38.3
			Chapel Valley - East	13.0
Cheryl Parkway BioBasin	84%	68%	Cheryl Parkway Pond	6.1
			Cheryl Parkway BioBasin	1.4
Cinque Terra North	20%	11%	Cinque Terra South	26.3
			Cinque Terra North	4.7
			Usona South BioBasin	3.6
WEast Fire Station Pond	83%	67%	East Fire Station Pond	2.3
			East Fire Station Infiltration	1.1
Extra Space Pond	85%	60%	Extra Space Pond	1.6
Glacier Valley Dry Pond	3%	2%	Glacier Valley Dry Pond	10.3
			Hatchery Hill Hotel	4.0
Gunflint Pond	69%	46%	Gunflint Pond	23.7
			EAGLE BioBasin 1	2.8
			Usona Rain Garden	1.5
			EAGLE BioBasin 2	0.7
			EAGLE BioBasin 3	0.5
Usona North BioBasin	0.4			
Harlan Hills East Pond	81%	56%	Harlan Hills East Pond	57.2
Harlan Hills West Pond	78%	54%	Harlan Hills West Pond	25.9
			Harlan Hills Condos East	2.3
Hospice Center	60%	41%	Hospice Center	5.6
Hospice II	78%	55%	Hospice Rain Garden G	3.6
			Hospice II	2.0
Longford Pond	68%	48%	Longford Pond	42.5
McKee Farms-Schumann (NW) Wet Pond	64%	47%	Schumann Greenway	243.2
			McKee Farms-Schumann Wet Pond	44.9
			Astor Pond	31.2
			Lacy Heights Infiltration	19.7
			Lacy Heights Pond	9.9
			Blackhawk BioBasin	5.5
			Blackhawk Wet Pond	4.4
			Aleo Ct	3.5
			Blackhawk Infiltration	2.2
			Hialeah UG Infiltration	2.2
			Courtyard SW Pond	1.5
Courtyard NE Pond	0.8			

			Courtyard South UG Detention	0.7
			Courtyard North UG Detention	0.5
			Blackhawk Wet Pond	0.5
			Blackhawk BioBasin	0.4
McKee Park - North Pond	66%	47%	Oak Meadow Pond	203.7
			Pembroke Greenway	147.8
			Cheryl Greenway	88.5
			Fitchburg Research Park	86.5
			Fitchburg Center Park Greenway	72.3
			Tower Hill Greenway	48.3
			McKee Park - South Pond	44.3
			McKee Park - North Pond	25.2
			Encompass South BioBasin	20.3
			New Promega	13.9
			Barbara Ditch	12.2
			Lacy Infiltration Trench 1	7.3
			Town Center A	4.2
			Glen Wood Heights Bio-Retention	3.5
			Nobel Ridge Rain Garden	3.4
			Gordon Flesch A	2.8
			Encompass Rain Garden	2.7
			WH Children's Infiltr. Trench	2.0
			Encompass North BioBasin	1.7
			Tri-North A	1.5
			Oak Meadows South	1.5
			Encompass Northeast BioBasin	1.3
			Gordon Flesch B	1.3
			Fitchburg Public Library North	1.3
			Madison Group BioBasin	1.2
			Oak Meadows Park Rain Garden	1.2
			Oak Meadows II	1.0
			Me&Julio Rain Garden	1.0
			Turnberry BioBasin	0.9
			Oak Meadows North	0.9
			Tri-North B	0.8
			Children's Dental BioBasin	0.7
			DaVinci BioBasin South	0.7
			City Hall	0.7
DaVinci Permeable Pavement 1	0.6			
DaVinci Infiltration Trench	0.6			
Madison Group Infiltration	0.5			
Fitchburg Public Library West	0.5			
Tri-North C	0.5			
Fitchburg Public Library East	0.4			
Senior Center Rain Garden	0.4			
DaVinci Permeable Pavement 2	0.3			
Turnberry UG Infiltration	0.3			
DaVinci BioBasin North	0.2			
MGE South BioBasin	79%	67%	MGE South BioBasin	2.4
Nicolet Pond	71%	53%	Nicolet Pond	94.7
			Arrowhead Pond West	47.2
			Thermo Fisher Pond	19.9
			Design Mart	5.3
			Charter	4.6
			Certco Fleet BioBasin	1.8
			Verona Williamsburg North	1.7
			Discovery Storage BioBasin	1.6
			Verona Williamsburg South	1.6
Thermo BioBasin A	1.2			

			Thermo BioBasin B	0.8
			Thermo Dry Pond	0.5
			McKenzie Workforce BioBasin	0.3
Nine Springs Golf Course Pond	91%	66%	Nine Springs Golf Course Pond	38.1
Nine Springs Greenway	71%	50%	Nine Springs Greenway	118.8
			North Waterway	61.7
			No Oaks Infiltration Basin	12.2
			Central Park Wet Pond South	9.0
			Uptown South Pond 2	7.6
			Uptown South Pond	5.9
			Aster Meadows #1	3.4
			No Oaks Wet Pond	3.4
			Central Park Wet Pond North	3.3
			Prairie Park Rain Garden 7	2.0
			No Oaks Ditches	2.0
			Swan Creek Apts BioBasin 1	1.4
			Prairie Park BioBasin 6	1.1
			Riva Infiltration Basin	0.9
			Uptown South Infiltration Basin	0.8
			Prairie Park BioBasin 3	0.8
			Nine Springs	0.8
			Prairie Park BioBasin 4	0.6
			Prairie Park BioBasin 5	0.6
			2nd Add. to Riva (Uptown Vill)	0.6
			Prairie Park #2	0.5
Prairie #3	0.5			
Prairie Park #1	0.5			
Prairie #1	0.4			
Central Park Dry Pond	0.3			
Pine Ridge Infiltration Facility	73%	62%	Pine Ridge Infiltration Facility	4.3
Pinnacle Pond	65%	45%	The Vue Wet Pond	7.1
			Pinnacle Pond	2.1
			The Vue Infiltration 5	0.8
			The Vue BioBasin 3	0.5
			The Vue I	0.5
			The Vue rain garden	0.4
Promega R&D North BioBasin	84%	65%	Promega R&D Wet Pond	13.2
			Promega R&D North BioBasin	10.9
Promega R&D South BioBasin	84%	65%	Promega R&D South BioBasin	5.5
Red Arrow Pond	59%	41%	Red Arrow Pond	20.2
			Renaissance Rain Garden	1.4
Renaissance Pond	86%	79%	Renaissance Pond	11.0
Saris Kettle	100%	100%	Saris Kettle	12.0
Seminole Hills Pond	59%	41%	Seminole Hills Pond	62.0
Seminole Village Pond	74%	55%	Seminole Village Pond	60.6
			Arapaho Greenway	20.0
			Business Park B Pond	16.7
			Business Park A Pond	16.3
			Oak Bank Pond	14.0
			MGE North BioBasin 2	2.1
			MGE North BioBasin 1	1.2
			West Fire Station	0.6
			West Fire Station BioBasin 2	0.5
Sub Zero Infiltration (North)	68%	48%	Sub Zero (North)	39.3
			Sub Zero Infiltration (North)	4.2
Terrace Point Pond	68%	50%	Terrace Point Pond	4.3
Uptown North Infiltration Basin	94%	78%	Uptown North Pond	10.4
			Uptown North Pond 2	3.5
			Uptown North Infiltration Basin	0.4

Valley View Pond	68%	49%	Valley View Pond	21.8
Reach 66 (Swan Creek)				
Addison Infiltration Basin	91%	88%	Addison Wet Pond	10.4
			Addison Infiltration Basin	1.7
Hartung Infiltration	95%	92%	Hartung Pond	2.3
			Hartung Infiltration	0.2
Lacy/MM BioBasin	70%	59%	Lacy/MM BioBasin	14.5
Larsen BioBasin	98%	84%	Larsen BioBasin	135.1
			Goodland Park BioBasin	31.0
			Forest Edge South Infiltration	4.9
			Forest Edge North Infiltration	4.2
			Forest Edge South BioBasin	1.7
			Forest Edge North BioBasin	1.4
Nine Springs Pond	95%	32%	Nine Springs Pond	42.4
Northern Lights Pond	92%	80%	Lacy Infiltration Trench 5	32.6
			Lacy Infiltration Trench 6	8.7
			Northern Lights Pond	7.9
			Lacy Woods BioBasin	7.5
			Northern Lights #2	2.9
			Northern Lights #3	2.3
			Northern Lights #1	1.4
			Northern Lights Greenway	0.9
Phoenix Pond	93%	66%	Phoenix Greenway East	27.9
			Prima Vista Greenway	14.0
			Phoenix Pond	8.3
			Phoenix Imaging Infiltration	6.1
			Phoenix Greenway West	6.0
			Vista Infiltration Facility	4.9
			Kwik Trip - Syene Pond	3.4
			Phoenix Imaging Wet Pond	2.4
			Falcon BioBasin	1.4
			Raven UG Infiltration 2	1.1
			Lacy Swale	0.7
			Raven UG Infiltration 1	0.6
			Osprey Pemeable Pavement 1	0.4
			Osprey Permeable Pavement 2	0.2
Swan Creek	86%	75%	The Crossing West Pond	61.8
			The Crossing East Pond	39.4
			Highfield NE Detention	35.4
			Monks Wet Detention Pond	30.6
			Quarry Hill Pond	26.7
			Techlands NE Wet Pond	23.3
			Swan Creek	18.6
			Fahey Wet Detention Pond	17.4
			Highfield NW Infiltration	15.8
			Techlands NW Wet Pond	9.9
			New Venture	7.7
			Lacy Infiltration Trench 3	7.7
			Smoky Greenway	6.4
			Lacy Infiltration Trench 2	6.4
			Berbee	5.9
			Kepler North Infiltration	5.3
			Kepler North BioBasin	5.1
			Kepler South BioBasin	4.6
			Highfield NW Detention	3.1
			Fahey Infiltration Facility	2.1
Lacy Infiltration Trench 4	1.5			
Monks Infiltration Facility	1.3			
Cameca Instruments West	1.2			

			Highfield NE Infiltration	1.1
			Quarry Hill Neighborhood Rec Trl	0.9
			Cameca Instruments South	0.9
			Techlands NE Infiltration	0.8
			Quarry Hill Dry Pond	0.6
			Cameca Instruments East	0.5
Swan Creek Pond	86%	61%	Snapdragon Greenway	89.6
			Big Bluestem Greenway	25.9
			Swan Creek Pond	14.9
			Swan Creek Rain Garden #2	2.1
			Swan Creek Rain Garden	2.1
			The Gardens	1.8
			Swan Creek North Swale #2	1.6
			Promega R&D East BioBasin	1.4
			Cornerstone #4	1.1
			Cornerstone #2	1.0
			Cornerstone #5	1.0
			Cornerstone #3	0.8
			Swan Creek North Swale #1	0.7
			Gardens #2	0.7
			Swan Creek Apts BioBasin 2	0.5
			Gardens #1	0.4
Cornerstone #1	0.3			

2.2 Calculation of City-Wide Efficiencies using Database Methodology with WinSLAMM

Before the GIS geodatabase can be analyzed and City-wide TSS and TP loads computed, a second dataset is created using WinSLAMM. This second dataset is the source for the numerical loading associated with each unique combination of data that has been prepared in GIS from the data described in the above sections.

The second database is created by preparing several small WinSLAMM models. Models are created for each combination of land use, soil type, sump cleaning, and street cleaning frequency within the City. Each model contains 100 acres of land area and has a unique code in the site description that matches the unique code in the GIS geodatabase. The WinSLAMM models are run in the batch editor and an excel table with the loadings from each of the 100-acre WinSLAMM file combinations is produced. This table is then imported into the geodatabase and linked through the unique code.

Using the join code in Microsoft Access, the loading from each standard land use is applied to each of the City specific polygons and prorated based on the size of each polygon. After the loading results table is joined with the geodatabase, loading results are generated for the City and aggregated as needed to provide the output results on a City-wide, watershed, land use, or other basis as desired

Loads can be calculated without BMPs (no-controls) or with BMPs (with-controls) to evaluate the effectiveness of existing BMPs on the City overall. Areas treated by a BMP are distinguished in the geodatabase BMP column with the established BMP efficiency that will be applied to the area. When multiple BMPs are in series, the final efficiency for the system is applied to the overall drainage area for all the BMPs. For the with-controls conditions the combination also includes street sweeping and catch basin cleaning, unless the practices have already been incorporated into a BMP model, in which case the overall most downstream BMP efficiency is applied on the backend to the applicable drainage area. For areas eligible for leaf management

credit, a 25% TP reduction was applied. For areas that already receive a pollutant load reduction from another BMP, an additional 12.5% TP reduction was added.

2.3 Existing Condition Results

The TMDL water quality analysis was completed for three Rock River reachsheds: Lake Wingra, Nine Springs Creek, and Swan Creek within the City of Fitchburg by modeling two annual pollutant loading scenarios:

1. No-Controls Conditions: Existing (2022) land use conditions with no BMPs applied, and
2. With-Controls Conditions: Existing (2022) land use with BMPs applied.

2.3.1 TMDL No-Controls Conditions Analysis

The TMDL no-controls conditions analysis was calculated to provide a baseline with which to compare the existing conditions (with-controls) analysis for each TMDL reach. The results of the TMDL no-controls analysis are shown on **Table 9**. **Figure 7** shows a graphical representation of the City's no-controls TSS loading rate in tons per acre per year relative to land use. **Figure 8** shows a graphical representation of the City's no-controls TP load in pounds per acre per year relative to land use.

2.3.2 TMDL With-Controls Conditions Analysis

Once the no-controls loads were established, the City's existing BMPs were evaluated to develop the with-controls results. The results of the existing TMDL with-controls analysis are summarized in **Table 9**. Red shading represents a percent difference that is in deficit compared to the target percent reduction and green shading represents a percent difference that is in excess of the requirements. **Figure 9** shows a graphical representation of the City's with-controls TSS loading rate in tons per acre per year relative to land use. **Figure 10** shows a graphical representation of the City's with-controls TP load in pounds per acre per year relative to land use.

Table 9. Existing TMDL Pollutant Load Summary

TMDL Reachshed	Modeled Area (ac)	TSS (tons)					TP (lbs)				
		No Controls	With Controls	Percent Reduction	TMDL Target Reduction	Percent Difference	No Controls	With Controls	Percent Reduction	TMDL Target Reduction	Percent Difference
Lake Wingra	132	27	13	53%	73%	20%	128	70	45%	61%	16%
Nine Springs Creek	3,611	480	231	52%	68%	16%	3,154	1,828	42%	63%	21%
Swan Creek	1,169	133	42	69%	62%	-6%	946	384	59%	54%	-5%
Total	4,912	640	285	55%	N/A	N/A	4,229	2,282	46%	N/A	N/A

3. Future Stormwater Pollution Reduction Analysis

Based on the results of the existing conditions analysis, additional pollutant reductions are needed for two of the City's reachsheds to meet TSS and TP reduction targets. The City has several options for making steps towards meeting the targets. The City can continue to pursue obtaining additional information to take credit for existing BMPs that either did not have a recorded stormwater maintenance agreement or sufficient modeling data. Additionally, the City may choose to pursue construction of new BMPs or retrofitting existing BMPs. Finally, non-structural BMPs such as enhanced street cleaning may also be an opportunity to increase load reductions especially where room for structural practices is limited.

3.1 Taking Credit for Existing BMPs

As a part of this 2024 TMDL WinSLAMM Report, an inventory of the City's BMPs has been created to determine which BMPs have stormwater maintenance agreements (SWMAs) or are publicly owned and have sufficient data to model. All BMPs that have both a SWMA or are publicly owned and have sufficient modeling data were incorporated into this updated plan, with the exception of some smaller BMPs that were omitted from the modeling. **Attachment B** includes the stormwater facility tracker used to inventory the BMPs.

As the City is able to obtain SWMAs and as-builts or survey data, additional BMPs can be added into the modeling to take credit for their load reductions. Depending on the size of the BMPs, this method of taking credit for additional existing BMPs could bring the City considerably closer to the TMDL reduction targets.

3.2 Future Structural Best Management Practices

This section describes potential additional BMPs that have been evaluated to determine future TMDL reductions that could likely be achieved if they are constructed. Throughout this section, "Existing" conditions will be used to describe the City's current buildout conditions in the TMDL area and "Future" conditions will be used to describe different potential scenarios where the City implements some or all of the BMPs proposed in this section.

Locations for additional future structural BMPs or retrofits to existing structural BMPs were selected according to recommendations made in previous studies and through meetings with City staff. All future BMPs that have been identified are located in the Nine Springs Creek reachshed. Focus has been put on this reachshed since it will require the most improvements to reach TMDL targets.

Existing BMPs were first evaluated for potential retrofitting which typically includes outfall structure upgrades or expansion to increase TSS and TP load removals. The criteria used for choosing retrofits was:

1. Parcel is currently owned by the City,
2. Current BMP is not meeting either TSS and/or TP targets, or
3. Additional area could be treated by the BMP.

Privately owned BMPs were not reviewed since the City would not have the ability to make improvements without acquiring land.

The locations of recommended BMPs from the 2013 Report were evaluated if the BMP was not yet implemented, and locations for new future BMPs were evaluated using the following criteria:

1. Parcel is near a gravity storm sewer outfall, and
2. Parcel is large enough to build a BMP of sufficient size to treat the drainage area.

Various structural BMPs (e.g. wet ponds, bioretention basins, and underground storage) were evaluated for each location based on the drainage area and site constraints. Most future BMP TP removal efficiencies were limited by amount of available land, contributing flows/drainage area, and the overall cost of installation. Locations of the future BMPs and their associated drainage areas are shown in **Figure 11.0**.

Once BMP retrofits and potential future BMPs were selected, each BMP was modeled in WinSLAMM to determine the maximum TSS and TP removal efficiencies that could be achieved for that drainage area. The potential future BMP models were designed based on the stormwater post-construction technical standards approved by WDNR. **Figures 11.1** through **11.10** show the locations of future BMP improvements and describe the changes recommended. **Table 10** includes a list of future BMPs recommended including estimated TSS and TP load reductions and the additional loads that would be removed if BMPs are installed.

Further evaluation will be required prior to implementing any of the BMPs mentioned below, however, the current analysis provides an evaluation of the various possibilities and likely pollutant removals for implementing the given future BMPs. Section 5 provides a cost analysis for the future BMPs that were analyzed.

Table 10. Potential Future Structural BMP Effectiveness

Future BMP Name	Retrofit or New BMP	Future BMP Type	Drainage Area for Full Series and Direct Drainage Area for Individual BMPs (acres)	Estimated Annual TSS Load Reduction (%) for Series and for Individual BMPs	Estimated Annual TP Load Reduction (%) for Series and for Individual BMPs	Additional TSS Removed by Future BMP Annually (tons/yr)	Additional TP Removed by Future BMP Annually (lbs/yr)
Belmar Hills Park UG Storage	New	Underground Storage	43.2	31%	21%	1.39	7.50
Nine Springs Golf Course Pond	Retrofit	Wet Pond	60.1	80%	58%	1.87	9.16
Seminole Hills Pond	Retrofit	Wet Pond	62.0	81%	57%	1.63	9.96
Triverton East BioBasin	New	Bioretention	11.0	31%	25%	0.60	2.81
Triverton West BioBasin	New	Bioretention	4.7	51%	47%	0.52	2.43
Chapel Valley - East			149.7	73%	53%		
Chapel Valley East Pond	Retrofit	Wet Pond	13.0			0.17	1.04
Dawley Bioretention Facility			149.8	76%	58%		
Arapaho Greenway	Retrofit	Swale	20.0			0.21	2.06
Business Park B Pond	Retrofit	Wet Pond	16.7			1.00	4.66
Dawley Bioretention Facility	New	Bioretention	15.7			0.94	8.40
McKee Park - North Pond			820.4	76%	55%		
McKee Farms Park SW Pond	New	Wet Pond	234.9			10.20	59.80
Nicolet Pond			356.4	72%	54%		
Design Mart Pond	Retrofit	Wet Pond	5.3			0.20	0.98

One additional practice that could be considered for existing and/or future wet ponds is enhanced phosphorus removal. The practice is not widely used in Wisconsin but has shown effectiveness for improving load reductions. Typically, coagulant treatment systems require power, pumps, and storage tanks to treat stormwater, so proximity to a power source can be a limiting factor. Enhanced phosphorus removal can be achieved through coagulation treatment by the addition of alum. Alum causes small particles to flocculate, or clump together, thereby improving load reductions in stormwater. Currently WinSLAMM software version 10.5 (released December 2022) does not have the capability to take alum addition into account when calculating pollutant load reductions.

New technical standards are anticipated for publication in 2025 according to the Wisconsin Standards Oversight Council (SOC). According to SOC, the standards will provide “criteria for the design, installation, and maintenance of systems that enhance phosphorus removal for urban stormwater post-construction nutrient discharge control. The technical standards will address enhancing the level of total phosphorus removal within wet detention ponds and reducing the potential export of soluble phosphorus from those ponds.” Publication of the technical standards will give communities better clarity on how enhanced phosphorus can be applied throughout Wisconsin.

3.2.1 Future Non-Structural Best Management Practices

The City’s existing catch basin cleaning, street cleaning, and leaf/yard waste collection programs are robust, therefore, potential changes to these programs were not considered as part of the future BMP analysis.

3.3 Future Condition Results

After modeling all potential future BMPs and calculating the TSS and TP efficiencies in WinSLAMM, new load reductions were calculated for each TMDL reachshed. Model results with the future BMPs in place are shown in **Table 11**. Even with the addition of all identified practices within the Nine Springs Creek reachshed, the reachshed still would not meet the TMDL TSS and TP targets. **Figure 12** shows a graphical representation of the City’s future TSS loading rate in tons per acre per year relative to land use if all future BMPs were implemented. **Figure 13** shows a graphical representation of the City’s future TP load in pounds per acre per year relative to land use if all future BMPs were implemented.

Recommendations and an implementation plan for moving closer to the TMDL targets has been included in Section 6 of this report.

Table 11. Future TMDL Pollutant Load Summary

TMDL Reachshed	Modeled Area (ac)	TSS (tons)					TP (lbs)				
		Existing (No Controls)	Future (With Controls)	Percent Reduction	TMDL Target Reduction	Percent Difference	Existing (No Controls)	Future (With Controls)	Percent Reduction	TMDL Target Reduction	Percent Difference
Lake Wingra	132	27	13	53%	73%	20%	128	70	45%	61%	16%
Nine Springs Creek	3,611	480	214	55%	68%	12%	3,154	1,729	45%	63%	18%
Swan Creek	1,169	133	42	69%	62%	-6%	946	384	59%	54%	-5%
Total	4,912	640	268	58%	N/A	N/A	4,229	2,183	48%	N/A	N/A

4. Cost Analysis

A cost analysis has been developed for potential future BMPs. Several existing BMPs that are already constructed were omitted from this analysis as they lacked a recorded stormwater maintenance agreement or sufficient data to model. Acquiring data and adding these BMPs to the model would be cost advantageous compared to constructing new BMPs or retrofitting existing BMPs.

4.1 Cost Analysis Approach

This section provides a cost analysis for all future BMPs that were analyzed in Section 4, including retrofits and new construction for:

1. Wet Ponds
2. Bioretention Basins
3. Grass Swales
4. Underground Storage

Cost estimates for construction of each of these BMPs are included in **Attachment A**. Capital cost estimate information came from a variety of sources including multiple bid tabs for BMPs developed by AECOM and the WisDOT Average Unit Price list published July 22, 2024. It was assumed that new BMPs on City-owned properties and retrofits on privately-owned property had \$0 land acquisition costs.

Once capital costs were estimated, the annualized cost per ton of TSS removed and the annualized cost per pound of TP removed were calculated to show the incremental improvement each future BMP would provide versus existing conditions. **Table 12** summarizes the future BMP cost analysis in the ascending order of annualized cost per ton TSS removed.

In addition to capital costs, maintenance costs can also be expected for all BMPs. Maintenance costs typically include minor annual maintenance such as weed removal or more significant costs such as dredging to remove sediment.

Table 12. Future BMP Cost Analysis

Proposed BMP ID	BMP Type	New or Retrofit	Additional TSS Removed by Future BMP Annually (tons/yr)	Additional TP Removed by Future BMP Annually (lbs/yr)	BMP Construction Cost	Annualized Cost per Ton TSS Removed (Construction Cost / Additional TSS Removed Annually)	Annualized Cost per Pound TP Removed (Construction Cost / Additional TP Removed Annually)
Seminole Hills Pond	Wet Pond	Retrofit	1.63	9.96	\$20,000	\$12,300	\$2,100
Business Park B Pond	Wet Pond	Retrofit	1.00	4.66	\$20,000	\$20,000	\$4,300
McKee Farms Park SW Pond	Wet Pond	New	10.20	59.80	\$970,000	\$95,100	\$16,300
Chapel Valley East Pond	Wet Pond	Retrofit	0.17	1.04	\$20,000	\$117,700	\$19,300
Design Mart Pond	Wet Pond	Retrofit	0.20	0.98	\$30,000	\$150,000	\$30,700
Triverton BioBasin	Bioretention	New	1.12	5.24	\$200,000	\$178,600	\$38,200
Dawley Bioretention Facility	Bioretention	New	0.94	8.40	\$200,000	\$212,800	\$23,900
Arapaho Greenway	Swale	Retrofit	0.21	2.06	\$80,000	\$381,000	\$38,900

Nine Springs Golf Course Pond	Wet Pond	Retrofit	1.87	9.16	\$1,160,000	\$620,400	\$126,700
Belmar Hills Park UG Storage	Underground Storage	New	1.39	7.50	\$2,130,000	\$1,532,400	\$284,000

4.2 Best Management Practice Cost Comparison

This section compares the cost effectiveness for each potential future BMP type evaluated. Overall, wet ponds have shown to be generally the most cost-effective BMP type evaluated and underground storage the least cost-effective.

A variety of factors influence the cost of any individual BMP. These include BMP location and connections to existing storm sewer, land acquisition cost (where applicable), existing land use, contributing drainage area size, and the BMP footprint size. The most effective BMPs have low capital cost and high pollutant reductions. **Table 13** presents a cost range for each type of BMP per pollutant unit removal in the ascending order of the annualized costs. In addition to capital cost, maintenance costs can also be expected for all BMPs.

Further evaluation will be required prior to implementing any of the BMPs mentioned below, and **Table 13** should only be used as a reference. The City should evaluate specific circumstances of BMPs prior to final selection and implementation. It is important to note that the cost-effectiveness of BMPs will decrease as more BMPs are installed in the study area.

Table 13. BMP Cost Comparison (Alternative Analysis)

BMP Type	New or Retrofit	Annualized Cost per Ton TSS Removed	Annualized Cost per Pound TP Removed
Wet Pond	Retrofit	\$12,300 - \$620,400	\$2,100 - \$126,700
Wet Pond	New	\$95,100	\$16,300
Grass Swale	Retrofit	\$381,000	\$38,900
Bioretention	New	\$178,600 - \$212,800	\$23,900 - \$38,200
Underground Storage	New	\$1,532,400	\$284,000

Recommendations for implementing future BMPs based on costs and pollutant removal effectiveness are presented in Section 6.

4.3 Feasibility Analysis of Alternative Funding Mechanisms

The anticipated future BMP construction costs from **Table 12** come to approximately \$4,910,000. Some options for the City to increase the stormwater budget to fund the cost of construction for these BMPs include the following:

1. Many of the proposed BMPs would be eligible for various grant programs (e.g. WDNR Urban Non-Point Source & Storm Water Management – UNPS&SW grants, Dane County Urban Water Quality Grant Program etc.) that could help offset some of the costs for design and/or construction. While grant research, applications, and reporting requirements do add administrative costs, the financial benefits usually outweigh these additional costs.
2. Increase the stormwater budget generated through City property taxes. To increase the property tax levy, a referendum prior to budget adoption would be required and the new levy must be within the state mandated limits, thus limiting the increase in general fund revenue generated by property taxes beyond the results of inflation and increasing

property value. An increase to the stormwater budget will most likely need to result by reallocating budget from another capital improvement project or City fund.

3. The City has established TIF (Tax Incremental Financing) districts from which special assessments can be levied and collected to fund stormwater projects within its district. To issue a special assessment, the City must follow the guidelines in the Wisconsin state code which include holding public hearings, issuing invoices to landowners in the storm sewer district, and tracking payments. Landowners within the special assessment districts may incur significant costs in relatively short time periods. This option may result in financial hardship.
4. Long-term bonding can effectively finance stormwater projects by directly raising federally tax-exempt money without a financier, such as a bank. To do so, a municipality must go through a rating process to learn how secure it is from defaulting on the security. Wisconsin law restricts the amount a municipality can borrow to 5% of its taxable property values, thus limiting the amount that can be raised. A Wisconsin municipal bond can be issued for 20 or 50 years.
5. Another option is to allow developers an option to construct regional stormwater BMPs in lieu of on-site BMPs for on-site stormwater treatment requirements. This should be outlined in the City's ordinance and involves negotiating an equitable distribution of the cost for land, engineering design, construction, and maintenance with the developer. This should be considered for future developments, however only developments in specific locations in relation to the City's stormwater system will have benefits to the City (e.g. site developments in close proximity to storm sewer outfalls).
6. Charge reports could be created for various watersheds on a BMP basis. Charge reports are similar to special assessment reports, except that they are more often used for funding regional stormwater facilities in new development areas. The communities will typically acquire property, design and construct the stormwater facility, then incorporate the charges as developer fees when new developments occur upstream of the regional stormwater facility. Charge reports have many of the same obstacles as special assessments, but also are challenging to implement in existing developed areas, which includes most of the City.
7. The City has an established storm sewer program (utility) which increases the City's revenue by assessing fees based on property classification and amount of impervious area. This creates a fund dedicated to stormwater related items, including consulting services, outlined in the annual budget. Since stormwater utility fees are a dedicated source of funding for stormwater related items that do not compete with schools, public safety, or roadway funding, it provides a benefit to the City for funding on future stormwater related projects and provides a long-term funding solution on a stormwater program basis, not just a project basis.
8. The City could also implement ordinances that require new development or redevelopment projects to implement stormwater practices that exceed the current minimum standards to enable the City to meet the TMDL goals. One major obstacle to this approach is that new development and redevelopment projects may be delayed or potentially not implemented if the costs for stormwater practice implementation gets too high. Timing of these improvements can also be very uncertain, which would present challenges to the City if there were deadlines imposed to meet the TMDL goals.

While increasing the stormwater budget and grant application opportunities are likely the easiest funding options for the City, it is recommended that the City consider all the potential options mentioned above and keep exploring new opportunities. A blend of several of these options may prove valuable depending on the scope and timing of individual BMPs.

5. Recommendations and Implementation Plan

The City of Fitchburg is currently meeting its compliance through participation in the approved Yahara WINS Adaptive Management Plan. The City will continue to participate in this program and also seek ways to progress closer to their TMDL targets to reduce the costs of the Adaptive Management Plan.

This implementation plan is broken down into two sections: 1) Annual Activities and 2) Activities by Reachshed. In addition to the activities outlined in this plan, new developments and re-developments should be evaluated on a site-by-site basis for the potential to incorporate additional BMPs. In addition, potential partnership opportunities between the City and developers to install regional BMPs should be considered.

5.1 Annual Activities

A variety of annual stormwater quality management activities are currently planned to follow the current WPDES permit conditions, including:

1. Continue to implement Permit minimum control measures which are not tied to numerical effluent limits including:
 - a. Public Education and Outreach
 - b. Public Involvement and Participation
 - c. Illicit Discharge Detection and Elimination
 - d. Construction Site Erosion Control
 - e. Post-Construction Storm Water Management
 - f. Pollution Prevention
2. Continue to operate and maintain existing stormwater treatment practices
3. Continue to enforce existing regulations including water quality controls for land development
4. Continue implementation of non-structural stormwater best management practices including:
 - a. Street cleaning
 - b. Catch basin cleaning
5. Monitor ongoing studies being conducted by others and changes in WDNR requirements such as:
 - a. Leaf collection
 - b. Enhanced phosphorus removal
6. Monitor technology and new practices in pilot studies
 - a. Enhanced Phosphorus Treatment
7. Monitor and act on opportunities to partner with developers and surrounding communities on stormwater best management projects

5.2 Activities by Reachshed

5.2.1 Lake Wingra (Reachshed 64)

The Lake Wingra reachshed accounts for a small portion (2%) of the City of Fitchburg's study area. Additionally, the areas within the City's study area that drain to Lake Wingra drain into the City of Madison study area are not all contiguous. This limits the City of Fitchburg's options for BMPs to smaller BMPs rather than larger, regional BMPs.

In 2022, the Town of Madison was dissolved, and several parcels were added to the City of Fitchburg. Many of these parcels fell in the Lake Wingra reachshed. It is recommended that the modeling be updated if any other boundary changes are made.

For the Lake Wingra reachshed, it will be important for the City to take credit for all existing BMPs. TSS and TP will need to be reduced approximately another 20% and 16% respectively to meet the TMDL reduction targets compared to the existing with-controls. Currently the Novation and Badger Rd BMPs do not have signed maintenance agreements. The Zimbrick BMPs were omitted from the existing modeling due to their small size. However, even if credit were taken for these existing BMPs the City would still likely fall short of the TMDL targets of 73% TSS and 61% TP for the Lake Wingra reachshed.

Therefore, additional options will need to be explored for the City of Fitchburg to meet the TMDL targets for the Lake Wingra reachshed such as construction of new BMPs. Future recommended BMPs were not modeled for this reachshed as a part of this TMDL WinSLAMM Report since overall the load reduction deficit compared to meet the TMDL target is less than for the Nine Springs Creek reachshed, which has been the focus of planning future BMPs.

Overall, for the Lake Wingra reachshed, it is recommended that the City acquire a recorded maintenance agreement for the Novation BMP, add all remaining existing BMPs to the modeling to receive credit for their pollutant load reductions, require any new development or redevelopment within the reachshed to meet the TMDL TSS target reduction of 73% and TP target reduction of 61%, and seek out additional opportunities for constructing new BMPs.

5.2.2 Nine Springs Creek (Reachshed 65)

The Nine Springs Creek reachshed accounts for a large portion (73%) of the City of Fitchburg's study area. TSS and TP will need to be reduced approximately another 16% and 21% respectively to meet the TMDL reduction targets.

Of the approximately 210 existing BMPs identified in the Nine Springs Creek reachshed, approximately 110 have been modeled. BMPs that have not been modeled either do not have sufficient modeling data, do not have a recorded maintenance agreement, or were omitted from the modeling due to their small size. It is recommended that the City continue to acquire recorded maintenance agreements and modeling data such as survey or as-builts especially for larger BMPs that would have a greater impact on the City's overall pollutant load reductions and incorporate these BMPs into the modeling.

It is also recommended that the City consider retrofitting and constructing new BMPs. **Table 14** below lists the future BMPs that have been modeled in ascending order of cost per unit load removed. The table also lists the impact that each future BMP would have on the overall reductions compared to existing conditions and shows that the overall cumulative deficit from

the TMDL targets would be narrowed from 16% to 12% for TSS and 21% to 18% for TP if all recommendations are implemented.

Table 14. Nine Springs Creek Reachshed Implementation Recommendations

TMDL Reachshed Number: 65							
TMDL Reachshed Name: Nine Springs Creek							
TMDL Percent Reduction Target: 68% (TSS) & 63% (TP)							
Priority Based on Cost per Unit Load Removed (lowest to highest)	Recommended Future BMP	% Load Reduction Toward TMDL Reduction		Cumulative Overall % Load Controlled Once Constructed		Cumulative Deficit from TMDL Reduction Target Once Constructed	
		TSS	TP	TSS	TP	TSS	TP
N/A	Starting point (Existing with controls)	-	-	51.9%	42.0%	-16.1%	-21.0%
1	Seminole Hills Pond	0.3%	0.3%	52.3%	42.4%	-15.7%	-20.6%
2	Business Park B Pond	0.2%	0.1%	52.5%	42.5%	-15.5%	-20.5%
3	McKee Farms Park SW Pond	2.1%	1.9%	54.6%	44.4%	-13.4%	-18.6%
4	Chapel Valley East Pond	0.0%	0.0%	54.6%	44.4%	-13.4%	-18.6%
5	Design Mart Pond	0.0%	0.0%	54.7%	44.5%	-13.3%	-18.5%
6	Triverton BioBasins	0.2%	0.2%	54.9%	44.6%	-13.1%	-18.4%
7	Dawley Bioretention Facility	0.2%	0.3%	55.1%	44.9%	-12.9%	-18.1%
8	Arapaho Greenway	0.0%	0.1%	55.1%	45.0%	-12.9%	-18.0%
9	Nine Springs Golf Course Pond	0.4%	0.3%	55.5%	45.3%	-12.5%	-17.7%
10	Belmar Hills Park UG Storage	0.3%	0.2%	55.8%	45.5%	-12.2%	-17.5%

Overall, for the Nine Springs Creek reachshed, it is recommended that the City acquire recorded maintenance agreements for existing BMPs that do not currently have them, add all remaining existing BMPs to the modeling to receive credit for their pollutant load reductions, construct the recommended new and retrofit BMPs, require any new development or redevelopment within the reachshed to meet the TMDL TSS target reduction of 68% and TP target reduction of 63%, and seek out additional opportunities for constructing new BMPs.

5.2.3 Swan Creek (Reachshed 66)

The Swan Creek reachshed (Reachshed 66) accounts for the remaining 25% of the City of Fitchburg’s study area. The TMDL target reductions have been met by the City’s existing modeled BMPs.

Since the City is achieving load reductions in excess of the requirements for the Swan Creek reachshed, the City may be eligible to trade credits with other Yahara WINS members. As described by the Intergovernmental Agreement for an Adaptive Management Plan for the Yahara Watershed, included in **Attachment J**, “trading with another MS4 member located within the same stream reach that has exceeded the baseline conditions can be used to meet the baseline condition, but trade agreements are the responsibility of the participating Members and are not addressed directly through this Agreement.”

5.2.4 Badfish Creek (Reachshed 69)

The southeast portion of the City drains to Badfish Creek (Reachshed 69), which is outside of the study limits for this report and was excluded from the analysis. However, this area may be included in the future as it becomes more urbanized, and new developments and re-developments should continue to be evaluated to achieve the TMDL reduction targets to the maximum extent practicable.

6. Ordinance Recommendations

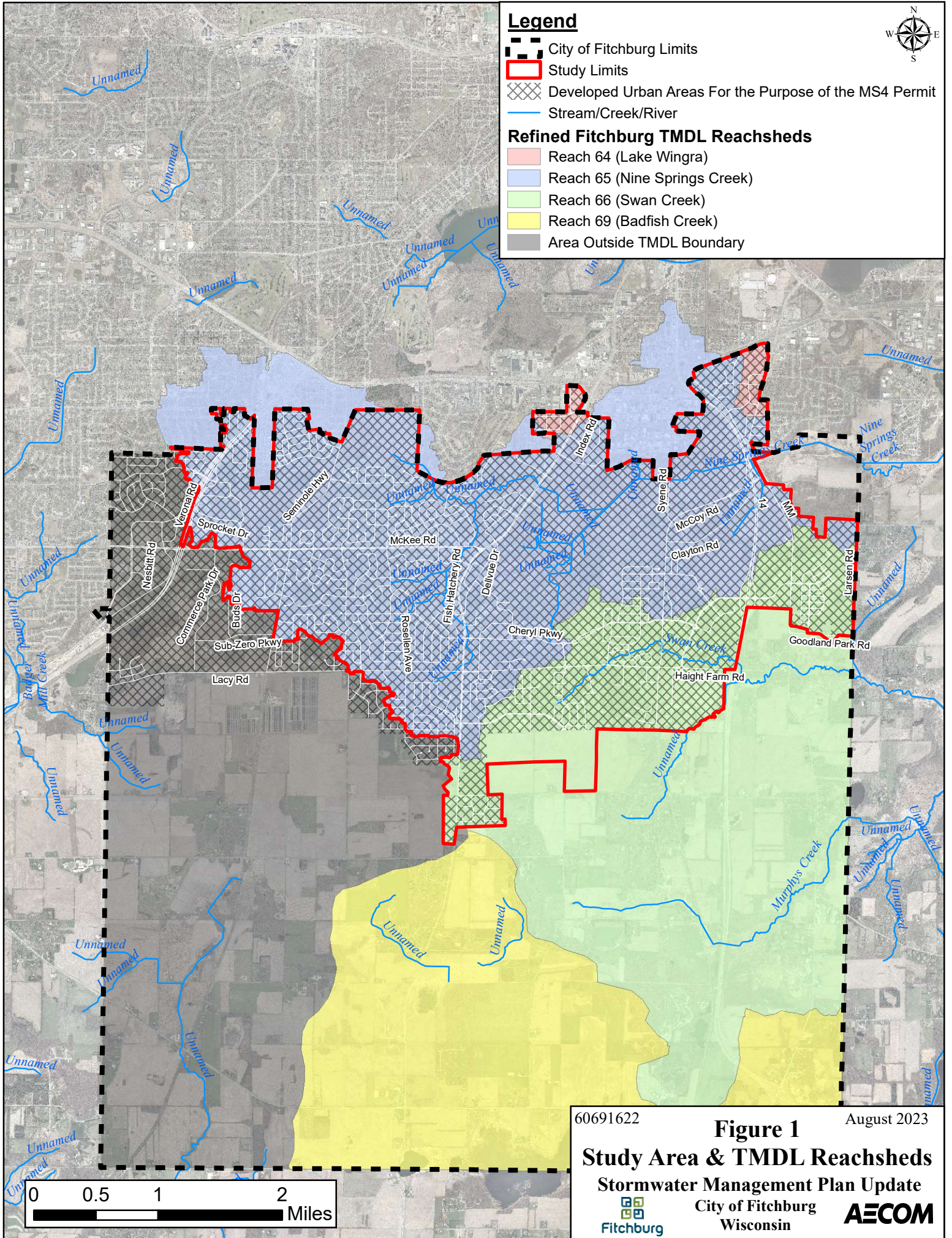
Chapter 30, Article II of the City of Fitchburg's ordinances pertain to Erosion Control and Stormwater Management (including Illicit Discharge and Prohibition and Disconnection). AECOM reviewed and provided initial suggested revisions to the current ordinance language. Recommendations included general clarifications and modifications to benefit water quality.

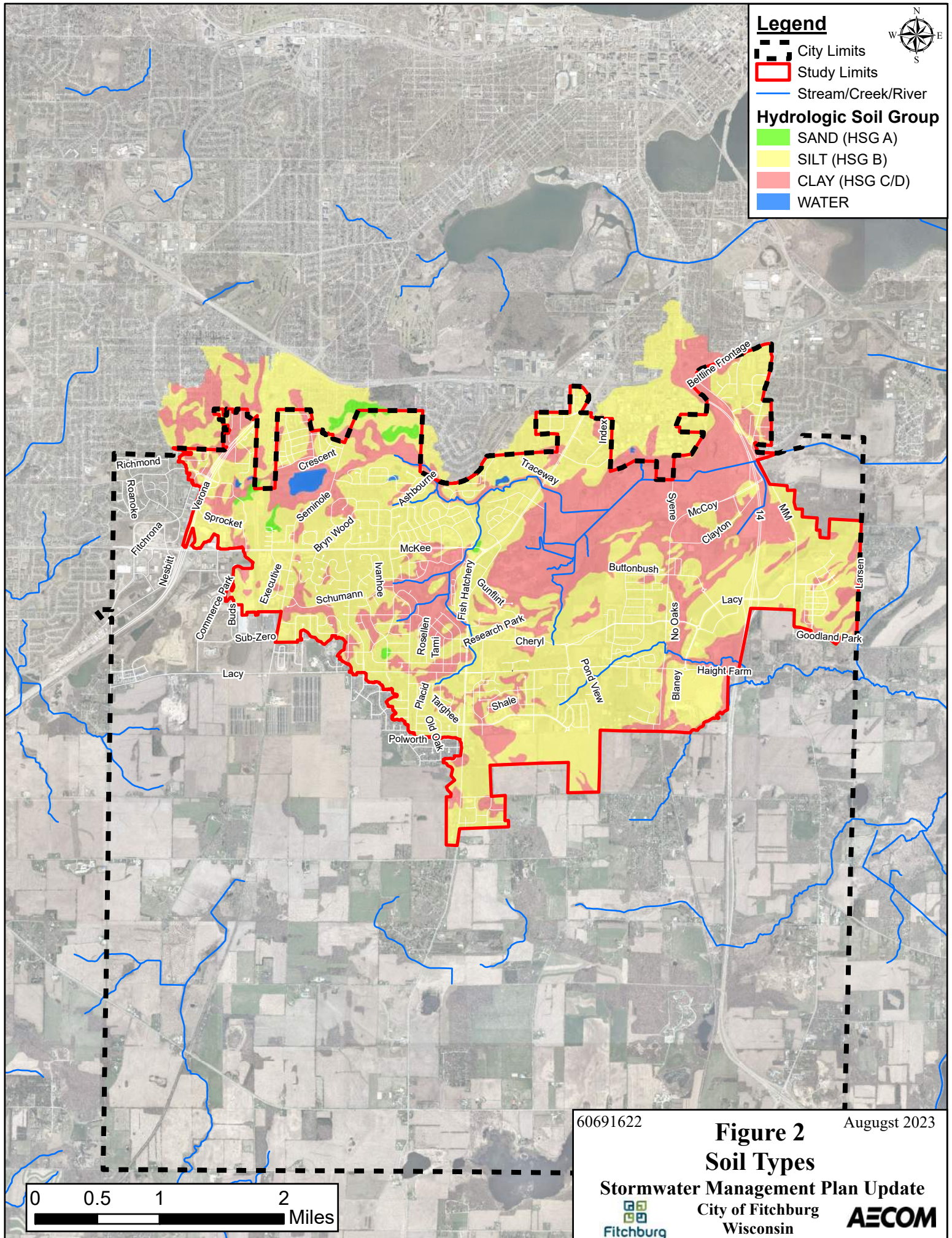
City staff reviewed the ordinance recommendations and prepared an updated version that is provided in **Attachment K**.

On November 11, 2024, City staff reviewed the ordinance with the Resource Conservation Commission. City staff is in the process of moving the ordinance through the full referral process prior to final approval.

Figures

- Figure 1** Study Area and TMDL Reachsheds
- Figure 2** Soil Types
- Figure 3** Land Use
- Figure 4** Analyzed and Excluded Areas
- Figure 5** Drainage Conditions
- Figure 6** Stormwater Conveyance Map
- Figure 7** TMDL TSS Loads Without Controls
- Figure 8** TMDL TP Loads Without Controls
- Figure 9** TMDL TSS Loads With Controls
- Figure 10** TMDL TP Loads With Controls
- Figure 11** Future TMDL Water Quality BMPs
- Figure 12** TMDL Future TSS Loads
- Figure 13** TMDL Future TP Loads





Legend

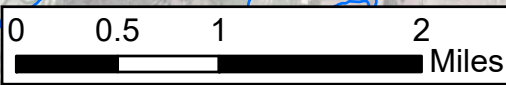
- City Limits
- Study Limits
- Stream/Creek/River

Hydrologic Soil Group

- SAND (HSG A)
- SILT (HSG B)
- CLAY (HSG C/D)
- WATER



Richmond
Roanoke
Fitchrona
Nesbitt
Verona
Sprocket
Commerce Park
Bud's
Sub-Zero
Lacy
Executive
Crescent
Seminole
Bryn Wood
Schumann
Ivanhoe
Rosellen
Tami
Placid
Targhee
Polworth
Old Oak
Ashbourne
Mckee
Fish Hatchery
Gunflint
Research Park
Cheryl
Shale
Traceway
Index
Buttonbush
No Oaks
Blaney
Pond View
Syrre
McCoy
Clayton
Haight Farm
Bellevue Frontage
Larsen
Goodland Park



60691622 August 2023

Figure 2
Soil Types

Stormwater Management Plan Update
City of Fitchburg
Wisconsin

AECOM

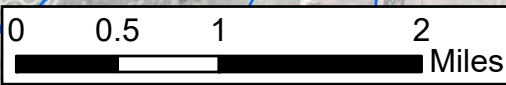
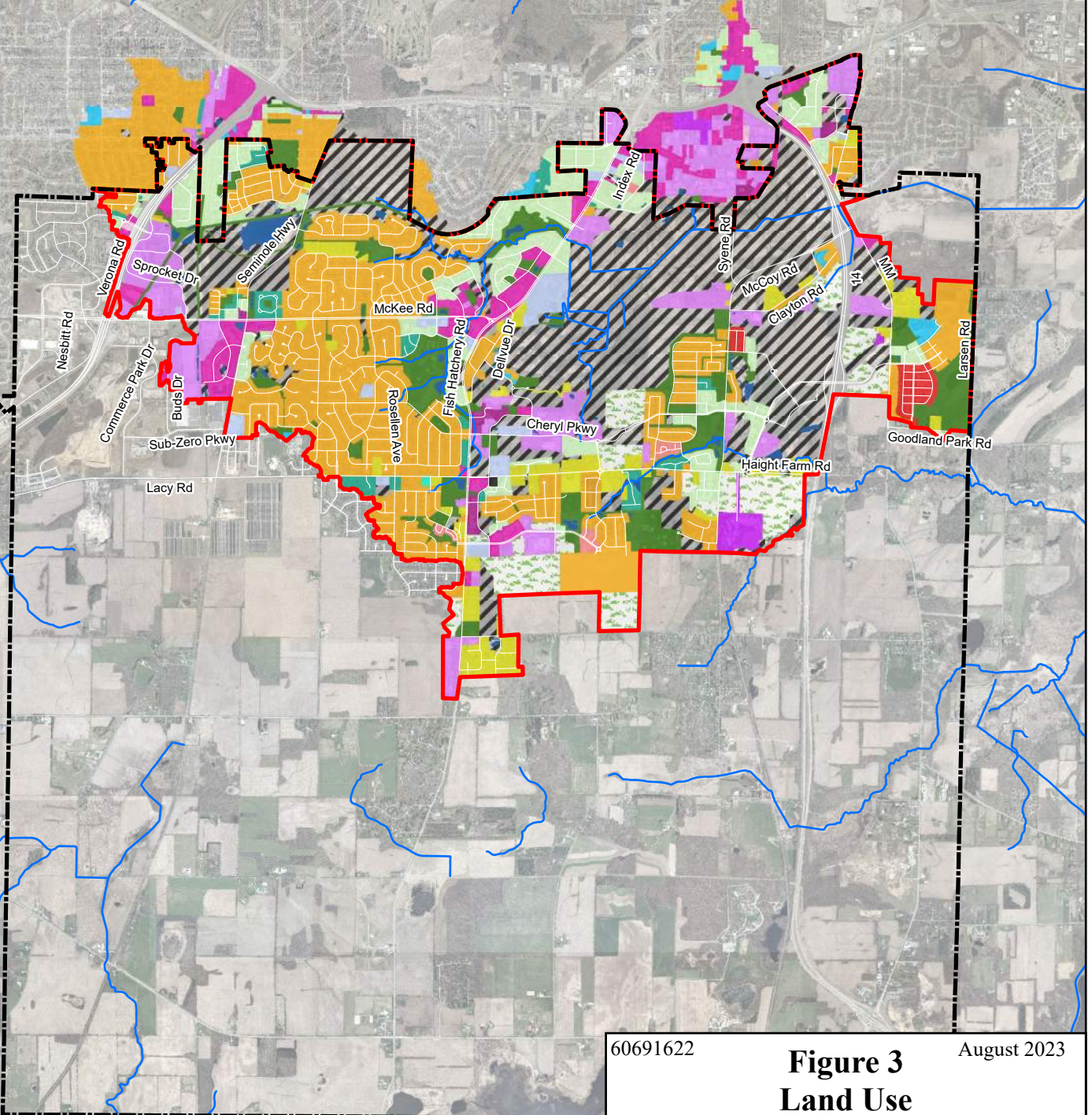


Legend

- City of Fitchburg Limits
- Study Limits
- Stream/Creek/River

Land Use

- Agriculture
- Downtown
- Duplexes
- Freeway
- High Density Residential (no alleys)
- High Density Residential (with alleys)
- Institutional
- Light Industrial
- Low Density Residential
- Medium Density Residential (no alleys)
- Medium Density Residential (with alleys)
- Medium Industrial
- Multi Family Residential
- Office Park
- Open Space Undeveloped
- Park
- School
- Strip Commercial
- Shopping Centers
- Suburban Residential
- Water



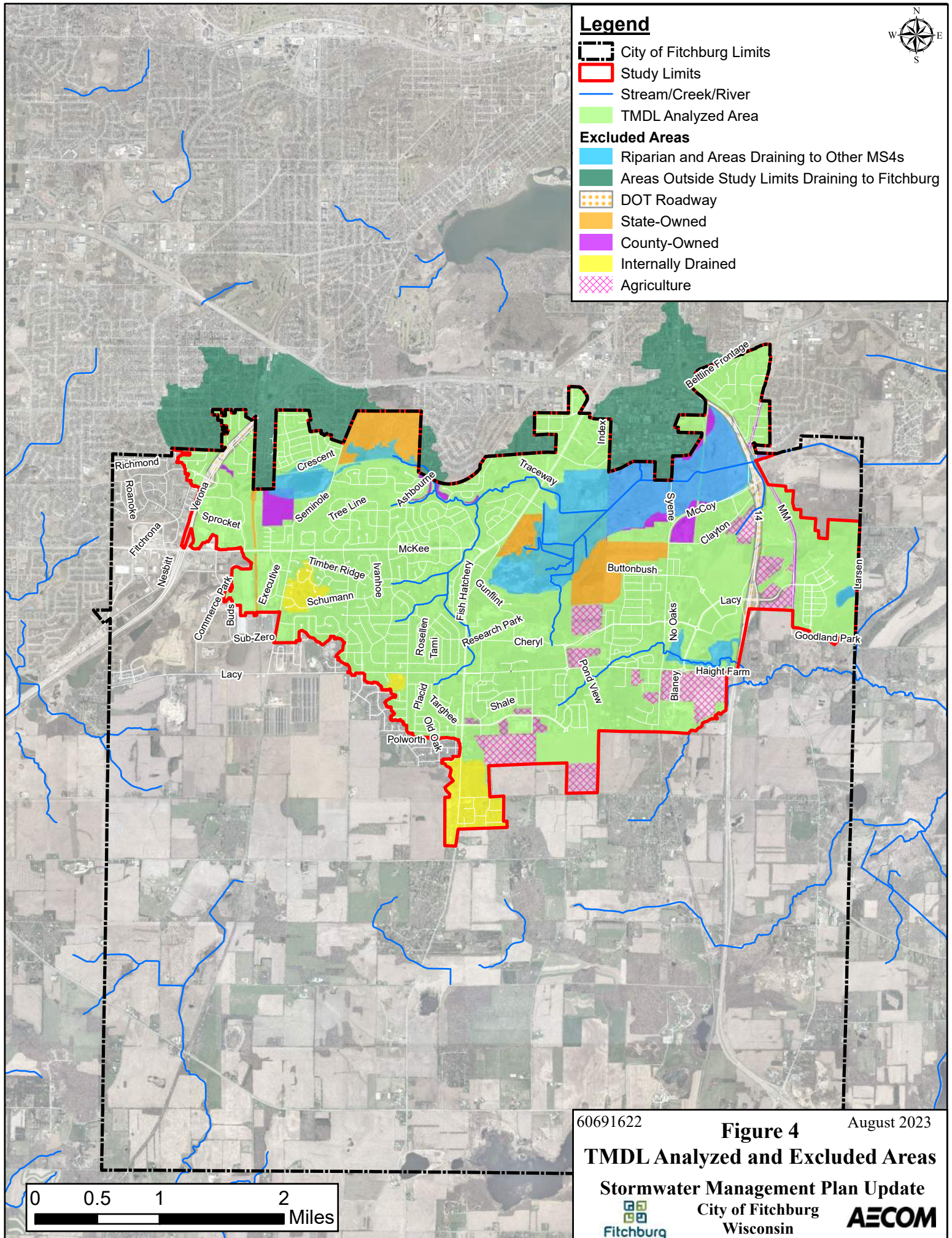
60691622

Figure 3 Land Use

August 2023

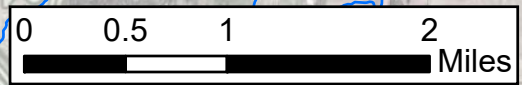
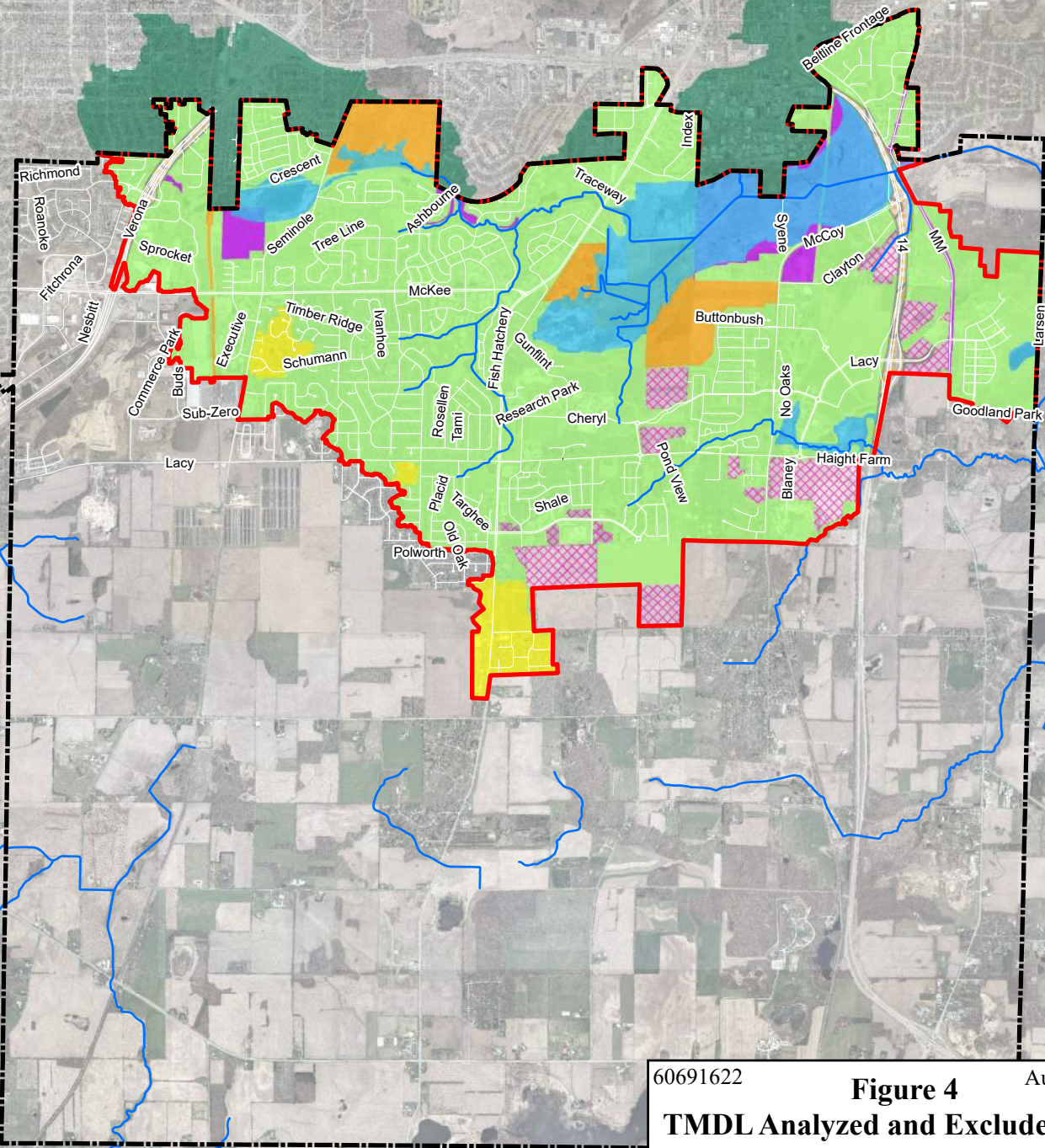
Stormwater Management Plan Update
 City of Fitchburg
 Wisconsin

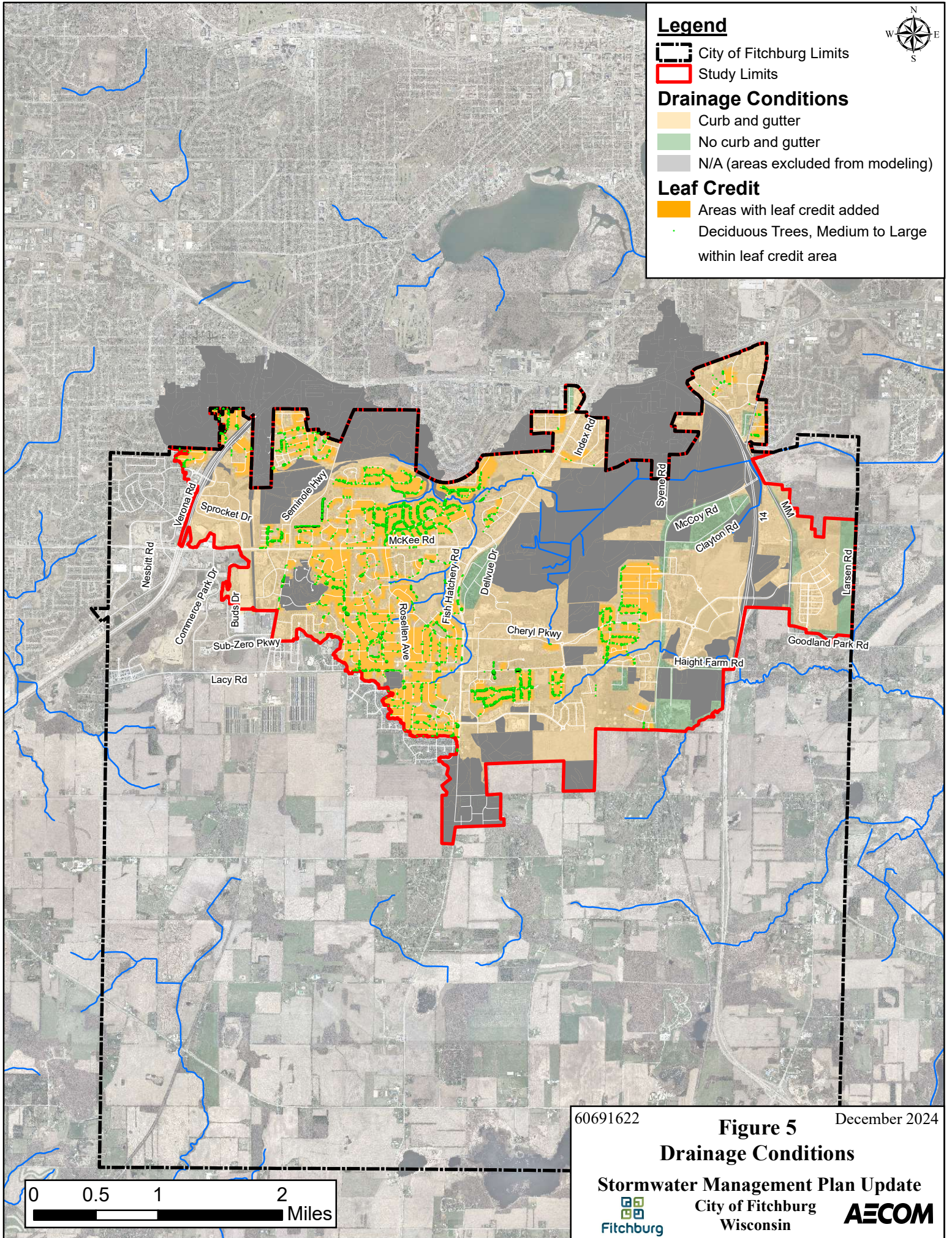






Legend

- City of Fitchburg Limits
- Study Limits
- Stream/Creek/River
- TMDL Analyzed Area
- Excluded Areas**
- Riparian and Areas Draining to Other MS4s
- Areas Outside Study Limits Draining to Fitchburg
- DOT Roadway
- State-Owned
- County-Owned
- Internally Drained
- Agriculture










Legend

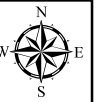
-  City of Fitchburg Limits
-  Study Limits

Drainage Conditions

-  Curb and gutter
-  No curb and gutter
-  N/A (areas excluded from modeling)

Leaf Credit

-  Areas with leaf credit added
-  Deciduous Trees, Medium to Large within leaf credit area



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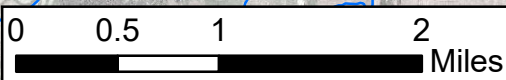
December 2024

Figure 5
Drainage Conditions

Stormwater Management Plan Update



City of Fitchburg
Wisconsin



Legend

- City of Fitchburg Limits
- Study Limits
- Stream/Creek/River
- Most Downstream BMP in series



Refined TMDL Reachsheds

- Reach 64 (Lake Wingra)
- Reach 65 (Nine Springs Creek)
- Reach 66 (Swan Creek)
- Reach 69 (Badfish Creek)
- Area Outside TMDL Boundary

Manholes

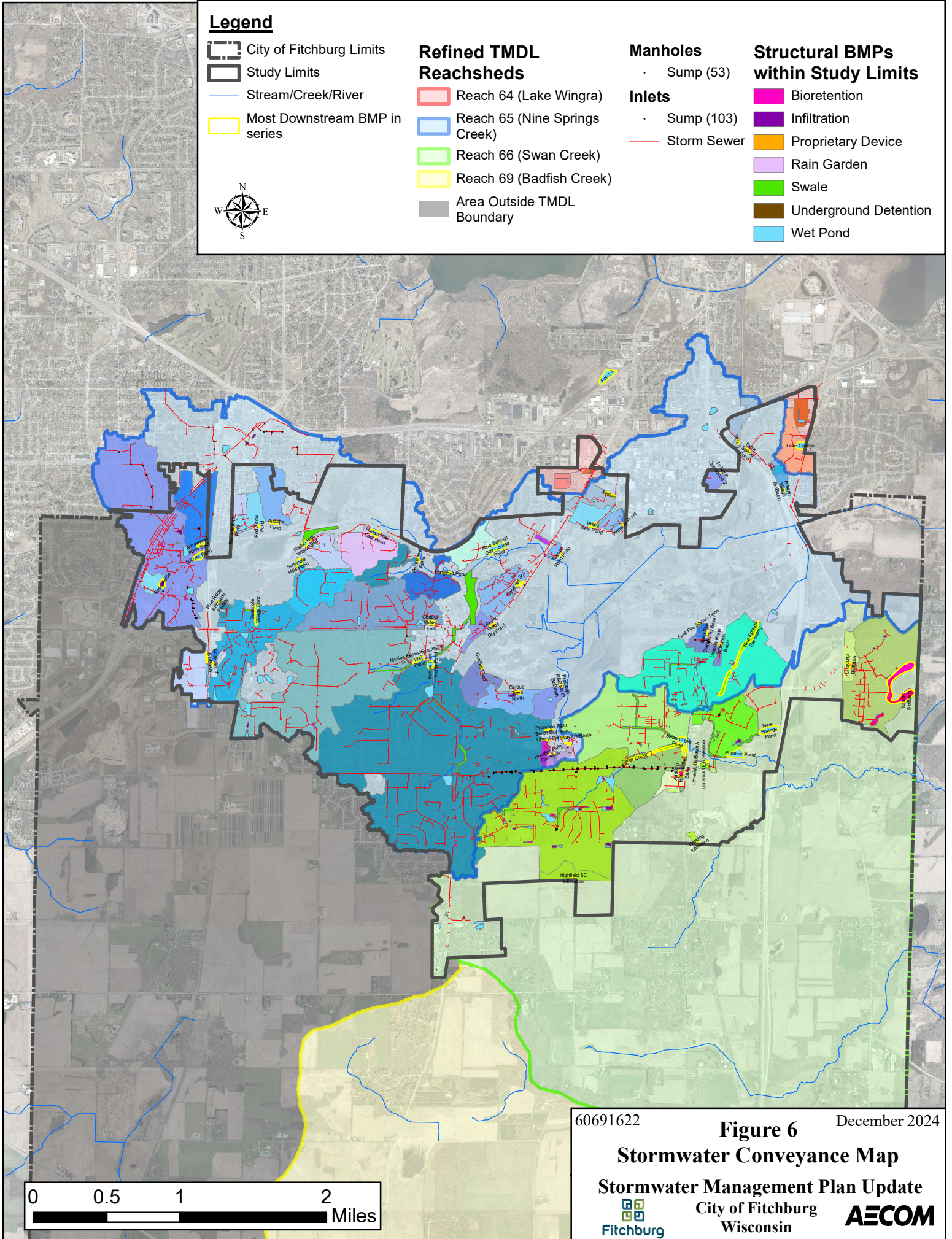
- Sump (53)

Inlets

- Sump (103)
- Storm Sewer

Structural BMPs within Study Limits

- Bioretention
- Infiltration
- Proprietary Device
- Rain Garden
- Swale
- Underground Detention
- Wet Pond



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Figure 6

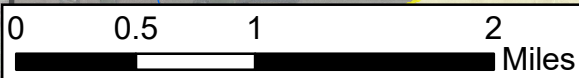
December 2024

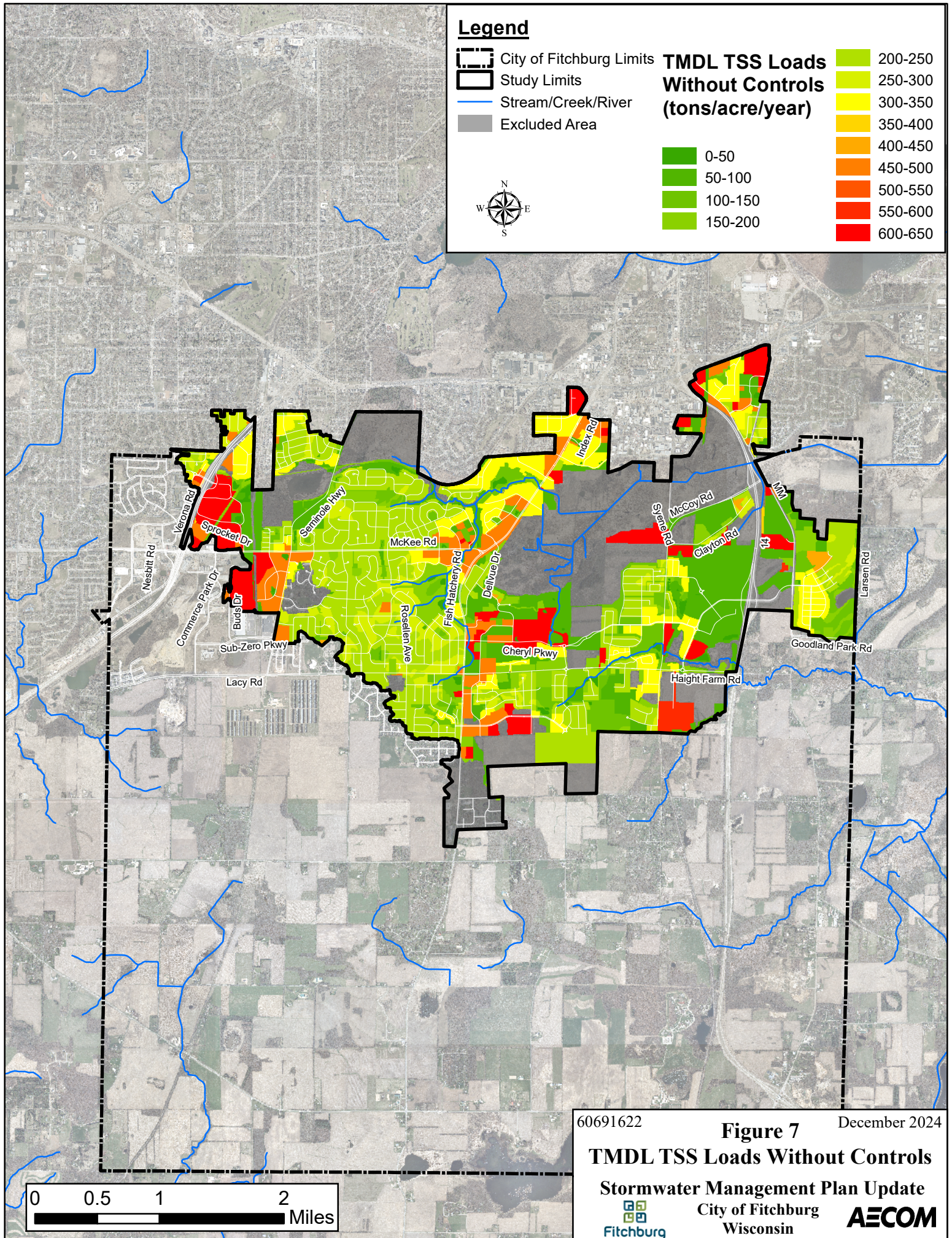
Stormwater Conveyance Map

Stormwater Management Plan Update



City of Fitchburg
Wisconsin





Legend

- City of Fitchburg Limits
- Study Limits
- Stream/Creek/River
- Excluded Area

TMDL TSS Loads Without Controls (tons/acre/year)

- | | | | |
|--|---------|--|---------|
| | 0-50 | | 200-250 |
| | 50-100 | | 250-300 |
| | 100-150 | | 300-350 |
| | 150-200 | | 350-400 |
| | | | 400-450 |
| | | | 450-500 |
| | | | 500-550 |
| | | | 550-600 |
| | | | 600-650 |



60691622

Figure 7

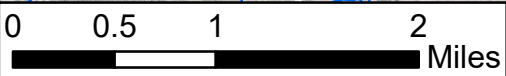
December 2024

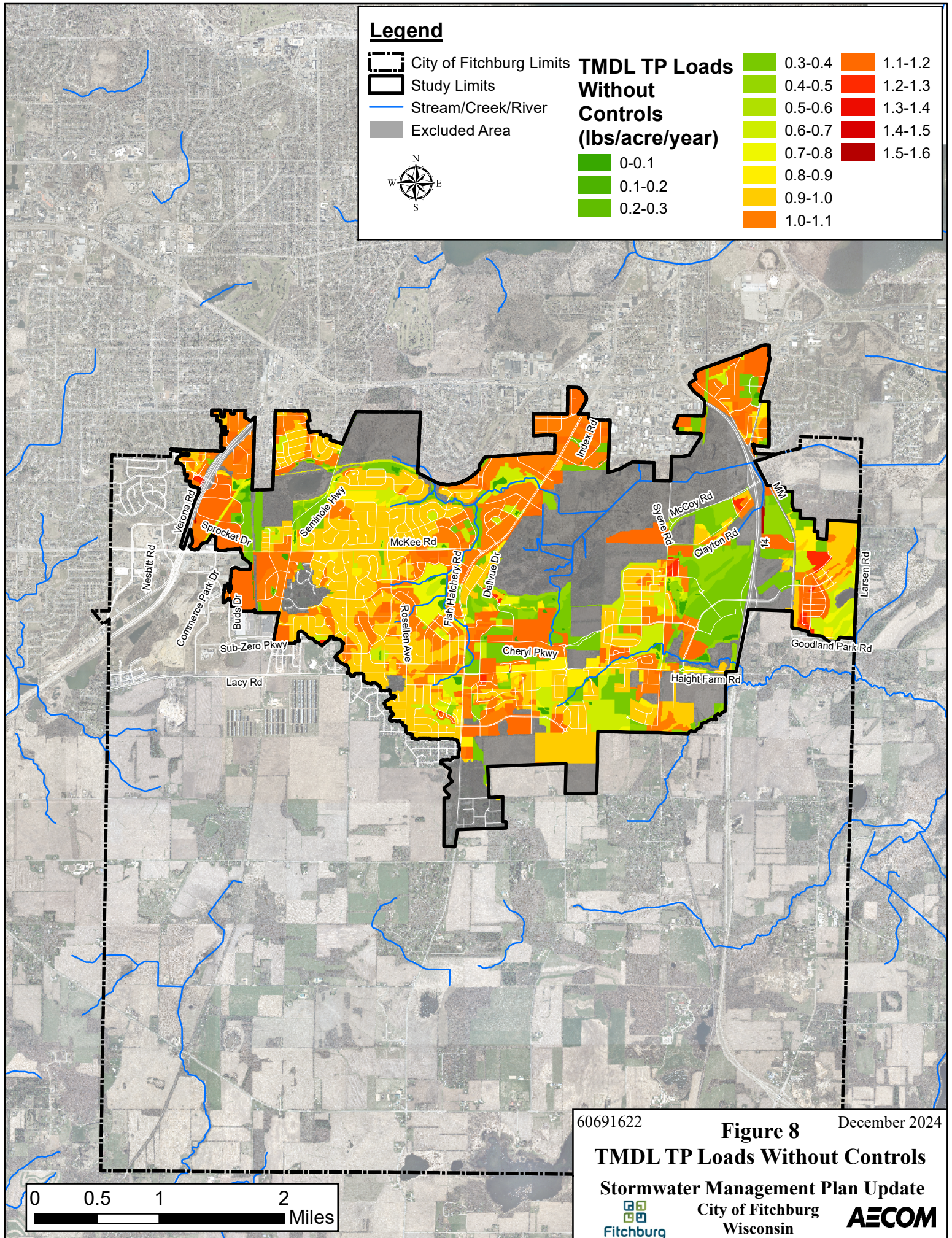
TMDL TSS Loads Without Controls

Stormwater Management Plan Update



City of Fitchburg
Wisconsin



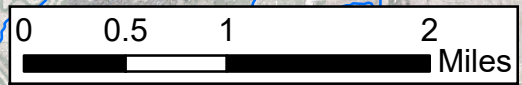


Legend

- City of Fitchburg Limits
- Study Limits
- Stream/Creek/River
- Excluded Area

TMDL TP Loads Without Controls (lbs/acre/year)

	0-0.1		0.3-0.4		1.1-1.2
	0.1-0.2		0.4-0.5		1.2-1.3
	0.2-0.3		0.5-0.6		1.3-1.4
			0.6-0.7		1.4-1.5
			0.7-0.8		1.5-1.6
			0.8-0.9		
			0.9-1.0		
			1.0-1.1		

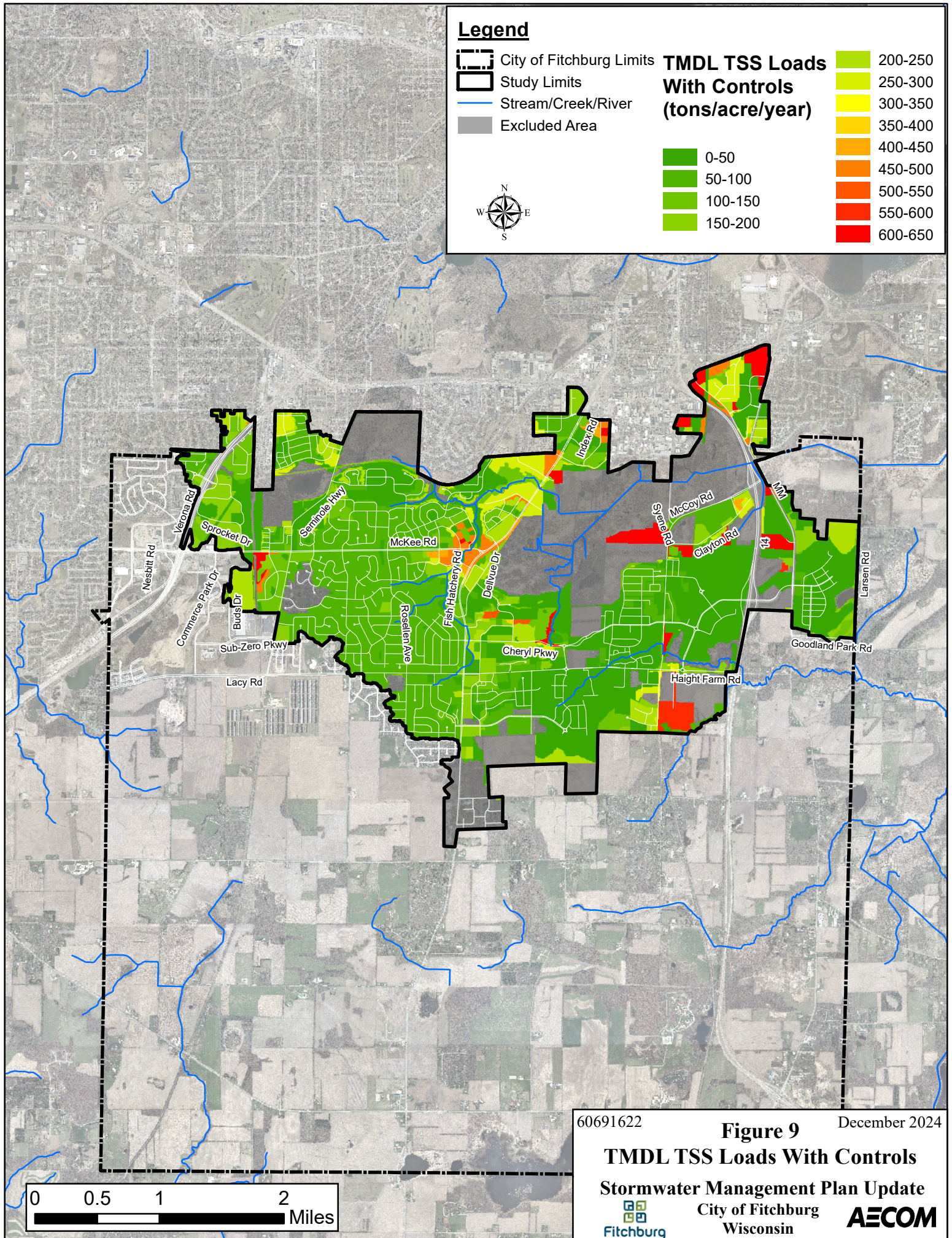


60691622 **Figure 8** December 2024

TMDL TP Loads Without Controls

Stormwater Management Plan Update

City of Fitchburg Wisconsin



Legend

- City of Fitchburg Limits
- Study Limits
- Stream/Creek/River
- Excluded Area

TMDL TSS Loads With Controls (tons/acre/year)

- 0-50
- 50-100
- 100-150
- 150-200
- 200-250
- 250-300
- 300-350
- 350-400
- 400-450
- 450-500
- 500-550
- 550-600
- 600-650



60691622

Figure 9

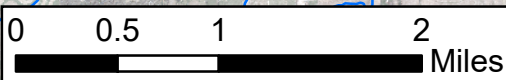
December 2024

TMDL TSS Loads With Controls





Stormwater Management Plan Update



City of Fitchburg
Wisconsin






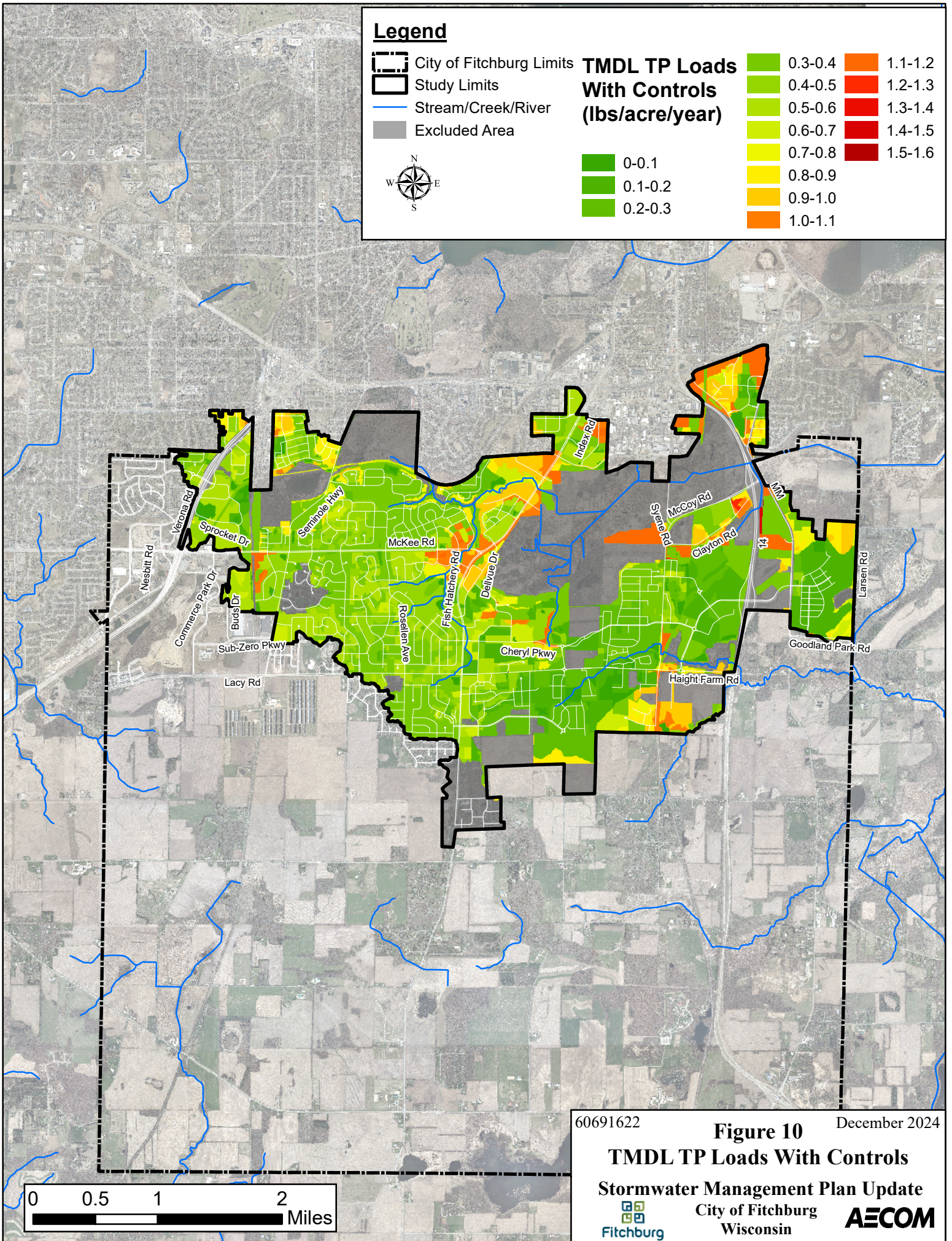
Legend

-  City of Fitchburg Limits
-  Study Limits
-  Stream/Creek/River
-  Excluded Area

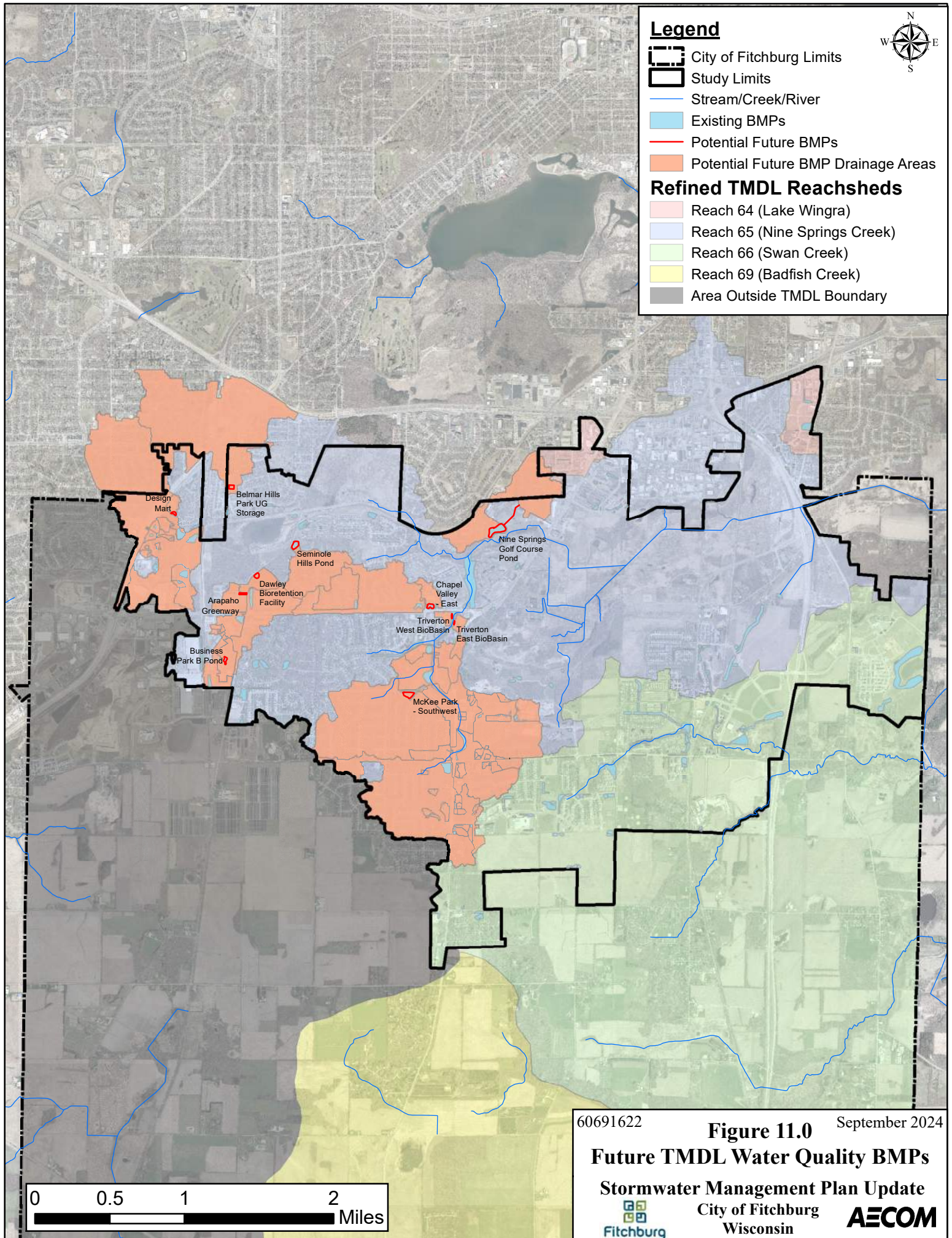


**TMDL TP Loads
With Controls
(lbs/acre/year)**

	0-0.1		1.1-1.2
	0.1-0.2		1.2-1.3
	0.2-0.3		1.3-1.4
	0.3-0.4		1.4-1.5
	0.4-0.5		1.5-1.6
	0.5-0.6		
	0.6-0.7		
	0.7-0.8		
	0.8-0.9		
	0.9-1.0		
	1.0-1.1		



60691622 **Figure 10** December 2024
TMDL TP Loads With Controls
Stormwater Management Plan Update
 City of Fitchburg Wisconsin **AECOM**

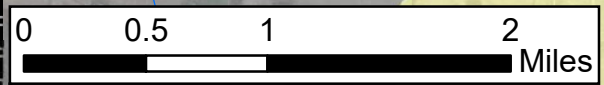


Legend

- City of Fitchburg Limits
- Study Limits
- Stream/Creek/River
- Existing BMPs
- Potential Future BMPs
- Potential Future BMP Drainage Areas

Refined TMDL Reachsheds

- Reach 64 (Lake Wingra)
- Reach 65 (Nine Springs Creek)
- Reach 66 (Swan Creek)
- Reach 69 (Badfish Creek)
- Area Outside TMDL Boundary



60691622

September 2024

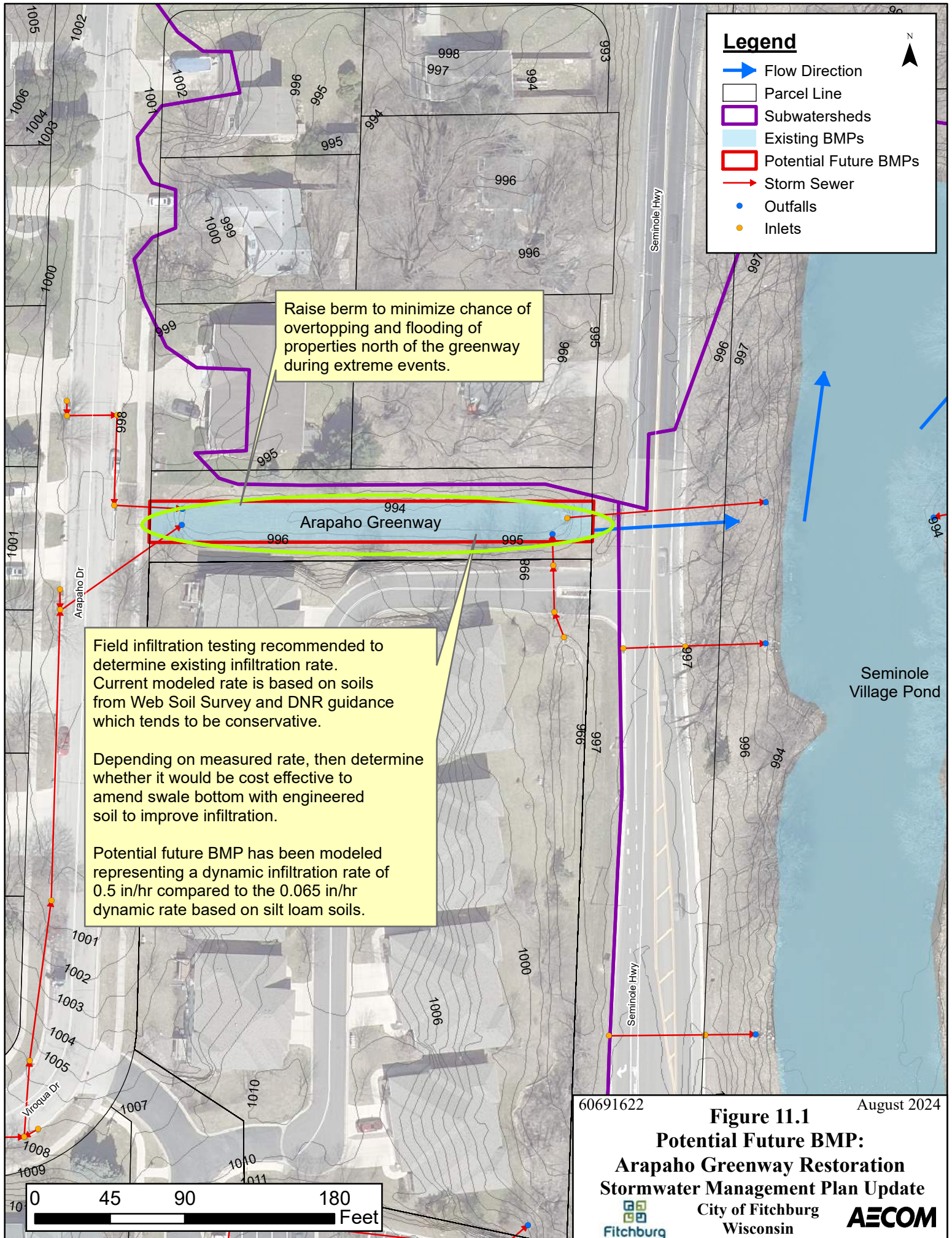
Figure 11.0
Future TMDL Water Quality BMPs

Stormwater Management Plan Update



City of Fitchburg
 Wisconsin





60691622 August 2024

Figure 11.1
Potential Future BMP:
Arapaho Greenway Restoration
Stormwater Management Plan Update
 City of Fitchburg Wisconsin
Fitchburg **AECOM**

WinSLAMM Details for the Future Conditions for Arapaho Greenway (Retrofit)

Existing

Grass Swale Data	
Total Drainage Area (ac)	20.145
Fraction of Drainage Area Served by Swales (0-1)	1.00
Swale Density (ft/ac)	0.00
Total Swale Length (ft)	230
Average Swale Length to Outlet (ft)	115
Typical Bottom Width (ft)	19.0
Typical Swale Side Slope (__ ft H : 1 ft V)	4.0
Typical Longitudinal Slope (ft/ft, V/H)	0.004
Swale Retardance Factor	D ▼
Typical Grass Height (in)	3
Swale Dynamic Infiltration Rate (in/hr)	0.065
Typical Swale Depth (ft) for Cost Analysis (Optional)	0.0
<input checked="" type="checkbox"/> Use Total Swale Length Instead of Swale Density for Infiltration Calculations	

Future

Grass Swale Data	
Total Drainage Area (ac)	20.145
Fraction of Drainage Area Served by Swales (0-1)	1.00
Swale Density (ft/ac)	0.00
Total Swale Length (ft)	230
Average Swale Length to Outlet (ft)	115
Typical Bottom Width (ft)	19.0
Typical Swale Side Slope (__ ft H : 1 ft V)	4.0
Typical Longitudinal Slope (ft/ft, V/H)	0.004
Swale Retardance Factor	D ▼
Typical Grass Height (in)	3
Swale Dynamic Infiltration Rate (in/hr)	0.500
Typical Swale Depth (ft) for Cost Analysis (Optional)	0.0
<input checked="" type="checkbox"/> Use Total Swale Length Instead of Swale Density for Infiltration Calculations	

Outlet structure modification is recommended to improve oil and grease control and improve TSS and TP load removals.

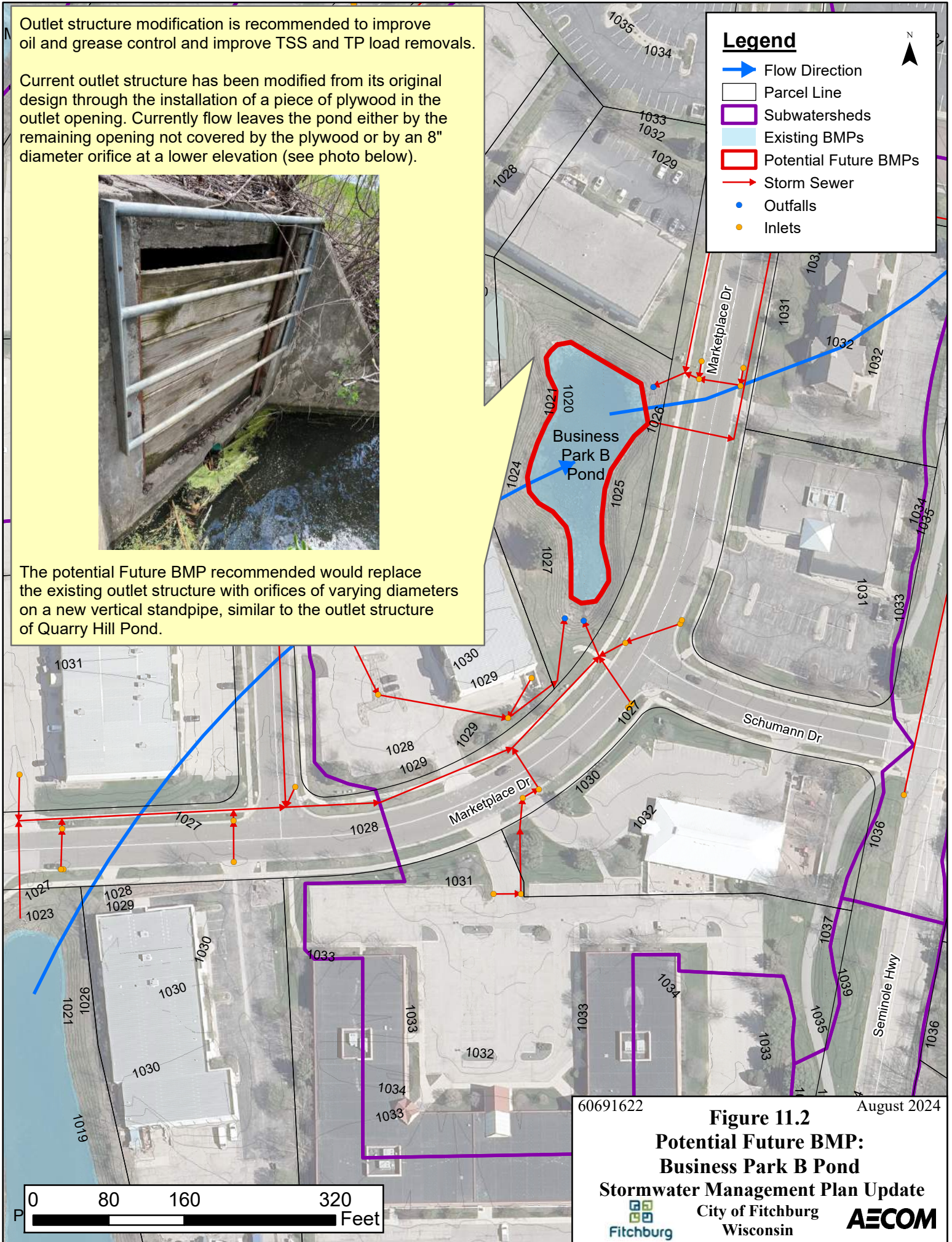
Current outlet structure has been modified from its original design through the installation of a piece of plywood in the outlet opening. Currently flow leaves the pond either by the remaining opening not covered by the plywood or by an 8" diameter orifice at a lower elevation (see photo below).



The potential Future BMP recommended would replace the existing outlet structure with orifices of varying diameters on a new vertical standpipe, similar to the outlet structure of Quarry Hill Pond.

Legend

- Flow Direction
- Parcel Line
- Subwatersheds
- Existing BMPs
- Potential Future BMPs
- Storm Sewer
- Outfalls
- Inlets



60691622

August 2024

Figure 11.2
Potential Future BMP:
Business Park B Pond

Stormwater Management Plan Update

City of Fitchburg
 Wisconsin



WinSLAMM Details for the Existing and Future Conditions for Business Park B Pond (Retrofit)

Existing

Wet Detention Control Device

Pond Number 3
Drainage System Control Practice

Initial Stage Elevation (ft):

Maximum Inflow into Pond (cfs)
Enter 0 or leave blank for no limit:

Enter Two Stage Area Values in Rows 1 and 2, and Press to Interpolate

Create Pond Stage-Area Values Refresh Schematic

Enter fraction (greater than 0) that you want to modify all pond areas by and then select 'Modify Pond Areas' button Modify Pond Areas

Copy Pond Data Paste Pond Data Recalculate Cumulative Volume

Save or Delete Pond Data to Database File Get Pond Data From Database File

Stage (ft)	Area (acres)	Cumulative Volume (ac-ft)
0	0.00	0.0000
1	0.01	0.0040
2	3.00	0.1330
3	7.50	0.4420
4	9.50	0.5640
5	11.50	0.6590
6	13.50	0.7860
7	14.50	0.9500
8	15.51	0.9501
9		
10		
11		
12		
13		
14		
15		
16		
17		

Only Vertical Dimension to Relative Scale

Add Sharp Crested Weir

Weir Length (ft)

Height from datum to bottom of weir opening (ft)

Add V-Notch Weir

Weir Angle (<180 degrees)

Height from datum to bottom of weir opening (ft)

Number of V-Notch weirs

Remove Orifice Set 1

Orifice Diameter (ft)

Invert elevation above datum (ft)

Number of orifices in set

Remove Orifice Set 2

Orifice Diameter (ft)

Invert elevation above datum (ft)

Number of orifices in set

Add Orifice Set 3

Orifice Diameter (ft)

Invert elevation above datum (ft)

Number of orifices in set

Add Stone Weeper

Width at bottom of weeper (ft)

Weeper side slope [H:1V]

Upstream side slope [H:1V]

Downstream side slope [H:1V]

Horizontal flow path length at top of weeper (ft)

Average rock diameter (ft)

Distance from bottom to top of weeper (ft)

Height from datum to bottom of weeper (ft)

Add Vertical Stand Pipe

Pipe diameter (ft)

Height above datum (ft)

Month	Evaporation (in/day)	Water Withdraw Rate (ac-ft/day)
Jan	0.00	0.000
Feb	0.00	0.000
Mar	0.00	0.000
Apr	0.00	0.000
May	0.00	0.000
Jun	0.00	0.000
Jul	0.00	0.000
Aug	0.00	0.000
Sep	0.00	0.000
Oct	0.00	0.000
Nov	0.00	0.000
Dec	0.00	0.000

Stage (ft)	Natural Seepage Rate (in/hr)	Other Outflow Rate (cfs)
0.00	0.00	0.000
0.01	0.00	0.000
3.00	0.00	0.000
7.50	0.00	0.000
9.50	0.00	0.000
11.50	0.00	0.000
13.50	0.00	0.000

Remove Broad Crested Weir (Required)

Weir crest length (ft)

Weir crest width (ft)

Height from datum to bottom of weir opening (ft)

Add Seepage Basin

Infiltration rate (in/hr)

Width of device (ft)

Length of device (ft)

Invert elevation of seepage basin inlet above datum (ft)

Add Pump

To Delete This Practice, Right Mouse Click on Icon and Select Delete

Control Practice #: 5 CP Index #: 6

Future

Wet Detention Control Device

Pond Number 3
Drainage System Control Practice

Initial Stage Elevation (ft):

Maximum Inflow into Pond (cfs)
Enter 0 or leave blank for no limit:

Enter Two Stage Area Values in Rows 1 and 2, and Press to Interpolate

Create Pond Stage-Area Values Refresh Schematic

Enter fraction (greater than 0) that you want to modify all pond areas by and then select 'Modify Pond Areas' button Modify Pond Areas

Copy Pond Data Paste Pond Data Recalculate Cumulative Volume

Save or Delete Pond Data to Database File Get Pond Data From Database File

Stage (ft)	Area (acres)	Cumulative Volume (ac-ft)
0	0.00	0.0000
1	0.01	0.0040
2	3.00	0.1330
3	7.50	0.4420
4	9.50	0.5640
5	11.50	0.6590
6	13.50	0.7860
7	14.50	0.9500
8	15.51	0.9501
9		
10		
11		
12		
13		
14		
15		
16		
17		

Only Vertical Dimension to Relative Scale

Add Sharp Crested Weir

Weir Length (ft)

Height from datum to bottom of weir opening (ft)

Add V-Notch Weir

Weir Angle (<180 degrees)

Height from datum to bottom of weir opening (ft)

Number of V-Notch weirs

Remove Orifice Set 1

Orifice Diameter (ft)

Invert elevation above datum (ft)

Number of orifices in set

Remove Orifice Set 2

Orifice Diameter (ft)

Invert elevation above datum (ft)

Number of orifices in set

Remove Orifice Set 3

Orifice Diameter (ft)

Invert elevation above datum (ft)

Number of orifices in set

Add Stone Weeper

Width at bottom of weeper (ft)

Weeper side slope [H:1V]

Upstream side slope [H:1V]

Downstream side slope [H:1V]

Horizontal flow path length at top of weeper (ft)

Average rock diameter (ft)

Distance from bottom to top of weeper (ft)

Height from datum to bottom of weeper (ft)

Remove Vertical Stand Pipe

Pipe diameter (ft)

Height above datum (ft)

Month	Evaporation (in/day)	Water Withdraw Rate (ac-ft/day)
Jan	0.00	0.000
Feb	0.00	0.000
Mar	0.00	0.000
Apr	0.00	0.000
May	0.00	0.000
Jun	0.00	0.000
Jul	0.00	0.000
Aug	0.00	0.000
Sep	0.00	0.000
Oct	0.00	0.000
Nov	0.00	0.000
Dec	0.00	0.000

Stage (ft)	Natural Seepage Rate (in/hr)	Other Outflow Rate (cfs)
0.00	0.00	0.000
0.01	0.00	0.000
3.00	0.00	0.000
7.50	0.00	0.000
9.50	0.00	0.000
11.50	0.00	0.000
13.50	0.00	0.000

Remove Broad Crested Weir (Required)

Weir crest length (ft)

Weir crest width (ft)

Height from datum to bottom of weir opening (ft)

Add Seepage Basin

Infiltration rate (in/hr)

Width of device (ft)

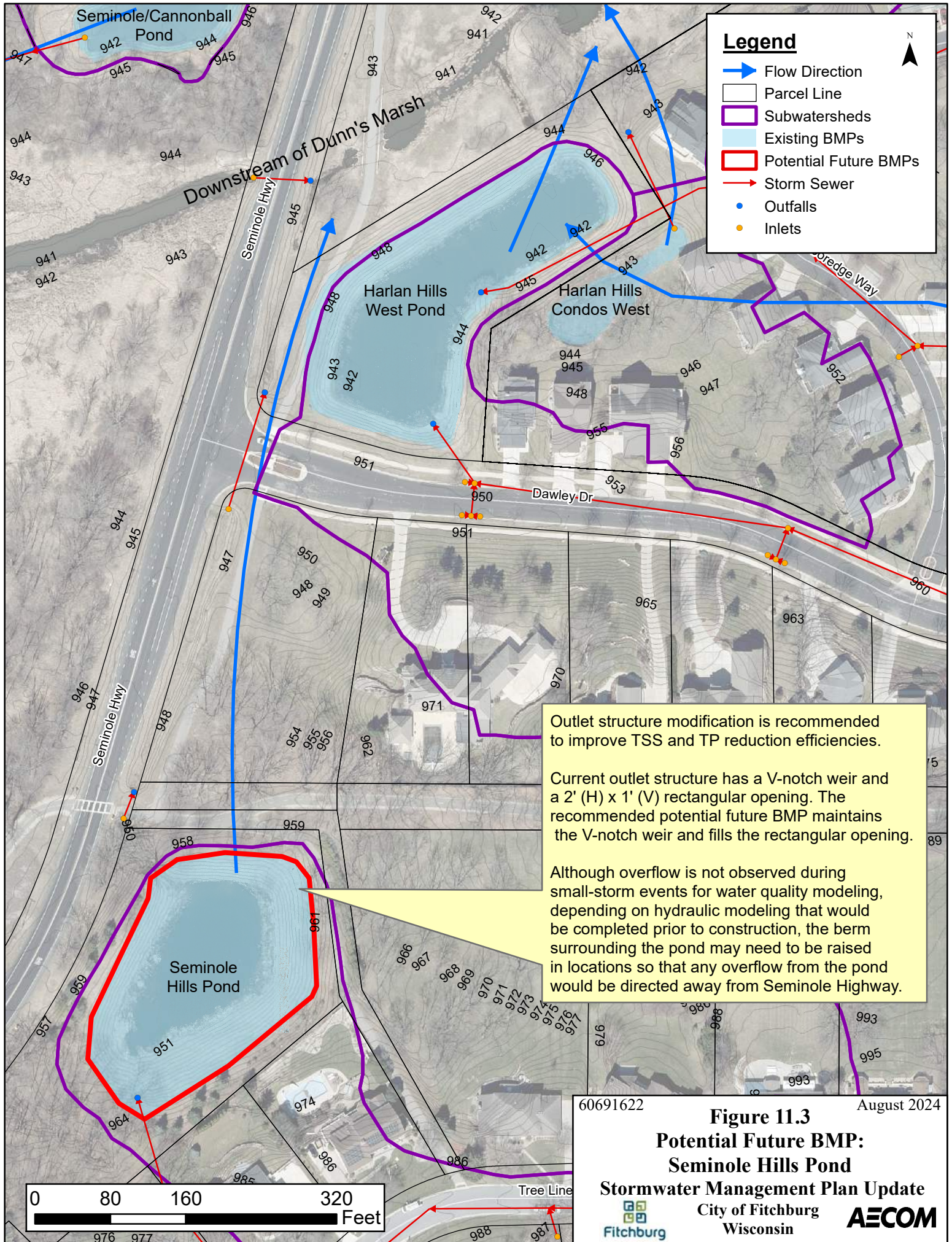
Length of device (ft)

Invert elevation of seepage basin inlet above datum (ft)

Add Pump

To Delete This Practice, Right Mouse Click on Icon and Select Delete

Control Practice #: 5 CP Index #: 6



WinSLAMM Details for the Existing and Future Conditions for Seminole Hills Pond (Retrofit)

Existing

Wet Detention Control Device

Pond Number 1
Drainage System Control Practice

Initial Stage Elevation (ft):

Maximum Inflow into Pond (cfs)

Enter 0 or leave blank for no limit:

Enter Two Stage Area Values in Rows 1 and 2, and Press to Interpolate

Create Pond Stage-Area Values Refresh Schematic

Enter fraction (greater than 0) that you want to modify all pond areas by and then select 'Modify Pond Areas' button Modify Pond Areas

Copy Pond Data Paste Pond Data Recalculate Cumulative Volume

Save or Delete Pond Data to Database File Get Pond Data From Database File

Stage (ft)	Area (acres)	Cumulative Volume (ac-ft)
0	0.00	0.0000
1	0.01	0.0001
2	1.00	0.1680
3	2.00	0.1930
4	3.00	0.2180
5	4.00	0.2470
6	5.00	0.2770
7	6.00	0.4090
8	7.00	0.4650
9	8.00	0.5230
10	9.00	0.5820
11	10.00	0.6420
12	11.00	0.7020
13	12.00	0.7630
14	13.00	0.8250
15	14.00	0.8890
16	15.00	0.9590
17	16.00	1.0290

Add Sharp Crested Weir

Weir Length (ft)

Height from datum to bottom of weir opening (ft)

Remove V-Notch Weir

Weir Angle (<180 degrees)

Height from datum to bottom of weir opening (ft)

Number of V-Notch weirs

Remove Orifice Set 1

Orifice Diameter (ft)

Invert elevation above datum (ft)

Number of orifices in set

Add Orifice Set 2

Orifice Diameter (ft)

Invert elevation above datum (ft)

Number of orifices in set

Add Orifice Set 3

Orifice Diameter (ft)

Invert elevation above datum (ft)

Number of orifices in set

Add Stone Weeper

Width at bottom of weeper (ft)

Weeper side slope [H:1V]

Upstream side slope [H:1V]

Downstream side slope [H:1V]

Horizontal flow path length at top of weeper (ft)

Average rock diameter (ft)

Distance from bottom to top of weeper (ft)

Height from datum to bottom of weeper (ft)

Add Vertical Stand Pipe

Pipe diameter (ft)

Height above datum (ft)

Month	Evaporation (in/day)	Water Withdraw Rate (ac-ft/day)
Jan	0.00	0.000
Feb	0.00	0.000
Mar	0.00	0.000
Apr	0.00	0.000
May	0.00	0.000
Jun	0.00	0.000
Jul	0.00	0.000
Aug	0.00	0.000
Sep	0.00	0.000
Oct	0.00	0.000
Nov	0.00	0.000
Dec	0.00	0.000

Stage (ft)	Natural Seepage Rate (in/hr)	Other Outflow Rate (cfs)
0.00	0.00	0.000
0.01	0.00	0.000
1.00	0.00	0.000
2.00	0.00	0.000
3.00	0.00	0.000
4.00	0.00	0.000
5.00	0.00	0.000

Remove Broad Crested Weir (Required)

Weir crest length (ft)

Weir crest width (ft)

Height from datum to bottom of weir opening (ft)

Add Seepage Basin

Infiltration rate (in/hr)

Width of device (ft)

Length of device (ft)

Invert elevation of seepage basin inlet above datum (ft)

Add Pump

To Delete This Practice, Right Mouse Click on Icon and Select Delete Press 'F1' for Help

Control Practice #: 1 CP Index #: 1

Future

Wet Detention Control Device

Pond Number 1
Drainage System Control Practice

Initial Stage Elevation (ft):

Maximum Inflow into Pond (cfs)

Enter 0 or leave blank for no limit:

Enter Two Stage Area Values in Rows 1 and 2, and Press to Interpolate

Create Pond Stage-Area Values Refresh Schematic

Enter fraction (greater than 0) that you want to modify all pond areas by and then select 'Modify Pond Areas' button Modify Pond Areas

Copy Pond Data Paste Pond Data Recalculate Cumulative Volume

Save or Delete Pond Data to Database File Get Pond Data From Database File

Stage (ft)	Area (acres)	Cumulative Volume (ac-ft)
0	0.00	0.0000
1	0.01	0.1450
2	1.00	0.1680
3	2.00	0.1930
4	3.00	0.2180
5	4.00	0.2470
6	5.00	0.2770
7	6.00	0.4090
8	7.00	0.4650
9	8.00	0.5230
10	9.00	0.5820
11	10.00	0.6420
12	11.00	0.7020
13	12.00	0.7630
14	13.00	0.8250
15	14.00	0.8890
16	15.00	0.9590
17	16.00	1.0290

Add Sharp Crested Weir

Weir Length (ft)

Height from datum to bottom of weir opening (ft)

Remove V-Notch Weir

Weir Angle (<180 degrees)

Height from datum to bottom of weir opening (ft)

Number of V-Notch weirs

Add Orifice Set 1

Orifice Diameter (ft)

Invert elevation above datum (ft)

Number of orifices in set

Add Orifice Set 2

Orifice Diameter (ft)

Invert elevation above datum (ft)

Number of orifices in set

Add Orifice Set 3

Orifice Diameter (ft)

Invert elevation above datum (ft)

Number of orifices in set

Add Stone Weeper

Width at bottom of weeper (ft)

Weeper side slope [H:1V]

Upstream side slope [H:1V]

Downstream side slope [H:1V]

Horizontal flow path length at top of weeper (ft)

Average rock diameter (ft)

Distance from bottom to top of weeper (ft)

Height from datum to bottom of weeper (ft)

Add Vertical Stand Pipe

Pipe diameter (ft)

Height above datum (ft)

Month	Evaporation (in/day)	Water Withdraw Rate (ac-ft/day)
Jan	0.00	0.000
Feb	0.00	0.000
Mar	0.00	0.000
Apr	0.00	0.000
May	0.00	0.000
Jun	0.00	0.000
Jul	0.00	0.000
Aug	0.00	0.000
Sep	0.00	0.000
Oct	0.00	0.000
Nov	0.00	0.000
Dec	0.00	0.000

Stage (ft)	Natural Seepage Rate (in/hr)	Other Outflow Rate (cfs)
0.00	0.00	0.000
0.01	0.00	0.000
1.00	0.00	0.000
2.00	0.00	0.000
3.00	0.00	0.000
4.00	0.00	0.000
5.00	0.00	0.000

Remove Broad Crested Weir (Required)

Weir crest length (ft)

Weir crest width (ft)

Height from datum to bottom of weir opening (ft)

Add Seepage Basin

Infiltration rate (in/hr)

Width of device (ft)

Length of device (ft)

Invert elevation of seepage basin inlet above datum (ft)










Add Pump

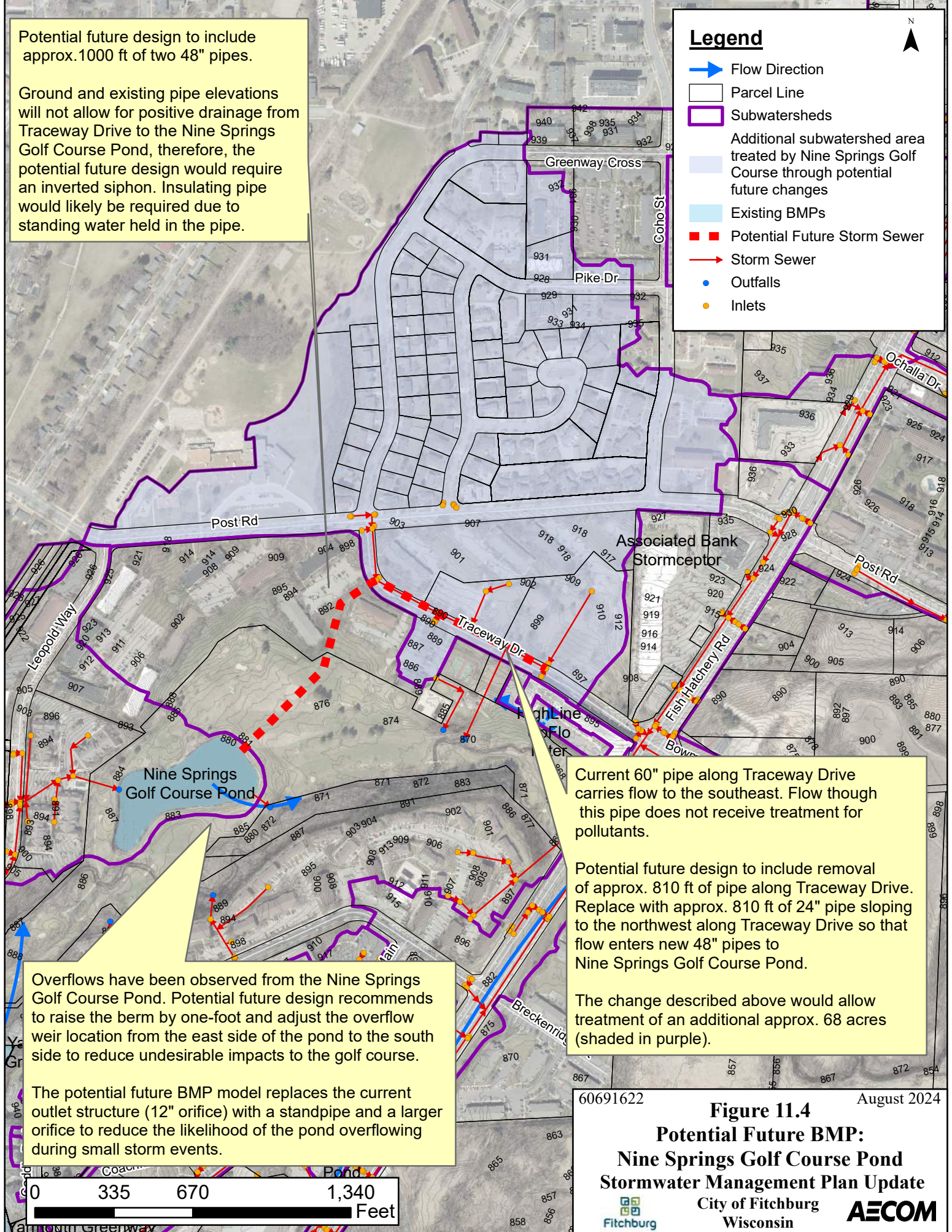
To Delete This Practice, Right Mouse Click on Icon and Select Delete Press 'F1' for Help

Potential future design to include approx. 1000 ft of two 48" pipes.

Ground and existing pipe elevations will not allow for positive drainage from Traceway Drive to the Nine Springs Golf Course Pond, therefore, the potential future design would require an inverted siphon. Insulating pipe would likely be required due to standing water held in the pipe.

Legend

-  Flow Direction
-  Parcel Line
-  Subwatersheds
-  Additional subwatershed area treated by Nine Springs Golf Course through potential future changes
-  Existing BMPs
-  Potential Future Storm Sewer
-  Storm Sewer
-  Outfalls
-  Inlets



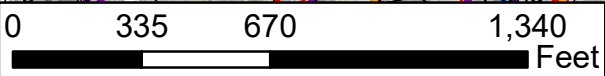
Current 60" pipe along Traceway Drive carries flow to the southeast. Flow through this pipe does not receive treatment for pollutants.

Potential future design to include removal of approx. 810 ft of pipe along Traceway Drive. Replace with approx. 810 ft of 24" pipe sloping to the northwest along Traceway Drive so that flow enters new 48" pipes to Nine Springs Golf Course Pond.

The change described above would allow treatment of an additional approx. 68 acres (shaded in purple).

Overflows have been observed from the Nine Springs Golf Course Pond. Potential future design recommends to raise the berm by one-foot and adjust the overflow weir location from the east side of the pond to the south side to reduce undesirable impacts to the golf course.

The potential future BMP model replaces the current outlet structure (12" orifice) with a standpipe and a larger orifice to reduce the likelihood of the pond overflowing during small storm events.



WinSLAMM Details for the Existing and Future Conditions for Nine Springs Golf Course Pond (Retrofit)

Existing

Wet Detention Control Device

Pond Number 1
Drainage System Control Practice

Initial Stage Elevation (ft):

Maximum Inflow into Pond (cfs):

Enter 0 or leave blank for no limit:

Enter Two Stage Area Values in Rows 1 and 2, and Press to Interpolate

Create Pond Stage-Area Values Refresh Schematic

Enter fraction (greater than 0) that you want to modify all pond areas by and then select 'Modify Pond Areas' button Modify Pond Areas

Copy Pond Data Paste Pond Data Recalculate Cumulative Volume

Save or Delete Pond Data to Database File Get Pond Data From Database File

Stage (ft)	Area (acres)	Cumulative Volume (ac-ft)
0	0.00	0.0000
1	0.01	0.3229
2	0.10	0.3229
3	0.20	0.3229
4	1.00	2.2537
5	2.00	2.3647
6	3.00	2.4770
7	4.00	2.5906
8	5.00	2.7056
9	6.00	3.0982
10	7.00	3.2189
11	8.00	3.3408
12	9.00	3.4641
13		
14		
15		
16		
17		

To Delete This Practice, Right Mouse Click on Icon and Select Delete

Control Practice #: 1 CP Index #: 1

Future

Wet Detention Control Device

Pond Number 1
Drainage System Control Practice

Initial Stage Elevation (ft):

Maximum Inflow into Pond (cfs):

Enter 0 or leave blank for no limit:

Enter Two Stage Area Values in Rows 1 and 2, and Press to Interpolate

Create Pond Stage-Area Values Refresh Schematic

Enter fraction (greater than 0) that you want to modify all pond areas by and then select 'Modify Pond Areas' button Modify Pond Areas

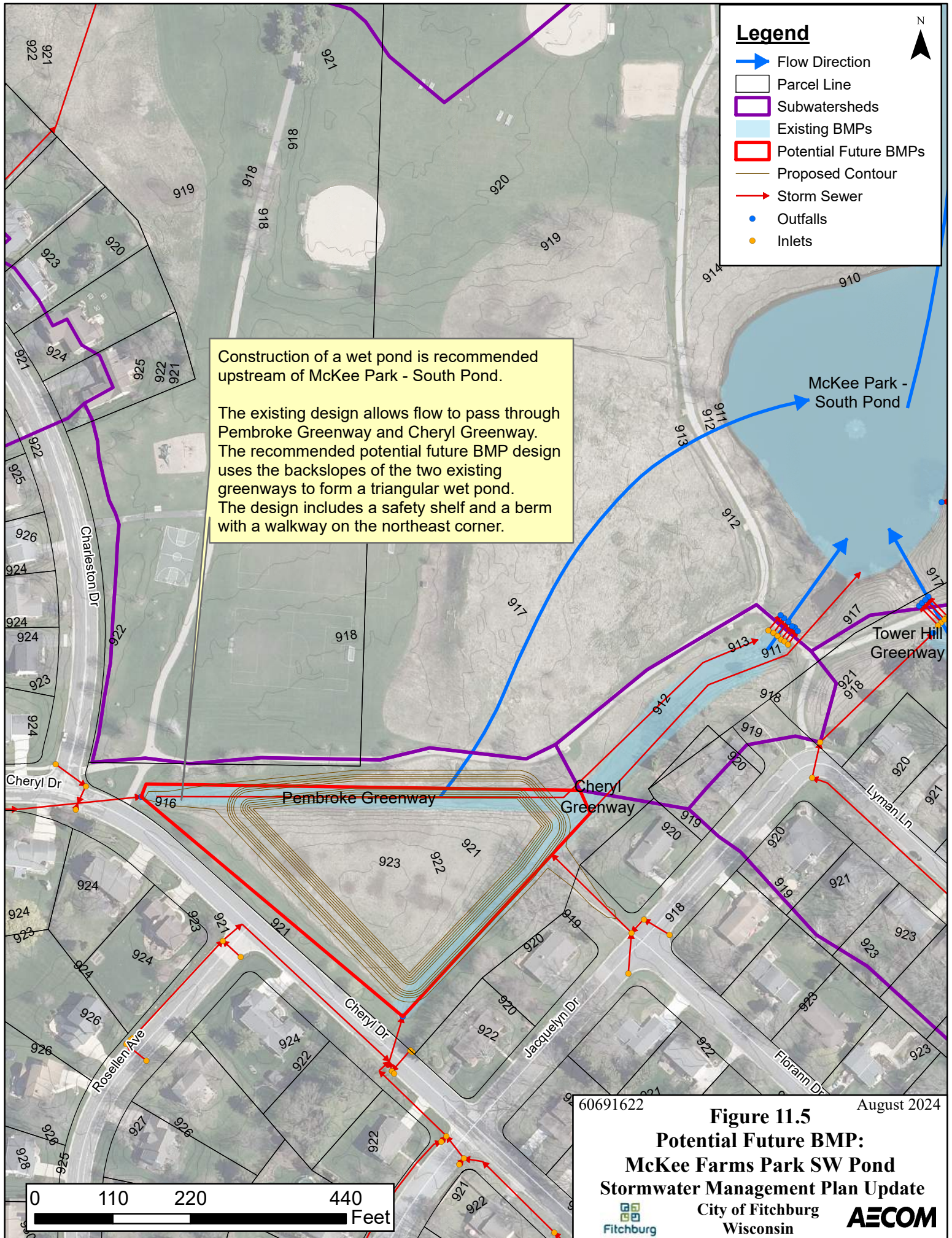
Copy Pond Data Paste Pond Data Recalculate Cumulative Volume

Save or Delete Pond Data to Database File Get Pond Data From Database File

Stage (ft)	Area (acres)	Cumulative Volume (ac-ft)
0	0.00	0.0000
1	0.01	0.3229
2	0.10	0.3229
3	0.20	0.3229
4	1.00	2.2537
5	2.00	2.3647
6	3.00	2.4770
7	4.00	2.5906
8	5.00	2.7056
9	6.00	3.0982
10	7.00	3.2189
11	8.00	3.3408
12	9.00	3.4641
13		
14		
15		
16		
17		

To Delete This Practice, Right Mouse Click on Icon and Select Delete

Control Practice #: 1 CP Index #: 1



Legend

- ➔ Flow Direction
- Parcel Line
- Subwatersheds
- Existing BMPs
- Potential Future BMPs
- Proposed Contour
- ➔ Storm Sewer
- Outfalls
- Inlets

Construction of a wet pond is recommended upstream of McKee Park - South Pond.

The existing design allows flow to pass through Pembroke Greenway and Cheryl Greenway. The recommended potential future BMP design uses the backslopes of the two existing greenways to form a triangular wet pond. The design includes a safety shelf and a berm with a walkway on the northeast corner.

McKee Park - South Pond

Tower Hill Greenway

Pembroke Greenway

Cheryl Greenway

Lyman Ln

Cheryl Dr

Jacquelyn Dr

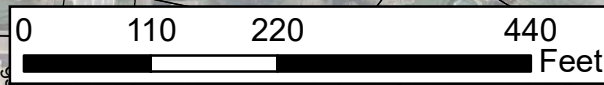
Florann Dr

Rosellen Ave

60691622

August 2024

Figure 11.5
Potential Future BMP:
McKee Farms Park SW Pond
Stormwater Management Plan Update
 City of Fitchburg
 Wisconsin



WinSLAMM Details for the Future Condition for McKee Farms Park SW Pond (New Construction)

Future

Wet Detention Control Device

Pond Number 4
Drainage System Control Practice

Initial Stage Elevation (ft):

Maximum Inflow into Pond (cfs)
 Enter 0 or leave blank for no limit:

Enter Two Stage Area Values in Rows 1 and 2, and Press to Interpolate

Create Pond Stage-Area Values Refresh Schematic

Enter fraction (greater than 0) that you want to modify all pond areas by and then select 'Modify Pond Areas' button

Modify Pond Areas

Copy Pond Data Paste Pond Data Recalculate Cumulative Volume

Save or Delete Pond Data to Database File Get Pond Data From Database File

Only Vertical Dimension to Relative Scale

To Delete This Practice, Right Mouse Click on Icon and Select Delete

 Press 'F1' for Help **Pump**

Stage (ft)	Area (acres)	Cumulative Volume (ac-ft)
0	0.00	0.0000
1	0.01	1.2570
2	1.00	1.3280
3	2.00	1.4010
4	3.00	1.4750
5	4.00	1.5510
6	5.00	1.6280
7	6.00	1.8940
8	7.00	1.9760
9	8.00	2.0600
10	9.00	2.1450
11	10.00	2.4000
12		
13		
14		
15		
16		
17		

Add Sharp Crested Weir

Weir Length (ft)

Height from datum to bottom of weir opening (ft)

Add V-Notch Weir

Weir Angle (<180 degrees)

Height from datum to bottom of weir opening (ft)

Number of V-Notch weirs

Remove Orifice Set 1

Orifice Diameter (ft) 0.50

Invert elevation above datum (ft) 6.00

Number of orifices in set 1

Remove Orifice Set 2

Orifice Diameter (ft) 0.33

Invert elevation above datum (ft) 7.00

Number of orifices in set 1

Remove Orifice Set 3

Orifice Diameter (ft) 0.33

Invert elevation above datum (ft) 8.00

Number of orifices in set 1

Add Stone Weeper

Width at bottom of weeper (ft)

Weeper side slope [H:1V]

Upstream side slope [H:1V]

Downstream side slope [H:1V]

Horizontal flow path length at top of weeper (ft)

Average rock diameter (ft)

Distance from bottom to top of weeper (ft)

Height from datum to bottom of weeper (ft)

Remove Vertical Stand Pipe

Pipe diameter (ft) 4.00

Height above datum (ft) 9.00

Month	Evaporation (in/day)	Water Withdraw Rate (ac-ft/day)
Jan	0.00	0.000
Feb	0.00	0.000
Mar	0.00	0.000
Apr	0.00	0.000
May	0.00	0.000
Jun	0.00	0.000
Jul	0.00	0.000
Aug	0.00	0.000
Sep	0.00	0.000
Oct	0.00	0.000
Nov	0.00	0.000
Dec	0.00	0.000

Stage (ft)	Natural Seepage Rate (in/hr)	Other Outflow Rate (cfs)
0.00	0.00	0.000
0.01	0.00	0.000
1.00	0.00	0.000
2.00	0.00	0.000
3.00	0.00	0.000
4.00	0.00	0.000
5.00	0.00	0.000

Remove Broad Crested Weir (Required)

Weir crest length (ft) 30.00

Weir crest width (ft) 10.00

Height from datum to bottom of weir opening (ft) 9.50

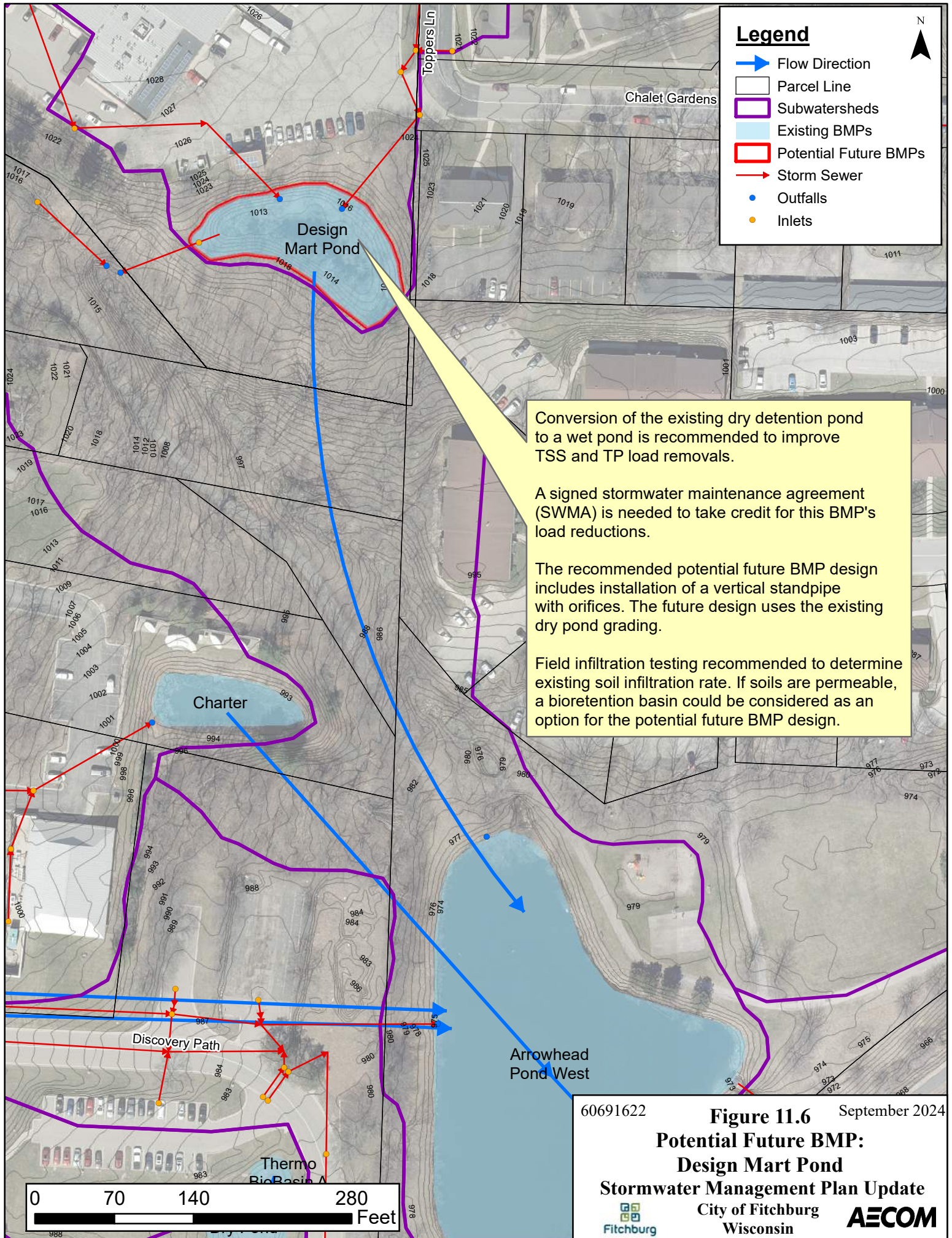
Add Seepage Basin

Infiltration rate (in/hr)

Width of device (ft)

Length of device (ft)

Invert elevation of seepage basin inlet above datum (ft)



Legend

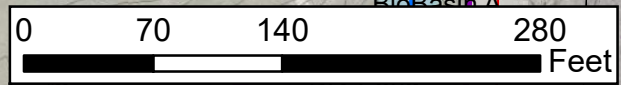
- Flow Direction
- Parcel Line
- Subwatersheds
- Existing BMPs
- Potential Future BMPs
- Storm Sewer
- Outfalls
- Inlets

Conversion of the existing dry detention pond to a wet pond is recommended to improve TSS and TP load removals.

A signed stormwater maintenance agreement (SWMA) is needed to take credit for this BMP's load reductions.

The recommended potential future BMP design includes installation of a vertical standpipe with orifices. The future design uses the existing dry pond grading.

Field infiltration testing recommended to determine existing soil infiltration rate. If soils are permeable, a bioretention basin could be considered as an option for the potential future BMP design.



WinSLAMM Details for the Existing and Future Conditions for Design Mart Pond (Retrofit)

Existing

Wet Detention Control Device

Pond Number 14
Drainage System Control Practice
CP Index #: 15

Total Area

Initial Stage Elevation (ft):

Maximum Inflow into Pond (cfs)
 Enter 0 or leave blank for no limit:

Enter Two Stage Area Values in Rows 1 and 2, and Press to Interpolate

Create Pond Stage-Area Values Refresh Schematic

Enter fraction (greater than 0) that you want to modify all pond areas by and then select 'Modify Pond Areas' button Modify Pond Areas

Copy Pond Data Paste Pond Data Recalculate Cumulative Volume

Save or Delete Pond Data to Database File Get Pond Data From Database File

Only Vertical Dimension to Relative Scale

To Delete This Practice, Right Mouse Click on Icon and Select Delete Press 'F1' for Help

Stage (ft)	Area (acres)	Cumulative Volume (ac-ft)
0	0.00	0.0000
1	0.01	0.0490
2	0.10	0.0490
3	2.00	0.1540
4	4.00	0.2160
5	6.00	0.3040
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		

Add Sharp Crested Weir

Weir Length (ft)

Height from datum to bottom of weir opening (ft)

Add V-Notch Weir

Weir Angle (<180 degrees)

Height from datum to bottom of weir opening (ft)

Number of V-Notch weirs

Remove Orifice Set 1

Orifice Diameter (ft)

Invert elevation above datum (ft)

Number of orifices in set

Add Orifice Set 2

Orifice Diameter (ft)

Invert elevation above datum (ft)

Number of orifices in set

Add Orifice Set 3

Orifice Diameter (ft)

Invert elevation above datum (ft)

Number of orifices in set

Add Stone Weeper

Width at bottom of weeper (ft)

Weeper side slope [H:1V]

Upstream side slope [H:1V]

Downstream side slope [H:1V]

Horizontal flow path length at top of weeper (ft)

Average rock diameter (ft)

Distance from bottom to top of weeper (ft)

Height from datum to bottom of weeper (ft)

Add Vertical Stand Pipe

Pipe diameter (ft)

Height above datum (ft)

Month	Evaporation (in/day)	Water Withdraw Rate (ac-ft/day)
Jan	0.00	0.000
Feb	0.00	0.000
Mar	0.00	0.000
Apr	0.00	0.000
May	0.00	0.000
Jun	0.00	0.000
Jul	0.00	0.000
Aug	0.00	0.000
Sep	0.00	0.000
Oct	0.00	0.000
Nov	0.00	0.000
Dec	0.00	0.000

Stage (ft)	Natural Seepage Rate (in/hr)	Other Outflow Rate (cfs)
0.00	0.00	0.000
0.01	0.00	0.000
0.10	0.00	0.000
2.00	0.00	0.000
4.00	0.00	0.000
6.00	0.00	0.000
n.n	n.n	n.n

Remove Broad Crested Weir (Required)

Weir crest length (ft)

Weir crest width (ft)

Height from datum to bottom of weir opening (ft)

Add Seepage Basin

Infiltration rate (in/hr)

Width of device (ft)

Length of device (ft)

Invert elevation of seepage basin inlet above datum (ft)

Add Pump

Future

Wet Detention Control Device

Pond Number 3
Drainage System Control Practice

Initial Stage Elevation (ft):

Maximum Inflow into Pond (cfs)
 Enter 0 or leave blank for no limit:

Enter Two Stage Area Values in Rows 1 and 2, and Press to Interpolate

Create Pond Stage-Area Values Refresh Schematic

Enter fraction (greater than 0) that you want to modify all pond areas by and then select 'Modify Pond Areas' button Modify Pond Areas

Copy Pond Data Paste Pond Data Recalculate Cumulative Volume

Save or Delete Pond Data to Database File Get Pond Data From Database File

Only Vertical Dimension to Relative Scale

To Delete This Practice, Right Mouse Click on Icon and Select Delete Press 'F1' for Help

Stage (ft)	Area (acres)	Cumulative Volume (ac-ft)
0	0.00	0.0000
1	0.01	0.0490
2	0.10	0.0490
3	2.00	0.1540
4	4.00	0.2160
5	6.00	0.3040
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		

Add Sharp Crested Weir

Weir Length (ft)

Height from datum to bottom of weir opening (ft)

Add V-Notch Weir

Weir Angle (<180 degrees)

Height from datum to bottom of weir opening (ft)

Number of V-Notch weirs

Remove Orifice Set 1

Orifice Diameter (ft)

Invert elevation above datum (ft)

Number of orifices in set

Remove Orifice Set 2

Orifice Diameter (ft)

Invert elevation above datum (ft)

Number of orifices in set

Add Orifice Set 3

Orifice Diameter (ft)

Invert elevation above datum (ft)

Number of orifices in set

Add Stone Weeper

Width at bottom of weeper (ft)

Weeper side slope [H:1V]

Upstream side slope [H:1V]

Downstream side slope [H:1V]

Horizontal flow path length at top of weeper (ft)

Average rock diameter (ft)

Distance from bottom to top of weeper (ft)

Height from datum to bottom of weeper (ft)

Remove Vertical Stand Pipe

Pipe diameter (ft)

Height above datum (ft)

Month	Evaporation (in/day)	Water Withdraw Rate (ac-ft/day)
Jan	0.00	0.000
Feb	0.00	0.000
Mar	0.00	0.000
Apr	0.00	0.000
May	0.00	0.000
Jun	0.00	0.000
Jul	0.00	0.000
Aug	0.00	0.000
Sep	0.00	0.000
Oct	0.00	0.000
Nov	0.00	0.000
Dec	0.00	0.000

Stage (ft)	Natural Seepage Rate (in/hr)	Other Outflow Rate (cfs)
0.00	0.00	0.000
0.01	0.00	0.000
0.10	0.00	0.000
2.00	0.00	0.000
4.00	0.00	0.000
6.00	0.00	0.000
n.n	n.n	n.n

Remove Broad Crested Weir (Required)

Weir crest length (ft)

Weir crest width (ft)

Height from datum to bottom of weir opening (ft)

Add Seepage Basin

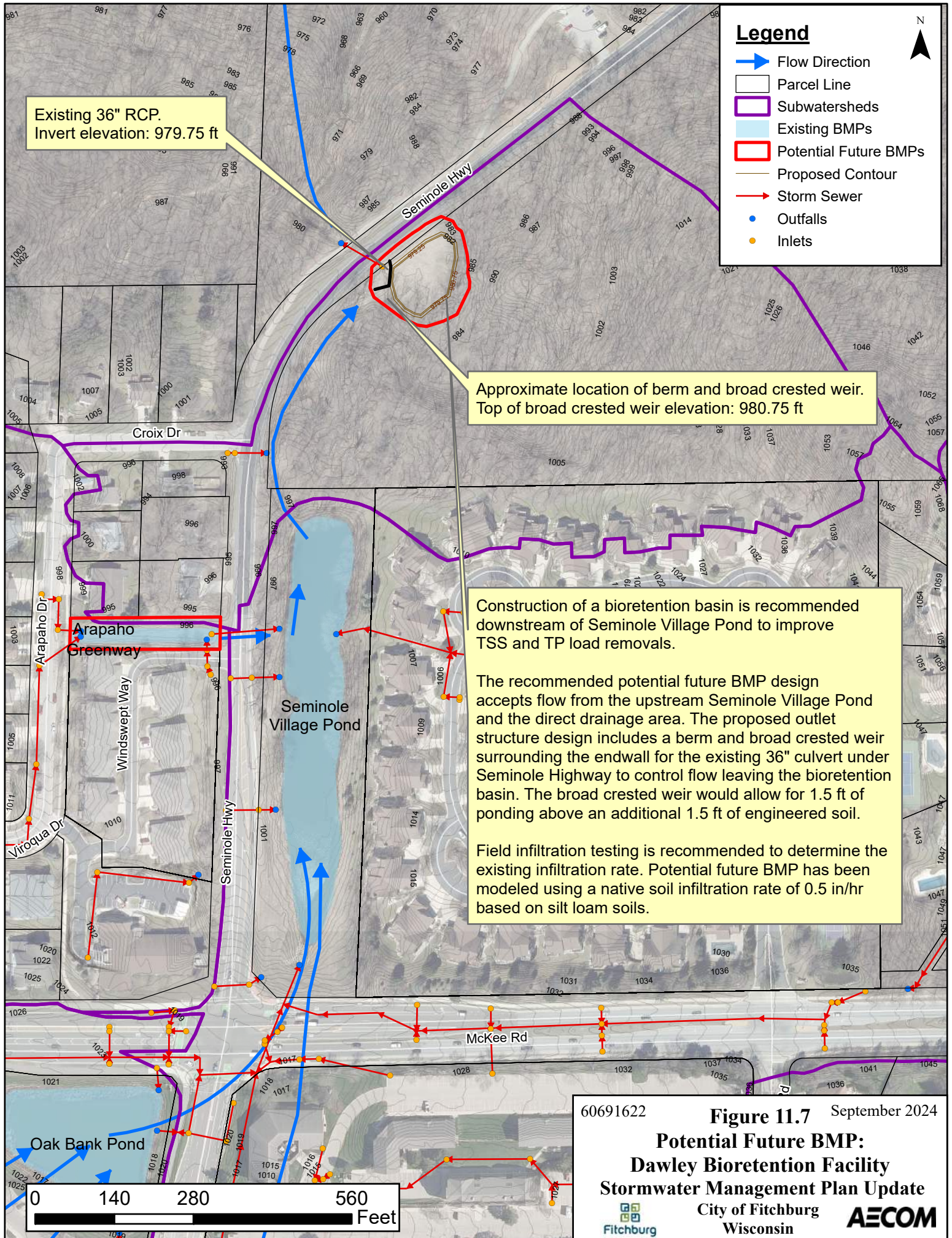
Infiltration rate (in/hr)

Width of device (ft)

Length of device (ft)

Invert elevation of seepage basin inlet above datum (ft)

Add Pump



Legend

- Flow Direction
- Parcel Line
- Subwatersheds
- Existing BMPs
- Potential Future BMPs
- Proposed Contour
- Storm Sewer
- Outfalls
- Inlets

Existing 36" RCP.
Invert elevation: 979.75 ft

Approximate location of berm and broad crested weir.
Top of broad crested weir elevation: 980.75 ft

Construction of a bioretention basin is recommended downstream of Seminole Village Pond to improve TSS and TP load removals.

The recommended potential future BMP design accepts flow from the upstream Seminole Village Pond and the direct drainage area. The proposed outlet structure design includes a berm and broad crested weir surrounding the endwall for the existing 36" culvert under Seminole Highway to control flow leaving the bioretention basin. The broad crested weir would allow for 1.5 ft of ponding above an additional 1.5 ft of engineered soil.

Field infiltration testing is recommended to determine the existing infiltration rate. Potential future BMP has been modeled using a native soil infiltration rate of 0.5 in/hr based on silt loam soils.



WinSLAMM Details for the Future Conditions for Dawley Bioretention Facility (New Construction)

Future

Biofiltration Control Device
✕

Drainage System Control Practice

Device Properties **Biofilter Number 1**

Top Area (sf)	12531
Bottom Area (sf)	6612
Total Depth (ft)	4.00
Typical Width (ft) (Cost est. only)	10.00
Native Soil Infiltration Rate (in/hr)	0.500
Native Soil Infiltration Rate COV	N/A
Infil. Rate Fraction-Bottom (0.001-1)	1.000
Infil. Rate Fraction-Sides (0.001-1)	0.001
Rock Filled Depth (ft)	0.00
Rock Fill Porosity (0-1)	0.00
Engineered Media Type	Media Data
Engineered Media Infiltration Rate	3.60
Engineered Media Infiltration Rate COV	N/A
Engineered Media Depth (ft)	1.50
Engineered Media Porosity (0-1)	0.27
Percent solids reduction due to Engineered Media (0-100)	0.00
Inflow Hydrograph Peak to Average Flow Ratio	3.80
Number of Devices in Source Area or Upstream Drainage System	1

Activate Pipe or Box Storage Pipe Box

Diameter (ft)	
Length (ft)	
Within Biofilter (check if Yes)	<input type="checkbox"/>
Perforated (check if Yes)	<input type="checkbox"/>
Bottom Elevation (ft above datum)	
Discharge Orifice Diameter (ft)	

Select Native Soil Infiltration Rate

<input type="radio"/> Sand - 8 in/hr	<input type="radio"/> Clay loam - 0.1 in/hr
<input type="radio"/> Loamy sand - 2.5 in/hr	<input type="radio"/> Silty clay loam - 0.05 in/hr
<input type="radio"/> Sandy loam - 1.0 in/hr	<input type="radio"/> Sandy clay - 0.05 in/hr
<input type="radio"/> Loam - 0.5 in/hr	<input type="radio"/> Silty clay - 0.04 in/hr
<input type="radio"/> Silt loam - 0.3 in/hr	<input type="radio"/> Clay - 0.02 in/hr
<input type="radio"/> Sandy silt loam - 0.2 in/hr	<input type="radio"/> Rain Barrel/Cistern - 0.00 in/hr

Use Random Number Generation to Account for Infiltration Rate Uncertainty

Estimated Surface Drain Time = 36.00 hrs.

Add **Sharp Crested Weir**

Weir Length (ft)	
Height from datum to bottom of weir opening (ft)	

 Broad Crested Weir-Reqd

Weir crest length (ft)	5.00
Weir crest width (ft)	1.00
Height from datum to bottom of weir opening (ft)	3.00

Add **Vertical Stand Pipe**

Pipe diameter (ft)	
Height above datum (ft)	

Add **Surface Discharge Pipe**

Pipe Diameter (ft)	
Invert elevation above datum (ft)	
Number of pipes at invert elev.	

Add **Drain Tile/Underdrain**

Pipe Diameter (ft)	
Invert elevation above datum (ft)	
Number of pipes at invert elev.	

Add **Other Outlet**

Stage Number	Stage (ft)	Other Outflow Rate (cfs)
1		
2		
3		
4		
5		

Add **Evapotranspiration**

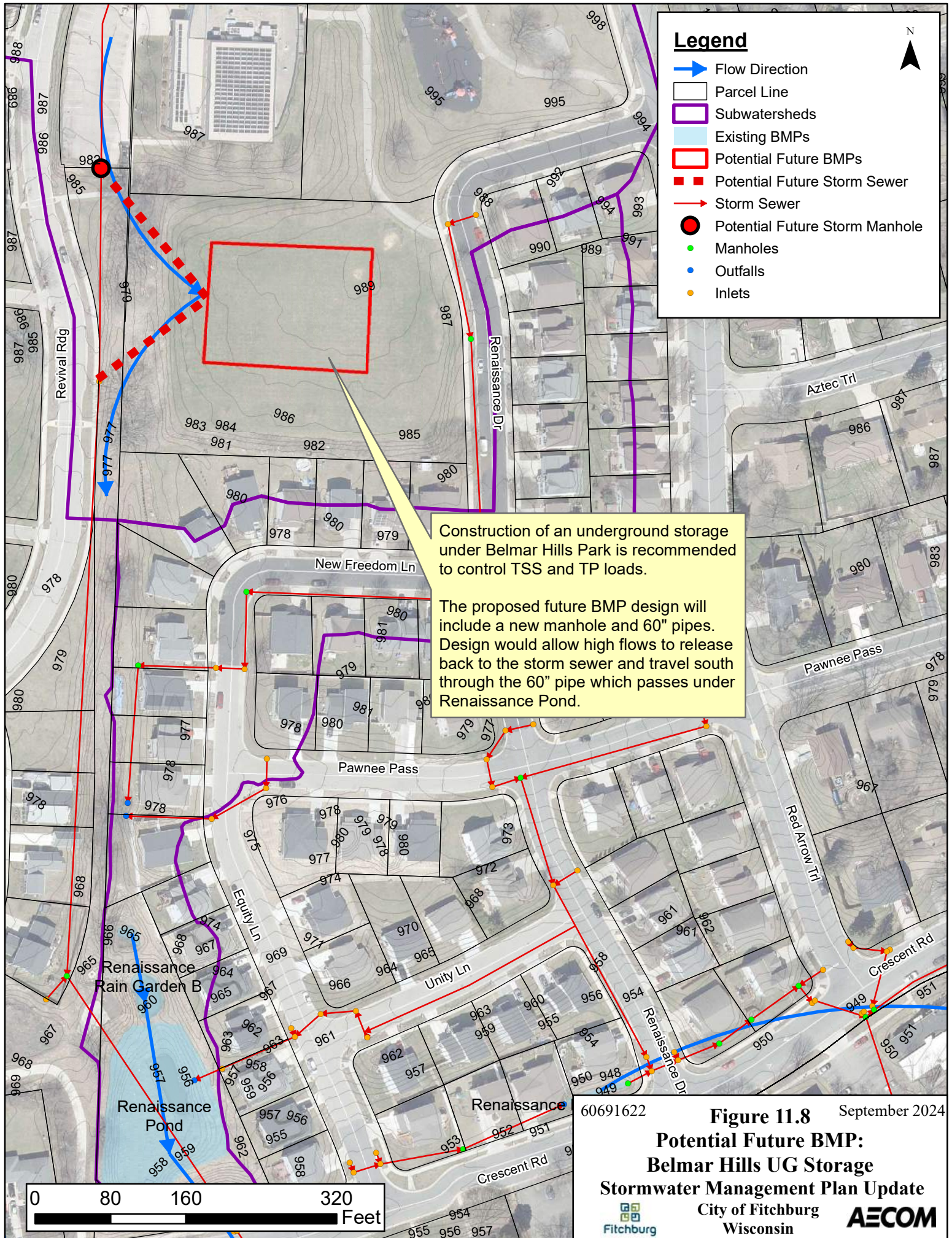
Soil porosity (saturation moisture content, 0-1)	
Soil field moisture capacity (0-1)	
Permanent wilting point (0-1)	
Supplemental irrigation used?	<input type="checkbox"/>
Fraction of available capacity when irrigation starts (0-1)	
Fraction of available capacity when irrigation stops (0-1)	
Fraction of biofilter that is vegetated	
Plant type	▼
Root depth (ft)	
ET Crop Adjustment Factor	

Plant Types				
	1	2	3	4
Jan				
Feb				
Mar				
Apr				
May				
Jun				
Jul				
Aug				
Sep				
Oct				
Nov				
Dec				

Biofilter Geometry Schematic

To Delete This Practice, Right Mouse Click on Icon and Select Delete

Control Practice #: 1 CP Index #: 1



Legend

- Flow Direction
- Parcel Line
- Subwatersheds
- Existing BMPs
- Potential Future BMPs
- Potential Future Storm Sewer
- Storm Sewer
- Potential Future Storm Manhole
- Manholes
- Outfalls
- Inlets

Construction of an underground storage under Belmar Hills Park is recommended to control TSS and TP loads.

The proposed future BMP design will include a new manhole and 60" pipes. Design would allow high flows to release back to the storm sewer and travel south through the 60" pipe which passes under Renaissance Pond.

60691622 **Figure 11.8** September 2024
**Potential Future BMP:
 Belmar Hills UG Storage**
 Stormwater Management Plan Update
 City of Fitchburg
 Wisconsin **AECOM**

0 80 160 320 Feet

WinSLAMM Details for the Future Condition for Belmar Hills UG Storage (New Construction)

Future

Drainage System Control Practice: Belmar Hills Park UG Storage

Native Soil Infiltration Rate (in/hr):
 Assumed Stone Porosity:

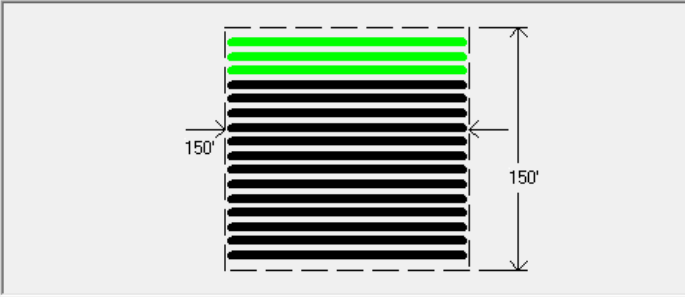
Total Available System Length (ft): Available Height from Chamber Base to Surface (ft):
 Total Available System Width (ft): Number of Isolator Rows:

Select Either of These Sizing Options:
 Use All Available Area Enter Required Storage Volume Enter Number of Rows and Row Length

Select Product

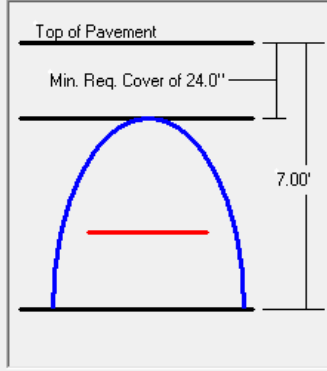
Chamber Segment Dimensions				Calculated System Size					
Product	Height (in)	Width (in)	Length (in)	Final Storage Volume (cf)	Number of Rows	Row Length (ft)	Total Chamber Length (ft)	Total System Width (ft)	Number of Chambers
<input type="radio"/> SC-160LP	12	25	85.4						
<input type="radio"/> SC-310	16	34	85.4						
<input type="radio"/> SC-740	30	51	85.4						
<input type="radio"/> DC-780	30	51	85.4						
<input type="radio"/> MC-3500	45	77	86						
<input checked="" type="radio"/> MC-7200	60	100	79.1	87156	16	142.1	2109.3	145.3	320

Cross Section		
Outlet	Invert Elevation (ft)	Orifice Diameter (ft)
Overflow Weir	2.00	N/A
Orifice 1	0.00	0.00
Drain Tile	NO	N/A

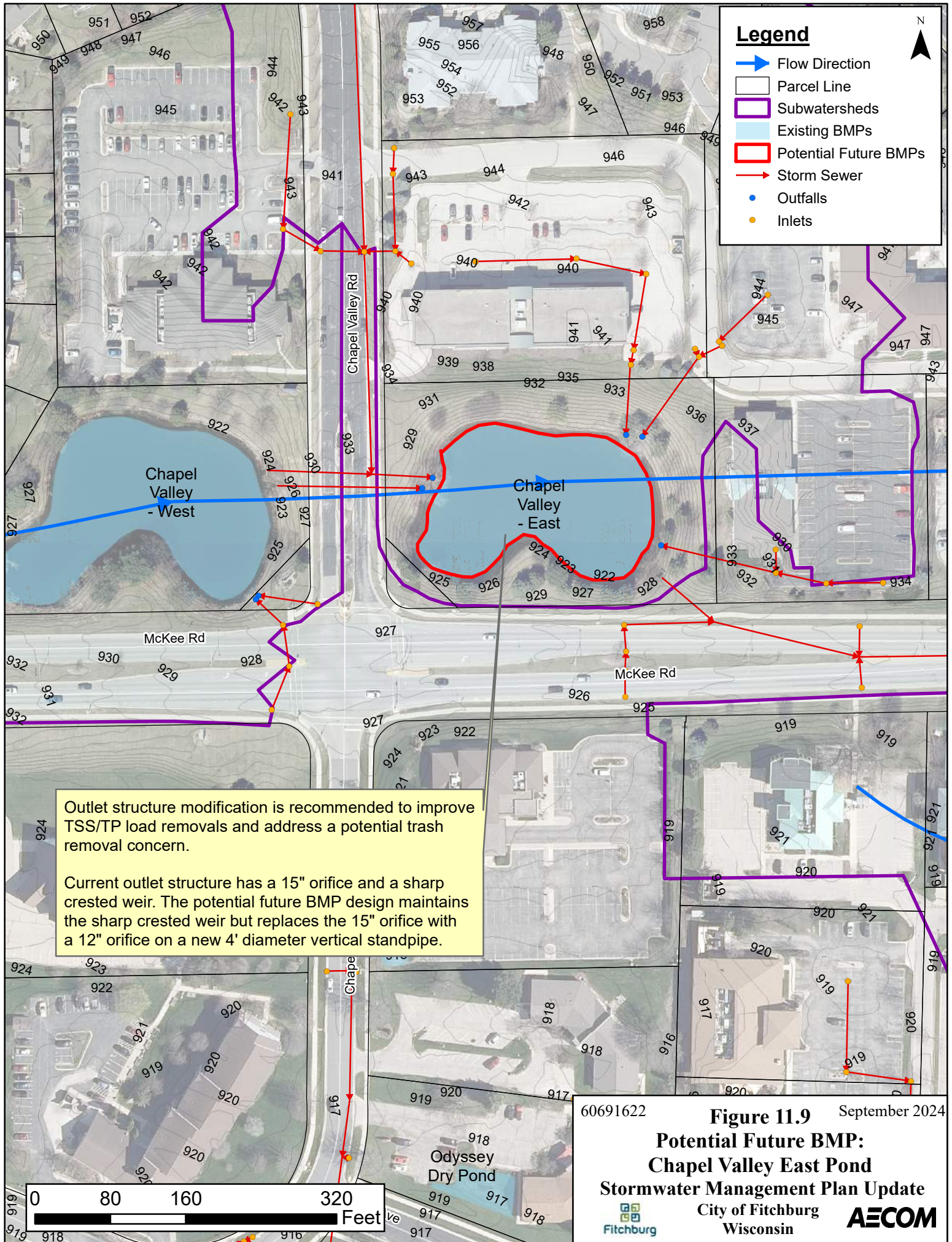


Approximate Pipe Configuration

Press 'F1' for Help



To Delete This Practice, Right Mouse Click on Icon and Select Delete



Legend

- Flow Direction
- Parcel Line
- Subwatersheds
- Existing BMPs
- Potential Future BMPs
- Storm Sewer
- Outfalls
- Inlets

Outlet structure modification is recommended to improve TSS/TP load removals and address a potential trash removal concern.

Current outlet structure has a 15" orifice and a sharp crested weir. The potential future BMP design maintains the sharp crested weir but replaces the 15" orifice with a 12" orifice on a new 4' diameter vertical standpipe.

60691622 **Figure 11.9** September 2024
Potential Future BMP:
Chapel Valley East Pond
Stormwater Management Plan Update
 City of Fitchburg Wisconsin **AECOM**

0 80 160 320 Feet

WinSLAMM Details for the Existing and Future Conditions for Chapel Valley East Pond (Retrofit)

Existing

Wet Detention Control Device

Pond Number 1
Drainage System Control Practice

Stage (ft)	Area (acres)	Cumulative Volume (ac-ft)
0	0.00	0.0000
1	0.01	0.5520
2	3.50	0.7880
3	5.50	0.9730
4	7.50	1.1360
5	9.50	1.3340
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		

Initial Stage Elevation (ft):

Maximum Inflow into Pond (cfs):

Enter Two Stage Area Values in Rows 1 and 2, and Press to Interpolate

Create Pond Stage-Area Values | Refresh Schematic

Enter fraction (greater than 0) that you want to modify all pond areas by and then select 'Modify Pond Areas' button:

Copy Pond Data | Paste Pond Data | Recalculate Cumulative Volume

Save or Delete Pond Data to Database File | Get Pond Data From Database File

Remove | Sharp Crested Weir

Weir Length (ft) 8.00
Height from datum to bottom of weir opening (ft) 6.25

Add | **V-Notch Weir**

Weir Angle (<180 degrees)

Height from datum to bottom of weir opening (ft)

Number of V-Notch weirs

Remove | Orifice Set 1

Orifice Diameter (ft) 1.25
Invert elevation above datum (ft) 3.50
Number of orifices in set 1

Add | **Orifice Set 2**

Orifice Diameter (ft)

Invert elevation above datum (ft)

Number of orifices in set

Add | **Orifice Set 3**

Orifice Diameter (ft)

Invert elevation above datum (ft)

Number of orifices in set

Add | **Stone Weeper**

Width at bottom of weeper (ft)

Weeper side slope (L:H:1V)

Upstream side slope (L:H:1V)

Downstream side slope (L:H:1V)

Horizontal flow path length at top of weeper (ft)

Average rock diameter (ft)

Distance from bottom to top of weeper (ft)

Height from datum to bottom of weeper (ft)

Add | **Vertical Stand Pipe**

Pipe diameter (ft)

Height above datum (ft)

Month	Evaporation (in/day)	Water Withdraw Rate (ac-ft/day)
Jan	0.00	0.000
Feb	0.00	0.000
Mar	0.00	0.000
Apr	0.00	0.000
May	0.00	0.000
Jun	0.00	0.000
Jul	0.00	0.000
Aug	0.00	0.000
Sep	0.00	0.000
Oct	0.00	0.000
Nov	0.00	0.000
Dec	0.00	0.000

Stage (ft)	Natural Seepage Rate (in/hr)	Other Outflow Rate (cfs)
0.00	0.00	0.000
0.01	0.00	0.000
3.50	0.00	0.000
5.50	0.00	0.000
7.50	0.00	0.000
9.50	0.00	0.000
n.n	n.n	n.n

Remove | Broad Crested Weir (Required)

Weir crest length (ft) 10.00
Weir crest width (ft) 10.00
Height from datum to bottom of weir opening (ft) 9.40

Add | **Seepage Basin**

Infiltration rate (in/hr)

Width of device (ft)

Length of device (ft)

Invert elevation of seepage basin inlet above datum (ft)

Add | **Pump**

To Delete This Practice, Right Mouse Click on Icon and Select Delete

Cancel | Continue | Press 'F1' for Help

Future

Wet Detention Control Device

Pond Number 1
Drainage System Control Practice

Stage (ft)	Area (acres)	Cumulative Volume (ac-ft)
0	0.00	0.0000
1	0.01	0.5520
2	3.50	0.7880
3	5.50	0.9730
4	7.50	1.1360
5	9.50	1.3340
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		

Initial Stage Elevation (ft):

Maximum Inflow into Pond (cfs):

Enter Two Stage Area Values in Rows 1 and 2, and Press to Interpolate

Create Pond Stage-Area Values | Refresh Schematic

Enter fraction (greater than 0) that you want to modify all pond areas by and then select 'Modify Pond Areas' button:

Copy Pond Data | Paste Pond Data | Recalculate Cumulative Volume

Save or Delete Pond Data to Database File | Get Pond Data From Database File

Remove | Sharp Crested Weir

Weir Length (ft) 8.00
Height from datum to bottom of weir opening (ft) 6.25

Add | **V-Notch Weir**

Weir Angle (<180 degrees)

Height from datum to bottom of weir opening (ft)

Number of V-Notch weirs

Remove | Orifice Set 1

Orifice Diameter (ft) 1.00
Invert elevation above datum (ft) 3.50
Number of orifices in set 1

Add | **Orifice Set 2**

Orifice Diameter (ft)

Invert elevation above datum (ft)

Number of orifices in set

Add | **Orifice Set 3**

Orifice Diameter (ft)

Invert elevation above datum (ft)

Number of orifices in set

Add | **Stone Weeper**

Width at bottom of weeper (ft)

Weeper side slope (L:H:1V)

Upstream side slope (L:H:1V)

Downstream side slope (L:H:1V)

Horizontal flow path length at top of weeper (ft)

Average rock diameter (ft)

Distance from bottom to top of weeper (ft)

Height from datum to bottom of weeper (ft)

Remove | Vertical Stand Pipe

Pipe diameter (ft) 4.00
Height above datum (ft) 8.25

Month	Evaporation (in/day)	Water Withdraw Rate (ac-ft/day)
Jan	0.00	0.000
Feb	0.00	0.000
Mar	0.00	0.000
Apr	0.00	0.000
May	0.00	0.000
Jun	0.00	0.000
Jul	0.00	0.000
Aug	0.00	0.000
Sep	0.00	0.000
Oct	0.00	0.000
Nov	0.00	0.000
Dec	0.00	0.000

Stage (ft)	Natural Seepage Rate (in/hr)	Other Outflow Rate (cfs)
0.00	0.00	0.000
0.01	0.00	0.000
3.50	0.00	0.000
5.50	0.00	0.000
7.50	0.00	0.000
9.50	0.00	0.000
n.n	n.n	n.n

Remove | Broad Crested Weir (Required)

Weir crest length (ft) 10.00
Weir crest width (ft) 10.00
Height from datum to bottom of weir opening (ft) 9.40

Add | **Seepage Basin**

Infiltration rate (in/hr)

Width of device (ft)

Length of device (ft)

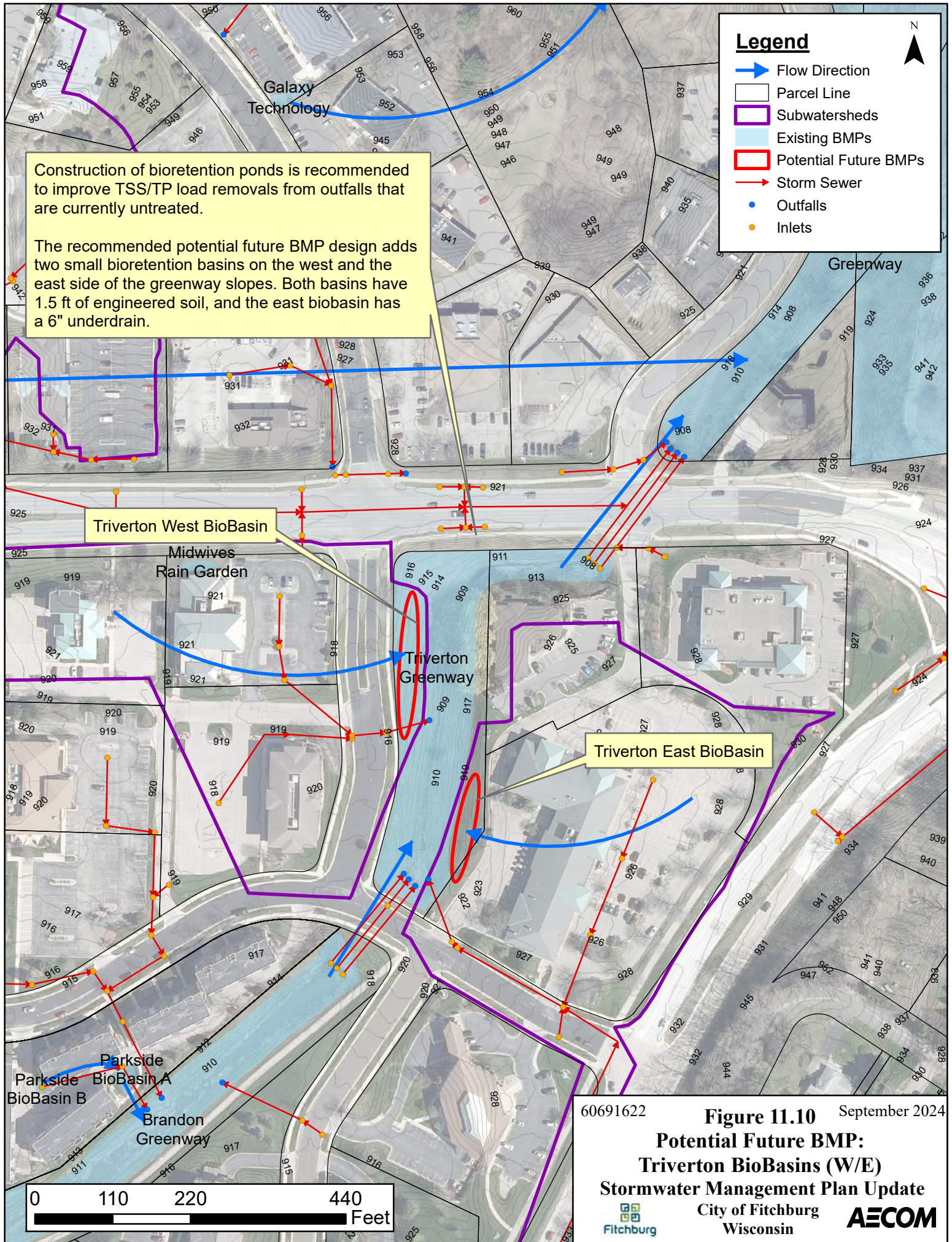
Invert elevation of seepage basin inlet above datum (ft)

Add | **Pump**

To Delete This Practice, Right Mouse Click on Icon and Select Delete

Cancel | Continue | Press 'F1' for Help

Control Practice #: 1 | CP Index #: 1



Construction of bioretention ponds is recommended to improve TSS/TP load removals from outfalls that are currently untreated.

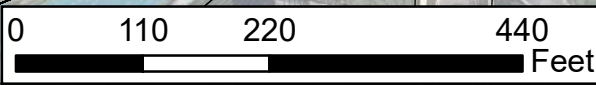
The recommended potential future BMP design adds two small bioretention basins on the west and the east side of the greenway slopes. Both basins have 1.5 ft of engineered soil, and the east biobasin has a 6" underdrain.

Legend

- ➔ Flow Direction
- ▭ Parcel Line
- ▭ Subwatersheds
- ▭ Existing BMPs
- ▭ Potential Future BMPs
- ➔ Storm Sewer
- Outfalls
- Inlets

Triverton West BioBasin

Triverton East BioBasin



WinSLAMM Details for the Future Conditions for Triverton West and East BioBasins (New Construction)

Triverton West Biobasin

Biofiltration Control Device

Drainage System Control Practice

Device Properties Biofilter Number 1

Top Area (sf)	4000
Bottom Area (sf)	2500
Total Depth (ft)	3.00
Typical Width (ft) (Cost est. only)	10.00
Native Soil Infiltration Rate (in/hr)	0.500
Native Soil Infiltration Rate CDV	N/A
Infil. Rate Fraction-Bottom (0.001-1)	1.000
Infil. Rate Fraction-Sides (0.001-1)	0.010
Rock Filled Depth (ft)	0.00
Rock Fill Porosity (0-1)	0.00
Engineered Media Type	Media Data
Engineered Media Infiltration Rate	3.60
Engineered Media Infiltration Rate CDV	N/A
Engineered Media Depth (ft)	1.50
Engineered Media Porosity (0-1)	0.27
Percent solids reduction due to Engineered Media (0-100)	80.00
Inflow Hydrograph Peak to Average Flow Ratio	3.80
Number of Devices in Source Area or Upstream Drainage System	1

Activate Pipe or Box Storage Pipe Box

Diameter (ft) _____
Length (ft) _____
Within Biofilter (check if Yes)
Perforated (check if Yes)
Bottom Elevation (ft above datum) _____
Discharge Orifice Diameter (ft) _____

Select Native Soil Infiltration Rate

<input type="radio"/> Sand - 8 in/hr	<input type="radio"/> Clay loam - 0.1 in/hr
<input type="radio"/> Loamy sand - 2.5 in/hr	<input type="radio"/> Silty clay loam - 0.05 in/hr
<input type="radio"/> Sandy loam - 1.0 in/hr	<input type="radio"/> Sandy clay - 0.05 in/hr
<input type="radio"/> Loam - 0.5 in/hr	<input type="radio"/> Silty clay - 0.04 in/hr
<input type="radio"/> Silt loam - 0.3 in/hr	<input type="radio"/> Clay - 0.02 in/hr
<input type="radio"/> Sandy silt loam - 0.2 in/hr	<input type="radio"/> Rain Barrel/Cistern - 0.00 in/hr

Use Random Number Generation to Account for Infiltration Rate Uncertainty

Estimated Surface Drain Time = 24.00 hrs.

Control Practice #: 1 CP Index #: 1

Add Sharp Crested Weir

Weir Length (ft) _____
Height from datum to bottom of weir opening (ft) _____

Broad Crested Weir-Req'd

Weir crest length (ft) 10.00
Weir crest width (ft) 3.00
Height from datum to bottom of weir opening (ft) 2.50

Add Vertical Stand Pipe

Pipe diameter (ft) _____
Height above datum (ft) _____

Add Surface Discharge Pipe

Pipe Diameter (ft) _____
Invert elevation above datum (ft) _____
Number of pipes at invert elev. _____

Add Drain Tile/Underdrain

Pipe Diameter (ft) _____
Invert elevation above datum (ft) _____
Number of pipes at invert elev. _____

Add Other Outlet

Stage Number	Stage (ft)	Other Outflow Rate (cfs)
1		
2		
3		
4		
5		

Add Evapotranspiration

Soil porosity (saturation moisture content, 0-1) _____
Soil field moisture capacity (0-1) _____
Permanent wilting point (0-1) _____
Supplemental irrigation used?
Fraction of available capacity when irrigation starts (0-1) _____
Fraction of available capacity when irrigation stops (0-1) _____
Fraction of biofilter that is vegetated _____
Plant type _____
Root depth (ft) _____
ET Crop Adjustment Factor _____

Evaporation

Month	Evapotranspiration (in/day)	Evaporation (in/day)
Jan		
Feb		
Mar		
Apr		
May		
Jun		
Jul		
Aug		
Sep		
Oct		
Nov		
Dec		

Plant Types

1	2	3	4

Biofilter Geometry Schematic

Press 'F1' for Help To Delete This Practice, Right Mouse Click on Icon and Select Delete

Triverton East Biobasin

Biofiltration Control Device

Drainage System Control Practice

Device Properties Biofilter Number 1

Top Area (sf)	5000
Bottom Area (sf)	3150
Total Depth (ft)	3.00
Typical Width (ft) (Cost est. only)	10.00
Native Soil Infiltration Rate (in/hr)	0.500
Native Soil Infiltration Rate CDV	N/A
Infil. Rate Fraction-Bottom (0.001-1)	1.000
Infil. Rate Fraction-Sides (0.001-1)	0.010
Rock Filled Depth (ft)	0.00
Rock Fill Porosity (0-1)	0.00
Engineered Media Type	Media Data
Engineered Media Infiltration Rate	3.60
Engineered Media Infiltration Rate CDV	N/A
Engineered Media Depth (ft)	1.50
Engineered Media Porosity (0-1)	0.27
Percent solids reduction due to Engineered Media (0-100)	80.00
Inflow Hydrograph Peak to Average Flow Ratio	3.80
Number of Devices in Source Area or Upstream Drainage System	1

Activate Pipe or Box Storage Pipe Box

Diameter (ft) _____
Length (ft) _____
Within Biofilter (check if Yes)
Perforated (check if Yes)
Bottom Elevation (ft above datum) _____
Discharge Orifice Diameter (ft) _____

Select Native Soil Infiltration Rate

<input type="radio"/> Sand - 8 in/hr	<input type="radio"/> Clay loam - 0.1 in/hr
<input type="radio"/> Loamy sand - 2.5 in/hr	<input type="radio"/> Silty clay loam - 0.05 in/hr
<input type="radio"/> Sandy loam - 1.0 in/hr	<input type="radio"/> Sandy clay - 0.05 in/hr
<input type="radio"/> Loam - 0.5 in/hr	<input type="radio"/> Silty clay - 0.04 in/hr
<input type="radio"/> Silt loam - 0.3 in/hr	<input type="radio"/> Clay - 0.02 in/hr
<input type="radio"/> Sandy silt loam - 0.2 in/hr	<input type="radio"/> Rain Barrel/Cistern - 0.00 in/hr

Use Random Number Generation to Account for Infiltration Rate Uncertainty

Estimated Surface Drain Time = 3.33 hrs.

Control Practice #: 1 CP Index #: 1

Add Sharp Crested Weir

Weir Length (ft) _____
Height from datum to bottom of weir opening (ft) _____

Broad Crested Weir-Req'd

Weir crest length (ft) 15.00
Weir crest width (ft) 3.00
Height from datum to bottom of weir opening (ft) 2.50

Add Vertical Stand Pipe

Pipe diameter (ft) _____
Height above datum (ft) _____

Add Surface Discharge Pipe

Pipe Diameter (ft) _____
Invert elevation above datum (ft) _____
Number of pipes at invert elev. _____

Remove Drain Tile/Underdrain

Pipe Diameter (ft) 0.50
Invert elevation above datum (ft) 0.00
Number of pipes at invert elev. 1

Add Other Outlet

Stage Number	Stage (ft)	Other Outflow Rate (cfs)
1		
2		
3		
4		
5		

Add Evapotranspiration

Soil porosity (saturation moisture content, 0-1) _____
Soil field moisture capacity (0-1) _____
Permanent wilting point (0-1) _____
Supplemental irrigation used?
Fraction of available capacity when irrigation starts (0-1) _____
Fraction of available capacity when irrigation stops (0-1) _____
Fraction of biofilter that is vegetated _____
Plant type _____
Root depth (ft) _____
ET Crop Adjustment Factor _____

Evaporation

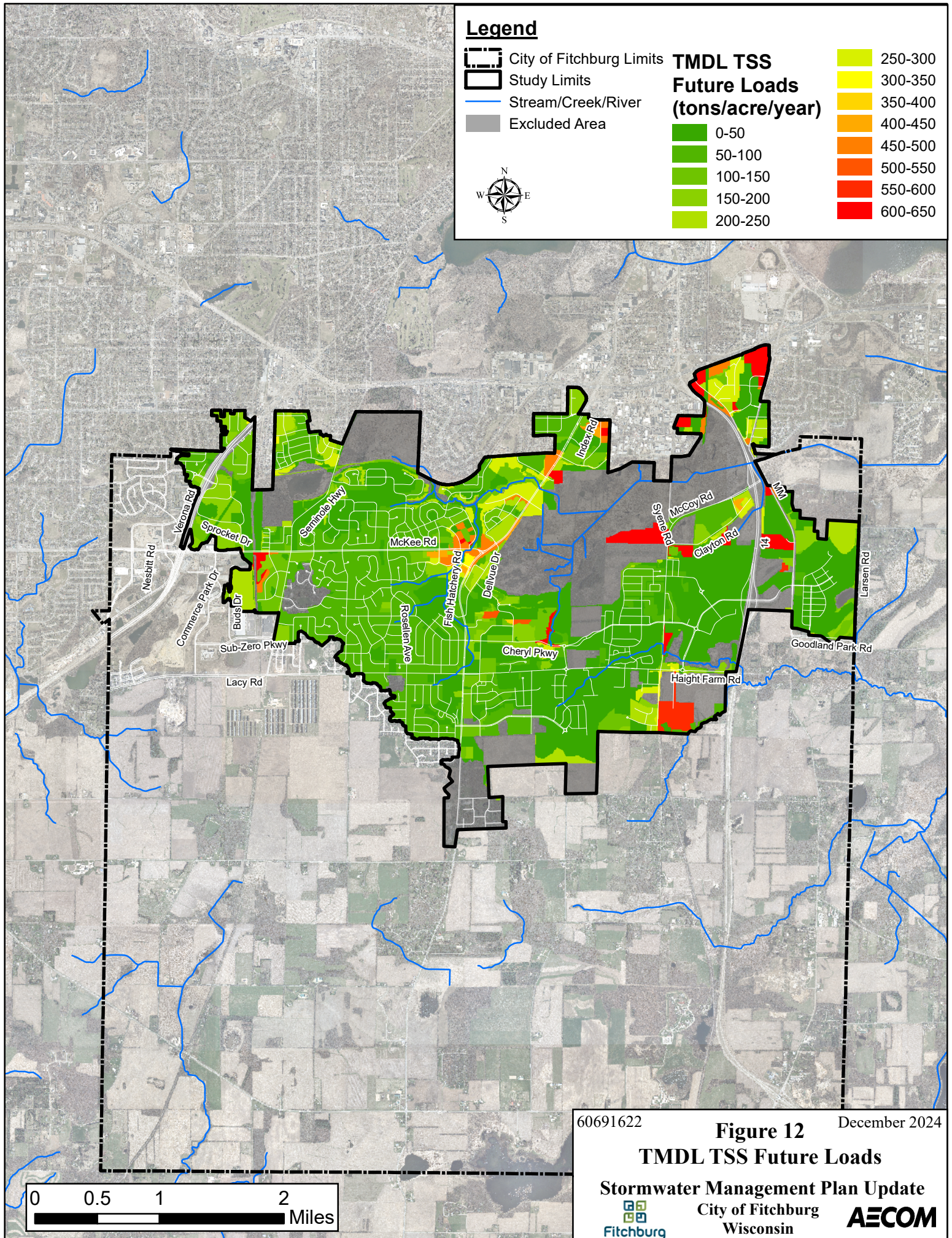
Month	Evapotranspiration (in/day)	Evaporation (in/day)
Jan		
Feb		
Mar		
Apr		
May		
Jun		
Jul		
Aug		
Sep		
Oct		
Nov		
Dec		

Plant Types

1	2	3	4

Biofilter Geometry Schematic

Press 'F1' for Help To Delete This Practice, Right Mouse Click on Icon and Select Delete



Legend

- City of Fitchburg Limits
- Study Limits
- Stream/Creek/River
- Excluded Area

**TMDL TSS
Future Loads
(tons/acre/year)**

- 0-50
- 50-100
- 100-150
- 150-200
- 200-250
- 250-300
- 300-350
- 350-400
- 400-450
- 450-500
- 500-550
- 550-600
- 600-650



60691622

Figure 12

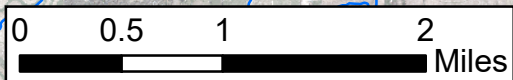
December 2024

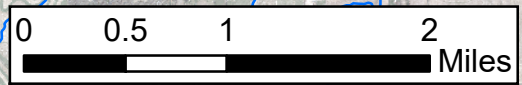
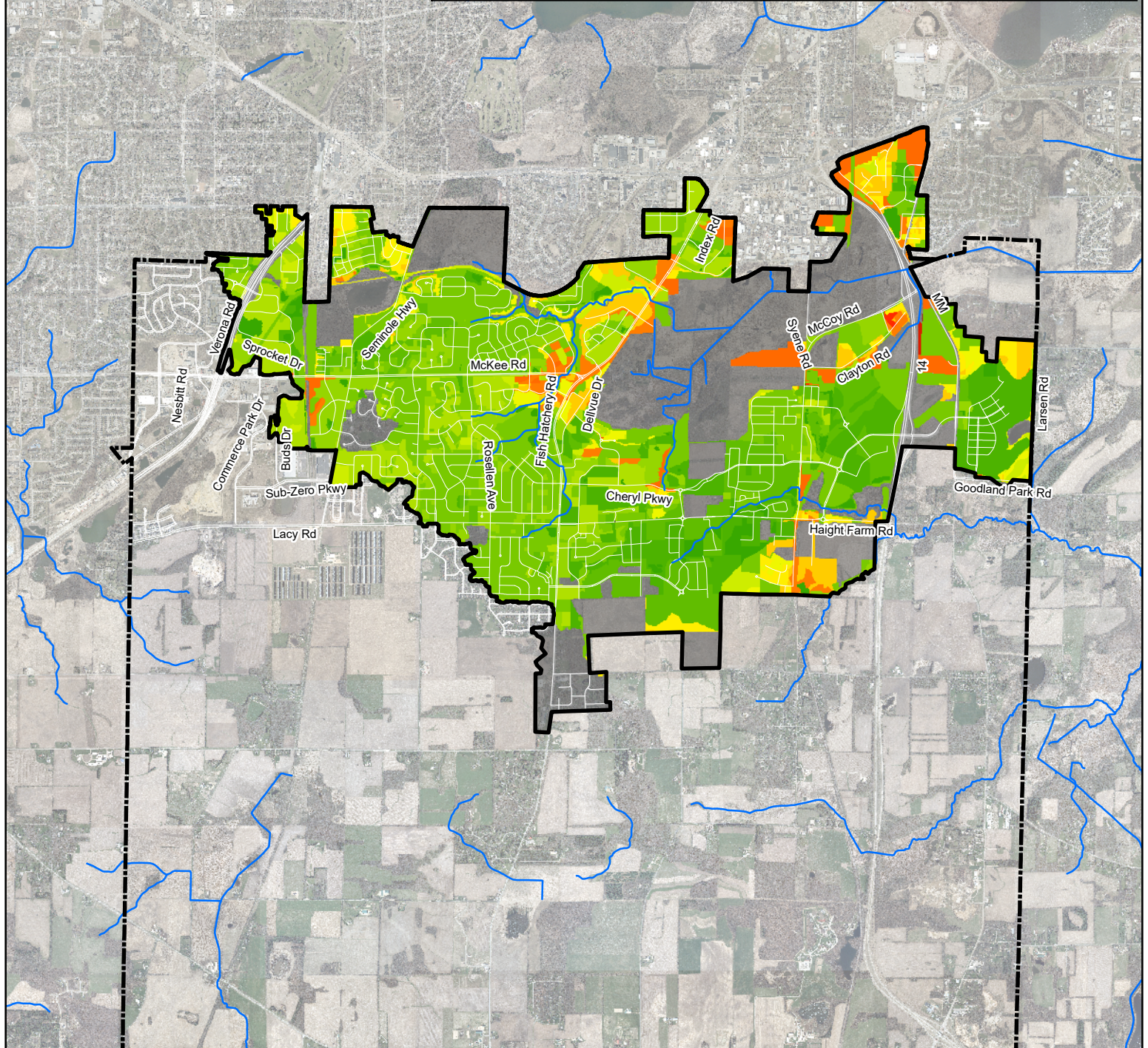
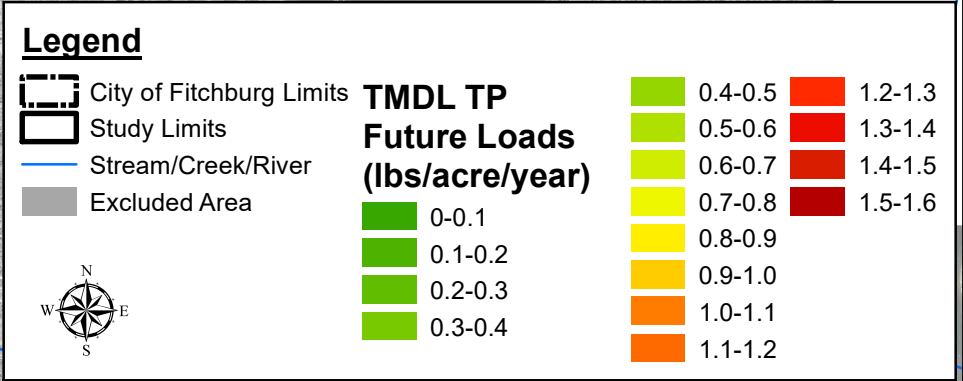
TMDL TSS Future Loads

Stormwater Management Plan Update



City of Fitchburg
Wisconsin





60691622 **Figure 13** December 2024
TMDL TP Future Loads
 Stormwater Management Plan Update
 City of Fitchburg Wisconsin **AECOM**

Attachments

Attachment A	Cost Estimates for Future BMPs
Attachment B	Fitchburg Stormwater BMP Tracker
Attachment C	2007 Source Loading and Management Model Results
Attachment D	2008 SLAMM Modeling Update Memo
Attachment E	2013 Modeling Summary and Attachments
Attachment F	Pages from Rock River TMDL Report – TMDL Targets for the City of Fitchburg
Attachment G	Dane County Highways Map
Attachment H	WPDES Permit No. WI-S058416-4
Attachment I	2023 Yahara WINS Annual Report
Attachment J	Intergovernmental Agreement for an Adaptive Management Plan for the Yahara Watershed
Attachment K	Ordinance Updates

Attachment A – Cost Estimates for Future BMPs

- A-1 Arapaho Greenway
- A-2 Business Park B Pond
- A-3 Seminole Hills Pond
- A-4 Nine Springs Golf Course Pond
- A-5 McKee Farms Park SW Pond
- A-6 Design Mart Pond
- A-7 Dawley Bioretention Facility
- A-8 Belmar Hills Park UG
- A-9 Chapel Valley East Pond
- A-10 Triverton BioBasins (West/East)

Attachment A-1

Arapaho Greenway - Cost Estimate					
ITEM NO.	ITEM DESCRIPTION	QTY.	UNIT	UNIT	TOTAL
				COST	COST
1	Mobilization	1	LS	\$6,000	\$ 6,000
2	Clearing	0.4	AC	\$2,700	\$ 945
3	Grubbing	0.4	AC	\$2,000	\$ 700
4	6" Topsoil & Erosion Mat	950	SY	\$15	\$ 14,250
5	Seeding	950	SY	\$1.50	\$ 1,425
6	Common Excavation	100	CY	\$25	\$ 2,500
7	Engineered Soil	240	CY	\$100	\$ 24,000
8	Inlet Protection Type C	3	EA	\$65	\$ 195
9	Silt Fence	515	LF	\$2	\$ 1,030
10	Stone Tracking Pad	1	EA	\$1,500	\$ 1,500
11	Medium Riprap	50	SY	\$100	\$ 5,000
Grass Swale Sub-Total				\$	57,545
Contingency (20%)				\$	11,509
Construction Services (10%)				\$	5,755
Land Acquisition Costs				\$	-
Project Total				\$	80,000

Attachment A-2

Business Park B Pond - Cost Estimate					
ITEM NO.	ITEM DESCRIPTION	QTY.	UNIT	UNIT COST	TOTAL COST
1	Mobilization	1	LS	\$2,000	\$ 2,000
2	Clearing	0.3	AC	\$2,700	\$ 675
3	Grubbing	0.3	AC	\$2,000	\$ 500
4	Stone Tracking Pad	1	EA	\$1,500	\$ 1,500
5	Dewatering Existing Pond, Complete	1	LS	\$6,500	\$ 6,500
6	Remove Existing Outlet Structure	1	LS	\$1,000	\$ 1,000
7	Connect to Existing Storm Sewer (18" RCP)	1	LS	\$400	\$ 400
8	36" Dia. Vertical Standpipe with Multiple Orifices	1	LS	\$1,300	\$ 1,300
Wet Pond Sub-Total					\$ 13,875
Contingency (20%)					\$ 2,775
Construction Services (10%)					\$ 1,388
Land Acquisition Costs					\$ -
Project Total					\$ 20,000

Attachment A-3

Seminole Hills Pond - Cost Estimate					
ITEM NO.	ITEM DESCRIPTION	QTY.	UNIT	UNIT	TOTAL
				COST	COST
1	Mobilization	1	LS	\$1,000	\$ 1,000
2	Clearing	0.5	AC	\$2,700	\$ 1,350
3	Grubbing	0.5	AC	\$2,000	\$ 1,000
4	Dewatering Existing Pond, Partial	1	LS	\$3,000	\$ 3,000
5	Abandon 18" Orifice of Existing Outlet Structure	1	LS	\$500	\$ 500
6	6" Topsoil & Erosion Mat	140	SY	\$15	\$ 2,100
7	Seeding	140	SY	\$1.50	\$ 210
8	Stone Tracking Pad	1	EA	\$1,500	\$ 1,500
				Wet Pond Sub-Total	\$ 10,660
				Contingency (20%)	\$ 2,132
				Construction Services (10%)	\$ 1,066
				Land Acquisition Costs	\$ -
				Project Total	\$ 20,000

Attachment A-4

Nine Springs Golf Course Pond - Cost Estimate					
ITEM NO.	ITEM DESCRIPTION	QTY.	UNIT	UNIT	TOTAL
				COST	COST
1	Mobilization	1	LS	\$82,000	\$ 82,000
2	Clearing	0.5	AC	\$2,700	\$ 1,350
3	Grubbing	0.5	AC	\$2,000	\$ 1,000
4	Traffic Control	1	LS	\$2,500	\$ 2,500
5	Construction Staking	1	LS	\$5,000	\$ 5,000
6	Dewatering Existing Pond, Partial	1	LS	\$3,000	\$ 3,000
7	6" Topsoil & Erosion Mat	2,210	SY	\$15	\$ 33,150
8	Seeding	2,210	SY	\$1.50	\$ 3,315
9	Common Excavation	2,635	CY	\$25	\$ 65,875
10	Connect to Existing Storm Sewer	1	LS	\$2,000	\$ 2,000
11	Remove and Replace Storm Sewer Pipe 24" RCP Class III	810	LF	\$150	\$ 121,500
12	Remove and Replace Manhole	1	EA	\$1,800	\$ 1,800
13	Remove and Replace Concrete Sidewalk	800	SF	\$20	\$ 16,000
14	Remove and Replace Storm Sewer Pipe 12" RCP	770	LF	\$90	\$ 69,300
15	Abandon Storm Sewer Lateral Pipe (size unknown)	430	LF	\$20	\$ 8,600
16	Storm Sewer Pipe 48" RCP Class III	1,000	LF	\$400	\$ 400,000
17	Storm Sewer Pipe 48" RCP Class III Apron Endwall	1	EA	\$2,500	\$ 2,500
18	Storm Sewer Pipe 48" RCP Class III Insulation for Inverted Siphon	1,000	LF	\$50	\$ 50,000
19	Medium Riprap	140	SY	\$100	\$ 14,000
20	Install Emergency Spillway (South side)	15	SY	\$150	\$ 2,250
21	Inlet Protection Type C	5	EA	\$65	\$ 325
22	Silt Fence	1,810	LF	\$2	\$ 3,620
23	Stone Tracking Pad	2	EA	\$1,500	\$ 3,000
				Wet Pond Sub-Total	\$ 892,085
				Contingency (20%)	\$ 178,417
				Construction Services (10%)	\$ 89,209
				Land Acquisition Costs	\$ -
				Project Total	\$ 1,160,000

Attachment A-5

McKee Farms Park SW Pond - Cost Estimate					
ITEM NO.	ITEM DESCRIPTION	QTY.	UNIT	UNIT COST	TOTAL COST
1	Mobilization	1	LS	\$68,000	\$ 68,000
2	Clearing	2.4	AC	\$2,700	\$ 6,480
3	Grubbing	2.4	AC	\$2,000	\$ 4,800
4	6" Topsoil & Erosion Mat	11,890	SY	\$15	\$ 178,350
5	Seeding	11,890	SY	\$1.50	\$ 17,835
6	Common Excavation	10,100	CY	\$25	\$ 252,500
7	Compacted Clay Liner	9,170	CY	\$20	\$ 183,400
8	24" RCP Storm Sewer	60	LF	\$150	\$ 9,000
9	24" RCP Class III Apron Endwall w/ Joint Ties	1	EA	\$550	\$ 550
10	48" Dia. Vertical Standpipe with Multiple Orifices	1	EA	\$3,600	\$ 3,600
11	Silt Fence	1,500	LF	\$2	\$ 3,000
12	Stone Tracking Pad	2	EA	\$1,500	\$ 3,000
13	Medium Riprap	145	SY	\$100	\$ 14,500
Wet Pond Sub-Total					\$ 745,015
Contingency (20%)					\$ 149,003
Construction Services (10%)					\$ 74,502
Land Acquisition Costs					\$ -
Project Total					\$ 970,000

Attachment A-6

Design Mart Pond - Cost Estimate					
ITEM NO.	ITEM DESCRIPTION	QTY.	UNIT	UNIT	TOTAL
				COST	COST
1	Mobilization	1	LS	\$2,000	\$ 2,000
2	Clearing	0.5	AC	\$2,700	\$ 1,350
3	Grubbing	0.5	AC	\$2,000	\$ 1,000
4	Stone Tracking Pad	1	EA	\$1,500	\$ 1,500
5	Dewatering, Complete	1	LS	\$5,000	\$ 5,000
6	24" Dia. Vertical Standpipe with Multiple Orifices	1	LS	\$500	\$ 500
7	Medium Riprap	35	SY	\$100	\$ 3,500
8	Silt Fence	700	LF	\$2	\$ 1,400
				Bioretention Sub-Total	\$ 16,250
				Contingency (20%)	\$ 3,250
				Construction Services (10%)	\$ 1,625
				Land Acquisition Costs	\$ -
				Project Total	\$ 30,000

Attachment A-7

Dawley Bioretention Facility - Cost Estimate					
ITEM NO.	ITEM DESCRIPTION	QTY.	UNIT	UNIT	TOTAL
				COST	COST
1	Mobilization	1	LS	\$14,000	\$ 14,000
2	Traffic Control	1	LS	\$4,000	\$ 4,000
3	Clearing	0.5	AC	\$2,700	\$ 1,350
4	Grubbing	0.5	AC	\$2,000	\$ 1,000
5	Excavation Common	1,760	CY	\$25	\$ 44,000
6	6" Topsoil & Erosion Mat	1,395	SY	\$15	\$ 20,925
7	Seeding	1,395	SY	\$1.50	\$ 2,093
8	Engineered Soil	525	CY	\$100	\$ 52,500
9	Outfall Structure - Broad Crested Weir	1	LS	\$1,000	\$ 1,000
10	Sediment Control Logs, 18-inch	500	LF	\$10	\$ 5,000
11	Silt Fence	500	LF	\$2	\$ 1,000
12	Stone Tracking Pad	1	EA	\$1,500	\$ 1,500
Bioretention Sub-Total					\$ 148,368
Contingency (20%)					\$ 29,674
Construction Services (10%)					\$ 14,837
Land Acquisition Costs					\$ -
Project Total					\$ 200,000

Attachment A-8

Belmar Hills Park UG Storage - Cost Estimate					
ITEM NO.	ITEM DESCRIPTION	QTY.	UNIT	UNIT	TOTAL
				COST	COST
1	Mobilization	1	LS	\$149,000	\$ 149,000
2	Clearing	0.6	AC	\$2,700	\$ 1,485
3	Grubbing	0.6	AC	\$2,000	\$ 1,100
4	6" Topsoil & Erosion Mat	2,665	SY	\$15	\$ 39,975
5	Seeding	2,665	SY	\$1.50	\$ 3,998
6	Common Excavation	5,835	CY	\$25	\$ 145,875
7	Arch Storage Pipe	2,110	LF	\$400	\$ 844,000
8	Stone Infiltration Bed	5,390	CY	\$50	\$ 269,500
9	Manholes 6-FT Diameter	1	EA	\$9,000	\$ 9,000
10	60" RCP Storm Sewer	300	LF	\$550	\$ 165,000
11	Connect into Existing Storm Structure	1	EA	\$1,500	\$ 1,500
12	Inlet Protection Type C	3	EA	\$65	\$ 195
13	Silt Fence	660	LF	\$2	\$ 1,320
14	Stone Tracking Pad	1	EA	\$1,500	\$ 1,500
Underground Storage Sub-Total					\$ 1,633,448
Contingency (20%)					\$ 326,690
Construction Services (10%)					\$ 163,345
Land Acquisition Costs					\$ -
Project Total					\$ 2,130,000

Attachment A-9

Chapel Valley East Pond - Cost Estimate					
ITEM NO.	ITEM DESCRIPTION	QTY.	UNIT	UNIT	TOTAL
				COST	COST
1	Mobilization	1	LS	\$2,000	\$ 2,000
2	Clearing	0.3	AC	\$2,700	\$ 675
3	Grubbing	0.3	AC	\$2,000	\$ 500
4	Stone Tracking Pad	1	EA	\$1,500	\$ 1,500
5	Dewatering Existing Pond, Complete	1	LS	\$6,500	\$ 6,500
6	Abandon the 15" orifice for Existing Outlet Structure	1	LS	\$500	\$ 500
7	Connect to Existing Storm Sewer (30" RCP)	1	LS	\$1,500	\$ 1,500
8	4' Dia. Vertical Standpipe with 12" Orifice	1	LS	\$1,500	\$ 1,500
Wet Pond Sub-Total					\$ 14,675
Contingency (20%)					\$ 2,935
Construction Services (10%)					\$ 1,468
Land Acquisition Costs					\$ -
Project Total					\$ 20,000

Attachment A-10

Triverton BioBasins (West/East) - Cost Estimate					
ITEM NO.	ITEM DESCRIPTION	QTY.	UNIT	UNIT	TOTAL
				COST	COST
1	Mobilization	1	LS	\$14,000	\$ 14,000
2	Traffic Control	1	LS	\$4,000	\$ 4,000
3	Clearing	1	AC	\$2,700	\$ 2,700
4	Grubbing	1	AC	\$2,000	\$ 2,000
5	Excavation Common	1,120	CY	\$25	\$ 28,000
6	6" Topsoil & Erosion Mat	1,100	SY	\$15	\$ 16,500
7	Seeding	1,100	SY	\$1.50	\$ 1,650
8	Engineered Soil	590	CY	\$100	\$ 59,000
9	6" Underdrain	150	LF	\$60	\$ 9,000
10	Underdrain Cleanouts	1	EA	\$750	\$ 750
11	Medium Riprap	40	SY	\$100	\$ 4,000
12	Inlet Protection Type C	1	EA	\$65	\$ 65
13	Silt Fence	1,100	LF	\$2	\$ 2,200
14	Stone Tracking Pad	2	EA	\$1,500	\$ 3,000
				Bioretention Sub-Total	\$ 146,865
				Contingency (20%)	\$ 29,373
				Construction Services (10%)	\$ 14,687
				Land Acquisition Costs	\$ -
				Project Total	\$ 200,000

Attachment B – Fitchburg Stormwater BMP Tracker

Reachshed	Most downstream BMP in Series	2013 GIS BMP Name	2023 GIS BMP Name	BMP Type	Owner	Recorded Maintenance Agreement	Model for 2023 update
Lake Wingra	Lake George	New	Lake George	Wet Pond	Private	Yes	Yes
Lake Wingra	Pond 4	New	Maple Lawn Infiltration Trench	Infiltration	Private	Yes	Yes
Lake Wingra	Pond 4	New	Park Bank BioBasin A	Bioretention	Private	Yes	Yes
Lake Wingra	Pond 4	New	Park Bank BioBasin B	Bioretention	Private	Yes	Yes
Lake Wingra	TBD	New	Badger Rd	Bioretention	TBD	TBD	No
Lake Wingra	Pond 4	New	Einstein North BioBasin	Bioretention	Private	Yes	Yes
Lake Wingra	Pond 4	New	Einstein West BioBasin	Bioretention	Private	Yes	Yes
Lake Wingra	TBD	New	Novaton	Wet Pond	Private	No per email with Ben 9/19/2023 (previously Town of Madison)	No, no SWMA
Lake Wingra	TBD	New	Zimbrick Honda BioBasin A	Bioretention	Private	Yes	No, small BMP
Lake Wingra	TBD	New	Zimbrick Honda BioBasin B	Bioretention	Private	Yes	No, small BMP
Lake Wingra	TBD	New	Zimbrick Honda Pervious Pav.	Infiltration	Private	Yes	No, small BMP
Nine Springs Creek	Apache Pond	Apache Dr Pond	Apache Pond	Wet Pond	Fitchburg	N/A	Yes
Nine Springs Creek	Arrowhead Pond East	Arrowhead Park (East)	Arrowhead Pond East	Wet Pond	Fitchburg	N/A	Yes
Nine Springs Creek	Artisan Village BioBasin	New	Artisan Village BioBasin	Bioretention	Private	Yes	Yes
Nine Springs Creek	Artisan Village BioBasin	New	Artisan Village South Pond	Wet Pond	Private	Yes	Yes
Nine Springs Creek	Artisan Village Infiltration	New	Artisan Village Infiltration	Infiltration	Private	Yes	Yes
Nine Springs Creek	Artisan Village Infiltration	New	Artisan Village North Wet Pond	Wet Pond	Private	Yes	Yes
Nine Springs Creek	Ashbourne Pond	Ashbourne Lane	Ashbourne Pond	Wet Pond	Fitchburg	N/A	Yes
Nine Springs Creek	Avalon	Avalon	Avalon	Infiltration	Private	Yes	Yes
Nine Springs Creek	Avalon	New	Ochalla BioBasin	Bioretention	Private	Yes	Yes
Nine Springs Creek	Avalon	New	Ochalla Pond	Wet Pond	Fitchburg	N/A	Yes
Nine Springs Creek	Casa del Sol	Casa Del Sol	Casa del Sol	Wet Pond	Private	No, confirmed with Ben 8/3/23, however, public stormwater easement present allowing city to perform maintenance	Yes
Nine Springs Creek	Casa del Sol	Elderly Apts	Elderly Apts	Infiltration	Private	No	No, no SWMA
Nine Springs Creek	Casa del Sol	GHC North	GHC North	Infiltration	Fitchburg	N/A	Yes
Nine Springs Creek	Casa del Sol	GHC South	GHC South	Infiltration	Fitchburg	N/A	Yes
Nine Springs Creek	Casa del Sol	Hatchery Hill	Hatchery Hill North	Wet Pond	Private	No, confirmed with Ben 8/3/23, however, public stormwater easement present allowing city to perform maintenance	No, no SWMA
Nine Springs Creek	Casa del Sol	Hatchery Hill	Hatchery Hill South	Wet Pond	Private	No, confirmed with Ben 8/3/23, however, public stormwater easement present allowing city to perform maintenance	No, no SWMA
Nine Springs Creek	Casa del Sol	Qdoba Dry	Qdoba Dry Pond	Infiltration	Private	Yes	Yes
Nine Springs Creek	Casa del Sol	Qdoba	Qdoba Wet Pond	Wet Pond	Private	Yes	Yes
Nine Springs Creek	Chapel Valley - East	Bosshard	Bosshard Pond	Wet Pond	Fitchburg	N/A	Yes
Nine Springs Creek	Chapel Valley - East	Chapel Valley East	Chapel Valley - East	Wet Pond	Private	Yes	Yes
Nine Springs Creek	Chapel Valley - East	Chapel Valley West	Chapel Valley - West	Wet Pond	Private	Yes	Yes
Nine Springs Creek	Cheryl Parkway BioBasin	New	Cheryl Parkway BioBasin	Bioretention	Fitchburg	N/A	Yes
Nine Springs Creek	Cheryl Parkway BioBasin	New	Cheryl Parkway Pond	Wet Pond	Fitchburg	N/A	Yes
Nine Springs Creek	Cinque Terra North	Cinque Terra North	Cinque Terra North	Infiltration	Private	Yes	Yes
Nine Springs Creek	Cinque Terra North	Cinque Terra South	Cinque Terra South	Infiltration	Private	Yes	Yes
Nine Springs Creek	Cinque Terra North	New	Usona South BioBasin	Bioretention	Private	Yes	Yes
Nine Springs Creek	East Fire Station Pond	New	East Fire Station Infiltration	Infiltration	Fitchburg	N/A	Yes
Nine Springs Creek	East Fire Station Pond	New	East Fire Station Pond	Wet Pond	Fitchburg	N/A	Yes
Nine Springs Creek	Extra Space Pond	New	Extra Space Pond	Wet Pond	Private	Yes	Yes
Nine Springs Creek	Glacier Valley Dry Pond	New	Glacier Valley Dry Pond	Infiltration	Fitchburg	N/A	Yes
Nine Springs Creek	Glacier Valley Dry Pond	Hatchery Hill Hotel	Hatchery Hill Hotel	Infiltration	Private	No, confirmed with Ben 8/3/23	No, no SWMA
Nine Springs Creek	Gunflint Pond	New	EAGLE BioBasin 1	Bioretention	Private	Yes	Yes
Nine Springs Creek	Gunflint Pond	New	EAGLE BioBasin 2	Bioretention	Private	Yes	Yes
Nine Springs Creek	Gunflint Pond	New	EAGLE BioBasin 3	Bioretention	Private	Yes	Yes
Nine Springs Creek	Gunflint Pond	Gunflint Trail	Gunflint Pond	Wet Pond	Fitchburg	N/A	Yes
Nine Springs Creek	Gunflint Pond	New	Usona North BioBasin	Bioretention	Private	Yes	Yes
Nine Springs Creek	Gunflint Pond	New	Usona Rain Garden	Bioretention	Private	Yes	Yes
Nine Springs Creek	Harlan Hills East Pond	Harlan Hills	Harlan Hills East Pond	Wet Pond	Fitchburg	N/A	Yes
Nine Springs Creek	Harlan Hills West Pond	Harlan Hills Condos East	Harlan Hills Condos East	Bioretention	Private	No	Yes
Nine Springs Creek	Harlan Hills West Pond	Dawley Drive	Harlan Hills West Pond	Wet Pond	Fitchburg	N/A	Yes
Nine Springs Creek	Hospice Center	Hospice Center	Hospice Center	Wet Pond	Private	Yes	Yes
Nine Springs Creek	Hospice II	Hospice II	Hospice II	Wet Pond	Private	Yes	Yes
Nine Springs Creek	Hospice II	New	Hospice Rain Garden G	Bioretention	Private	Yes	Yes
Nine Springs Creek	Longford Pond	Longford Terrace	Longford Pond	Wet Pond	Fitchburg	N/A	Yes
Nine Springs Creek	McKee Farms-Schumann (NW) Wet Pond	Aleo Ct	Aleo Ct	Infiltration	Fitchburg	N/A	No, does not have sufficient data to model
Nine Springs Creek	McKee Farms-Schumann (NW) Wet Pond	New	Astor Pond	Wet Pond	Private	Yes	Yes
Nine Springs Creek	McKee Farms-Schumann (NW) Wet Pond	New	Blackhawk BioBasin	Bioretention	Private	Yes	Yes
Nine Springs Creek	McKee Farms-Schumann (NW) Wet Pond	New	Blackhawk Infiltration	Infiltration	Private	Yes	Yes
Nine Springs Creek	McKee Farms-Schumann (NW) Wet Pond	New	Blackhawk Wet Pond	Wet Pond	Private	Yes	Yes
Nine Springs Creek	McKee Farms-Schumann (NW) Wet Pond	New	Courtyard NE Pond	Wet Pond	Private	No	No, no SWMA
Nine Springs Creek	McKee Farms-Schumann (NW) Wet Pond	New	Courtyard North UG Detention	Underground Detention	Private	No	No, no SWMA
Nine Springs Creek	McKee Farms-Schumann (NW) Wet Pond	New	Courtyard South UG Detention	Underground Detention	Private	No	No, no SWMA
Nine Springs Creek	McKee Farms-Schumann (NW) Wet Pond	New	Courtyard SW Pond	Wet Pond	Private	No	No, no SWMA
Nine Springs Creek	McKee Farms-Schumann (NW) Wet Pond	New	Hialeah UG Infiltration	Infiltration	Private	Yes	Yes
Nine Springs Creek	McKee Farms-Schumann (NW) Wet Pond	Lacy Heights (reconstructed)	Lacy Heights Infiltration	Bioretention	Fitchburg	N/A	Yes
Nine Springs Creek	McKee Farms-Schumann (NW) Wet Pond	Lacy Heights (reconstructed)	Lacy Heights Pond	Bioretention	Fitchburg	N/A	Yes
Nine Springs Creek	McKee Farms-Schumann (NW) Wet Pond	McKee Farms 2004	McKee Farms-Schumann (NW) Wet Pond	Wet Pond	Fitchburg	N/A	Yes
Nine Springs Creek	McKee Farms-Schumann (NW) Wet Pond	New	Schumann Greenway	Swale	Fitchburg	N/A	Yes
Nine Springs Creek	McKee Farms-Schumann (NW) Wet Pond	New	Schumann Greenway Wet Pond	Wet Pond	Fitchburg	N/A	No, small BMP
Nine Springs Creek	McKee Park - North Pond	New	Barbara Ditch	Swale	Private	No	No, no SWMA
Nine Springs Creek	McKee Park - North Pond	New	Cheryl Greenway	Swale	Fitchburg	N/A	Yes

Nine Springs Creek	McKee Park - North Pond	New	Children's Dental BioBasin	Bioretention	Private	Yes	No, small BMP
Nine Springs Creek	McKee Park - North Pond	City Hall	City Hall	Bioretention	Fitchburg	N/A	No, does not have sufficient data to model
Nine Springs Creek	McKee Park - North Pond	Fitchburg Research Park	DaVinci BioBasin North	Bioretention	Private	Yes	No, does not have sufficient data to model
Nine Springs Creek	McKee Park - North Pond	New	DaVinci BioBasin South	Bioretention	Private	Yes	No, does not have sufficient data to model
Nine Springs Creek	McKee Park - North Pond	New	DaVinci Infiltration Trench	Infiltration	Private	Yes	No, does not have sufficient data to model
Nine Springs Creek	McKee Park - North Pond	New	DaVinci Permeable Pavement 1	Infiltration	Private	Yes	No, does not have sufficient data to model
Nine Springs Creek	McKee Park - North Pond	New	DaVinci Permeable Pavement 2	Infiltration	Private	Yes	No, does not have sufficient data to model
Nine Springs Creek	McKee Park - North Pond	New	Encompass North BioBasin	Bioretention	Private	Unrecorded	No, no SWMA
Nine Springs Creek	McKee Park - North Pond	New	Encompass Northeast BioBasin	Bioretention	Private	Unrecorded	No, no SWMA
Nine Springs Creek	McKee Park - North Pond	New	Encompass Rain Garden	Bioretention	Private	Unrecorded	No, no SWMA
Nine Springs Creek	McKee Park - North Pond	New	Encompass South BioBasin	Bioretention	Private	Unrecorded	No, no SWMA
Nine Springs Creek	McKee Park - North Pond	New	Fitchburg Center Park Greenway	Swale	Fitchburg	N/A	No, excluded
Nine Springs Creek	McKee Park - North Pond	New	Fitchburg Public Library East	Bioretention	Fitchburg	N/A	No, does not have sufficient data to model
Nine Springs Creek	McKee Park - North Pond	New	Fitchburg Public Library North	Bioretention	Fitchburg	N/A	No, does not have sufficient data to model
Nine Springs Creek	McKee Park - North Pond	New	Fitchburg Public Library West	Bioretention	Fitchburg	N/A	No, does not have sufficient data to model
Nine Springs Creek	McKee Park - North Pond	Fitchburg Research Park	Fitchburg Research Park	Wet Pond	Private	Yes	Yes
Nine Springs Creek	McKee Park - North Pond	New	Glen Wood Heights Bio-Retention	Infiltration	Private	Yes	Yes
Nine Springs Creek	McKee Park - North Pond	Gordon Flesch A	Gordon Flesch A	Bioretention	Private	Yes	No, small BMP
Nine Springs Creek	McKee Park - North Pond	Gordon Flesch B	Gordon Flesch B	Bioretention	Private	Yes	No, does not have sufficient data to model
Nine Springs Creek	McKee Park - North Pond	New	Lacy Infiltration Trench 1	Infiltration	Fitchburg	N/A	Yes
Nine Springs Creek	McKee Park - North Pond	New	Madison Group BioBasin	Bioretention	Private	Yes	No, small BMP
Nine Springs Creek	McKee Park - North Pond	New	Madison Group Infiltration	Infiltration	Private	Yes	No, small BMP
Nine Springs Creek	McKee Park - North Pond	McKee Park North	McKee Park - North Pond	Wet Pond	Fitchburg	N/A	Yes
Nine Springs Creek	McKee Park - North Pond	McKee Park South	McKee Park - South Pond	Wet Pond	Fitchburg	N/A	Yes
Nine Springs Creek	McKee Park - North Pond	New	Me&Julio Rain Garden	Bioretention	Private	Yes	No, small BMP
Nine Springs Creek	McKee Park - North Pond	New Promega	New Promega	Wet Pond	Private	Yes	Yes
Nine Springs Creek	McKee Park - North Pond	New	Nobel Ridge Rain Garden	Bioretention	Private	Yes	No, small BMP
Nine Springs Creek	McKee Park - North Pond	WIBA	Oak Meadow Pond	Wet Pond	Fitchburg	N/A	Yes
Nine Springs Creek	McKee Park - North Pond	Oak Meadows II	Oak Meadows II	Bioretention	Private	Yes	No, does not have sufficient data to model
Nine Springs Creek	McKee Park - North Pond	Oak Meadows (North)	Oak Meadows North	Infiltration	Private	Yes	No, does not have sufficient data to model
Nine Springs Creek	McKee Park - North Pond	Oak Meadows Rain Garden	Oak Meadows Park Rain Garden	Bioretention	Private	Yes	No, does not have sufficient data to model
Nine Springs Creek	McKee Park - North Pond	Oak Meadows	Oak Meadows South	Bioretention	Private	Yes	No, does not have sufficient data to model
Nine Springs Creek	McKee Park - North Pond	New	Pembroke Greenway	Swale	Fitchburg	N/A	Yes
Nine Springs Creek	McKee Park - North Pond	New	Senior Center Rain Garden	Bioretention	Fitchburg	N/A	No, does not have sufficient data to model
Nine Springs Creek	McKee Park - North Pond	New	Tower Hill Greenway	Swale	Fitchburg	N/A	Yes
Nine Springs Creek	McKee Park - North Pond	Town Center A	Town Center A	Bioretention	Private	No	No, no SWMA
Nine Springs Creek	McKee Park - North Pond	Town Center B	Town Center B	Bioretention	Private	No	No, no SWMA
Nine Springs Creek	McKee Park - North Pond	Town Center C	Town Center C	Bioretention	Private	No	No, no SWMA
Nine Springs Creek	McKee Park - North Pond	Town Center D	Town Center D	Bioretention	Private	No	No, no SWMA
Nine Springs Creek	McKee Park - North Pond	Town Center E	Town Center E	Bioretention	Private	No	No, no SWMA
Nine Springs Creek	McKee Park - North Pond	Tri-North A	Tri-North A	Bioretention	Private	No	No, no SWMA
Nine Springs Creek	McKee Park - North Pond	Tri-North B	Tri-North B	Bioretention	Private	No	No, no SWMA
Nine Springs Creek	McKee Park - North Pond	Tri-North C	Tri-North C	Bioretention	Private	No	No, no SWMA
Nine Springs Creek	McKee Park - North Pond	New	Turnberry BioBasin	Bioretention	Private	Yes	No, does not have sufficient data to model
Nine Springs Creek	McKee Park - North Pond	New	Turnberry UG Infiltration	Infiltration	Private	Yes	No, does not have sufficient data to model
Nine Springs Creek	McKee Park - North Pond	New	WH Children's Infil. Trench	Infiltration	Private	Yes	Yes
Nine Springs Creek	MGE South BioBasin	New	MGE South BioBasin	Bioretention	Private	Yes	Yes
Nine Springs Creek	Nicolet Pond	Arrowhead Park (West)	Arrowhead Pond West	Wet Pond	Fitchburg	N/A	Yes
Nine Springs Creek	Nicolet Pond	New	Certco Fleet BioBasin	Bioretention	Private	Yes	Yes
Nine Springs Creek	Nicolet Pond	Charter	Charter	Wet Pond	Private	No, confirmed with Ben 8/3/23	Yes
Nine Springs Creek	Nicolet Pond	Design Mart	Design Mart	Dry Pond	Private	No, confirmed with Ben 8/3/23	Yes
Nine Springs Creek	Nicolet Pond	New	Discovery Storage BioBasin	Bioretention	Private	Yes	Yes
Nine Springs Creek	Nicolet Pond	New	McKenzie Workforce BioBasin	Bioretention	Private	Yes	Yes
Nine Springs Creek	Nicolet Pond	Nicolet (Dry)	Nicolet Pond	Wet Pond	Private	Yes	Yes
Nine Springs Creek	Nicolet Pond	New	Thermo BioBasin A	Bioretention	Private	No	Yes
Nine Springs Creek	Nicolet Pond	New	Thermo BioBasin B	Bioretention	Private	No	Yes
Nine Springs Creek	Nicolet Pond	New	Thermo Dry Pond	Dry Pond	Private	No	Yes
Nine Springs Creek	Nicolet Pond	New	Thermo Fisher Pond	Wet Pond	Private	Yes	Yes
Nine Springs Creek	Nicolet Pond	New	Verona Williamsburg North	Bioretention	DOT, Fitchburg maintained	Yes	Yes
Nine Springs Creek	Nicolet Pond	New	Verona Williamsburg South	Bioretention	DOT, Fitchburg maintained	Yes	Yes
Nine Springs Creek	Nine Springs Golf Course Pond	Nine Springs Golf Course	Nine Springs Golf Course Pond	Wet Pond	Fitchburg	N/A	Yes
Nine Springs Creek	Nine Springs Greenway	Uptown Village: Private Bioretention Basin	2nd Add. to Riva (Uptown Vill)	Bioretention	Private	Yes	No, does not have sufficient data to model
Nine Springs Creek	Nine Springs Greenway	Aster Meadows #1	Aster Meadows #1	Bioretention	Private	No	No, no SWMA
Nine Springs Creek	Nine Springs Greenway	New	Central Park Dry Pond	Bioretention	Fitchburg	N/A	Yes
Nine Springs Creek	Nine Springs Greenway	New	Central Park Wet Pond North	Wet Pond	Fitchburg	N/A	Yes
Nine Springs Creek	Nine Springs Greenway	New	Central Park Wet Pond South	Wet Pond	Fitchburg	N/A	Yes
Nine Springs Creek	Nine Springs Greenway	No Name; Rain Garden	Nine Springs	Bioretention	Private	No	No, no SWMA
Nine Springs Creek	Nine Springs Greenway	New	Nine Springs Greenway	Swale	Fitchburg	N/A	Yes
Nine Springs Creek	Nine Springs Greenway	Uptown Village: Public Infiltration Trench	No Oaks Ditches	Swale	Fitchburg	N/A	No, does not have sufficient data to model
Nine Springs Creek	Nine Springs Greenway	Uptown Village; Public Regional Bioretention Basin	No Oaks Infiltration Basin	Bioretention	Fitchburg	N/A	Yes
Nine Springs Creek	Nine Springs Greenway	Nine Springs 1st Addition	No Oaks Wet Pond	Wet Pond	Fitchburg	N/A	Yes

Nine Springs Creek	Nine Springs Greenway	New	North Waterway	Swale	Fitchburg	N/A	Yes
Nine Springs Creek	Nine Springs Greenway	Prairie #1	Prairie #1	Bioretention	Private	Yes	No, does not have sufficient data to model
Nine Springs Creek	Nine Springs Greenway	Prairie #3	Prairie #3	Bioretention	Private	Yes	No, does not have sufficient data to model
Nine Springs Creek	Nine Springs Greenway	Prairie #1	Prairie Park #1	Bioretention	Private	Yes	No, does not have sufficient data to model
Nine Springs Creek	Nine Springs Greenway	Prairie Park #1	Prairie Park #2	Bioretention	Private	Yes	No, does not have sufficient data to model
Nine Springs Creek	Nine Springs Greenway	New	Prairie Park BioBasin 3	Bioretention	Private	Yes	No, small BMP
Nine Springs Creek	Nine Springs Greenway	New	Prairie Park BioBasin 4	Bioretention	Private	Yes	No, small BMP
Nine Springs Creek	Nine Springs Greenway	New	Prairie Park BioBasin 5	Bioretention	Private	Yes	No, small BMP
Nine Springs Creek	Nine Springs Greenway	New	Prairie Park BioBasin 6	Bioretention	Private	Yes	No, small BMP
Nine Springs Creek	Nine Springs Greenway	New	Prairie Park Rain Garden 7	Bioretention	Private	Yes	No, small BMP
Nine Springs Creek	Nine Springs Greenway	New	Swan Creek Apts BioBasin 1	Bioretention	Private	Yes	No, does not have sufficient data to model
Nine Springs Creek	Nine Springs Greenway	New	Syene and No Oaks North	-	Fitchburg	N/A	No, does not have sufficient data to model
Nine Springs Creek	Nine Springs Greenway	Uptown Village: Public Infiltration Basin	Syene and No Oaks South	Infiltration	Fitchburg	N/A	No, does not have sufficient data to model
Nine Springs Creek	Nine Springs Greenway	Area D (reconstructed)	Uptown South Infiltration Basin	Infiltration	Fitchburg	N/A	Yes
Nine Springs Creek	Nine Springs Greenway	Area D (reconstructed)	Uptown South Pond	Wet Pond	Fitchburg	N/A	Yes
Nine Springs Creek	Nine Springs Greenway	Area D (reconstructed)	Uptown South Pond 2	Wet Pond	Fitchburg	N/A	Yes
Nine Springs Creek	Pine Ridge Infiltration Facility	Pine Ridge (Dry)	Pine Ridge Infiltration Facility	Bioretention	Fitchburg	N/A	Yes
Nine Springs Creek	Pinnacle Pond	Pinnacle Pond	Pinnacle Pond	Wet Pond	Fitchburg	N/A	Yes
Nine Springs Creek	Pinnacle Pond	New	The Vue BioBasin 3	Bioretention	Private	Yes	No, does not have sufficient data to model
Nine Springs Creek	Pinnacle Pond	New	The Vue BioBasin 6	Bioretention	Private	Yes	No, does not have sufficient data to model
Nine Springs Creek	Pinnacle Pond	New	The Vue I	Bioretention	Private	Yes	No, does not have sufficient data to model
Nine Springs Creek	Pinnacle Pond	New	The Vue Infiltration 5	Infiltration	Private	Yes	No, does not have sufficient data to model
Nine Springs Creek	Pinnacle Pond	New	The Vue rain garden	Bioretention	Private	Yes	No, does not have sufficient data to model
Nine Springs Creek	Pinnacle Pond	New	The Vue Wet Pond	Wet Pond	Private	Yes	Yes
Nine Springs Creek	Promega R&D North BioBasin	New	Promega R&D North BioBasin	Bioretention	Private	Yes	Yes
Nine Springs Creek	Promega R&D North BioBasin	New	Promega R&D Wet Pond	Wet Pond	Private	Yes	Yes
Nine Springs Creek	Promega R&D South BioBasin	New	Promega R&D South BioBasin	Bioretention	Private	Yes	Yes
Nine Springs Creek	Red Arrow Pond	Found in WinSLAMM but not in 2013 GIS	Red Arrow Pond	Wet Pond	Fitchburg	N/A	Yes
Nine Springs Creek	Red Arrow Pond	Renaissance on the Park Condos (South, Reconstructed)	Renaissance Rain Garden	Infiltration	Fitchburg	N/A	No, small BMP
Nine Springs Creek	Renaissance Pond	Renaissance on the Park (Reconstructed)	Renaissance Pond	Infiltration	Fitchburg	N/A	Yes
Nine Springs Creek	Renaissance Pond	Renaissance Rain Garden A (North)	Renaissance Rain Garden A	Rain Garden	Fitchburg	N/A	Yes
Nine Springs Creek	Renaissance Pond	Renaissance Rain Garden B (South)	Renaissance Rain Garden B	Rain Garden	Fitchburg	N/A	Yes
Nine Springs Creek	Saris Kettle	New	Saris Kettle	Infiltration (modeled as wet pond)	Private	Yes	Yes
Nine Springs Creek	Seminole Hills Pond	Seminole Hills	Seminole Hills Pond	Wet Pond	Fitchburg	N/A	Yes
Nine Springs Creek	Seminole Village Pond	New	Arapah Greenway	Swale	Fitchburg	N/A	Yes
Nine Springs Creek	Seminole Village Pond	Business Park A	Business Park A Pond	Wet Pond	Fitchburg	N/A	Yes
Nine Springs Creek	Seminole Village Pond	Busienss Park B	Business Park B Pond	Wet Pond	Fitchburg	N/A	Yes
Nine Springs Creek	Seminole Village Pond	New	MGE North BioBasin 1	Bioretention	Private	Yes	Yes
Nine Springs Creek	Seminole Village Pond	New	MGE North BioBasin 2	Bioretention	Private	Yes	Yes
Nine Springs Creek	Seminole Village Pond	Oak Bank	Oak Bank Pond	Wet Pond	Private	No, confirmed with Ben 8/3/23, however, public stormwater easement present allowing city to perform maintenance	Yes
Nine Springs Creek	Seminole Village Pond	Seminole Village	Seminole Village Pond	Wet Pond	Fitchburg	N/A	Yes
Nine Springs Creek	Seminole Village Pond	New	West Fire Station	Bioretention	Fitchburg	N/A	Yes
Nine Springs Creek	Seminole Village Pond	New	West Fire Station BioBasin 2	Bioretention	Fitchburg	N/A	Yes
Nine Springs Creek	Sub Zero Infiltration (North)	Sub Zero (Middle)	Sub Zero (North)	Wet Pond	Private	Yes	Yes
Nine Springs Creek	Sub Zero Infiltration (North)	Sub Zero Infiltration	Sub Zero Infiltration (North)	Wet Pond	Private	Yes	Yes
Nine Springs Creek	TBD	New	Apache Rain Garden	Bioretention	Fitchburg	N/A	No, does not have sufficient data to model
Nine Springs Creek	TBD	New	Associated Bank Stormceptor	Proprietary Device	Private	Yes	No, small BMP
Nine Springs Creek	TBD	New	Brandon Greenway	Swale	Fitchburg	N/A	No, excluded
Nine Springs Creek	TBD	New	East Fire Station Dry Basin	Wet Pond	Fitchburg	N/A	No, small BMP
Nine Springs Creek	TBD	Galaxy Technology	Galaxy Technology	Bioretention	Private	No	No, no SWMA
Nine Springs Creek	TBD	New	Gunderson BioBasin	Bioretention	Private	Yes	No, does not have sufficient data to model
Nine Springs Creek	TBD	Harlan Hills Condos West	Harlan Hills Condos West	Bioretention	Private	No	No, no SWMA
Nine Springs Creek	TBD	New	HighLine UG Detention	Underground Detention	Private	Yes	No, small BMP
Nine Springs Creek	TBD	New	HighLine UG Infiltration	Infiltration	Private	Yes	No, small BMP
Nine Springs Creek	TBD	New	HighLine UpFlo Filter	Bioretention	Private	Yes	No, small BMP
Nine Springs Creek	TBD	Hospice/Fish Hatchery (future)	Hospice	Bioretention	Private	Yes	No, does not have sufficient data to model
Nine Springs Creek	TBD	New	Hospice Rain Garden A	Bioretention	Private	Yes	No, small BMP
Nine Springs Creek	TBD	New	Hospice Rain Garden B	Bioretention	Private	Yes	No, small BMP
Nine Springs Creek	TBD	New	Hospice Rain Garden D	Bioretention	Private	Yes	No, does not have sufficient data to model
Nine Springs Creek	TBD	New	Hospice Rain Garden E	Bioretention	Private	Yes	No, does not have sufficient data to model
Nine Springs Creek	TBD	New	Memorial UCC Kettle	Infiltration	Private	No	No, excluded
Nine Springs Creek	TBD	New	Midwives Rain Garden	Bioretention	Private	Yes	No, no SWMA
Nine Springs Creek	TBD	Area H	Northern Sod Farm/GreenTech	N/A	Fitchburg	N/A	No, unsure of construction
Nine Springs Creek	TBD	New	Odyssey Dry Pond	Bioretention	Private	Unrecorded	No, no SWMA
Nine Springs Creek	TBD	Orchard Ridge School	Orchard Ridge School	Bioretention	Madison	N/A	No, excluded
Nine Springs Creek	TBD	No Name	Park Beltline NE	N/A	Madison	N/A	No, excluded
Nine Springs Creek	TBD	No Name	Park Beltline SW	N/A	Madison	N/A	No, excluded
Nine Springs Creek	TBD	New	Parkside BioBasin A	Bioretention	Private	No	No, no SWMA
Nine Springs Creek	TBD	New	Parkside BioBasin B	Bioretention	Private	No	No, no SWMA
Nine Springs Creek	TBD	Post Watford	Post Watford Retention	Wet Pond	Madison	N/A	No, excluded
Nine Springs Creek	TBD	New	Seminole Glen East Kettle Pond	Wet Pond	Fitchburg	N/A	No, excluded

Nine Springs Creek	TBD	New	Seminole Glen Kettle	Wet Pond	Fitchburg	N/A	No, excluded
Nine Springs Creek	TBD	New	Seminole Glen West Kettle Pond	Wet Pond	Fitchburg	N/A	No, excluded
Nine Springs Creek	TBD	Seminole Oaks	Seminole Oaks	Bioretention	Private	No	No, excluded
Nine Springs Creek	TBD	New	Seminole Prairie Rain Garden A	Bioretention	Private	No	No, excluded
Nine Springs Creek	TBD	New	Seminole Prairie Rain Garden B	Bioretention	Private	No	No, excluded
Nine Springs Creek	TBD	New	Seminole Prairie Rain Garden C	Bioretention	Private	No	No, excluded
Nine Springs Creek	TBD	Dunns Marsh (Madison)	Seminole/Cannonball Pond	Wet Pond	Madison	N/A	No, excluded
Nine Springs Creek	TBD	Ski Ln	Ski Ln	Infiltration	Private	No per email with Ben 9/19/2023 (previously Town of Madison)	No, no SWMA
Nine Springs Creek	TBD	Ski Ln 1	Ski Ln 1	Infiltration	Private	Unrecorded	No, does not have sufficient data to model
Nine Springs Creek	TBD	Ski Ln 2	Ski Ln 2	Wet Pond	Private	No	No, no SWMA
Nine Springs Creek	TBD	New	Splash Pad #1 (North)	Bioretention	Fitchburg	N/A	No, small BMP
Nine Springs Creek	TBD	New	Splash Pad #2 (South)	Bioretention	Fitchburg	N/A	No, small BMP
Nine Springs Creek	TBD	New	Syene/Post Retention Pond	Wet Pond	Madison	N/A	No, excluded
Nine Springs Creek	TBD	New	The Vue Infiltration 4	Infiltration	Private	Yes	No, does not have sufficient data to model
Nine Springs Creek	TBD	Tri North Operations 1	Tri North Operations 1	Bioretention	Private	Yes	No, does not have sufficient data to model
Nine Springs Creek	TBD	Tri North Operations 2	Tri North Operations 2	Wet Pond	Private	Yes	No, does not have sufficient data to model
Nine Springs Creek	TBD	McKee Farms 2004 Holding dry	Triverton Greenway	Swale	Fitchburg	N/A	No, excluded
Nine Springs Creek	TBD	U-Haul	U-HAUL (Verona/Freeport Rd)	N/A	Madison	N/A	No, excluded
Nine Springs Creek	TBD	New	Verona Rd Atticus Wy BioBasin NE	N/A	Madison	N/A	No, excluded
Nine Springs Creek	TBD	New	Verona Rd Atticus Wy BioBasin SE	N/A	Madison	N/A	No, excluded
Nine Springs Creek	TBD	New	Yarmouth Greenway	Swale	Fitchburg	N/A	No, excluded
Nine Springs Creek	Terrace Point Pond	New	Terrace Point Pond	Wet Pond	Private	Yes	Yes
Nine Springs Creek	Uptown North Infiltration Basin	New	Uptown North Infiltration Basin	Infiltration	Fitchburg	N/A	Yes
Nine Springs Creek	Uptown North Infiltration Basin	New	Uptown North Pond	Wet Pond	Fitchburg	N/A	Yes
Nine Springs Creek	Uptown North Infiltration Basin	New	Uptown North Pond 2	Wet Pond	Fitchburg	N/A	Yes
Nine Springs Creek	Valley View Pond	Valley View	Valley View Pond	Wet Pond	Fitchburg	N/A	Yes
Swan Creek	Addison Infiltration Basin	New	Addison Infiltration Basin	Bioretention	Fitchburg	N/A	Yes
Swan Creek	Addison Infiltration Basin	New	Addison Wet Pond	Wet Pond	Fitchburg	N/A	Yes
Swan Creek	Hartung Infiltration	New	Hartung Infiltration	Infiltration	Private	Yes	Yes
Swan Creek	Hartung Infiltration	New	Hartung Pond	Wet Pond	Private	Yes	Yes
Swan Creek	Lacy/MM BioBasin	New	Lacy/MM BioBasin	Bioretention	Fitchburg	N/A	Yes
Swan Creek	Larsen BioBasin	New	Forest Edge North BioBasin	Bioretention	Private	Yes	Yes
Swan Creek	Larsen BioBasin	New	Forest Edge North Infiltration	Infiltration	Private	Yes	Yes
Swan Creek	Larsen BioBasin	New	Forest Edge South BioBasin	Bioretention	Private	Yes	Yes
Swan Creek	Larsen BioBasin	New	Forest Edge South Infiltration	Infiltration	Private	Yes	Yes
Swan Creek	Larsen BioBasin	New	Goodland Park BioBasin	Bioretention	Fitchburg	N/A	Yes
Swan Creek	Larsen BioBasin	New	Larsen BioBasin	Bioretention	Fitchburg	N/A	Yes
Swan Creek	Nine Springs Greenway	New	2nd Addition to Terravessa	Bioretention	Tentatively private but located in public parcel currently	No	No, no SWMA
Swan Creek	Nine Springs Greenway	Uptown Village; Private Infiltration Basin	Riva Infiltration Basin	Infiltration	Private	Yes	No, does not have sufficient data to model
Swan Creek	Nine Springs Pond	New	Nine Springs Pond	Wet Pond	Fitchburg	N/A	Yes
Swan Creek	Northern Lights Pond	New	Lacy Infiltration Trench 5	Infiltration	Fitchburg	N/A	Yes
Swan Creek	Northern Lights Pond	New	Lacy Infiltration Trench 6	Infiltration	Fitchburg	N/A	Yes
Swan Creek	Northern Lights Pond	New	Lacy Woods BioBasin	Bioretention	Private	Yes	Yes
Swan Creek	Northern Lights Pond	New	Northern Lights #1	Bioretention	Private	No	No, no SWMA
Swan Creek	Northern Lights Pond	New	Northern Lights #2	Bioretention	Private	No	No, no SWMA
Swan Creek	Northern Lights Pond	New	Northern Lights #3	Bioretention	Private	No	No, no SWMA
Swan Creek	Northern Lights Pond	New	Northern Lights Greenway	Swale	Fitchburg	N/A	No, small BMP
Swan Creek	Northern Lights Pond	New	Northern Lights Pond	Wet Pond	Fitchburg	N/A	Yes
Swan Creek	Phoenix Pond	New	Falcon BioBasin	Bioretention	Private	Yes	No, small BMP
Swan Creek	Phoenix Pond	New	Kwik Trip - Syene Pond	Wet Pond	Private	Yes	Yes
Swan Creek	Phoenix Pond	New	Lacy Swale	Bioretention	Fitchburg	N/A	No, does not have sufficient data to model
Swan Creek	Phoenix Pond	New	Osprey Pemeable Pavement 1	Infiltration	Private	Yes	No, small BMP
Swan Creek	Phoenix Pond	New	Osprey Permeable Pavement 2	Infiltration	Private	Yes	No, small BMP
Swan Creek	Phoenix Pond	New	Phoenix Greenway East	Swale	Fitchburg	N/A	Yes
Swan Creek	Phoenix Pond	New	Phoenix Greenway West	Swale	Fitchburg	N/A	Yes
Swan Creek	Phoenix Pond	New	Phoenix Imaging Infiltration	Infiltration	Private	Yes	Yes
Swan Creek	Phoenix Pond	New	Phoenix Imaging Wet Pond	Wet Pond	Private	Yes	Yes
Swan Creek	Phoenix Pond	New	Phoenix Pond	Wet Pond	Fitchburg	N/A	Yes
Swan Creek	Phoenix Pond	New	Prima Vista Greenway	Swale	Fitchburg	N/A	Yes
Swan Creek	Phoenix Pond	New	Raven UG Infiltration 1	Infiltration	Private	Yes	No, small BMP
Swan Creek	Phoenix Pond	New	Raven UG Infiltration 2	Infiltration	Private	Yes	No, small BMP
Swan Creek	Phoenix Pond	New	Raven UG Infiltration 3	Infiltration	Private	Yes	No, small BMP
Swan Creek	Phoenix Pond	New	Vista Infiltration Facility	Bioretention	Private	Yes	Yes
Swan Creek	Swan Creek	New	Berbee	Bioretention	Private	Yes	No, does not have sufficient data to model
Swan Creek	Swan Creek	New	Cameca Insurments East	Infiltration	Private	Yes	No, small BMP
Swan Creek	Swan Creek	New	Cameca Insurments South	Infiltration	Private	Yes	No, small BMP
Swan Creek	Swan Creek	New	Cameca Insurments West	Infiltration	Private	Yes	No, small BMP
Swan Creek	Swan Creek	New	Fahey Infiltration Facility	Infiltration	Fitchburg	N/A	Yes
Swan Creek	Swan Creek	New	Fahey Wet Detention Pond	Wet Pond	Fitchburg	N/A	Yes
Swan Creek	Swan Creek	New	Highfield NE Detention	Wet Pond	Fitchburg	N/A	Yes
Swan Creek	Swan Creek	New	Highfield NE Infiltration	Infiltration	Fitchburg	N/A	Yes
Swan Creek	Swan Creek	New	Highfield NW Detention	Wet Pond	Private	Yes	Yes
Swan Creek	Swan Creek	New	Highfield NW Infiltration	Infiltration	Private	Yes	Yes
Swan Creek	Swan Creek	New	Kepler South BioBasin	Bioretention	Private	Yes	Yes

Swan Creek	Swan Creek	New	Lacy Infiltration Trench 2	Infiltration	Fitchburg	N/A	Yes
Swan Creek	Swan Creek	New	Lacy Infiltration Trench 3	Infiltration	Fitchburg	N/A	Yes
Swan Creek	Swan Creek	New	Lacy Infiltration Trench 4	Infiltration	Fitchburg	N/A	Yes
Swan Creek	Swan Creek	New	Monks Infiltration Facility	Infiltration	Fitchburg	N/A	Yes
Swan Creek	Swan Creek	New	Monks Wet Detention Pond	Wet Pond	Fitchburg	N/A	Yes
Swan Creek	Swan Creek	New	New Venture	Bioretention	Private	Unrecorded	Yes
Swan Creek	Swan Creek	New	Promega Packaging Facility Cent	Wet Pond	Private	Yes	Yes
Swan Creek	Swan Creek	New	Promega Packaging Facility East	Wet Pond	Private	Yes	Yes
Swan Creek	Swan Creek	New	Promega Packaging Facility West	Infiltration	Private	Yes	Yes
Swan Creek	Swan Creek	New	Quarry Hill Dry Pond	Bioretention	Fitchburg	N/A	No, small BMP
Swan Creek	Swan Creek	New	Quarry Hill Neighborhood Rec Trl	Swale	Fitchburg	N/A	No
Swan Creek	Swan Creek	New	Quarry Hill Pond	Wet Pond	Fitchburg	N/A	Yes
Swan Creek	Swan Creek	New	Smoky Greenway	Swale	Fitchburg	N/A	Yes
Swan Creek	Swan Creek	New	Swan Creek	Swale	Fitchburg	N/A	Yes
Swan Creek	Swan Creek	New	Techlands NE Infiltration	Bioretention	Fitchburg	N/A	Yes
Swan Creek	Swan Creek	New	Techlands NE Wet Pond	Wet Pond	Fitchburg	N/A	Yes
Swan Creek	Swan Creek	New	Techlands NW Wet Pond	Wet Pond	Private	Yes	Yes
Swan Creek	Swan Creek	New	The Crossing East Pond	Wet Pond	Fitchburg	N/A	Yes
Swan Creek	Swan Creek	New	The Crossing West Pond	Wet Pond	Fitchburg	N/A	Yes
Swan Creek	Swan Creek Pond	New	Big Bluestem Greenway	Swale	Fitchburg	N/A	Yes
Swan Creek	Swan Creek Pond	New	Comerstone #1	Bioretention	Private	No	No, no SWMA
Swan Creek	Swan Creek Pond	New	Comerstone #2	Bioretention	Private	No	No, no SWMA
Swan Creek	Swan Creek Pond	New	Comerstone #3	Bioretention	Private	No	No, no SWMA
Swan Creek	Swan Creek Pond	New	Comerstone #4	Bioretention	Private	No	No, no SWMA
Swan Creek	Swan Creek Pond	New	Comerstone #5	Bioretention	Private	No	No, no SWMA
Swan Creek	Swan Creek Pond	New	Gardens #1	Bioretention	Private	No	No, no SWMA
Swan Creek	Swan Creek Pond	New	Gardens #2	Bioretention	Private	No	No, no SWMA
Swan Creek	Swan Creek Pond	New	Promega R&D East BioBasin	Bioretention	Private	Yes	Yes
Swan Creek	Swan Creek Pond	New	Snapdragon Greenway	Swale	Fitchburg	N/A	Yes
Swan Creek	Swan Creek Pond	New	Swan Creek Apts BioBasin 2	Bioretention	Private	Yes	No, does not have sufficient data to model
Swan Creek	Swan Creek Pond	New	Swan Creek North Swale #1	Swale	Fitchburg	N/A	No
Swan Creek	Swan Creek Pond	New	Swan Creek North Swale #2	Swale	Fitchburg	N/A	No
Swan Creek	Swan Creek Pond	New	Swan Creek Pond	Wet Pond	Fitchburg	N/A	Yes
Swan Creek	Swan Creek Pond	New	Swan Creek Rain Garden	Bioretention	Fitchburg	N/A	No, does not have sufficient data to model
Swan Creek	Swan Creek Pond	New	Swan Creek Rain Garden #2	Bioretention	Fitchburg	N/A	No, does not have sufficient data to model
Swan Creek	Swan Creek Pond	New	The Gardens	Bioretention	Private	No	No, no SWMA
Swan Creek	TBD	New	Aroura Pond	Wet Pond	Private	Yes	Not Modeled
Swan Creek	TBD	New	FHR Facility	Wet Pond	Fitchburg	N/A	No, excluded
Swan Creek	TBD	New	Highfield SC Infiltration	Infiltration	Private	No	No, no SWMA
Swan Creek	TBD	New	Highfield SE Detention	Wet Pond	Private	No	No, no SWMA
Swan Creek	TBD	New	Highfield SW Detention	Wet Pond	Private	No	No, no SWMA
Swan Creek	TBD	New	Hillside Heights Kettle	Wet Pond	Fitchburg	N/A	No, excluded
Swan Creek	TBD	New	Hillside Heights North Pond	Wet Pond	Fitchburg	N/A	No, excluded
Swan Creek	TBD	New	Lacy Rain Garden	Bioretention	Fitchburg	N/A	No, does not have sufficient data to model
Swan Creek	TBD	New	Limerick BioBasin 2	Bioretention	Private	Yes	No longer modeled
Swan Creek	TBD	New	Limerick BioBasin A	Bioretention	Private	Yes	No longer modeled
Swan Creek	TBD	New	Limerick BioBasin C	Bioretention	Private	Yes	No longer modeled
Swan Creek	TBD	New	Limerick UG Detention	Underground Detention	Private	Yes	No longer modeled
Swan Creek	TBD	New	Maintenance Facility Rain Garden	Bioretention	Fitchburg	N/A	No, excluded
Swan Creek	TBD	New	Oak Ridge Substation	Infiltration	Private	No	No, excluded
Swan Creek	TBD	New	Oak Ridge Substation Pond	Wet Pond	Private	No	No, excluded
Swan Creek	TBD	New	Sunnyside Infiltration Facility	Infiltration	Fitchburg	N/A	No, excluded

Attachment C – 2007 Source Loading and Management Model Results

2007 Source Loading and Management Model Results

To meet the Wisconsin Department of Natural Resources (DNR) requirements for storm water management, the City of Fitchburg recently ran the Source Loading and Management Model (SLAMM) to determine the amount of Total Suspended Solids (TSS) and phosphorus removed from rain water run off by the City storm water system. The DNR is requiring a 20% reduction in TSS by 2008, and a 40% reduction by 2013.

Fitchburg is a suburb of Madison with a population of 24,000 people. It covers 36 square miles and is roughly one third urbanized and two thirds rural; the DNR's state fish hatchery is also located in Fitchburg. There is a particular importance to reduce TSS in Fitchburg because of the location of the hatchery within city limits.

SLAMM was designed to model urbanized areas only. Rural areas are assumed to have a minimal amount of TSS in its runoff and thus are not modeled. The US census definition of urbanized (a census block with more than 1000 people per square mile and surrounding blocks with a density of 500 people per square mile) was used to determine what subwatersheds to model (see Appendix 1). Subwatersheds that had census blocks within them that met the above criteria were modeled. Additionally five other subwatersheds that have been developed since the 2000 census were also modeled. In total 56 subwatersheds were modeled. Four of the modeled areas crossed the city limits into Madison (Western Hills, Allied, Renaissance, and Fish Hatchery Road). By agreement with the City of Madison only the portion of the subwatershed within the Fitchburg city limits was modeled for this report. The portions within the city limits of Madison will be modeled by the City of Madison.

The impervious area data to input into the model was derived from Fitchburg's Geographic Information Systems (GIS) database. The GIS database was created in 2002 and has been updated annually since. Additional GIS data was used from the Dane County Land Information Office. The parameters for the model were agreed upon by the DNR and the Madison Area Municipal Storm Water Partnership (MAMSWaP). SLAMM version 9.2 was used to run the study in June 2007. For a detailed list of data sources and the SLAMM parameters see Appendix 2.

Each individual subwatershed was modeled and the TSS reduction with the current storm sewer system was determined. For examples of the worksheets used in the modeling process and the model output see Appendix 3, 4, and 5. The individual subwatersheds had results ranging from 0.46% TSS reduction (Belmar East) to 100% TSS reduction (Nicolet East); see Appendix 6 for individual subwatershed results. With the assumption that the rural areas of the city have a minimal contribution to the TSS for the city, the mean of the 56

individual results were used to determine the total city wide reduction. As a whole the city wide reduction of TSS was 40.24%, for a 5 year model run.





While there is no requirement for phosphorus reduction at this time, it is anticipated that there will be in the near future. For the 2007 model run we had reductions of 0.39% to 68.73% for the modeled sewersheds. The mean reduction for the city was 26.16%

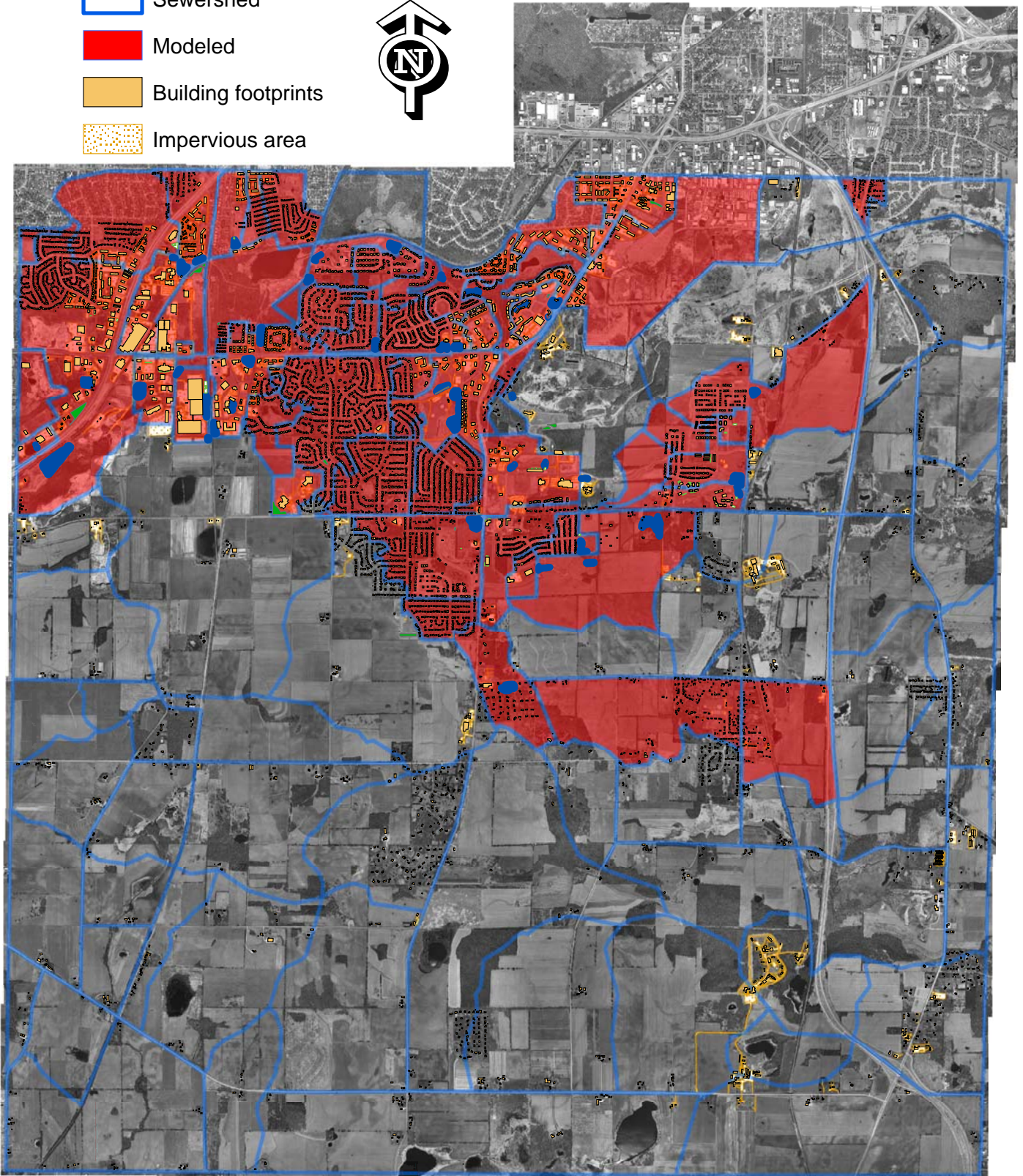
There was a 9.5% increase in TSS reduction from 2006. For previous model results see appendix 7. The increase is due to a number of detention ponds and infiltrations basins that came on line between the spring of 2005 and the time of the next model run, August 2007. In addition a comprehensive review of the GIS data and current storm water management practices was undertaken. The result of this review was improved and more accurate data set, which allowed the city to model all public and private storm water management practices.

Fitchburg is currently exceeding DNR requirements for 2008 of a 20% reduction. While the city continues to grow, the impervious area of Fitchburg will expand, however with current storm water management practices incorporated in new construction, the TSS reduction should remain consistent with our current numbers or improve. Fitchburg's baseline model also shows which subsewersheds can show a significant reduction in TSS with improvements to the stormsewer system. As the model is updated each year, the city will get a better idea of what the cost will be to continue to meet the 2013 DNR requirements of 40% reduction. The city should be able to continue to meet the reduction requirement with continued investment and improvement of the stormsewer infrastructure.

2007 SLAMM Model Run

Legend

-  Sewershed
-  Modeled
-  Building footprints
-  Impervious area



Data Sources:

The sewersheds to model were chosen by using the United States Census definition of urbanized (a census block with more than 1000 people per square mile, and surrounding blocks with a density of 500 people per square mile). Sewersheds that met the above were selected to model. Additional sewersheds were added due to new construction since the 2000 census.

Residential:

Roof 1 (Single Family): Building footprints, Fly Dane 2005. Dane County LIO, all single family homes disconnected from impervious
Roof 2 (Multi-Family): Building footprints, Fly Dane 2005. Dane County LIO
Roof 3 (Storage/Other): Building footprints, Fly Dane 2005. Dane County LIO
Driveways: 1) determine by multiplying single family count by 3700 (assumed impervious for single family dwelling per Fitchburg storm utility). Convert result to acres. Subtract Roof 1 from result.
Sidewalks: City of Fitchburg sidewalk inventory 2007 update. Converted to square feet by multiplying by 5, and converted to acres.
Streets: Dane County LIO, June 2007 update. Converted to square feet by multiplying by 34 (residential), or 59 (major roads), or 22 (rural), and converted to acres.
Small landscaped areas: determine by subtracting SLAMM subtotal (identified land use from GIS) from total acreage. Multiply by impervious % of sewershed. See 0001-Jamestown for example
Other pervious areas determine by subtracting sewershed acreage from subtotal 2 (assumed landscaped pervious area). See 0001-Jamestown for example

Commercial:

Roof 1: Building footprints, Fly Dane 2005. Dane County LIO
Paved Parking/Storage: City of Fitchburg, Impervious shapefile 2000 version
Large Landscaped Area 1: determine by subtracting SLAMM subtotal from total acreage. Multiply by impervious % of sewershed. See 0001-Jamestown for example

Industrial:

Roof 1: Building footprints, Fly Dane 2005. Dane County LIO
Paved Parking/Storage: City of Fitchburg, Impervious shapefile 2007 update

Other Urban

Open space City of Fitchburg, General Land Use Plan
Water Body Area On screen digitized from 2005 Orthophoto, Fly Dane 2005, Dane County LIO

Practices

Drainage ways City of Fitchburg, drainage way file, 2007 update. 100% C&G good (if applicable: total swale length divided by total C&G length for swale %, remaining % is C&G good)
Street sweeping street sweeper data, 2005. Not applied to sewersheds with swales or catch basins
Outfalls City of Fitchburg, Outfall file, 2007 update
Pond Release structures City of Fitchburg, Pond Release structures file, 2007 update
Catch Basins City of Fitchburg, Inlet file, 2007 update
Pipe Diameter City of Fitchburg, Storm Pipe file, mean of all pipe within a sewer shed, 2007 update
Wet Detention City of Fitchburg, Basin file, 2007 update
Evaportation Data collected by Montgomery and Assc. Based on measurements from the Jamestown #1 pond in 2006

SLAMM Parameters

Rain file: WisReg - Madison Five Year Rainfall
Winter season, start 12/02, end 03/12
Pollutant: WI_GEO01
Runoff coefficient: WI_SL01
Particulate solids concentration: WI_AVG01
Particulate residue delivery: WI_DLV01

Ponds:

Critical particle size: NURP

Sewershed Name: SC02-A-0116-H-FIT-C Northern Lights
 Sewershed acreage: **64.58**
 Sewershed acreage minus open water: **64.18**

SLAMM TSS Reduction: 58.32%

		Number to plug into SLAMM (acres)			Impervious % of sewershed	Total
Residential						
Roof 1 (single family): acres	0.44			0.44		0.01
Roof 2 (multi-family): acres	1.67			1.67		0.03
Roof 3 (outbuilding/storage): acres	0.29			0.29		0.00
Single family home: count	8					
Driveways (single family): 1	29600	0.68	0.24	0.24		0.00
Sidewalks (all landuse types): feet	4010	20050	0.46	0.46		0.01
Street (all landuse types): feet	9666	328644	7.54	7.54		0.12
Street length (miles)	1.83	3.66 (curb miles)				0.16
Small landscaped area: 2	40.87	6.74		6.74		
Other Pervious Area: 3 (do last)	33.20			33.20		
Commercial						
Roof 1 (commercial): acres				0.00		0.00
Paved Parking/Storage: acres	1.47			1.47		0.02
Large Landscaped area: 2	40.87	0.93		0.93		0.02
Industrial:						
Roof 1 (industrial): acres				0.00		0.00
Paved Parking/Storage: acres	0			0.00		0.00
Large Landscaped Area: 2	40.87	0.00		0.00		0.00
Other Urban Area:						
Other Open Space (Parks): acres	10.79			10.79		
Water Body Area	0.403			0.40		
SLAMM Subtotal (no landscaping)					23.31	
Subtotal 2 (with landscaping)					30.97	
Check (must equal sewershed acreage minus open water)				64.18		

- 1) determine by multiplying single family count by 3700 (assumed impervious for single family dwelling per Fitchburg storm utility). Convert result to acres. Subtract Roof 1 from result.
- 2) determine by subtracting SLAMM subtotal from total acreage. Multiply by impervious % of sewershed
- 3) determine by subtracting sewershed acreage from subtotal 2.

Practices:

Drainage System % (must equal 1)	Grass Swales	Undeveloped Roadside	C&G poor	C&G fair	C&G good	Sum
	0.10				0.90	1
Swales (linear ft):	1815					
Street (linear ft.)	9666					
C&G (linear ft.)	17398.80					
Density (ft of swale/acres)	28.28					

Street sweeping Not applied

Pond (wet basin)

Stages: stages 1 divide total pond acreage by 5. Stage 2 double stage one result, Stage 3 triple stage one result, stage 4 stage 1 multiplied by 4, stage 5 GIS acreage										
		stage 1	stage 2	stage 3	stage 4	stage 5	stage 6	7	8	
Pond acreage	0.403	0.050375	0.101		0.151125	0.202	0.252	0.30225	0.35	0.40
Initial stage elevation: 4										
Outlets:	gabion									
Other orifice										
Diameter (ft):	42x16x2									
Invert Elevation above datum:	6									

Infiltration area: 5401 ft
 depth: 2 ft
 Silt Loam
 Braod Crested weir:
 outfall to bottom: 2'
 number: 5
 applied to multi-family (roofs 2)

evaporation applied to all ponds see evaportaion rate tab

WinSLAMM Data File: [M:\GIS\DATA\Deptmnts\PubWorks\Stormwater\SLAMM\data\Results\v9.2\pr...]

File Land Use Pollutants Tools Run Utilities Help

SLAMM Data File:
0116-Northern Lights.DAT

Current Land Use: Residential

Current Source Area

Current File Data...

Current File Status

Current File Data Entered

Land Use Areas

Residential Area: 61.77 Acres
Institutional Area: 0.00 Acres
Commercial Area: 2.40 Acres
Industrial Area: 0.00 Acres
Other Urban Area: 0.00 Acres
Freeway Area: 0.00 Acres
Total Area: 64.17 Acres

Exit Program

Press F1 for Help

Source Area No.	Source Area	Area (acres)	I	W	P	O	S	B	Source Area Parameters
1	Roofs 1	0.44							Entered
2	Roofs 2	1.67							Entered
3	Roofs 3	0.29							Entered
4	Roofs 4								
5	Roofs 5								
6	Paved Parking/Storage 1								
7	Paved Parking/Storage 2								
8	Paved Parking/Storage 3								
9	Unpaved Pkng/Storage 1								
10	Unpaved Pkng/Storage 2								
11	Playground 1	10.79							Entered
12	Playground 2								
13	Driveways 1	0.24							Entered
14	Driveways 2								
15	Driveways 3								
16	Sidewalks/Walks 1	0.46							Entered
17	Sidewalks/Walks 2								
18	Street Area 1	7.54							Entered
19	Street Area 2								
20	Street Area 3								
21	Large Landscaped Area 1								
22	Large Landscaped Area 2								
23	Undeveloped Area	33.20							Entered
24	Small Landscaped Area 1	6.74							Entered
25	Small Landscaped Area 2								
26	Small Landscaped Area 3								
27	Isolated Area	0.40							Entered
28	Other Pervious Area								
29	Other Dir Cnctd Imp Area								
30	Other Part Cnctd Imp Area								

Current File Data

SLAMM Data File Name:
M:\GIS\DATA\Deptmnts\PubWorks\Stormwater\SLAMM\data\Results\v9.2\practices\0116-Northern Lights.dat

Site Description: 0116 Northern Lights

Seed: -42

Rain File: C:\Program Files\winslamm\Rain Files\WisReg - Madison Five Year Rainfall.ran

Start Date: 01/02/80 Winter Season Range
End Date: 01/01/85 Start of Winter (mm/dd) 12/02 End of Winter (mm/dd) 03/12

Pollutant Probability Distribution File: C:\Program Files\winslamm\WL_GE001.ppd

Runoff Coefficient File: C:\Program Files\winslamm\WL_SL06 Dec06.rsv

Particulate Solids Concentration File: C:\Program Files\winslamm\WL_AVG01.psc

Particulate Residue Delivery File: C:\Program Files\winslamm\WL_DL01.ppr

Street Delivery File (Select LU): C:\Program Files\winslamm\WL_Res and Other Urban Dec06.std

Residential LU Industrial LU
 Institutional LU Other Urban LU
 Commercial LU Freeways

Change all Street Delivery Files to Match the Current File

Use Cost Estimation Option: Select Cost Data File

Drainage System: Data Entered

Cancel Continue

WinSLAMM Model Output

File View

Runoff Volume Particulate Solids Pollutants **Output Summary**

File Name: M:\GIS\DATA\Deptmnts\PubWorks\Stormwater\SLAMM\data\Results\v9.2\practices\0116-Northern Lights.dat

Drainage System and Outfall Output Summary

	Runoff Volume (cu. ft.)	Percent Runoff Reduction	Runoff Coefficient (Rv)	Particulate Solids Conc. (mg/L)	Particulate Solids Yield (lbs)	Percent Particulate Solids Reduction
Source Area Total without Controls	5.688E+06	<== Percent Reduction Basis Value	0.15	136.0		
Outfall Total without Controls					48247	<== Basis Value
<hr/>						
Current File Output: Total Before Drainage System	5.639E+06	0.87 %	0.15	136.8	48133	
Current File Output: Total After Drainage System	5.527E+06	2.83 %	0.14	136.1	46921	
Current File Output: Total After Outfall Controls	5.378E+06	5.45 %	0.14	59.95	20110	58.32 %
Current File Output: Annualized Total After Outfall Controls	1.076E+06				4022	
Total Area Modeled (ac)	64.17	Years in Model Run:	5.00			

Print Output Summary to Text File

Total Control Practice Costs

Capital Cost	N/A
Land Cost	N/A
Annual Maintenance Cost	N/A
Present Value of All Costs	N/A
Annualized Value of All Costs	N/A

Receiving Water Impacts Due To Stormwater Runoff

	Perform Flow Duration Curve Calculations	Calculated Rv	Approx. Biological Condition of Receiving Water
Without Controls		0.15	Fair
With Controls		0.14	Fair



Appendix 5

**August 2007 SLAMM Results
5 Year Model Run**

Sewershed Name	Size Acres	Primary Land Use	Phosphorus			Particulate Solids			Practices	
			Yield			Yield			Primary	Other
			No Controls Pounds	With Controls	Reduction %	No Controls Tons	With Controls	TSS Reduction %		
0001-Jamestown	563.69	Residential	1702.0	935.40	45.04%	252.81	79.82	68.43%	Wet Detention	Infiltration, Drainage Control
0004-Monticello	16.38	Residential	49.1	47.10	4.01%	6.64	6.24	5.99%	Street Sweeping	
0005-Target	68.52	Commercial	169.5	109.70	35.28%	21.43	8.03	62.55%	Wet Detention	Infiltration
0006-Ten Pin Alley	20.41	Commercial	73.2	62.81	14.17%	12.06	8.70	27.85%	Wet Detention	Drainage Control
0011-Commerce Park	60.00	Industrial	283.2	115.20	59.32%	87.71	26.23	70.09%	Wet Detention	Infiltration, Street Sweeping
0023-Renaissance	21.42	Residential	75.9	69.47	8.47%	11.32	10.28	9.22%	Street Sweeping	Wet Detention, Infiltration
0024-Sub Zero	57.92	Industrial	255.6	127.30	50.20%	68.63	18.45	73.12%	Wet Detention	Infiltration, Drainage Control
0025-Western Hills	114.90	Residential	521.9	266.30	48.97%	68.41	17.60	74.28%	Wet Detention	Biofiltration, Drainage Control
0026-Allied Dr	78.79	Residential	331.8	211.70	36.20%	42.59	19.45	54.33%	Wet Detention	Drainage Control
0027-Nicolet west	83.16	Industrial	330.1	309.10	6.36%	63.03	56.08	11.02%	Drainage Control	Wet Detention
0029-Seminole & McKee	150.79	Residential	664.8	355.30	46.56%	106.21	33.65	68.32%	Wet Detention	Street Sweeping, Biofiltration
0031-Nicolet East	72.79	Industrial	272.5	85.21	68.73%	49.53	0.00	100.00%	Infiltration	Drainage Control
0032-Belmar West	31.81	Residential	179.3	178.60	0.39%	25.48	25.34	0.57%	Street Sweeping	
0033 Dunns Marsh	202.86	Open Urban	903.0	850.70	5.79%	41.41	32.26	22.09%	Drainage Control	Biofiltration
0034-Belmar East	82.68	Residential	435.4	434.20	0.28%	55.08	54.82	0.46%	Street Sweeping	
0036-Fish Hatchery Road	321.88	Commercial	671.6	657.40	2.11%	55.62	52.63	5.37%	Street Sweeping	
0038-Golf Course	77.05	Residential	192.7	143.40	25.58%	16.41	7.05	57.04%	Wet Detention	Biofiltration, Street Sweeping
0039-Wispering Pines	32.16	Residential	143.2	141.30	1.33%	21.04	20.63	1.97%	Street Sweeping	
0040-Ridgewood	39.84	Commercial	187.0	184.40	1.39%	30.84	30.27	1.85%	Street Sweeping	
0041-Post Rd	14.48	Commercial	68.6	68.02	0.79%	13.66	13.49	1.29%	Street Sweeping	
0042-Hatchery Hill	38.29	Commercial	291.8	176.00	39.68%	48.44	21.89	54.81%	Wet Detention	Infiltration, Drainage Control
0043-High Ridge	36.73	Residential	178.3	174.90	1.91%	28.40	27.68	2.55%	Street Sweeping	
0044-Harlan Hills	54.69	Residential	259.8	167.20	35.64%	33.05	15.15	54.15%	Wet Detention	Street Sweeping
0045-Seminole Hills	66.37	Residential	267.3	118.30	55.74%	29.58	4.81	83.73%	Wet Detention	Street Sweeping
0046-Ashbourne	36.21	Residential	113.4	66.23	41.60%	13.75	5.30	61.41%	Wet Detention	Street Sweeping
0047-Rosecommon	43.10	Residential	153.3	77.02	49.76%	21.38	5.59	73.85%	Wet Detention	Drainage Control
0048-Noodles	32.10	Commercial	154.2	151.70	1.62%	24.24	23.71	2.15%	Street Sweeping	
0049-Bosshard	61.31	Residential	244.5	138.90	43.19%	23.97	7.30	69.54%	Wet Detention	Street Sweeping
0050-Longford	89.07	Residential	451.1	291.90	35.29%	62.25	31.00	50.20%	Wet Detention	Street Sweeping
0051-McKee Farms	180.98	Residential	567.8	335.10	40.98%	85.19	37.81	55.62%	Wet Detention	Biofiltration, Drainage Control
0052-Rat Farm	78.06	Residential	166.5	79.86	52.04%	22.80	6.46	71.66%	Wet Detention	Drainage Control
0053-Osmundsen	258.67	Residential	1066.0	1047.00	1.78%	123.90	119.76	3.35%	Street Sweeping	Biofiltration
0054-Chappel Valley	37.31	Residential	165.7	100.20	39.53%	19.78	8.29	58.08%	Wet Detention	Street Sweeping
0055-Wildwood	144.28	Residential	634.8	620.10	2.32%	76.68	73.69	3.90%	Wet Detention	Street Sweeping
0056-Research Park	159.75	Commercial	603.3	324.40	46.23%	79.93	24.27	69.63%	Wet Detention	Drainage Control
0057-Tech Campus	135.95	Commercial	542.8	525.00	3.28%	58.38	53.23	8.81%	Street Sweeping	Biofiltration
0058-Oak Meadows	206.49	Residential	975.4	491.20	49.64%	117.56	32.32	72.51%	Wet Detention	Street Sweeping
0059-Tower Hill	102.57	Residential	460.6	224.30	51.30%	56.82	14.75	74.04%	Wet Detention	Street Sweeping
0060-Swan Creek North	349.27	Residential	808.9	597.40	26.15%	76.09	31.55	58.54%	Wet Detention	Drainage Control
0063-Glacier Valley	26.20	Residential	117.5	115.50	1.70%	12.56	12.18	3.02%	Drainage Control	
0066-Seminole Forest	76.47	Residential	391.3	389.40	0.49%	49.62	49.22	0.82%	Street Sweeping	
0067-Rimrock	29.84	Residential	137.6	135.30	1.67%	16.53	16.03	3.02%	Street Sweeping	
0084-The Crossing	334.63	Residential	942.6	586.90	37.74%	84.65	34.38	59.38%	Wet Detention	Drainage Control
0086-Quarry Hill West	28.22	Residential	124.9	58.71	52.99%	16.33	3.76	76.97%	Wet Detention	Street Sweeping
0087-Quarry Hill East	37.54	Residential	155.7	80.89	48.05%	19.63	6.06	69.11%	Wet Detention	Infiltration, Street Sweeping
0089-Syene Road	228.68	Residential	775.7	770.30	0.70%	68.27	67.10	1.71%	Street Sweeping	
0090-Greenfield	336.19	Residential	1129.0	1119.00	0.89%	98.97	96.79	2.20%	Street Sweeping	
0092-Irish Lane	139.81	Residential	480.4	290.80	39.47%	50.21	19.88	60.42%	Wet Detention	Street Sweeping
0104-Byrneland	57.69	Residential	272.1	108.40	60.16%	33.30	3.95	88.13%	Infiltration	Street Sweeping
0111-Stoner Prairie	41.84	Institutional	145.9	120.20	17.61%	17.38	9.58	44.88%	Infiltration	Street Sweeping
0112-Honeysuckle	17.05	Residential	68.9	44.97	34.70%	12.11	6.18	49.00%	Biofiltration	Street Sweeping
0113-Swan Creek	80.42	Residential	251.2	121.50	51.63%	31.74	4.81	84.84%	Wet Detention	Biofiltration, Drainage Control
0114-E Cheryl Parkway	67.16	Open Urban	118.5	117.80	0.59%	8.15	8.00	1.92%	Drainage Control	
0115-Hollyhock	46.82	Residential	135.8	132.60	2.36%	15.38	14.67	4.60%	Street Sweeping	
0116-Northern Lights	64.17	Residential	188.7	122.90	34.87%	24.12	10.05	58.32%	Wet Detention	Infiltration, Drainage Control
WI07-Coho	85.52	Commercial	395.7	393.70	0.51%	64.55	64.10	0.71%	Street Sweeping	Infiltration

Phosphorus			Particulate Solids		
Yield			Yield		
Base	With Controls	Reduction	Base	With Controls	TSS Reduction
Pounds		%	Tons		%
382.99	281.57	26.16%	47.78	26.65	40.24%

Size
Acres
5920.98

**City Wide
Summary**

Yearly Model Results

Year	TSS Reduction	Phosphorus Reduction
2006	30.69%	N/A
2007	40.24%	21.03%

Attachment D – 2008 SLAMM Modeling Update Memo



MEMO

CITY OF FITCHBURG DEPARTMENT OF PUBLIC WORKS

5520 LACY ROAD
FITCHBURG WI 53711
(608) 270-4260
FAX: (608) 270-4275

To:	Eric Rortvedt, P.E., WisDNR Water Resources Engineer
From:	Rick Eilertson, P.E., Environmental Engineer and Felipe Avila, GIS Engineering Specialist
Date:	March 10, 2008
Subject:	SLAMM Modeling Update for NR 216 Permit Requirements

This memo is being sent to provide information on additional updates incorporated into the City of Fitchburg's Source Loading and Management Model (SLAMM) since our submittal to the Wisconsin Department of Natural Resources (WisDNR) on September 7, 2007.

Below are responses to the following questions you sent us via e-mail on December 26, 2007:

- 1. Exclusion of Undeveloped and Agricultural Lands - There appears to be agricultural and/or undeveloped lands within the red shaded area and labeled as "modeled" that should be excluded from the calculation. The June 6, 2005, DNR modeling guidance lists areas prohibited from inclusion in the modeling to calculate 20% and 40% TSS load reductions, which include undeveloped lands greater than 5 acres and agricultural land. I suggest that agricultural and undeveloped lands that drain into a MS4 modeled area be shaded another color for identification. The load from undeveloped areas greater than 5 acres and agricultural land should not be used for or against Fitchburg in determining its level of compliance with the urban area TSS performance standard. Please explain how excluded agricultural and undeveloped areas were or will be accounted for in the modeling. Please submit a revised modeling map and results summary as appropriate.*

Fitchburg Response: Agricultural lands, parks and urban open space (ie: undeveloped land) greater than 5 acres were removed from the September 7, 2007 model. Subwatersheds with acreage removed under the above criteria were run again and the results were incorporated into **Attachment 1 – Fitchburg Oct. 1, 2004 Baseline SLAMM Results**. The modeling map was revised to show undeveloped land greater than 5 acres or agricultural lands as green shapes and attached as **Attachment 2 – Fitchburg Oct. 1, 2004 Baseline SLAMM Modeling Map**.

- 2. Exclusion of New Development - There appears to be areas of new development where the construction site NOI was received by the DNR after October 1, 2004 that should not have been included in the "modeled" area. New developed areas subject to the ch. NR 151, post-construction TSS standard of 80% should not be included in the developed urban area load calculation. Similar to agricultural land, the load generated and/or controlled in such areas*

would not affect Fitchburg's level of compliance with respect to meeting the developed urban area standard. I have attached a spreadsheet which lists 5 construction sites NOIs that were received by DNR after Oct. 1, 2004. I believe that these NOIs include new development that should be excluded in the developed urban area calculations. Please make appropriate adjustments to the modeling and submit a revised map and results summary as appropriate.

Notice of Intent (NOI) Permit Applications noted in Eric Rortved's Dec. 26, 2007 e-mail

PERMITTEE_NAME	SITE_NAME	FIN	NOI_DATE
Ellefson Company, The	Renaissance on the Park (Lot 12 - Belmar Plat)	31132	22-Feb-05
Sub Zero Freezer Company Inc	Sub Zero	31476	7-Apr-05
Gorman & Company, Inc	Waterford Glen Subdivision	32271	20-Jul-05
Fitchburg	Cinque Terre	32384	2-Aug-05
Fitchburg Technology Campus	New Venture Center II	32700	14-Sep-05

Fitchburg Response: The parcels listed above were removed from the September 7, 2007 model. Subwatersheds with acreage removed under the above criteria were run again and the results were incorporated into the summary. The modeling map was revised to show. Subwatersheds with acreage removed under the above criteria were run again and the results were incorporated into **Attachment 1 – Fitchburg Oct. 1, 2004 Baseline SLAMM Results**. The modeling map was revised to show parcels developed after October 1, 2004 (to be excluded from the city-wide NR 216 Permit Modeling) as yellow shapes and attached as **Attachment 2 – Fitchburg Oct. 1, 2004 Baseline SLAMM Modeling Map**.

3. *Maintenance of Treatment Devices - In order to take credit for privately owned treatment devices, the City must have the authority to require maintenance and/or authority to perform maintenance of stormwater treatment devices itself. Please clarify whether the City is able to require or itself perform any necessary maintenance of the modeled treatment devices.*

Fitchburg Response: Fitchburg requires Maintenance Agreements for all private stormwater practices to be recorded at the Dane County Register of Deeds, with a copy sent back to the Public Works Department. An example of this required maintenance agreement is attached as **Attachment 3 – Sample Stormwater Maintenance Agreement**.

4. *Result Summary Table - In future submittals, please report the results on an annual average year basis (1/5 of the value generated for the 5 year modeled period).*

Fitchburg Response: The Result Summary Table has been updated to show the results on an annual average year basis and is attached as **Attachment 1 – Fitchburg Oct. 1, 2004 Baseline SLAMM Results**.

Attachment 1 - Fitchburg Oct. 1, 2004 Baseline SLAMM Results

Annualized Model Run = 1/5 of Amounts for 5 year modeled period

Sewershed Name	Size Acres	Primary Land Use	Phosphorus			Particulate Solids			Practices	
			Yield		Reduction %	Yield		TSS Reduction %	Primary	Other
			No Controls Pounds/Year	With Controls Pounds/Year		No Controls Tons/Year	With Controls Tons/Year			
0001-Jamestown	563.69	Residential	377.4	202.40	46.37%	54.55	18.80	65.53%	Wet Detention	Drainage Control
0004-Monticello	16.38	Residential	8.2	7.91	3.42%	1.08	1.02	5.33%	Street Sweeping	
0006-Ten Pin Alley	20.41	Commercial	14.6	12.56	14.17%	2.41	1.74	27.85%	Wet Detention	Drainage Control
0011-Commerce Park	60.00	Industrial	64.2	25.92	59.61%	21.83	7.13	67.35%	Wet Detention	Infiltration, Street Sweeping
0023-Renaissance	21.42	Residential	10.8	10.61	1.34%	2.01	1.98	1.54%	Street Sweeping	Wet Detention, Infiltration
0024-Sub Zero	57.92	Industrial	21.2	11.65	45.09%	5.05	1.67	66.88%	Wet Detention	Infiltration, Drainage Control
0025-Western Hills	114.90	Residential	104.4	100.04	4.16%	13.68	12.62	7.78%	Drainage Control	Biofiltration
0026-Allied Dr	78.79	Residential	66.4	64.72	2.47%	8.52	8.18	4.02%	Drainage Control	
0027-Nicolet west	83.16	Industrial	61.6	57.68	6.33%	12.30	10.98	10.67%	Drainage Control	Wet Detention
0029-Seminole & McKee	150.79	Residential	133.0	71.06	46.56%	21.24	6.73	68.32%	Wet Detention	Street Sweeping, Biofiltration
0031-Nicolet East	72.79	Industrial	35.4	34.90	1.41%	8.58	8.38	2.30%	Drainage Control	
0032-Belmar West	31.81	Residential	28.6	28.48	0.42%	4.30	4.27	0.67%	Street Sweeping	
0033 Dunns Marsh	202.86	Open Urban	128.1	128.02	0.05%	3.03	3.02	0.41%	Drainage Control	Biofiltration
0034-Belmar East	40.30	Residential	35.4	35.30	0.34%	4.86	4.83	0.52%	Street Sweeping	
0036-Fish Hatchery Road	321.88	Commercial	26.8	26.74	0.30%	5.83	5.81	0.43%	Street Sweeping	
0038-Golf Course	77.05	Residential	21.6	19.05	11.74%	1.31	0.59	55.09%	Wet Detention	Biofiltration, Street Sweeping
0039-Wisping Pines	32.16	Residential	28.6	28.48	0.56%	4.21	4.17	0.87%	Street Sweeping	
0040-Ridgewood	39.84	Commercial	37.4	36.92	1.39%	6.21	6.10	1.84%	Street Sweeping	
0041-Post Rd	14.48	Commercial	13.7	13.58	0.99%	2.73	2.69	1.60%	Street Sweeping	
0042-Hatchery Hill	38.29	Commercial	58.7	35.62	39.34%	9.72	4.40	54.69%	Wet Detention	Infiltration, Drainage Control
0043-High Ridge	36.73	Residential	35.7	35.32	0.95%	5.68	5.61	1.25%	Street Sweeping	
0044-Harlan Hills	54.69	Residential	44.5	28.10	36.91%	5.93	2.63	55.71%	Wet Detention	Street Sweeping
0045-Seminole Hills	66.37	Residential	53.5	52.32	2.13%	5.92	5.67	4.23%	Street Sweeping	
0046-Ashbourne	36.21	Residential	20.7	20.26	2.31%	2.51	2.41	4.08%	Street Sweeping	
0047-Rosecommon	43.10	Residential	26.7	12.34	53.78%	3.86	0.92	76.26%	Wet Detention	Drainage Control
0048-Noodles	32.10	Commercial	26.9	26.44	1.78%	4.54	4.44	2.32%	Street Sweeping	
0049-Bosshard	61.31	Residential	48.9	27.78	43.19%	4.79	1.46	69.54%	Wet Detention	Street Sweeping
0050-Longford	89.07	Residential	90.6	58.64	35.26%	12.60	6.29	50.06%	Wet Detention	Street Sweeping
0051-McKee Farms	180.98	Residential	73.7	39.20	46.84%	13.17	5.41	58.92%	Wet Detention	Biofiltration, Drainage Control
0052-Rat Farm	78.06	Residential	28.9	13.61	52.86%	3.75	1.01	72.97%	Wet Detention	Drainage Control
0053-Osmundsen	258.67	Residential	213.2	209.20	1.88%	24.78	23.95	3.36%	Street Sweeping	Biofiltration
0054-Chappel Valley	37.31	Residential	33.3	20.16	39.39%	4.03	1.70	57.68%	Wet Detention	Street Sweeping
0055-Wildwood	144.28	Residential	123.8	120.90	2.36%	15.00	14.40	3.98%	Street Sweeping	
0056-Research Park	159.75	Commercial	64.3	57.42	10.64%	11.95	9.78	18.13%	Wet Detention	Drainage Control
0057-Tech Campus	135.95	Commercial	48.0	47.38	1.25%	6.89	6.76	1.93%	Street Sweeping	Biofiltration
0058-Oak Meadows	206.49	Residential	154.3	72.76	52.83%	20.74	5.29	74.49%	Wet Detention	Street Sweeping
0059-Tower Hill	102.57	Residential	92.1	44.86	51.30%	11.36	2.95	74.04%	Wet Detention	Street Sweeping
0060-Swan Creek North	349.27	Residential	82.8	41.44	49.96%	13.27	4.43	66.59%	Wet Detention	Drainage Control
0063-Glacier Valley	26.20	Residential	16.1	15.93	1.30%	2.00	1.96	2.14%	Drainage Control	
0066-Seminole Forest	76.47	Residential	13.6	13.18	2.76%	2.28	2.20	3.56%	Street Sweeping	
0067-Rimrock	29.84	Residential	27.5	27.08	1.67%	3.31	3.21	3.02%	Street Sweeping	
0086-Quarry Hill West	28.22	Residential	10.1	3.70	63.49%	1.47	0.16	89.41%	Wet Detention	Street Sweeping
0087-Quarry Hill East	37.54	Residential	26.3	13.03	50.37%	3.49	1.01	71.20%	Wet Detention	Infiltration, Street Sweeping
0089-Syene Road	228.68	Residential	29.0	27.94	3.72%	4.88	4.65	4.79%	Street Sweeping	
0090-Greenfield	336.19	Residential	45.5	43.52	4.39%	7.10	6.66	6.15%	Street Sweeping	
0092-Irish Lane	139.81	Residential	34.6	16.27	52.91%	5.55	1.66	70.10%	Wet Detention	Street Sweeping
0104-Byrneland	57.69	Residential	54.4	53.42	1.84%	6.66	6.44	3.29%	Street Sweeping	
0111-Stoner Prairie	41.84	Institutional	13.3	13.34	0.01%	2.58	2.58	0.01%		
0112-Honeysuckle	17.05	Residential	14.3	9.66	32.33%	2.35	1.26	46.23%	Biofiltration	Street Sweeping
0113-Swan Creek	80.42	Residential	46.6	20.06	56.93%	6.20	0.86	86.14%	Wet Detention	Biofiltration, Drainage Control
0114-E Cheryl Parkway	67.16	Open Urban	8.3	8.31	0.14%	1.33	1.33	0.20%	Drainage Control	
0115-Hollyhock	46.82	Residential	18.4	17.72	3.55%	2.93	2.79	4.83%	Street Sweeping	
0116-Northern Lights	64.17	Residential	29.4	16.12	45.24%	4.57	1.81	60.44%	Wet Detention	Infiltration, Drainage Control
WI07-Coho	85.52	Commercial	65.2	64.76	0.61%	11.94	11.85	0.76%	Street Sweeping	Infiltration

Size	
Acres	5475.45

Phosphorus			Particulate Solids		
Base	Yield With Controls	Reduction	Base	Yield With Controls	TSS Reduction
Pounds/Year		%	Tons/Year		%
2990.5	2243.81	24.97%	433	271	37.48%









Annualized Model Run w/ No Controls
Citywide TSS lbs/Acre/Year: 158.11

Annualized Model Run w/ Controls
Citywide TSS lbs/Acre/Year: 98.85

Citywide TSS Reduction: 37.48%

Attachment 2 - Fitchburg Oct. 1, 2004 Baseline SLAMM Modeling Map

Legend

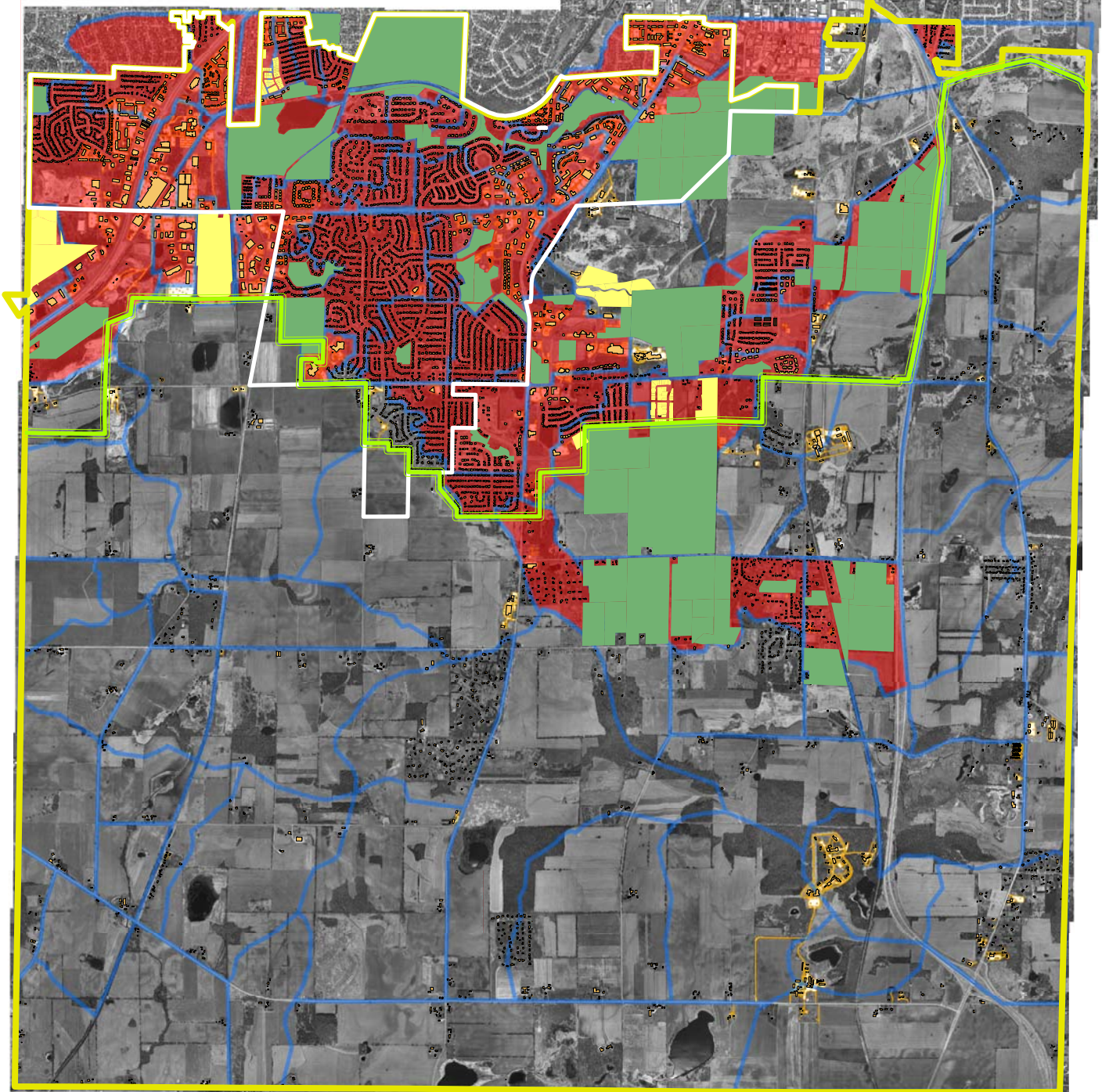
-  Sewershed
-  Modeled
-  Post Oct. 1, 2004 NOI*
-  >5 ac Undeveloped**
-  Building footprints
-  2000 Census Defined Urbanized Area
-  City Limits
-  Urban Service Area Border



*Areas developed after Oct. 1, 2004 required to have 80% TSS reduction and excluded from NR 216 Permit model

**Undeveloped and open spaces areas are excluded from NR 216 Permit model

City of Madison



Sample Stormwater Maintenance Agreement

DECLARATION OF CONDITIONS, COVENANTS AND RESTRICTIONS FOR MAINTENANCE OF STORMWATER MANAGEMENT MEASURES

RECITALS:

- A. _____ (“Owner”) is the owner of _____ more particularly described on Exhibit A attached hereto (the “Property”).
- B. Owner desires to construct stormwater management measures on the Property in accordance with certain plans and specifications approved by the City of Fitchburg (the “City”).
- C. The City requires Owner to record this Declaration of Conditions, Covenants and Restrictions for Maintenance of Stormwater Management Measures (this “Declaration”) regarding maintenance of certain stormwater management measures (“Stormwater Management Measures”) to be located on the Property all as more particularly described on Exhibit A. Owner agrees to maintain the Stormwater Management Measures and to grant to the City the rights set forth below.

NOW, THEREFORE, in consideration of the declarations herein and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the owner agrees as follows:

- 1. Maintenance. Owner and its successors and assigns shall be responsible to repair and maintain the Stormwater Management Measures located on the Property in good condition and in working order and such that the measures comply with approved plans on file with the City. Said maintenance shall be at the Owner’s sole cost and expense. Owner will conduct such maintenance or repair work in accordance with all applicable laws, codes, regulations, and similar requirements.
- 2. Easement to City. If Owner fails to maintain the Stormwater Management Measures as required in Section 1, then the City shall have the right, after providing Owner with written notice of the maintenance issue (each, a “Maintenance Notice”) and thirty (30) days to comply with the City’s Maintenance Notice, to enter the Property in order to conduct the maintenance specified in the Maintenance Notice. The City will conduct such maintenance work in accordance with all applicable laws, codes, regulations, and similar requirements and will not unreasonably interfere with Owner’s use of Property. All costs and expenses incurred by the City in conducting such maintenance may be charged to Owner by placing the amount on the tax roll for the Property as a special assessment in accordance with Section 66.0703, Wis. Stats.
- 3. Term/Termination. The term of this Declaration shall commence on the date that this Declaration is filed of record with the Register of Deeds Office for Dane County, Wisconsin, and except as otherwise herein specifically provided, shall continue in perpetuity. Notwithstanding the foregoing, this Declaration may be terminated by recording with the Register of Deeds Office for Dane County, Wisconsin, a written instrument of termination signed by the City and all of the then-owners of the Property.
- 4. Miscellaneous.
 - (a) Notices. Any notice, request or demand required or permitted under this Declaration shall be in writing and shall be deemed given when personally served or three (3) days after the same has been deposited with the United States Post Office, registered or certified mail, return receipt requested, postage prepaid and addressed as follows:

If to Owner:

If to the City: City Engineering Division
5520 Lacy Road
Fitchburg, WI 53711
Attn: City Engineer

Any party may change its address for the receipt of notice by written notice to the other.

This space reserved for recording data

Return to:

City of Fitchburg
5520 Lacy Road
Fitchburg, WI 53711

PIN#:

EXHIBIT A
Stormwater Management Maintenance Measures

Legal Description of Property: _____

PIN: _____

Stormwater Management Measures Included in this Agreement:

- All site storm sewer pipes and structures
- Infiltration basin
- _____ oil and grease inlet filters
- _____ proprietary device for Total Suspended Solids (TSS) Control (ie: Stormceptor, CDS, or equal)

Specific Maintenance Requirements:

Short Term Maintenance(during construction and/or restoration):

- The building construction contractor at the owner's expense or as agreed to by the owner and contractor shall perform inspection of all facilities during construction and until site stabilization.
- Inspections during construction shall be weekly and/or after a rainfall event of 0.5" or more.
- Repairs necessary to restore the facility to design performance will be made within 48 hours of the inspection.
- Deficiencies include, but are not limited to, rill erosion, sediment deposition in the infiltration basin or behind perimeter control, and deposition of sediment on the tracking pad.
- Tracking on the public right-of-way shall be inspected regularly during days that construction traffic is leaving the construction site. Any excessive sediment tracked onto the public right-of-way shall be scraped immediately. Thorough sweeping, with appropriate equipment that physically picks up and removes the sediment (vs. pushing it to other locations within the public right-of-way) shall be conducted at the end of each working day during construction activities.

Long Term Maintenance:

- All stormwater provisions constructed as part of this project are permanent in location and function over time. The constructed stormwater provisions such as infiltration basins, inlet filters, and storm structures shall not be removed or significantly altered without written permission from the **City of Fitchburg's** Public Works Department. Owner shall maintain records of inspections and maintenance as described below in accordance with Chapter 27 of the **City of Fitchburg** Municipal Code of Ordinances.
- To maximize filtration, mowing in buffer areas should be minimized. If occasional mowing is necessary, the Department of Natural Resources suggests the mowing height should be no shorter than 6 inches. The Department of Natural Resources also states that the application of fertilizers, herbicides, pesticide or other chemical applications are prohibited on drainage devices in the long-term. The application of fertilizer for vegetation restoration is acceptable.

EXHIBIT A
Stormwater Management Maintenance Measures

- Facilities showing signs of soil erosion should be repaired with emphasis put on grassed waterways being maintained for proper stormwater conveyance.
- Facilities or parts of facilities with no vegetation shall be restored to good vegetated catch.
- Inspections of the infiltration basin shall be done at least semi-annually in early spring and early fall. Infiltration area inspections shall include spreader and overflow spillway for indication of failure. Note the condition of vegetation as part of inspection. If standing water is observed over 50% of the basin floor 3 days after rainfall, the basin is clogged and measures should be undertaken to unclog it. Acceptable measures include removing the top 2 to 3 inches, chisel plowing and adding topsoil and engineered compost material. If deep tilling is used, the basin shall be drained and the soils dried to a depth of 8 inches. After procedures, the owner /operator shall replant with State-approved native plugs.
- Oil & grease management devices shall be inspected quarterly. Repair work needs to be done whenever the performance of a stormwater structure is compromised. Oil & Grease inlet filters shall be replaced once a year or more frequently if the filter is damaged.
- Storm structures outfitted with devices to capture total suspended solids (TSS) shall be inspected semi-annually in early spring and early fall. Cleaning of TSS and other debris shall be performed anytime the sediment in the unit reaches 8 inches in depth or the volume exceeds 15% of the total storage volume.

Attachment E – 2013 Modeling Summary and Attachments

Modeling Summary

City of Fitchburg, Wisconsin

MSA Project No. 07729004

November 2013

Prepared by:

MSA Professional Services, Inc.
2901 International Lane, Suite 300
Madison, WI 53704

“Your Trusted Partner”

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DRAFT

1.0 WATER QUALITY MODELING

The findings of this study are taken from a detailed WinSLAMM (Version 10.0) Urban Catchment Model of the City's stormwater management system. WinSLAMM is a Wisconsin Department of Natural Resources (WDNR) approved model recommended for use in determining removal of TSS, TP, and other pollutants by structural and non-structural stormwater management practices. The WDNR "believes that computer modeling is the most efficient and cost effective method for calculating pollutant loads. Pollutant loading models such as SLAMM, P8 or equivalent methodology may be used to evaluate the efficiency of the design in reducing total suspended solids.") 'WinSLAMM' abbreviates "Source Loading and Management Model [for Windows]" (see notation under NR216.07(6)(b)).

WinSLAMM was originally developed to better understand the relationships between sources of urban runoff pollutants and runoff quality. It has been continually expanded since the late 1970s and has been revised to include a wide variety of source area (runoff and pollutant generators) and outfall control practices (runoff and pollutant management practices). WinSLAMM is based on actual field observations and has minimal reliance on theoretical processes.

Input data required by WinSLAMM for each model application includes a number of data files that describe local meteorological and hydrological conditions and pollutant loading characteristics. These files are prescribed for use in the WinSLAMM model by the USGS Wisconsin Water Science Center and include parameter files for rainfall, pollutant distribution, runoff coefficients, particulate solids concentrations, and pollutant delivery data.

1.1 RAINFALL DATA

The USGS has evaluated rainfall data collected across the state of Wisconsin for many years and has identified annual rainfall records for five locations in the state that are felt to be representative of a 'typical rainfall year'. For Fitchburg, the closest rainfall record recommended for use in water quality modeling is the Madison rainfall record for 1981. When simulations are executed for a typical rainfall year it is necessary to eliminate the winter season where precipitation falls as snow or ice. The SLAMM model cannot accommodate snowfall and runoff from snowmelt events. The range of winter dates applicable to the Madison rainfall data run from December 2 to March 12. Thus, the single-year simulation runs from March 12 to December 2.

It has been determined by the USGS and WDNR that a single year's simulation does not fairly represent the impact of street sweeping. Accordingly, a second rainfall record consisting of five consecutive years' data must be used for street sweeping analyses. For Fitchburg, the rainfall gauge was again the Madison rainfall gauge.

1.2 WinSLAMM POLLUTANT LOADING FILES

Pollutant loading files required by the WinSLAMM model include a *Pollutant Probability Distribution File*, *Runoff Coefficient File*, *Particulate Solids Concentration File*, *Particulate Residue Reduction File*, and a *Street Delivery Parameter File*.

The *Pollutant Probability Distribution File* describes the pollutant loading from different source areas (land use types). This data is based upon actual pollutant loading collected from the study area or region.

The *Runoff Coefficient File* describes parameters specific to different source areas (land use types) that determine the runoff volumes resulting from rainfall events of different depth.

The *Particulate Solids Concentration File* contains parameters allowing the WinSLAMM model to determine the weight of particulate solids loadings resulting from runoff events of different volumes. The particulate solids concentration file includes data measured by the USGS from source areas including residential, commercial, and industrial rooftops; residential lawns; residential driveways; residential, commercial and industrial streets; commercial and industrial parking lots; freeways; and undeveloped areas.

The *Street Delivery Parameter File* contains data describing the fraction of total particulates that do not reach the outfall during a rain event, for different rain depths and street textures.

The *Particle Size Distribution File* (a/k/a critical particle size file), are needed to run a WinSLAMM model if there is a control practice, such as a detention pond, biofilter or catchbasin in the model, that determines pollutant removal efficiencies by particle settling or filtering. The particle size distribution information describes the size distribution of urban runoff particulates that enter a control practice.

1.3 MODEL PARAMETER FILES

The following model parameter files were entered into the WinSLAMM model(s) for evaluation of the City of Fitchburg's stormwater management system.

Rainfall Files -	<i>WisReg - Madison WI 1981.RAN</i>
Pollutant Probability Distribution File -	<i>WI_GEO02.ppdx</i>
Runoff Coefficient File -	<i>WI_SL06 Dec06.rsv</i>
Particulate Solids Concentration File -	<i>Wi_AVG01.pscx</i>
Street Delivery File:	
Residential/Other -	<i>WI_Res and Other Urban Dec06.std</i>
Institutional/Commercial/Industrial -	<i>WI_Com Inst Indust Dec06.std</i>
Freeway -	<i>Freeway Dec06.std</i>
Particle Size Distribution File -	<i>NURP.cpz</i>

1.4 WATERSHEDS, LAND USES, SOURCE AREAS, AND SOIL TYPES.

Watersheds are the sources of runoff and pollutants simulated by the program. WinSLAMM is capable of modeling multiple watersheds containing multiple discrete *land uses* in six categories: residential, institutional, commercial, industrial, freeway, and "other" urban areas. Each land use contains specific runoff and pollutant *source areas*

including roofs, paved parking/storage areas, unpaved parking/storage areas, playground, driveways, sidewalks/walks, street areas, landscaped areas (small and large), undeveloped areas, isolated/water body area, other pervious areas and impervious areas (directly connected and indirectly connected). Each source area is further categorized by *soil type*, including sand, silt, and clay soil types. It is necessary to manually enter surface area (acres) for each source area within each land use within the watershed to be evaluated.

1.5 WATER QUALITY MANAGEMENT PRACTICES

WinSLAMM allows for assignment of water quality management practices for individual source areas within a land use type, land use types within a single watershed, within the drainage system serving the watershed, or at the point of discharge of the watershed. Each structural management practice must be defined according to its specific geometry, including storage volume, outlet configuration, infiltration rate, etc. Non-structural management practices such as street sweeping must be defined according to the type and frequency of activity.

The WinSLAMM modeling completed for this study included two types of management practices, street sweeping and ‘end-of-pipe’ structural management practices. Street sweeping is a management practice applied at the *land use* level within the WinSLAMM model and ‘end-of-pipe’ practices are applied downstream of a *junction* which can combine several land uses and/or outputs from upstream BMPs. Both types of management practices were evaluated in the WinSLAMM model itself.

2.0 APPLICATION OF WATER QUALITY MODELS

The purpose of this study is to assess the current reduction level of total suspended solids (TSS) and total phosphorus (TP) achieved by best management practices (BMPs) within the City of Fitchburg prior to stormwater discharging to Nine Springs Creek. While this project is not intended to assess City BMPs and management practices for compliance with the requirements of NR151 and NR216, the WDNR’s guidance in the application of water quality models for the assessment of pollutant reductions was followed as far as applicable. This guidance is documented on the DNR’s website at:

http://dnr.wi.gov/topic/stormwater/standards/ms4_modeling.html

2.1 MODEL STUDY LIMITS

For this study, watershed areas draining to existing or proposed structural management practices were delineated using the GIS program ESRI ArcMap 10.0. Delineation of watersheds was completed using two-foot contour interval topographic maps overlaid with storm sewer and surface drainage system maps. The water quality modeling study area includes the entire city limits and those areas outside the city limits that drain to an existing or proposed structural water quality management practice within the City.

2.2 MODEL LAND USE

WinSLAMM analyzes urban drainage areas by categorizing portions of any given watershed into one of six different land uses, including:

- Residential
- Commercial
- Industrial
- Institutional
- Freeway
- Other Urban

Each of these land uses (except Freeway) contains 15 different types of source area such as landscape, roofs, parking, playgrounds, streets, etc. The Freeway land use contains 7 types of source area such as freeway with paved shoulder, high traffic urban highways, median areas, etc. The model contains the ability to further classify portions of each source area according to its runoff behavior (for example, whether roofs are flat or pitched, whether impervious areas drain directly to the drainage system or drain onto sandy or clayey soils, what type of conveyance system a street area uses, etc.).

Since data with this level of specificity is not typically available at a municipal or watershed scale, the WinSLAMM model comes with *Standard Land Use Files* which describe the distribution of source areas within a particular land use type. These files have been prepared by the authors of the WinSLAMM model based on studies of Wisconsin communities. The program also allows Standard Land Use files to be edited by a user to reflect conditions within a specific community. For Fitchburg's case, the Standard Land Use files were edited by the following procedure:

- 1) Land use for areas of the City were determined by linking the City's parcel shape file to the City's assessor database and assigning each parcel a land use based on its zoning class. Since the assessor database categories are broader than what is needed for SLAMM modeling, and in some cases assessor parcel information was missing or inaccurate, areas were reviewed and refined/revised as appropriate based on land use discerned from aerial photos, and/or other additional information provided by the city. A final interpretation was made to classify areas into the following land uses:

TABLE 1
City of Fitchburg
WinSLAMM Standard Land Use Classifications

Land Use Class	Standard Land Use File
Residential	<ul style="list-style-type: none">• Duplex• Low density residential• Medium density residential• Mobile homes• Multi-family residential
Commercial	<ul style="list-style-type: none">• Shopping Center• Strip commercial

Industrial	<ul style="list-style-type: none"> • Light industrial
Institutional	<ul style="list-style-type: none"> • School • General institutional
Other Urban	<ul style="list-style-type: none"> • Open

- 2) Within each land use, random samples of non-right-of-way parcels were chosen and on each chosen parcel the impervious areas such as roof, driveway, street, parking, etc. were digitized. Then, each impervious area type was expressed as a percentage of the aggregate sample area. This percentage, in turn, was applied to the non-right-of-way portion of the land use as a whole.
- 3) Within right-of-way areas, the right-of-way was first split into areas adjacent to corresponding non-right-of-way land use (for instance, right-of-way having medium density residential (MDR) lots on both sides of the street was assigned a right-of-way MDR land use; right-of-way having MDR on one side and duplex on the other would have been split down the centerline and then assigned half to MDR and half to duplex, etc.) Then, random sampling as in (2) above was performed to determine a typical street width, sidewalk width, area of driveway, etc. for the right-of-way portion of the land use as a whole.

The procedure above yielded an estimate of percentage distribution of *source areas* within each *land use classification*. A summary is listed in Table 2, below.

TABLE 2
City of Fitchburg
Sample % of Source Area by Land Use Classification

Land Use		Source Area						
		Road	Roof	Driveway	Sidewalk	Parking Lot	Pool	Pervious
Non-Right-of-Way Areas	Low Density Residential (LDR)	0.00%	7.44%	4.64%	0.94%	0.00%	2.18%	84.80%
	Multi Family Residential (MFR)	0.00%	26.41%	10.52%	4.06%	25.06%	0.00%	33.95%
	Medium Density Residential (MDR)	0.00%	18.76%	6.20%	3.71%	24.22%	8.92%	38.19%
	Duplex Residential	0.00%	14.65%	5.87%	4.25%	0.00%	0.00%	75.23%
	Mobile Homes	0.00%	14.08%	3.46%	1.66%	0.66%	0.00%	80.14%
	School	0.00%	26.40%	0.00%	6.65%	48.50%	0.00%	18.45%
	General	0.00%	9.07%	6.36%	2.12%	19.43%	0.00%	63.02%

	Institutional							
	Shopping Center	0.00%	20.21%	4.77%	5.24%	43.45%	0.00%	26.32%
	Strip Commercial	0.00%	27.72%	0.00%	0.63%	51.98%	0.00%	19.67%
	Light Industrial (LI)	0.00%	18.07%	5.19%	1.04%	32.24%	0.00%	43.46%
	Open	0.00%	0.68%	0.00%	3.84%	0.78%	0.00%	94.70%
Right-of-Way Areas	Low Density Residential (LDR)	69.17%	0.00%	0.67%	2.31%	0.00%	0.00%	27.85%
	Multi Family Residential (MFR)	40.66%	0.00%	0.02%	7.06%	0.19%	0.00%	52.07%
	Medium Density Residential (MDR)	57.24%	0.00%	2.61%	4.00%	0.00%	0.00%	36.15%
	Duplex Residential	54.78%	0.00%	6.55%	9.23%	0.00%	0.00%	29.45%
	Mobile Homes	73.16%	0.00%	1.16%	0.94%	12.02%	0.00%	12.73%
	School	62.97%	0.00%	0.00%	11.80%	5.61%	0.00%	19.62%
	General Institutional	48.35%	0.00%	0.20%	6.68%	0.00%	0.00%	44.78%
	Shopping Center	54.73%	0.00%	0.01%	11.06%	0.65%	0.00%	33.55%
	Strip Commercial	42.68%	0.00%	0.86%	6.09%	2.46%	0.00%	47.91%
	Light Industrial (LI)	30.04%	0.00%	1.55%	8.19%	2.21%	0.00%	58.01%

At the scale of the project in question, however, specific connectivity of each source area was indeterminate – i.e. how much rooftop or driveway drained to yard areas vs. direct connectivity to a storm sewer or other conveyance, etc. Therefore, to estimate the subdivision of each source area into its runoff characteristic, the typical WinSLAMM standard land use files were used to create this distribution. For example, low density residential (LDR) land use in the WinSLAMM standard land use file used all pitched roofs (no flat roofs), of which 24% were directly connected to the drainage system. A summary of the distribution of each source area is attached to the end of this document.

Several areas within the city of Fitchburg and surrounding communities fall under the category of *freeway*, including the Beltline Highway, USH 14 (south of the Beltline), Verona Road (south of the Beltline) and portions of Fish Hatchery Road. As these

transportation facilities do not meet the characteristics of typical streets within the City and therefore do not follow the same distribution of impervious area determined for the City-specific Standard Land Use data, the WinSLAMM default Standard Land Use was applied to these freeway areas, which depend on variables like average daily traffic and number of lanes.

2.3 SOIL CLASSIFICATIONS

Each land use was further sub-categorized according to the underlying soil type. WinSLAMM requires that the soil for all land uses be classified as *sand, silt, or clay*. Table 3 on the following page identifies the soil texture that each soil series identified in the Dane County Soil Atlas was assigned within the WinSLAMM model.

The size (area) and characteristics of each source area within each land use type was entered into the model according to the distribution within each standard land use file. Land use types were entered into the model according to the total area within each watershed corresponding to each land use and each soil texture. For instance, a watershed may consist of residential land use built atop sandy and silty soils; land use for residential – sand and residential – silt were separately entered into the model according to the total area of each land use and soil type within the watershed.

TABLE 3
City of Fitchburg
WinSLAMM Soil Classifications

Soil Symbol	Soil Name	Soil Texture	Soil Symbol	Soil Name	Soil Texture
Ad	ADRIAN MUCK	CLAY	Mc	MARSHAN SILT LOAM	SILT
Af	ALLUVIAL LAND, WET	CLAY	Md	MCHENRY SILT LOAM	SILT
Bb	BATAVIA SILT LOAM	SILT	Mh	MILITARY LOAM	SILT
Bo	BOYER SANDY LOAM	SILT	Os	ORION SILT LOAM	SILT
Co	COLWOOD SILT LOAM	SILT	Pa	PALMS MUCK	CLAY
Cu	CUT AND FILL LAND	SILT	Pn	PLANO SILT LOAM	SILT
Dn	DODGE SILT LOAM	SILT	Po	PLANO SILT LOAM	SILT
Do	DODGE AND KIDDER SOILS	SILT	Ra	RADFORD SILT LOAM	SILT
Dr	DRESDEN LOAM	SILT	Rn	RINGWOOD SILT LOAM	SILT
Ds	DRESDEN SILT LOAM	SILT	Rp	RODMAN SANDY LOAM	SILT
Ef	ELBURN SILT LOAM	SILT	Sa	SABLE SILTY CLAY LOAM	CLAY
Eg	ELBURN SILT LOAM	SILT	Sc	ST. CHARLES SILT LOAM	SILT
Ev	ELVERS SILT LOAM	SILT	Se	SALTER SANDY LOAM	SILT
Gn	GRANBY LOAMY SAND	SAND	Sf	SALTER SILT LOAM	SILT
Gp	GRAVEL PIT	SAND	Sh	SALTER SANDY LOAM	SILT
Gs	GRAYS SILT LOAM	SILT	Sp	SPINKS AND PLAINFIELD LOAMY SAND	SAND
Gw	GRISWOLD LOAM	SILT	Tr	TROXEL SILT LOAM	SILT
Ha	HAYFIELD SILT LOAM	SILT	Vr	VIRGIL SILT LOAM	SILT

Ho	HOUGHTON MUCK	CLAY	Vw	VIRGIL SILT LOAM	SILT
Kd	KIDDER LOAM	SILT	W	WATER	CLAY
Ke	KEGONSA SILT LOAM	SILT	Wa	WACOUSTA SILTY CLAY LOAM	CLAY
Kr	KIDDER SOILS	SILT	Wx	WHALAN SILT LOAM	SILT
Mb	MARSH	SILT			

2.4 STREET SWEEPING

The WinSLAMM model is capable of modeling both mechanical and high-efficiency (vacuum) street sweeping. Sweeping intervals may be altered and sweeping may be evaluated with and without parking restrictions. Parking restrictions assume that cars are not allowed to park on streets on days when sweeping is to occur.

Street sweeping frequency data within the City of Fitchburg was provided by the City of Fitchburg Street Supervisor. Sweeping of the streets begins in April and continues until snowfall. Street sweeping occurs once every 8-weeks with a vacuum assisted cleaner. Parking density was assumed to be light and assumed street sweeping parking controls enforced by the City.

Street sweeping data in areas outside of the City of Fitchburg was provided by the City of Madison, including areas north and west of Dunn's Marsh, and in the vicinity of Park Street. The City of Madison previously determined TSS reduction rates of 1% and 2%, respectively, for these two areas using WinSLAMM, so these areas were not modeled again by MSA.

The WNDR and USGS have provided the following guidance on their website regarding application of street sweeping to water quality models:

"For developed urban areas under s. NR 151.13, permitted municipalities must reduce the TSS load by 20% in 2008 and 40% in 2013. Again, this should be reported on an average annual basis. However, there are no identified rainfall years for the developed urban area performance standards in NR 151.13. Since a single year did not fairly represent the impact of street cleaning, a series of rainfall files (5 consecutive years) must be used..."

The reason for this requirement is that it was found that identical street sweeping programs provided substantially different TSS reduction rates depending on the annual rainfall record selected for the simulation. It is speculated by the authors of the WinSLAMM model that this is the result of interactions between the randomness of rainfall events and the fixed schedule of sweeping. For example, if one rainfall record has comparatively more rainfall events on Mondays while street sweeping occurs consistently on Tuesdays then many of the pollutants that would be captured by the sweeper will have been washed off by the previous day's rainfall. On the other hand, if rainfalls occur more commonly at the end of the week, then the Tuesday sweeping schedule will capture comparatively more sediment, as there will be more 'dry' days of accumulation prior to the sweeping event. By running five years of rainfall data through

the model it was felt that the impact of the randomness of rainfall occurrences would be reduced.

A WinSLAMM model was created that contained only areas of the City which did not drain to a structural BMP. This was done due to the fact that in general, street sweeping is a much less-efficient practice than structural BMPs. It was determined that the City's current street sweeping program removed approximately 14% of the TSS generated by urban areas on an annual basis.

2.5 STRUCTURAL BMPs

There are currently 58 structural stormwater quality management devices within the City of Fitchburg's storm water management system. The City's engineering department provided construction plans for most devices documenting necessary geometric data such as storage volume and outlet device configuration. Those BMPs where plan information was not available were visually inspected and necessary geometry data was estimated. The location of each BMP was identified in GIS and the drainage area tributary to each device was delineated. The land use and soil characteristics of each BMP drainage area were determined by intersecting the land use-soil type and BMP drainage area shapefiles in GIS, and summing the area of each land use and soil type within each drainage area. This information was used to create a WinSLAMM model of four sections of the watershed: Dunn's Marsh, West of Fish Hatchery, South of McKee Road, and East of Fish Hatchery. The WinSLAMM model determined TSS removal rates for each of these areas. When sweeping practice rates are factored in, and results are summarized below in Table 4.

TABLE 4
City of Fitchburg
Calculated TSS Reductions

Subwatershed	Area (ac)	TSS Load		TSS Reduction
		(lbs/yr)	(lbs/acre/yr)	
Dunn's Marsh	1365	400002	293	38.8%
Seminole to Fish Hatchery	951	207520	218	40.51%
South of McKee Road	1300	406347	313	42.86%
East of Fish Hatchery	4361	614276	141	12.91%
TOTAL	7977	1628145	204	30.1%

Locations for other potential additional structural BMPs or retrofits to existing structural BMPs were selected according to recommendations made in previous studies and through interviews with City staff. Alternative BMPs were assumed to be wet detention ponds with permanent pool depths of three feet and live storage depths equal to three feet plus the diameter of the existing storm sewer pipe that will serve the basin. It was assumed that pond outflows would be restricted by an outlet structure consisting of a low-flow

orifice with a minimum size of four inches. It also was assumed that each pond would have a weir overflow outlet at an elevation one-half foot below the top of the live storage maximum depth. With these structural BMPs in place, the WinSLAMM model was re-run to determine the additional benefit to the Creek that these BMP improvements could provide. The results are summarized below in Table 5.

TABLE 5
City of Fitchburg
Recommended BMP Improvements

	WinSLAMM ID	BMP Name	Subwatershed	Existing TSS Load (lbs/yr)	Existing TSS Trapped (lbs/yr)	Potential TSS Trapped (lbs/yr)	Details
1	1610	Pine Ridge Dry	1	1234	0	987 ²	Convert to Biofilter
2	1621	Seminole Village	1	28047	10611	16828 ²	Construct Dividing Berm
3	1626	Business Park B	1	9949	7570	1040	Disconnect 1027 from 1626
4	1657-1	Renaissance North	1	1296	73	970	Convert to Wet, Improve Outlet
5	1700	Nicolet	1	41918	0	25151 ²	Convert to Wet Pond
6	1040	Casa del Sol East	2	6808	208	412	Disconnect 1041 from 1040
7	1043-1	Hatchery Hill	2	1415	0	214	Disconnect 1043-2 from 1043-1
8	1110	Nine Springs	2	9567	8649.3	12267	Drain additional area to pond
9	1520	Seminole Hills	2	16277	105	9359	Modify Outlet
10	2100	McKee Park North	3	88758	2083	71006	Alum Addition
11	2110-1	McKee Park South	3	130222	46281	104178	Alum Addition
12	2110-2	McKee Park SW ¹	3	132866	-	47879 ²	Construct new wet pond
13	3000	Lacy Heights	3	8371	0	1960 ²	Convert to Biofilter
14	630	Area H ¹	4	15601	0	12481	Construct new Wet Pond
15	1000	Fish Hatchery East ¹	4	57214	-	44751 ²	Construct new Wet Pond

1. BMP to be constructed in future

2. Estimated according to TSS reduction rates identified in WDNR Conservation Practice Standard 1001

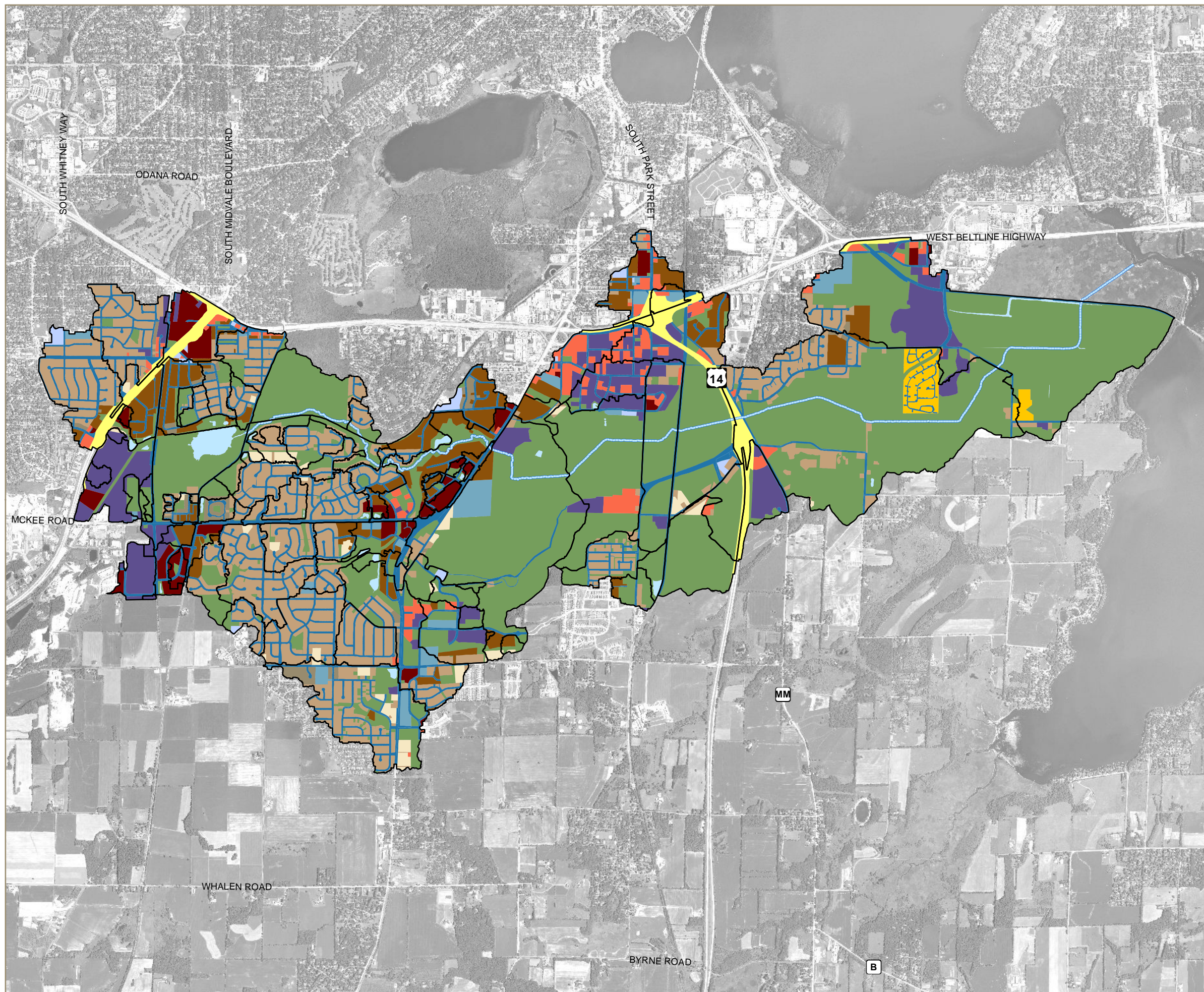
Standard Land Use File - Percentage of Source Area Type and Connectivity by Land Use

City of Fitchburg

Land Use	Flat Roof		Pitched Roof		Driveway		Sidewalk		Parking		Landscape		Undev	Isolated	Street Area		
	DCIA	Unconn.	DCIA	Unconn.	DCIA	Unconn.	DCIA	Unconn.	DCIA	Unconn.	Large	Small					
Non-Right-of-Way Areas	Low Density Residential (LDR)	0.00%	0.00%	1.78%	5.65%	3.30%	1.35%	0.47%	0.47%	0.00%	0.00%	0.00%	84.80%	0.00%	2.18%	0.00%	100% of roofs are pitched, 24% directly connected roofs, 71% driveway and 50% sidewalk are DC. Pools entered as isolated.
	Multi Family Residential (MFR)	4.49%	0.00%	17.36%	3.96%	7.15%	3.37%	2.03%	2.03%	25.06%	0.00%	3.39%	27.17%	3.39%	0.00%	0.00%	Roofs divided 17/83/15 into flat DC/pitched DC/pitched unconn. Parking is 100% DC. Driveway is 68% DC. Sidewalk is 50% DC. Pervious areas split 10/80/10 into large/small/undeveloped.
	Medium Density Residential (MDR)	0.00%	0.00%	5.63%	13.13%	4.65%	1.55%	1.85%	1.85%	18.17%	6.06%	0.00%	38.19%	0.00%	8.92%	0.00%	100% of roofs are pitched, 30% directly connected roofs, 75% driveway/parking and 50% sidewalk are DC. Pools entered as isolated.
	Duplex Residential	0.00%	0.00%	3.96%	10.69%	5.87%	0.00%	4.25%	0.00%	0.00%	0.00%	0.00%	75.23%	0.00%	0.00%	0.00%	100% of roofs are pitched, 27% directly connected roofs, 100% driveway and sidewalk are DC
	Mobile Homes	14.08%	0.00%	0.00%	0.00%	3.46%	0.00%	0.83%	0.83%	0.63%	0.03%	0.00%	80.14%	0.00%	0.00%	0.00%	Roofs are 100% flat DC. Parking is 96% DC. Driveway is 100% DC. Sidewalk is 50% DC. Pervious assigned to small landscape.
	School	26.40%	0.00%	0.00%	0.00%	0.00%	0.00%	6.85%	0.00%	46.07%	2.42%	9.23%	9.23%	0.00%	0.00%	0.00%	Roofs are 100% flat DC. Parking is 95% DC. All other impervious are 100% DC. Pervious split 50/50 between large landscape/small landscape.
	General Institutional	3.36%	0.00%	5.35%	0.36%	6.36%	0.00%	2.12%	0.00%	17.68%	1.75%	12.61%	50.41%	0.00%	0.00%	0.00%	Roofs divided 37/75/14 into flat DC/pitched DC/pitched unconn, 100% dwg/sidewalk are DC, parking is 91% DC, pervious areas split 20/80 large landscape/small landscape
	Shopping Center	20.21%	0.00%	0.00%	0.00%	4.77%	0.00%	5.24%	0.00%	43.45%	0.00%	0.00%	15.79%	10.54%	0.00%	0.00%	Roofs are 100% flat DC. All other impervious are 100% DC. Pervious split 60/40 between small landscape/undeveloped.
	Strip Commercial	27.72%	0.00%	0.00%	0.00%	0.00%	0.00%	0.63%	0.00%	50.42%	1.56%	0.00%	19.67%	0.00%	0.00%	0.00%	Roofs are 100% flat DC. Parking is 97% DC. All other impervious are 100% DC. Pervious assigned to small landscape.
	Light Industrial (LI)	14.63%	16.3%	1.81%	0.00%	5.19%	0.00%	1.04%	0.00%	26.76%	5.48%	8.69%	26.08%	8.69%	0.00%	0.00%	Roofs divided 81/9/10 into flat DC/flat unconn/pitched DC. Parking is 83% DC. All other impervious is DC. Pervious areas split 20/80/20 into large/small/undeveloped.
Open	0.68%	0.00%	0.00%	0.00%	0.00%	0.00%	3.84%	0.00%	0.78%	0.00%	0.00%	0.00%	94.70%	0.00%	0.00%	Roofs 100% flat, all impervious is DC. Pervious areas are assigned undeveloped.	
Right-of-Way Areas	Low Density Residential (LDR)	0.00%	0.00%	0.00%	0.00%	0.67%	0.00%	2.31%	0.00%	0.00%	0.00%	0.00%	27.85%	0.00%	0.00%	69.17%	Curb-mile: area ratio will be 0.46 - implies 36' street, typical for Fitchburg. All impervious areas are directly connected.
	Multi Family Residential (MFR)	0.00%	0.00%	0.00%	0.00%	0.02%	0.00%	7.06%	0.00%	0.19%	0.00%	0.00%	52.07%	0.00%	0.00%	40.66%	Curb-mile: area ratio will be 0.46 - implies 36' street, typical for Fitchburg. All impervious areas are directly connected.
	Medium Density Residential (MDR)	0.00%	0.00%	0.00%	0.00%	2.61%	0.00%	4.00%	0.00%	0.00%	0.00%	0.00%	36.15%	0.00%	0.00%	57.24%	Curb-mile: area ratio will be 0.46 - implies 36' street, typical for Fitchburg. All impervious areas are directly connected.
	Duplex Residential	0.00%	0.00%	0.00%	0.00%	6.55%	0.00%	9.23%	0.00%	0.00%	0.00%	0.00%	29.45%	0.00%	0.00%	54.77%	Curb-mile: area ratio will be 0.46 - implies 36' street, typical for Fitchburg. All impervious areas are directly connected.
	Mobile Homes	0.00%	0.00%	0.00%	0.00%	1.16%	0.00%	0.94%	0.00%	12.02%	0.00%	0.00%	12.73%	0.00%	0.00%	73.15%	Curb-mile: area ratio will be 0.46 - implies 36' street, typical for Fitchburg. All impervious areas are directly connected.
	School	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	11.80%	0.00%	5.61%	0.00%	0.00%	19.62%	0.00%	0.00%	62.97%	Curb-mile: area ratio will be 0.46 - implies 36' street, typical for Fitchburg. All impervious areas are directly connected.
	General Institutional	0.00%	0.00%	0.00%	0.00%	0.20%	0.00%	6.88%	0.00%	0.00%	0.00%	0.00%	44.78%	0.00%	0.00%	48.34%	Curb-mile: area ratio will be 0.46 - implies 36' street, typical for Fitchburg. All impervious areas are directly connected.
	Shopping Center	0.00%	0.00%	0.00%	0.00%	0.01%	0.00%	11.06%	0.00%	0.65%	0.00%	0.00%	33.55%	0.00%	0.00%	54.73%	Curb-mile: area ratio will be 0.27 - similar to SLU data originally developed for SLAMM.
	Strip Commercial	0.00%	0.00%	0.00%	0.00%	0.86%	0.00%	6.09%	0.00%	2.46%	0.00%	0.00%	47.91%	0.00%	0.00%	42.68%	Curb-mile: area ratio will be 0.40 - similar to SLU data originally developed for SLAMM.
	Light Industrial (LI)	0.00%	0.00%	0.00%	0.00%	1.55%	0.00%	8.19%	0.00%	2.21%	0.00%	0.00%	58.01%	0.00%	0.00%	30.04%	Curb-mile: area ratio will be 0.46 - implies 36' street, typical for Fitchburg. All impervious areas are directly connected.
Open	0.00%	0.00%	0.00%	0.00%	3.33%	0.00%	6.21%	0.00%	0.00%	0.00%	0.00%	42.42%	0.00%	0.00%	48.04%	Curb-mile: area ratio will be 0.46 - implies 36' street, typical for Fitchburg. All impervious areas are directly connected.	

DRAFT

LAND USE

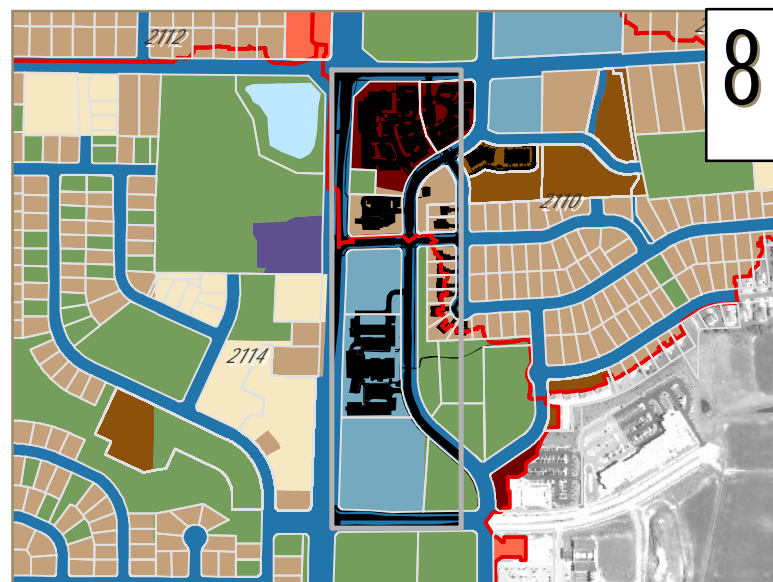
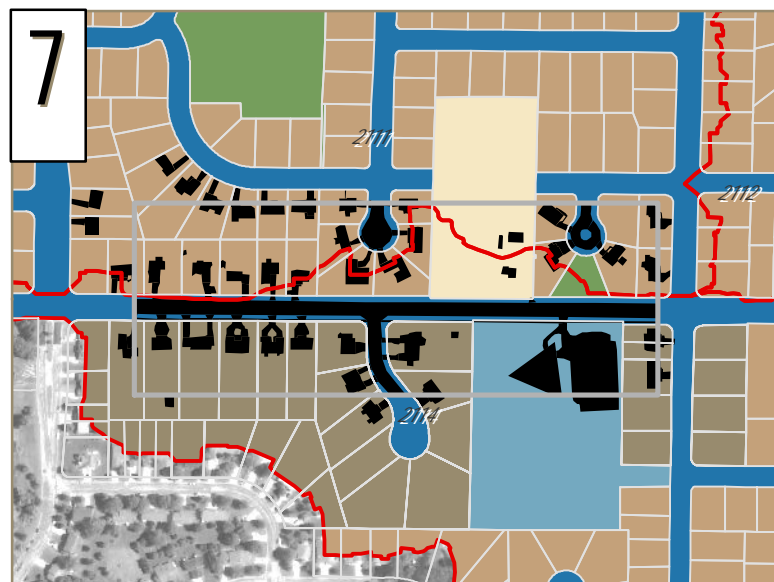
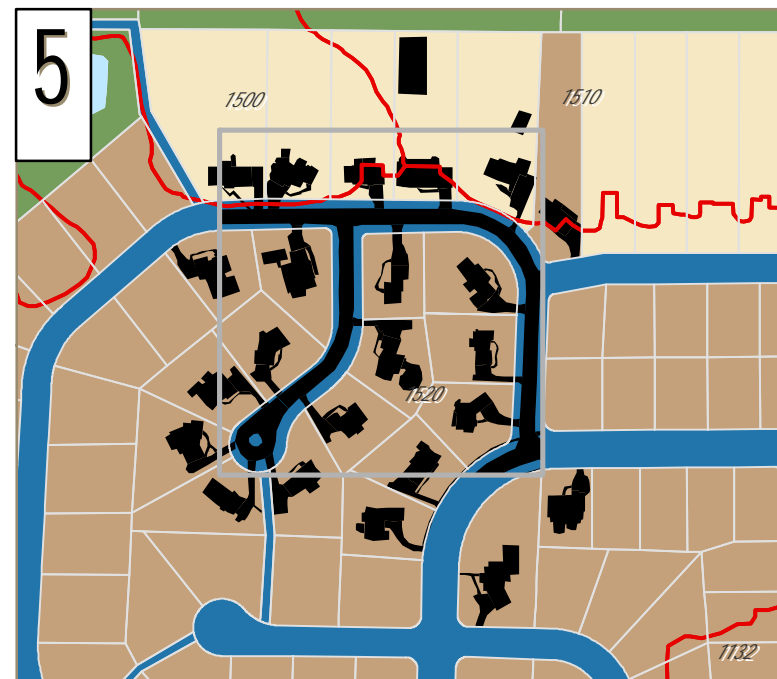
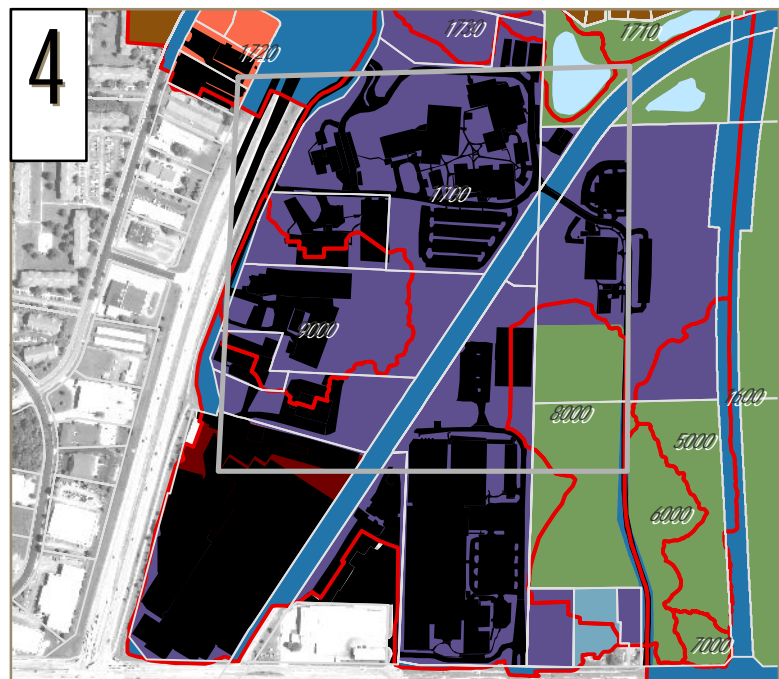
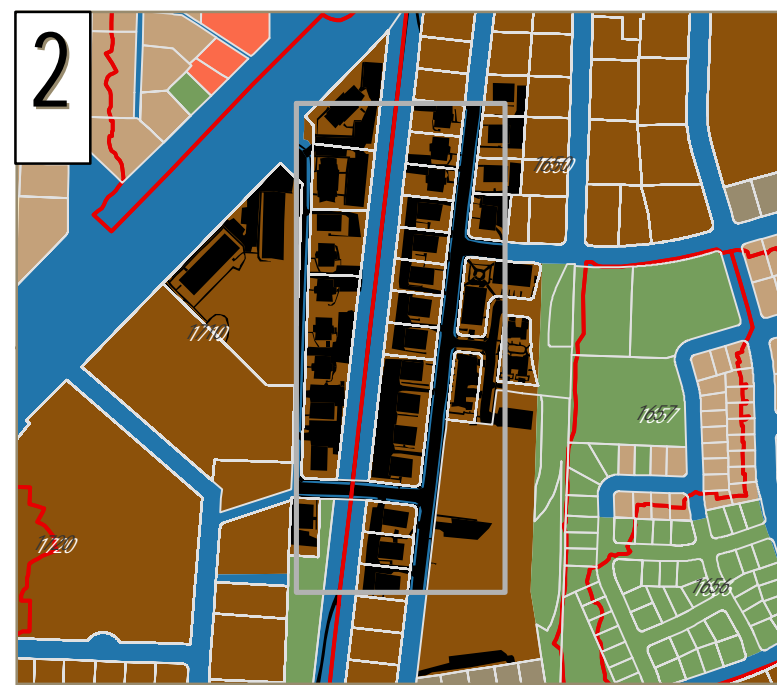
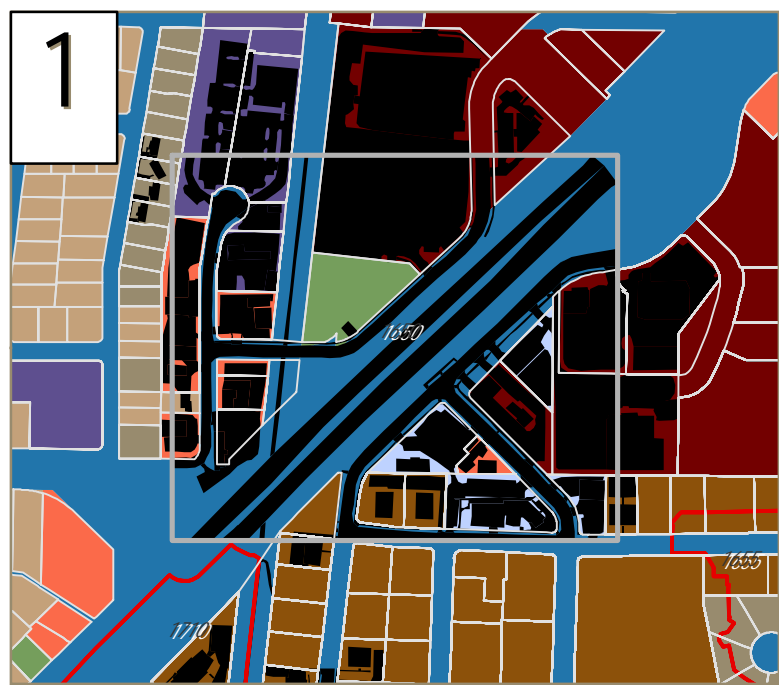


-  NINE SPRINGS CREEK
-  WATERSHED
- LAND USE (WINSLamm CODING)
-  SHOPPING CENTER
-  STRIP COMMERCIAL
-  LIGHT INDUSTRIAL
-  MOB HOMES
-  MULTI-FAMILY RESIDENTIAL
-  DUPLEX
-  MEDIUM DENSITY RESIDENTIAL
-  LIGHT DENSITY RESIDENTIAL
-  INSTITUTIONAL
-  SCHOOL
-  HWY
-  TRANSPORTATION
-  OPEN SPACE
-  WATER

DATA SOURCES:
 LAND USE DATA BASED ON DANE COUNTY LAND USE,
 MODIFIED BY MSA FOR WINSLamm.
 WATERSHED BOUNDARIES PROVIDED BY MSA (09/18/2013).
 AERIAL IMAGERY PROVIDED BY USDA (NAIP 2010).

FITCHBURG
 DANE COUNTY, WISCONSIN





IMPERVIOUS AREA DIGITIZATION

- Digitization Area
 - Parcel
 - Select Digitized Impervious Areas
 - Watershed
- Land Use (WinSLAMM Coding)*
- Downtown Commercial
 - Shopping Center
 - Strip Commercial
 - Light Industrial
 - Multi-Family Residential
 - Duplex
 - Medium Density Residential
 - Light Density Residential
 - Institutional
 - School
 - Transportation
 - Open Space
 - Water

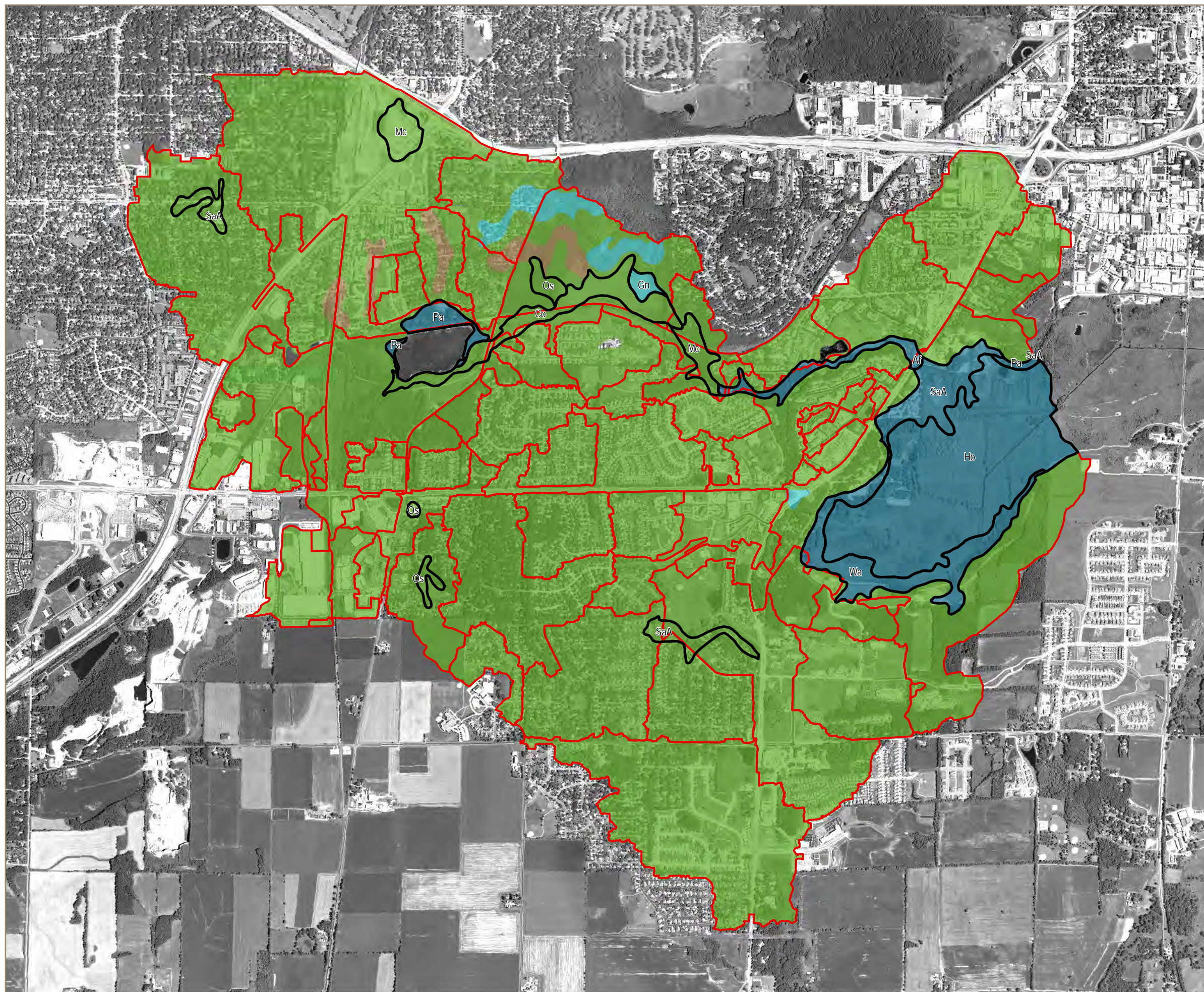
DATA SOURCES:
BASE DATA FROM CITY
AERIAL FROM USDA, NAIP 2010

CITY OF FITCHBURG
DANE COUNTY, WI



E

SOIL CLASSIFICATION



Watershed

Soil Classification (WinSLAMM Coding)

A: Sand

B: Silt

C: Clay

D: Clay

Soils with A/D or B/D Classification

Af: Alluvial land, wet (B/D)

Co: Colwood silt loam (B/D)

Gn: Granby loamy sand (A/D)

Ho: Houghton muck (A/D)

Wa: Wacousta silty clay loam (B/D)

Mc: Marsha silt loam (B/D)

Os: Orion silt loam, wet (B/D)

Pa: Palms muck (A/D)

Houghton muck, Palms muck, Alluvial land, and Wacousta silty clay loam were assigned a poorly drained classification (D).

Colwood silt loam, Granby loamy sand, Marsha silt loam, and Orion silt loam were assigned a draining classification (A or B).

Sable silty clay loam was assigned a draining classification (B) in urban areas, and a poorly draining classification (D) in undeveloped areas.

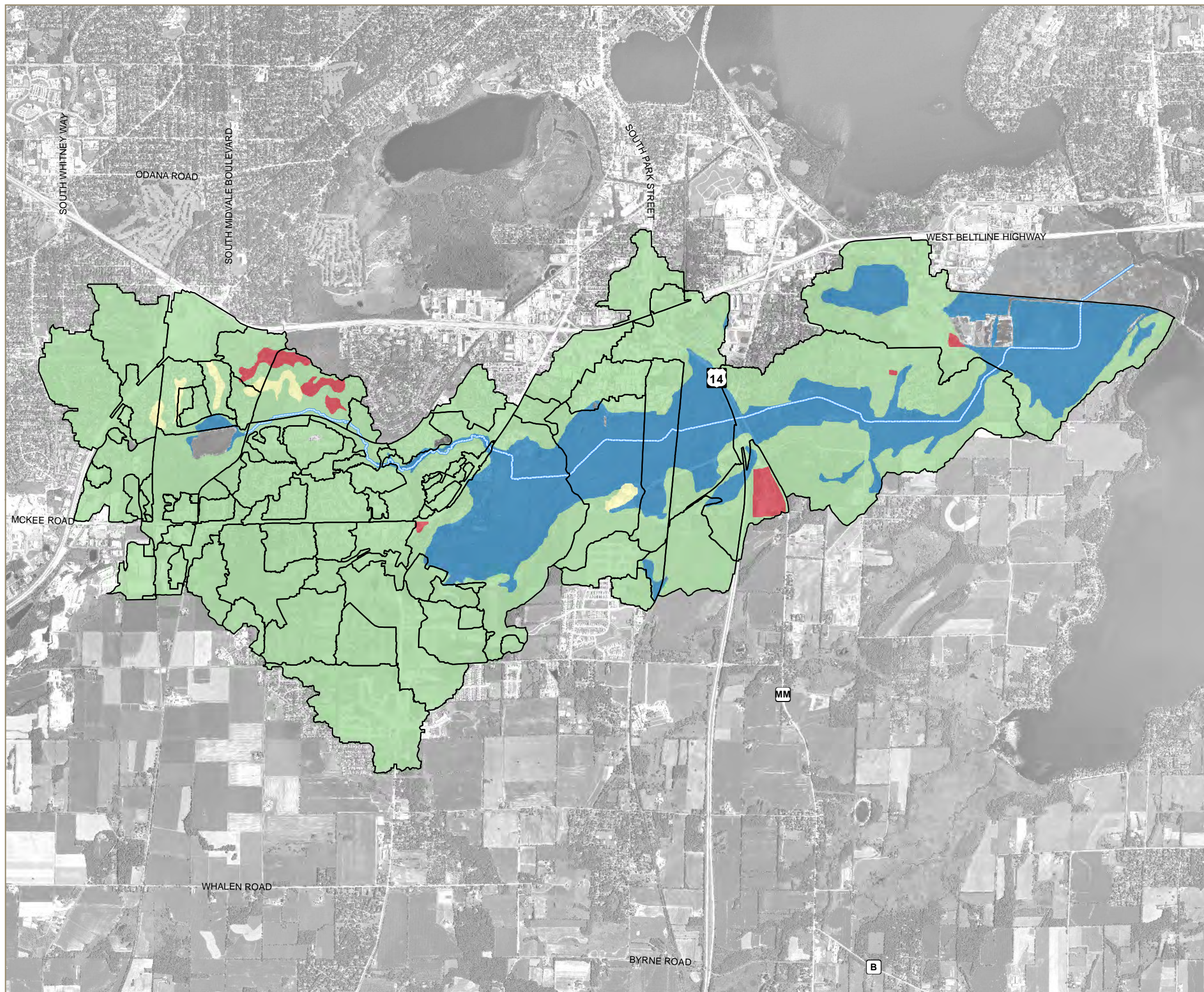
DATA SOURCES:
BASE DATA PROVIDED BY COUNTY.
AERIAL IMAGERY PROVIDED BY USDA, NAIP 2010.

CITY OF FITCHBURG
DANE COUNTY, WI

MSA
PROFESSIONAL SERVICES



SOILS



 NINE SPRINGS CREEK

 WATERSHED

SOIL: WINSLAMM CODING

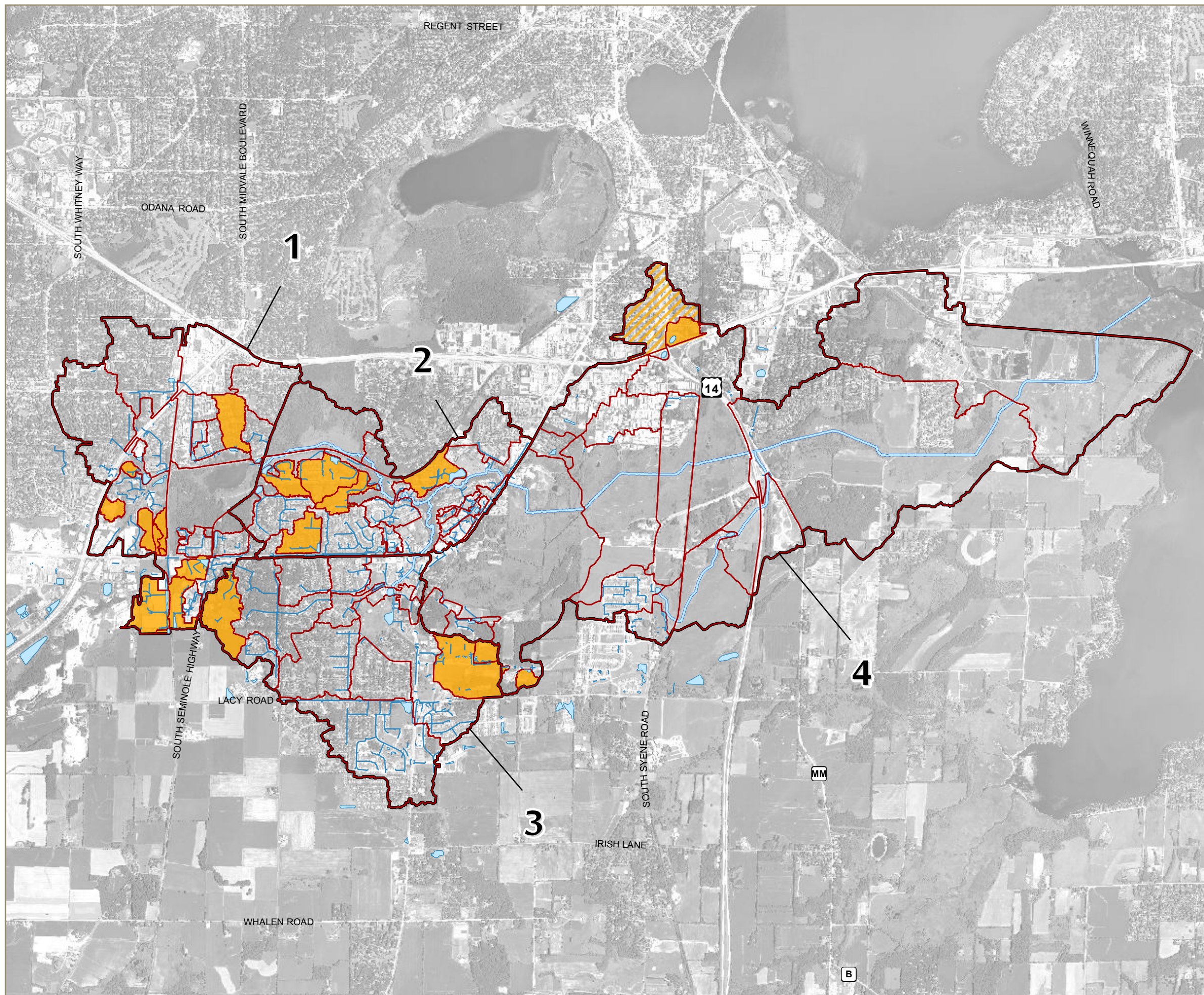
-  A
-  B
-  C
-  D








DATA SOURCES:
SOILS FROM USDA,
MODIFIED BY MSA TO ACCOUNT FOR A/D AND B/D CLASSIFICATIONS.
WATERSHED BOUNDARIES PROVIDED BY MSA (09/18/2013).
AERIAL IMAGERY PROVIDED BY USDA (NAIP 2010).

FITCHBURG
DANE COUNTY, WISCONSIN



WATERSHEDS AND TMDL REQUIREMENTS



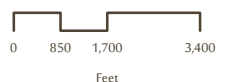
-  WINSLamm MODEL AREA
-  WATERSHEDS
-  CURRENTLY MEETS TMDL
-  LIKELY MEETS TMDL REQUIREMENTS
-  STORM PIPE
-  NINE SPRINGS CREEK
-  BMP POND

WINSLamm AREAS:

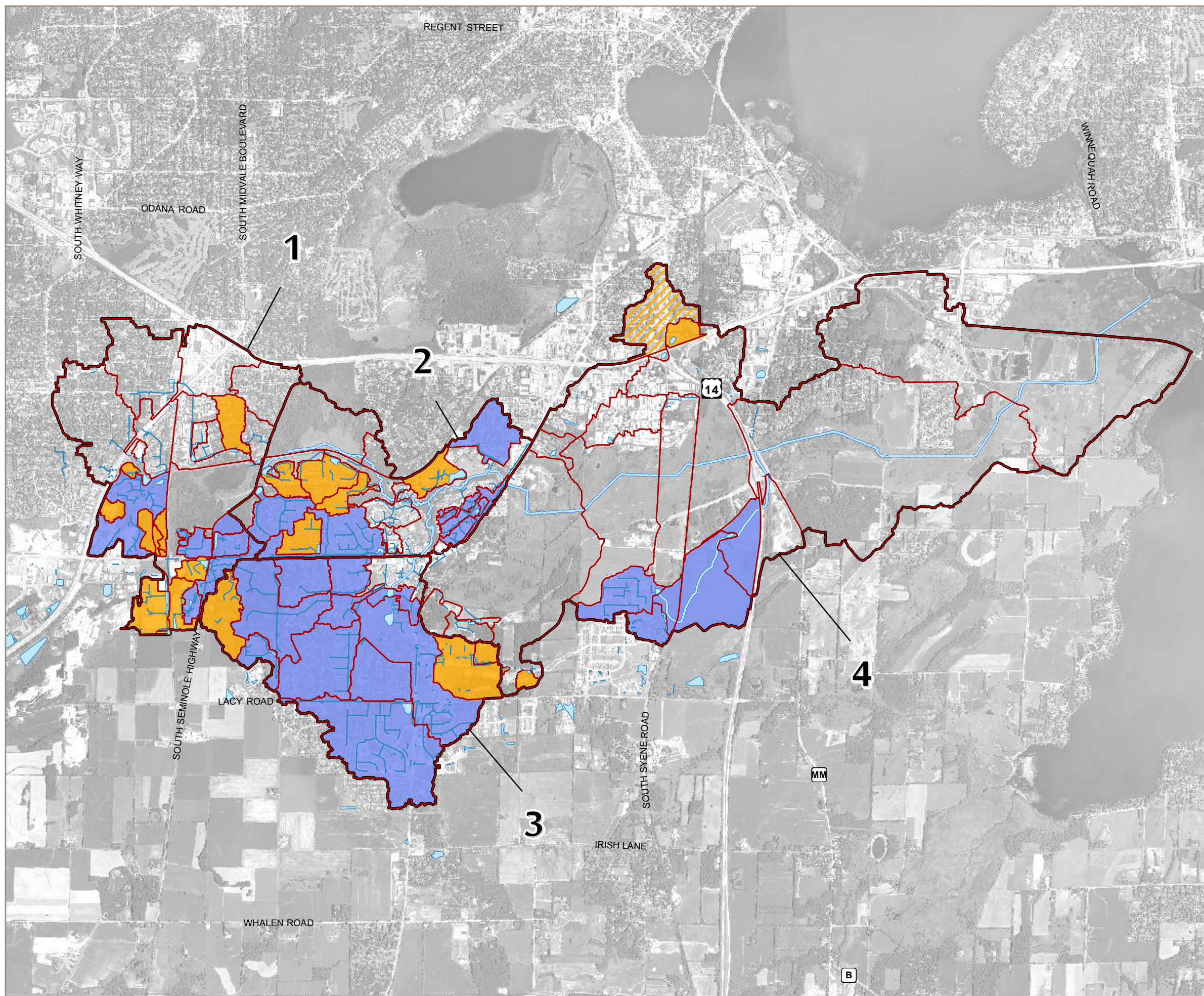
- 1 DUNN'S MARSH
- 2 WEST OF FISH HATCHERY ROAD
- 3 SOUTH OF MCKEE ROAD
- 4 EAST OF FISH HATCHERY ROAD









DATA SOURCES:
 STORM PIPES AND BMP POND S PROVIDED BY THE CITY OF FITCHBURG.
 WATERSHED BOUNDARIES PROVIDED BY MSA (07/23/2013).
 AERIAL IMAGERY PROVIDED BY USDA (NAIP 2010).

FITCHBURG
 DANE COUNTY, WISCONSIN



WATERSHEDS AND TMDL REQUIREMENTS

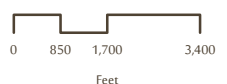


-  WINSLamm MODEL AREA
-  WATERSHEDS
-  CURRENTLY MEETS TMDL REQUIREMENTS
-  LIKELY MEETS TMDL REQUIREMENTS
-  WILL MEET TMDL REQUIREMENTS AFTER IMPROVEMENTS
-  STORM PIPE
-  NINE SPRINGS CREEK
-  BMP POND

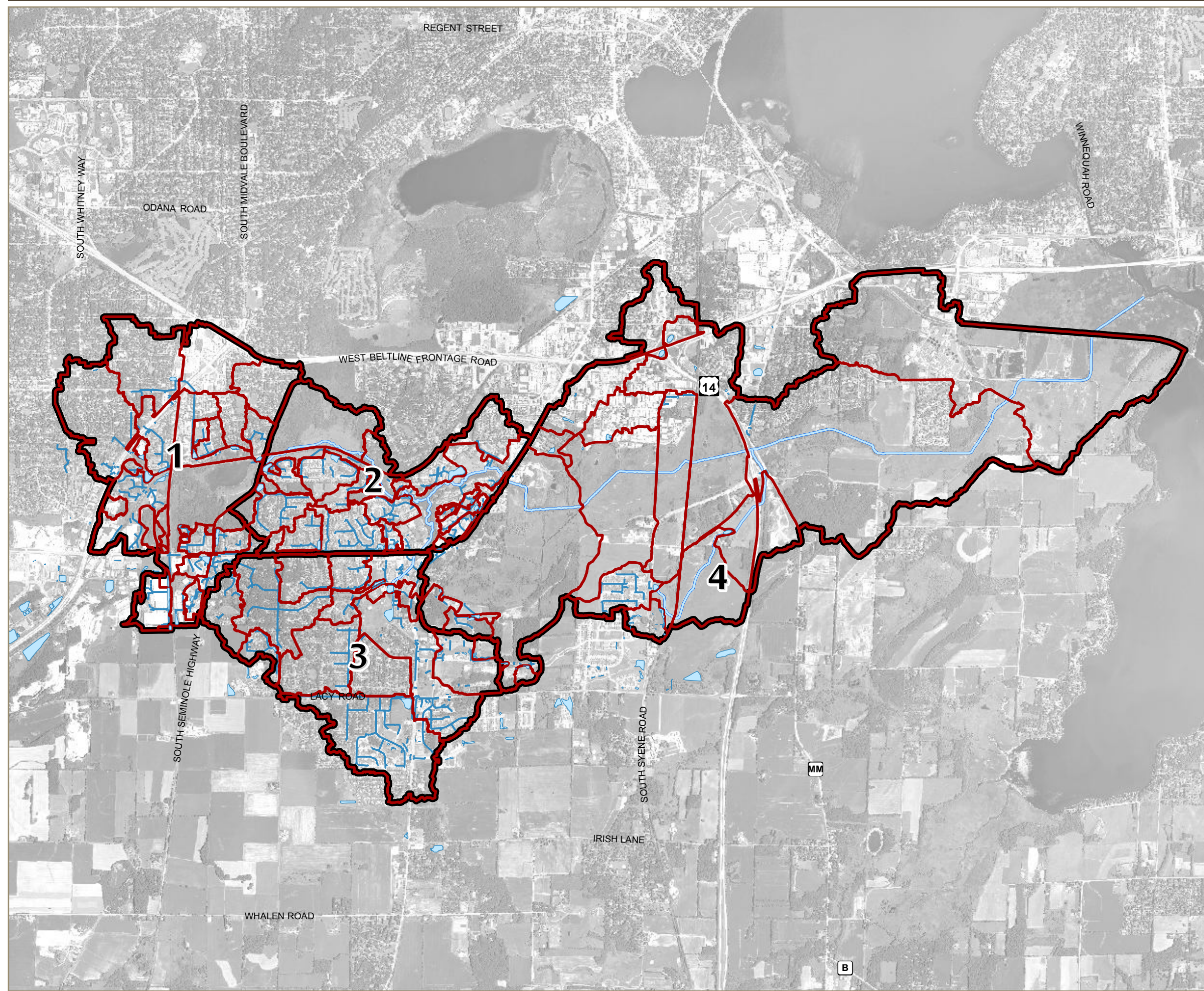
- WINSLamm AREAS:**
- 1 DUNN'S MARSH
 - 2 WEST OF FISH HATCHERY ROAD
 - 3 SOUTH OF MCKEE ROAD
 - 4 EAST OF FISH HATCHERY ROAD






DATA SOURCES:
 STORM PIPES AND BMP POND PROVIDED BY THE CITY OF FITCHBURG.
 WATERSHED BOUNDARIES PROVIDED BY MSA (07/23/2013).
 AERIAL IMAGERY PROVIDED BY USDA (NAIP 2010).

FITCHBURG
 DANE COUNTY, WISCONSIN



WATERSHEDS: STUDY AREA

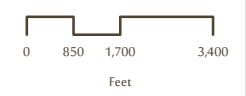


-  WINSLAMM MODEL
-  WATERSHEDS
-  STORM PIPE
-  NINE SPRINGS CREEK
-  BMP

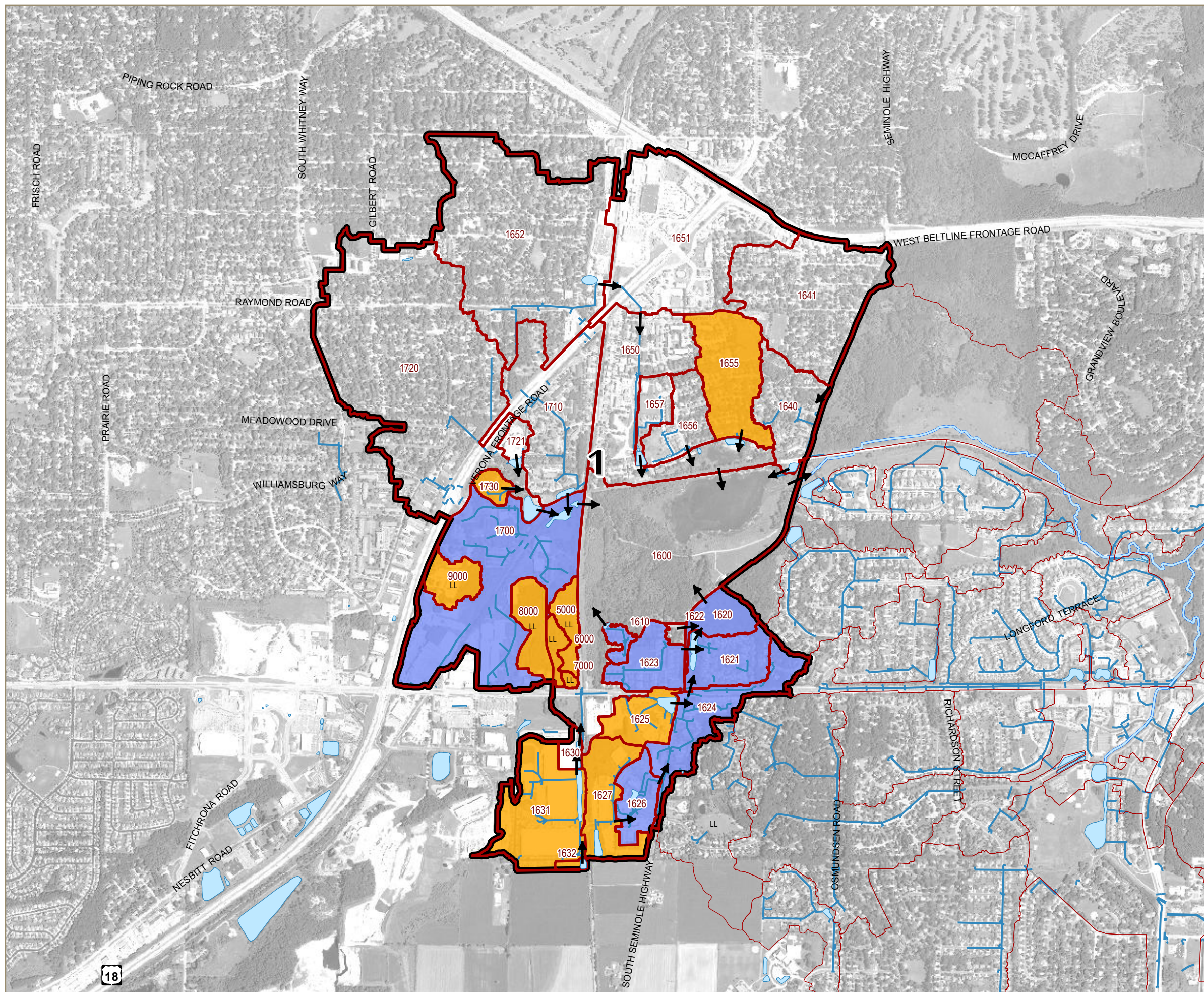
- WINSLAMM AREAS:**
- 1 DUNN'S MARSH
 - 2 WEST OF FISH HATCHERY ROAD
 - 3 SOUTH OF MCKEE ROAD
 - 4 EAST OF FISH HATCHERY ROAD











DATA SOURCES:
STORM PIPES AND BMP POND LOCATIONS PROVIDED BY THE CITY OF FITCHBURG.
WATERSHED BOUNDARIES PROVIDED BY MSA (07/23/2013).
AERIAL IMAGERY PROVIDED BY USDA (NAIP 2010).

FITCHBURG
DANE COUNTY, WISCONSIN



WATERSHEDS: DUNN'S MARSH



-  WINSLAMM MODEL
-  WATERSHEDS
-  CURRENTLY MEETS TMDL
-  LIKELY MEETS TMDL REQUIREMENTS
-  WILL MEET TMDL REQUIREMENTS
-  WATERSHED FLOW DIRECTION
-  LL LANDLOCKED
-  STORM PIPE
-  NINE SPRINGS CREEK
-  BMP

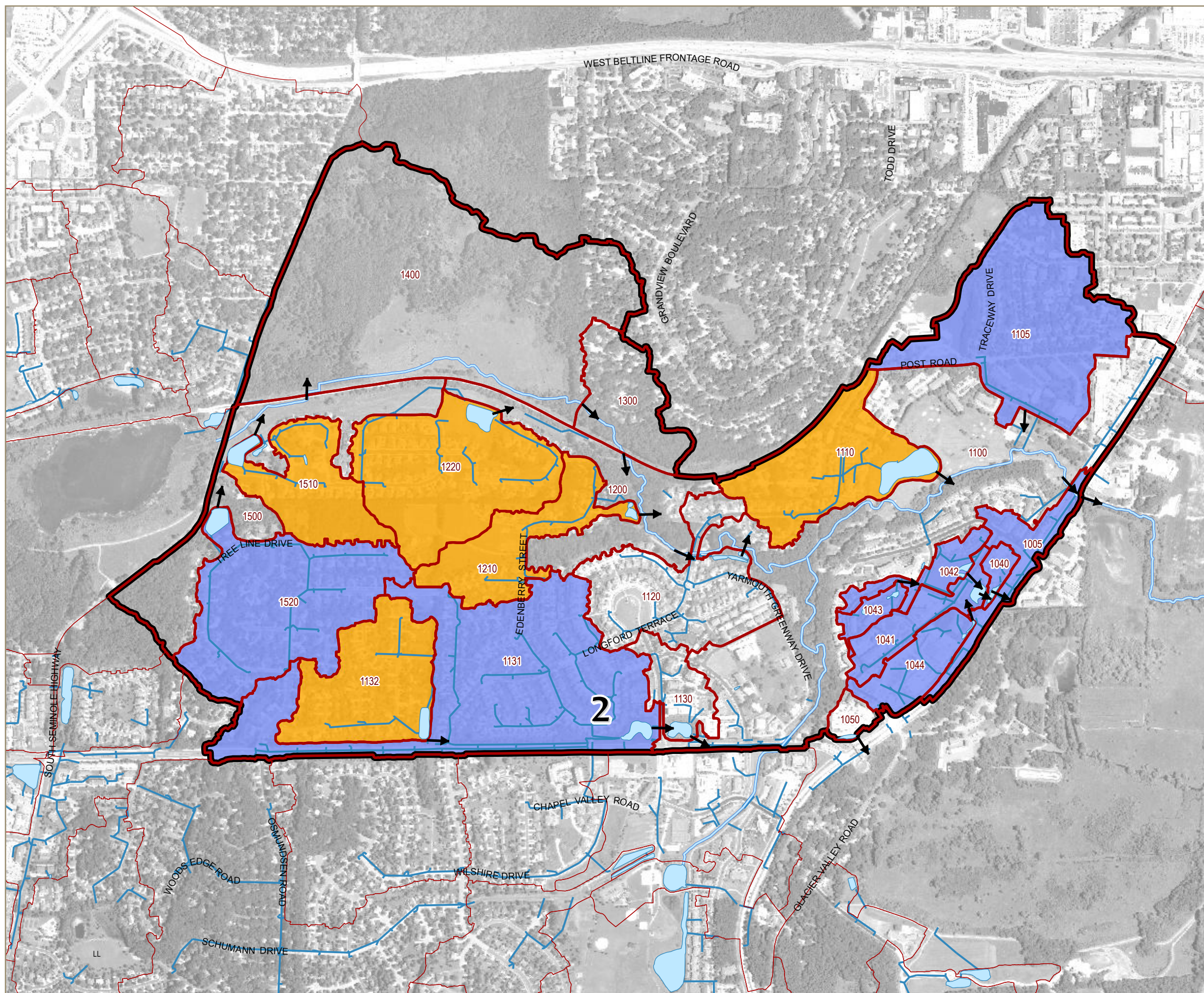
- WINSLAMM AREAS:**
- 1 DUNN'S MARSH
 - 2 WEST OF FISH HATCHERY ROAD
 - 3 SOUTH OF MCKEE ROAD
 - 4 EAST OF FISH HATCHERY ROAD











DATA SOURCES:
STORM PIPES AND BMP POND PROVIDED BY THE CITY OF FITCHBURG.
WATERSHED BOUNDARIES PROVIDED BY MSA (07/23/2013).
AERIAL IMAGERY PROVIDED BY USDA (NAIP 2010).

FITCHBURG
DANE COUNTY, WISCONSIN



WATERSHEDS: WEST OF FISH HATCHERY ROAD



-  WINSLAMM MODEL
-  WATERSHEDS
-  CURRENTLY MEETS TMDL
-  LIKELY MEETS TMDL REQUIREMENTS
-  WILL MEET TMDL REQUIREMENTS
-  WATERSHED FLOW DIRECTION
-  LL LANDLOCKED
-  STORM PIPE
-  NINE SPRINGS CREEK
-  BMP

WINSLAMM AREAS:

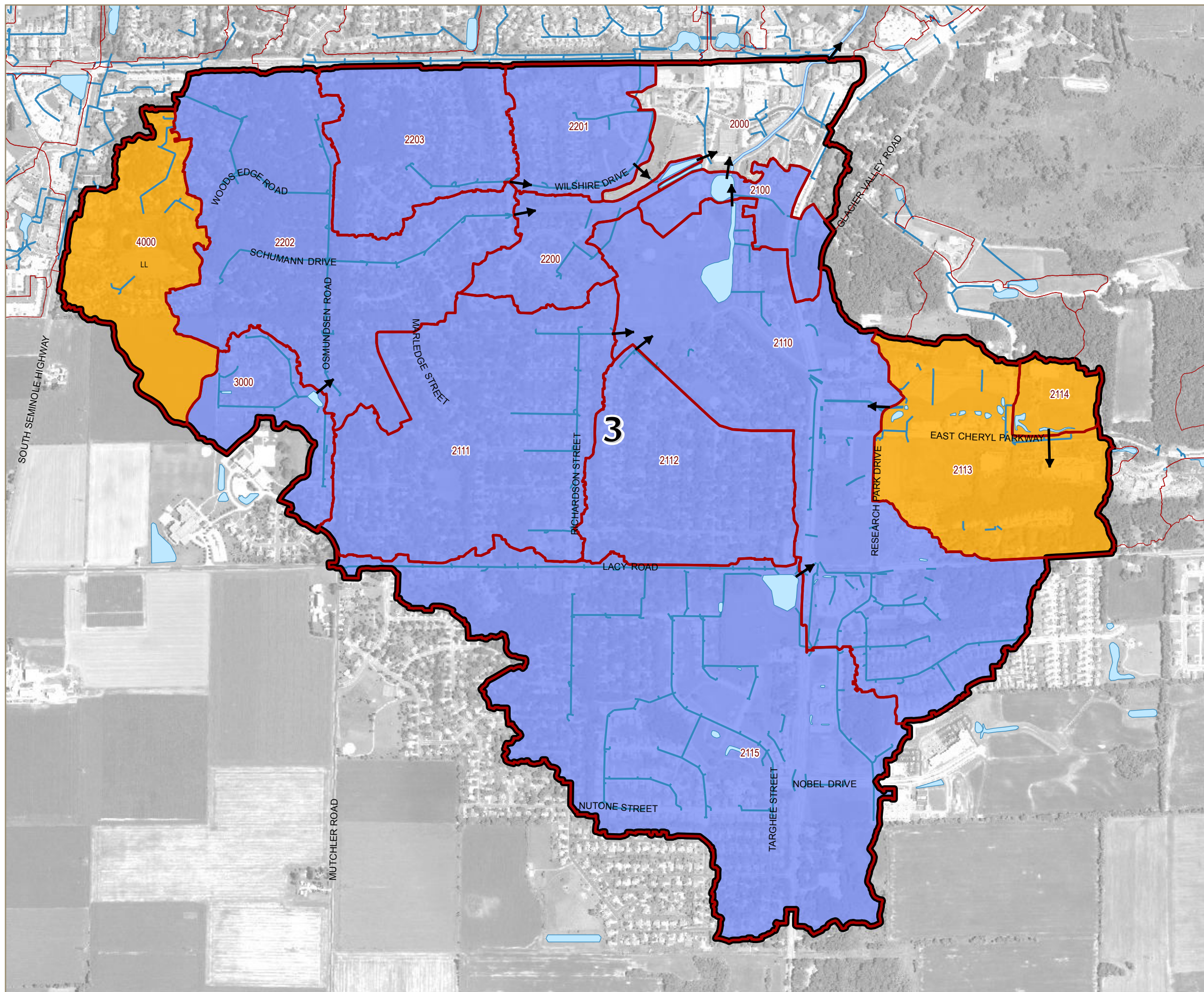
- 1 DUNN'S MARSH
- 2 WEST OF FISH HATCHERY ROAD
- 3 SOUTH OF MCKEE ROAD
- 4 EAST OF FISH HATCHERY ROAD

DATA SOURCES:
STORM PIPES AND BMP POND PROVIDED BY THE CITY OF FITCHBURG.
WATERSHED BOUNDARIES PROVIDED BY MSA (07/23/2013).
AERIAL IMAGERY PROVIDED BY USDA (NAIP 2010).

FITCHBURG
DANE COUNTY, WISCONSIN



WATERSHEDS: SOUTH OF MCKEE ROAD



- WINSLAMM MODEL
- WATERSHEDS
- CURRENTLY MEETS TMDL
- LIKELY MEETS TMDL REQUIREMENTS
- WILL MEET TMDL REQUIREMENTS
- WATERSHED FLOW DIRECTION
- LANDLOCKED
- STORM PIPE
- NINE SPRINGS CREEK
- BMP

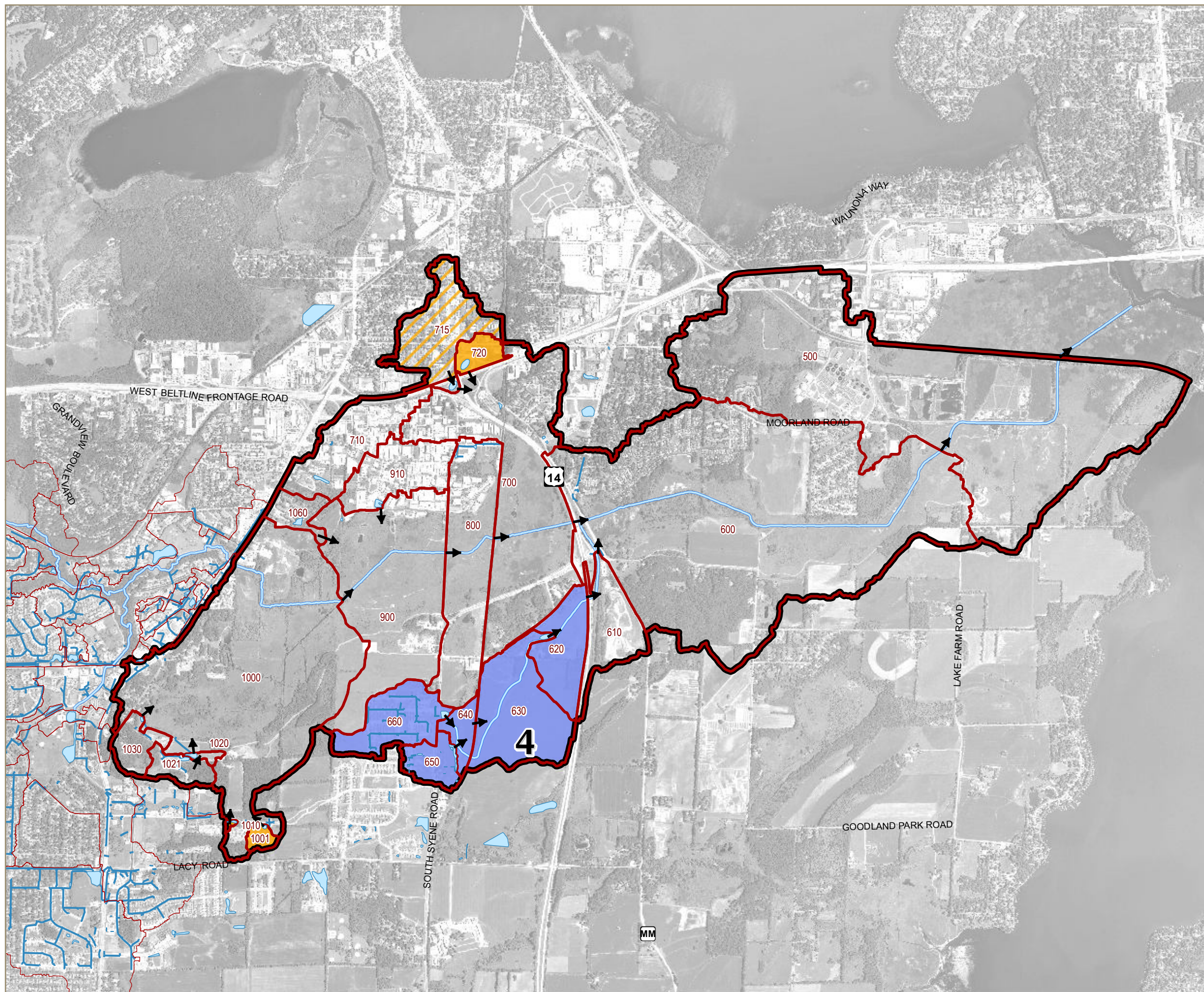
- WINSLAMM AREAS:**
- 1 DUNN'S MARSH
 - 2 WEST OF FISH HATCHERY ROAD
 - 3 SOUTH OF MCKEE ROAD
 - 4 EAST OF FISH HATCHERY ROAD











DATA SOURCES:
STORM PIPES AND BMP/PONDS PROVIDED BY THE CITY OF FITCHBURG.
WATERSHED BOUNDARIES PROVIDED BY MSA (07/23/2013).
AERIAL IMAGERY PROVIDED BY USDA (NAIP 2010).

FITCHBURG
DANE COUNTY, WISCONSIN



WATERSHEDS: EAST OF FISH HATCHERY ROAD



-  WINSLAMM MODEL
-  WATERSHEDS
-  CURRENTLY MEETS TMDL
-  LIKELY MEETS TMDL REQUIREMENTS
-  WILL MEET TMDL REQUIREMENTS
-  WATERSHED FLOW DIRECTION
-  LL LANDLOCKED
-  STORM PIPE
-  NINE SPRINGS CREEK
-  BMP

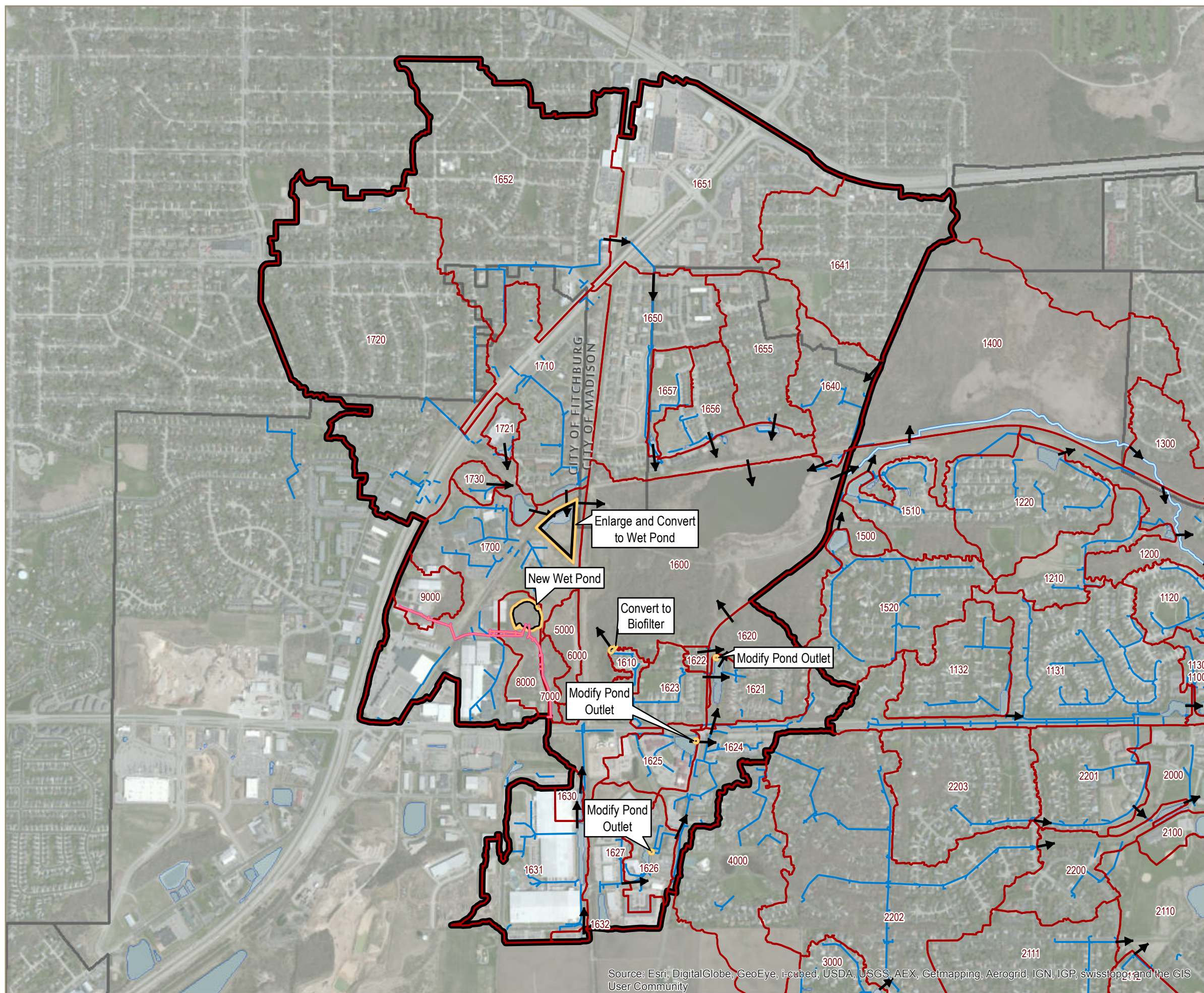
- WINSLAMM AREAS:**
- 1 DUNN'S MARSH
 - 2 WEST OF FISH HATCHERY ROAD
 - 3 SOUTH OF MCKEE ROAD
 - 4 EAST OF FISH HATCHERY ROAD

DATA SOURCES:
STORM PIPES AND BMP POND S PROVIDED BY THE CITY OF FITCHBURG.
WATERSHED BOUNDARIES PROVIDED BY MSA (07/23/2013).
AERIAL IMAGERY PROVIDED BY USDA (NAIP 2010).

FITCHBURG
DANE COUNTY, WISCONSIN



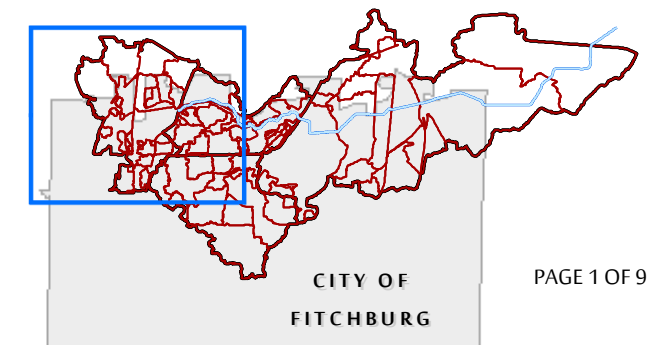
PROPOSED BMP IMPROVEMENTS: DUNN'S MARSH



LEGEND

- PROPOSED BMP IMPROVEMENT
- WATERSHEDS
- WINSLamm MODEL AREA
- NINE SPRINGS CREEK
- STORM PIPE
- PROPOSED STORMLINE MODIFICATION
- EXISTING BMP POND
- MUNICIPALITIES

LOCATION MAP:
NINE SPRINGS CREEK
STUDY AREA



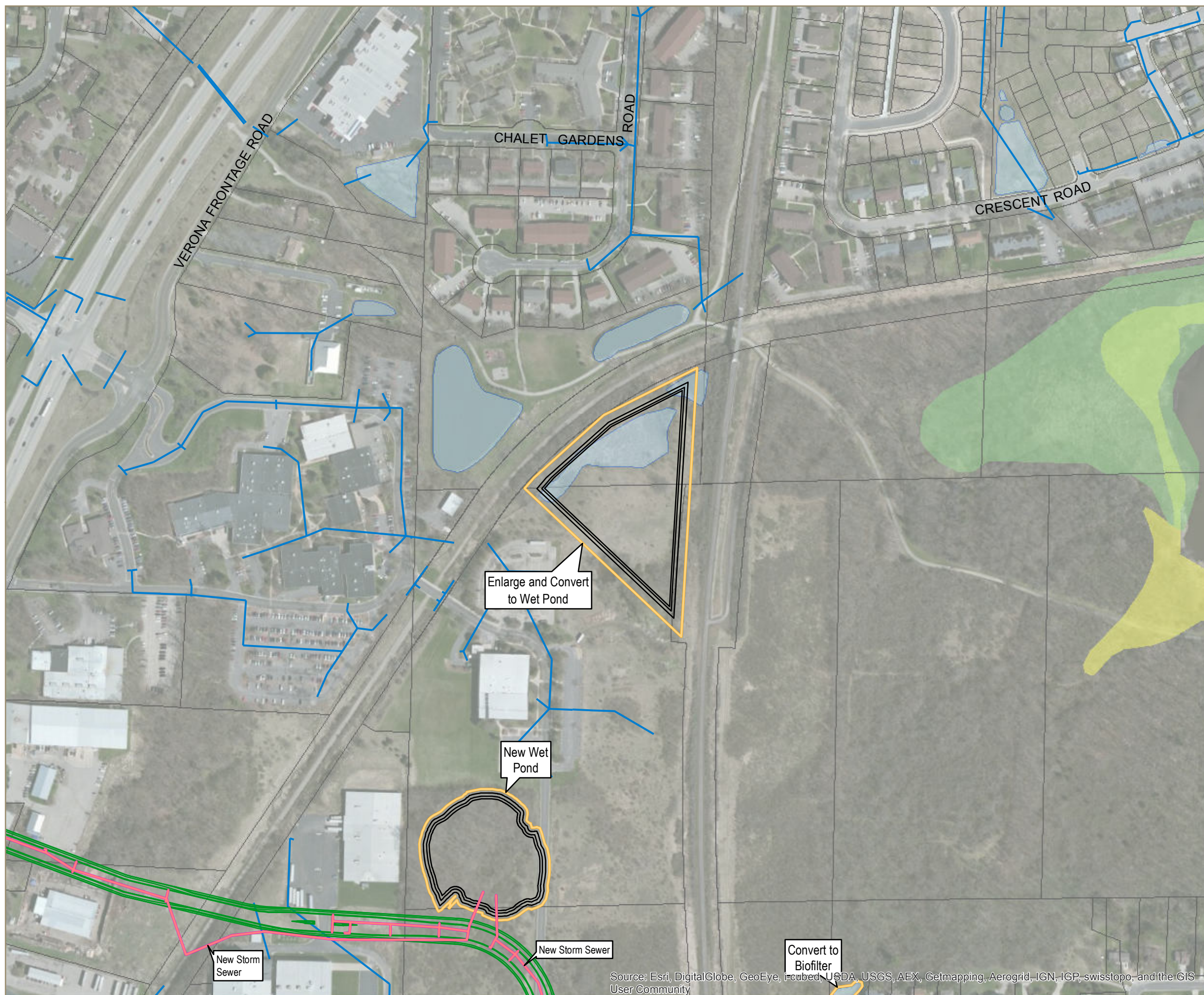
DATA SOURCES:
STORM LINES AND BMP PONDS PROVIDED BY THE CITY OF FITCHBURG.
PARCELS PROVIDED BY DANE COUNTY.
PROPOSED BMP IMPROVEMENTS AND WATERSHEDS PROVIDED BY MSA.
AERIAL IMAGERY PROVIDED BY ESRI.

CITY OF FITCHBURG
DANE COUNTY, WISCONSIN



Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

PROPOSED BMP IMPROVEMENTS: NEW WET POND AND ENLARGE & CONVERT TO WET POND



LEGEND

- PROPOSED BMP IMPROVEMENT
- STORM PIPE
- NEW ROAD
- PROPOSED STORMLINE MODIFICATION
- EXISTING BMP POND
- PARCELS
- WETLAND
- POORLY AND VERY POORLY DRAINED SOILS

LOCATION MAP:
NINE SPRINGS CREEK
STUDY AREA



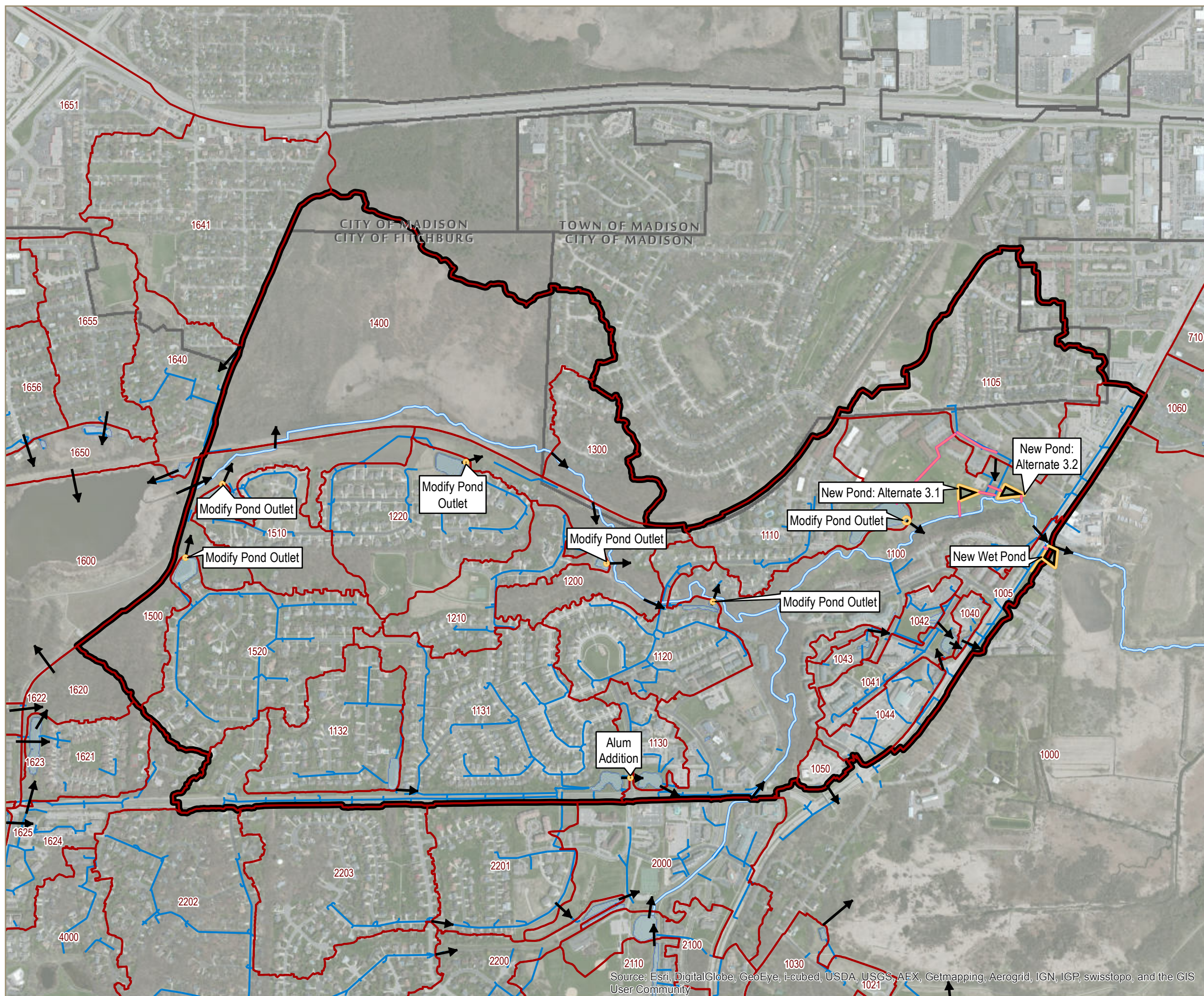
DATA SOURCES:
STORM LINES AND BMP PONDS PROVIDED BY THE CITY OF FITCHBURG.
PARCELS PROVIDED BY DANE COUNTY.
PROPOSED BMP IMPROVEMENTS AND WATERSHEDS PROVIDED BY MSA.
AERIAL IMAGERY PROVIDED BY ESRI.

**CITY OF FITCHBURG
DANE COUNTY, WISCONSIN**



Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

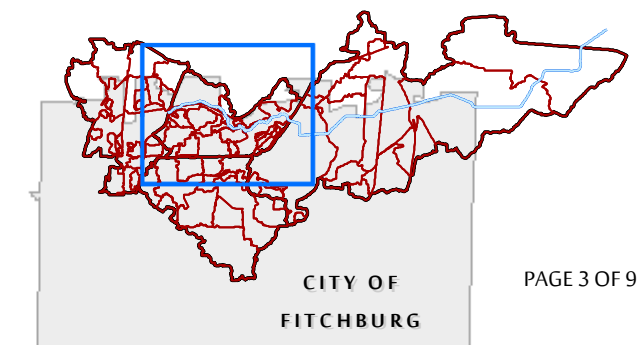
PROPOSED BMP IMPROVEMENTS: WEST OF FISH HATCHERY ROAD



LEGEND

- PROPOSED BMP IMPROVEMENT
- WATERSHEDS
- WINSLAMM MODEL AREA
- NINE SPRINGS CREEK
- STORM PIPE
- PROPOSED STORMLINE MODIFICATION
- EXISTING BMP POND
- MUNICIPALITIES

LOCATION MAP:
NINE SPRINGS CREEK
STUDY AREA



PAGE 3 OF 9

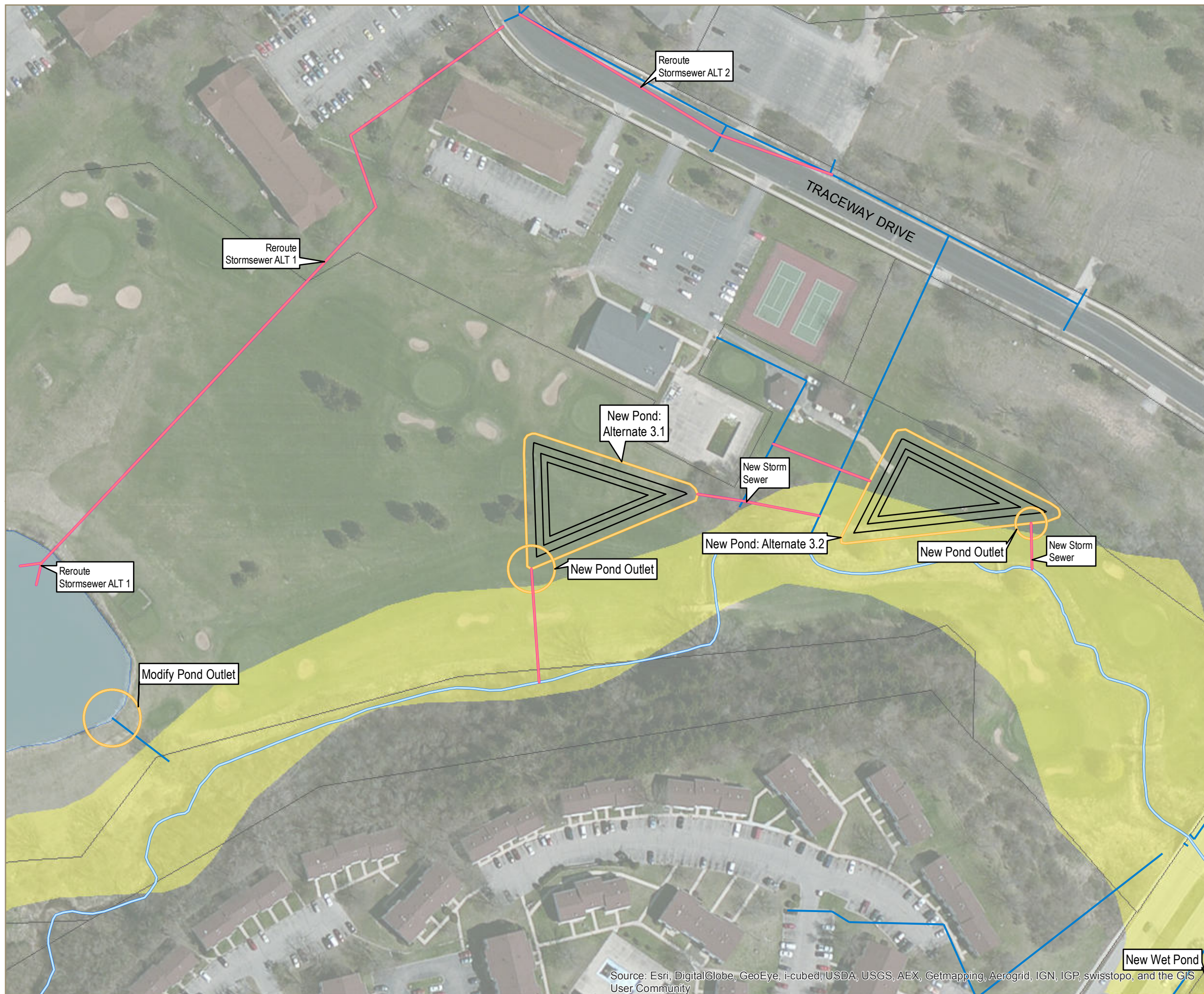
DATA SOURCES:
STORM LINES AND BMP PONDS PROVIDED BY THE CITY OF FITCHBURG.
PARCELS PROVIDED BY DANE COUNTY.
PROPOSED BMP IMPROVEMENTS AND WATERSHEDS PROVIDED BY MSA.
AERIAL IMAGERY PROVIDED BY ESRI.

CITY OF FITCHBURG
DANE COUNTY, WISCONSIN



Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

PROPOSED BMP IMPROVEMENTS: NINE-SPRINGS GOLF COURSE REGIONAL POND IMPROVEMENTS (AREA 1110)



LEGEND

- PROPOSED BMP IMPROVEMENT
- NINE SPRINGS CREEK
- STORM PIPE
- PROPOSED STORMLINE MODIFICATION
- EXISTING BMP POND
- PARCELS
- POORLY AND VERY POORLY DRAINED SOILS

LOCATION MAP:
NINE SPRINGS CREEK
STUDY AREA



CITY OF
FITCHBURG

PAGE 4 OF 9

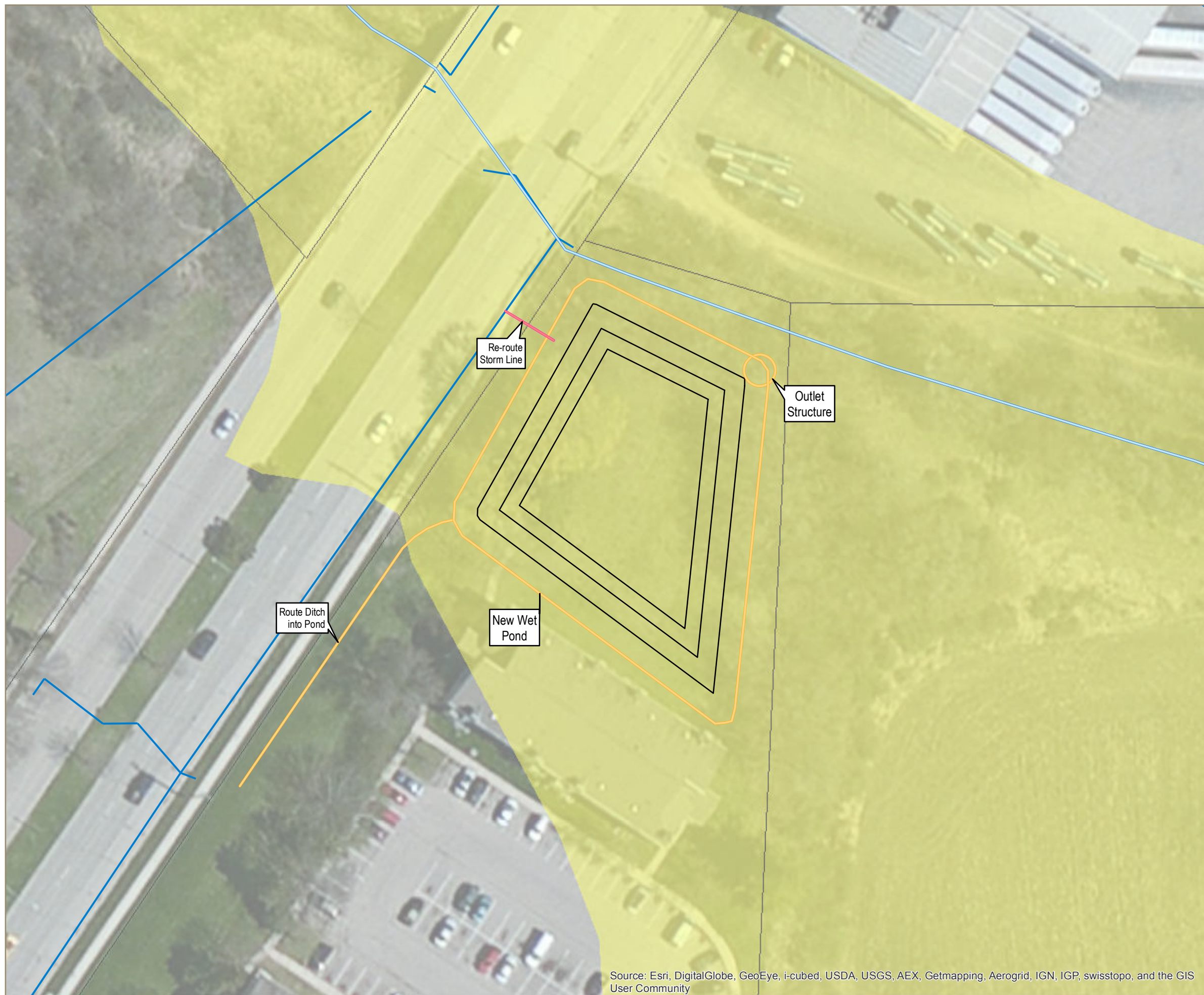
DATA SOURCES:
STORM LINES AND BMP PONDS PROVIDED BY THE CITY OF FITCHBURG.
PARCELS PROVIDED BY DANE COUNTY.
PROPOSED BMP IMPROVEMENTS AND WATERSHEDS PROVIDED BY MSA.
AERIAL IMAGERY PROVIDED BY ESRI.

CITY OF FITCHBURG
DANE COUNTY, WISCONSIN



Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

PROPOSED BMP IMPROVEMENTS: FISH HATCHERY EAST WET POND (AREA 1000)



LEGEND

- PROPOSED BMP IMPROVEMENT
- NINE SPRINGS CREEK
- STORM PIPE
- PROPOSED STORMLINE MODIFICATION
- PARCELS
- POORLY AND VERY POORLY DRAINED SOILS

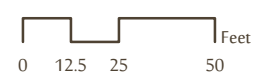
LOCATION MAP:
NINE SPRINGS CREEK
STUDY AREA



PAGE 5 OF 9

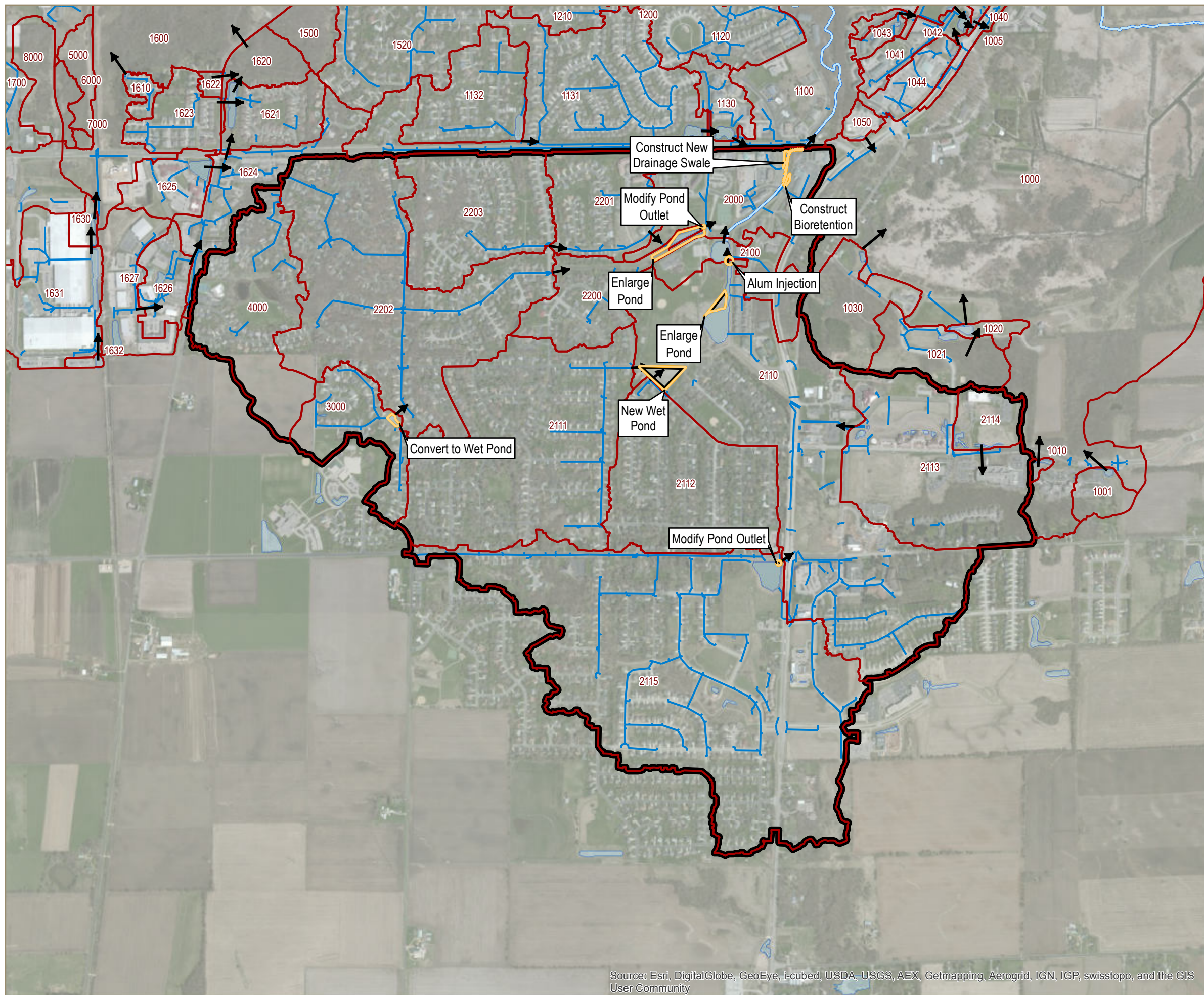
DATA SOURCES:
STORM LINES AND BMP PONDS PROVIDED BY THE CITY OF FITCHBURG.
PARCELS PROVIDED BY DANE COUNTY.
PROPOSED BMP IMPROVEMENTS AND WATERSHEDS PROVIDED BY MSA.
AERIAL IMAGERY PROVIDED BY ESRI.

CITY OF FITCHBURG
DANE COUNTY, WISCONSIN



Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

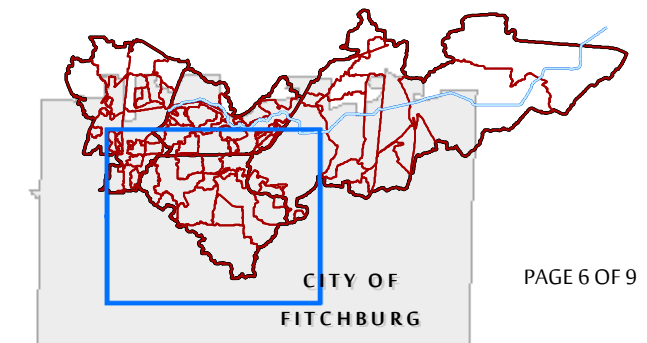
PROPOSED BMP IMPROVEMENTS: SOUTH OF MCKEE ROAD



LEGEND

- PROPOSED BMP IMPROVEMENT
- WATERSHEDS
- WINSLAMB MODEL AREA
- NINE SPRINGS CREEK
- STORM PIPE
- EXISTING BMP POND
- MUNICIPALITIES

LOCATION MAP:
NINE SPRINGS CREEK
STUDY AREA



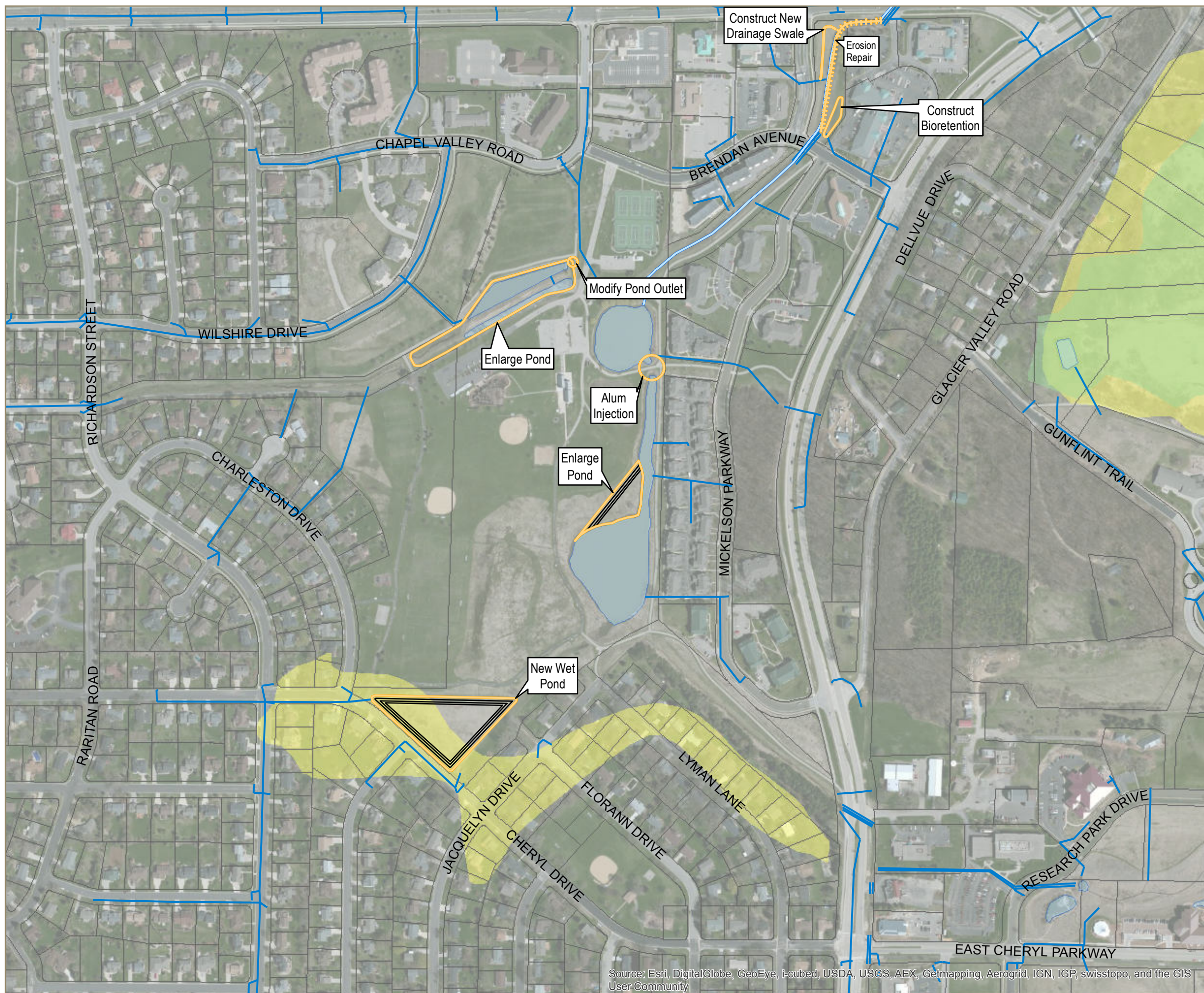
PAGE 6 OF 9

DATA SOURCES:
STORM LINES AND BMP PONDS PROVIDED BY THE CITY OF FITCHBURG.
PARCELS PROVIDED BY DANE COUNTY.
PROPOSED BMP IMPROVEMENTS AND WATERSHEDS PROVIDED BY MSA.
AERIAL IMAGERY PROVIDED BY ESRI.

CITY OF FITCHBURG
DANE COUNTY, WISCONSIN



Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community



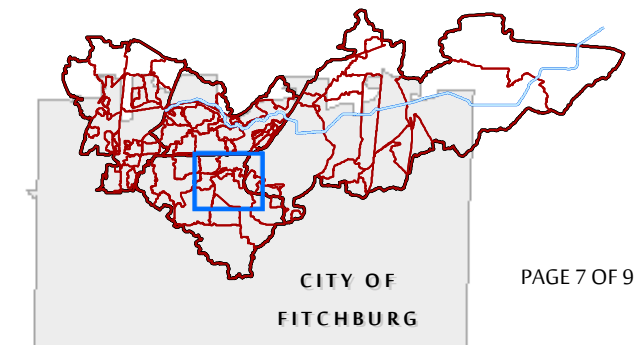
PROPOSED BMP IMPROVEMENTS:

NEW POND, ENLARGE PONDS, ALUM INJECTION, NEW DRAINAGE SWALE, NEW BIORETENTION, AND EROSION REPAIR

LEGEND

- PROPOSED BMP IMPROVEMENT
- NINE SPRINGS CREEK
- STORM PIPE
- EXISTING BMP POND
- PARCELS
- MUNICIPALITIES
- WETLAND
- POORLY AND VERY POORLY DRAINED SOILS

LOCATION MAP:
NINE SPRINGS CREEK
STUDY AREA

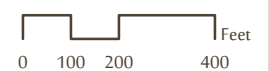


CITY OF
FITCHBURG

PAGE 7 OF 9

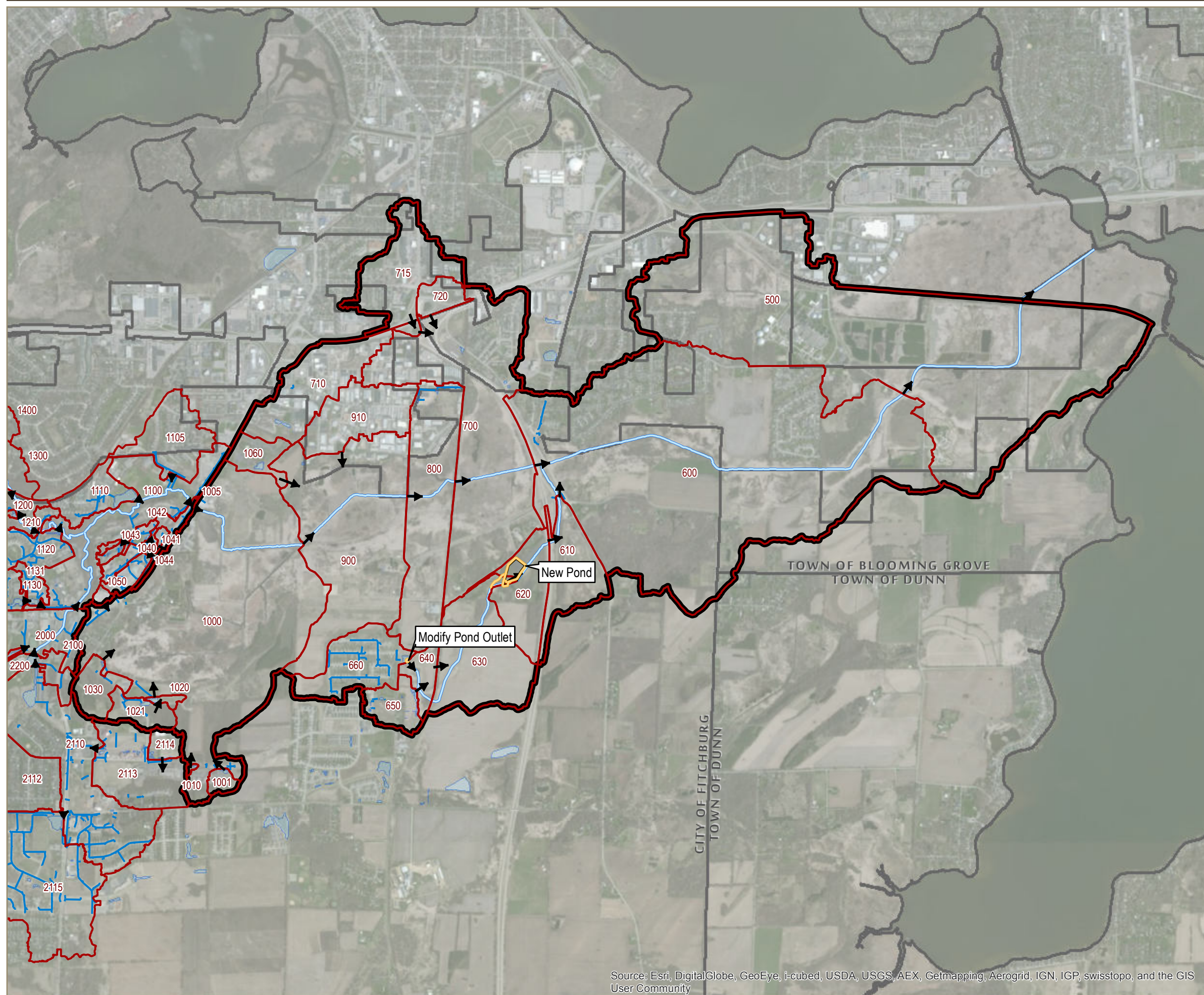
DATA SOURCES:
STORM LINES AND BMP PONDS PROVIDED BY THE CITY OF FITCHBURG.
PARCELS PROVIDED BY DANE COUNTY.
PROPOSED BMP IMPROVEMENTS AND WATERSHEDS PROVIDED BY MSA.
AERIAL IMAGERY PROVIDED BY ESRI.

CITY OF FITCHBURG
DANE COUNTY, WISCONSIN










Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

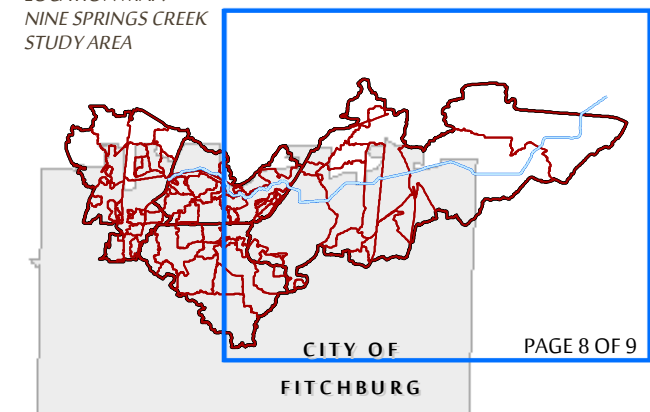
PROPOSED BMP IMPROVEMENTS: EAST OF FISH HATCHERY ROAD



LEGEND

-  PROPOSED BMP IMPROVEMENT
-  WATERSHEDS
-  WINSLAMB MODEL AREA
-  NINE SPRINGS CREEK
-  STORM PIPE
-  EXISTING BMP POND
-  MUNICIPALITIES

LOCATION MAP:
NINE SPRINGS CREEK
STUDY AREA



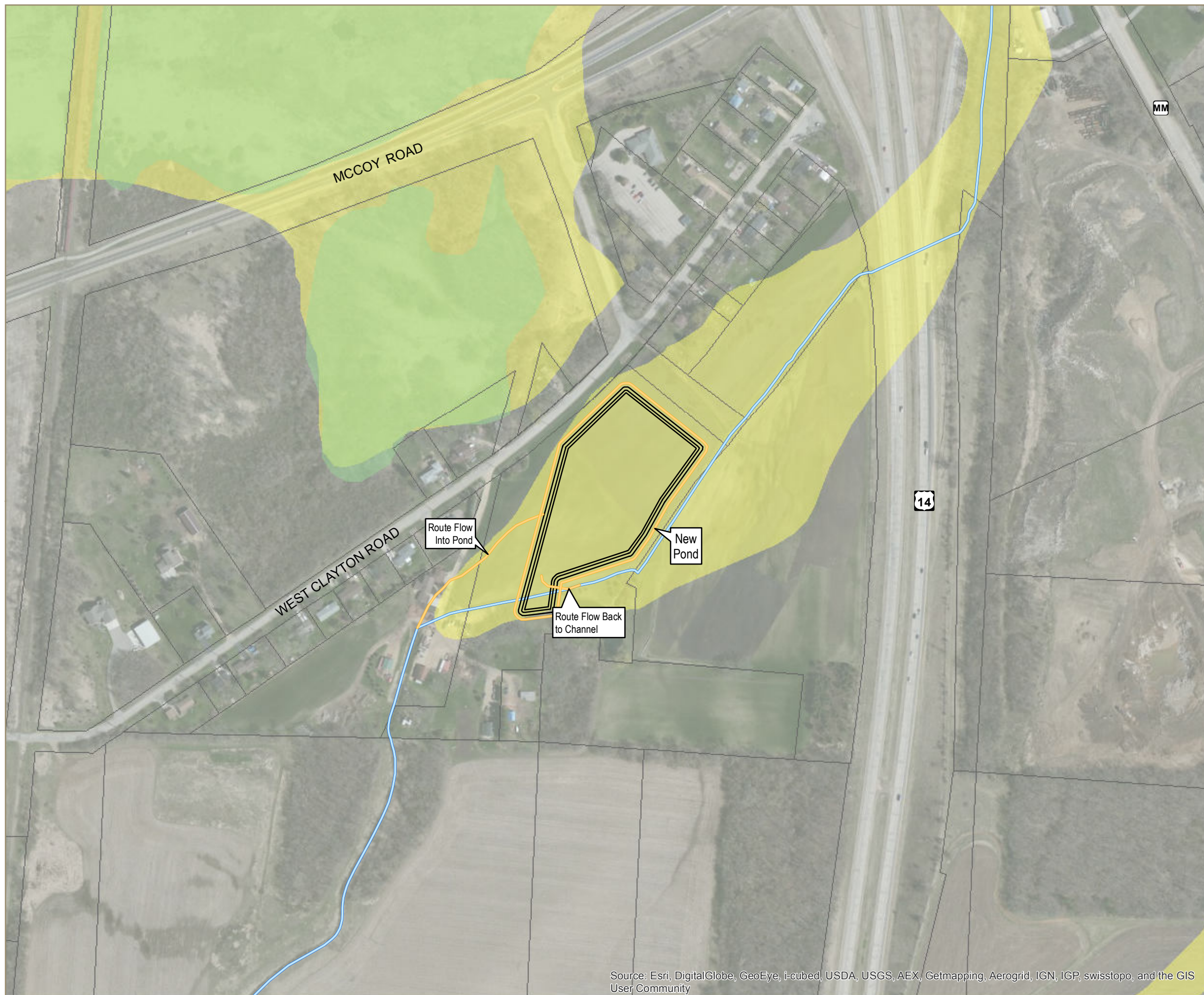
DATA SOURCES:
STORM LINES AND BMP PONDS PROVIDED BY THE CITY OF FITCHBURG.
PARCELS PROVIDED BY DANE COUNTY.
PROPOSED BMP IMPROVEMENTS AND WATERSHEDS PROVIDED BY MSA.
AERIAL IMAGERY PROVIDED BY ESRI.

CITY OF FITCHBURG
DANE COUNTY, WISCONSIN



Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

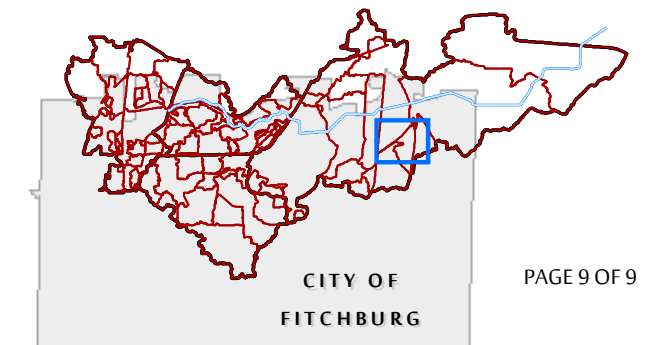
PROPOSED BMP IMPROVEMENTS: CONSTRUCT NEW POND



LEGEND

- PROPOSED BMP IMPROVEMENT
- NINE SPRINGS CREEK
- PARCELS
- WETLAND
- POORLY AND VERY POORLY DRAINED SOILS

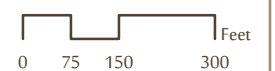
LOCATION MAP:
NINE SPRINGS CREEK
STUDY AREA



PAGE 9 OF 9

DATA SOURCES:
STORM LINES AND BMP PONDS PROVIDED BY THE CITY OF FITCHBURG.
PARCELS PROVIDED BY DANE COUNTY.
PROPOSED BMP IMPROVEMENTS AND WATERSHEDS PROVIDED BY MSA.
AERIAL IMAGERY PROVIDED BY ESRI.

CITY OF FITCHBURG
DANE COUNTY, WISCONSIN



Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Attachment F – Pages from Rock River TMDL Report – TMDL Targets for the City of Fitchburg

Rock River TMDL

Appendix H. Required Percent Reduction of TP from Annual Baseline Load

Note: Baseline load is defined in Section 4.2. Average percent load reduction is the average of the monthly average percent load reductions.

*Note that the non-permitted urban percentage of baseline load is not a percent reduction. This column is shown to facilitate division of nonpoint source load between agricultural and non-permitted urban sources. See Section 6.3 for specific allocation approach.

Reach	Waterbody Name	Waterbody Extents	Required Average Percent Reduction of TP from Baseline Load			Non-Permitted Urban Percentage of Baseline Load*
			Nonpoint Source	MS4	WWTF	
1	West Branch Rock River	South Branch Rock River to Mile 39	23%	-	-	2%
2	South Branch Rock River	Mile 3 to 20	29%	29%	19%	6%
3	South Branch Rock River	Mile 1 to 3	67%	82%	92%	19%
4	West Branch Rock River/Horicon Marsh	Mile 0 to South Branch Rock River	38%	-	7%	6%
5	Wayne Creek	Mile 4.1 to 4.8	47%	-	-	0%
6	Wayne Creek	Kohlsville River to Mile 4.1	32%	-	-	0%
7	Kohlsville River	Mile 0 to 9	32%	-	-	0%
8	Limestone Creek	Mile 0 to 1	24%	-	-	0%
9	East Branch Rock River	Kohlsville River to Limestone Creek	30%	-	1%	0%
10	East Branch Rock River	Kummel Creek to Kohlsville River	27%	-	-	5%
11	Kummel Creek	Mile 14 to 18	19%	-	-	0%
12	Kummel Creek	Mile 0 to 14	29%	-	10%	3%
13	East Branch Rock River	Mile 11 to Kummel Creek	37%	-	15%	3%
14	East Branch Rock River	Gill Creek to Mile 11	56%	-	78%	13%
15	Gill Creek	Mile 0 to 6	40%	-	-	0%
16	Irish Creek	Mile 0 to 3	39%	-	-	0%
17	East Branch Rock River	Mile 0 to Irish Creek	45%	-	48%	1%
18	Rock River	Mile 296 to 305	62%	-	77%	46%
19	Dead Creek	Mile 0 to 3	41%	-	60%	6%
20	Rock River	Mile 270 to 293	27%	14%	0%	1%
21	Rock River	Oconomowoc River to Mile 270	27%	10%	0%	3%
22	Flynn Creek	Mile 0 to 6	30%	-	-	0%
23	Oconomowoc River	Mason Creek to Flynn Creek	29%	12%	-	2%
24	Mason Creek	Mile 0 to 5.2	39%	11%	-	0%
25	Oconomowoc River	Battle Creek to Mason Creek	52%	64%	77%	33%
26	Battle Creek	Mile 2.1 to 4.6	32%	35%	-	13%
27	Oconomowoc River	Rock River to Battle Creek	10%	0%	-	9%
28	Rock River	Mile 249 to Oconomowoc River	15%	1%	-	6%
29	Rock River	Johnson Creek to Mile 249	36%	51%	64%	2%
30	Johnson Creek	Mile 0 to 17.5	24%	0%	-	1%
31	Rock River	Crawfish River to Johnson Creek	47%	-	72%	41%
32	Alto Creek	Mile 0 to 6.15	27%	-	-	0%
33	Mill Creek, Beaver Dam Lake	Beaver Dam to Fox Lake	34%	29%	22%	11%
34	Beaver Dam River	Calamus Creek to Mile 30	37%	81%	92%	0%
35	Calamus Creek	Mile 0 to 17	18%	-	-	0%
36	Beaver Dam River	Mile 14 to Calamus Creek	23%	-	-	0%
37	Park Creek	Mile 0 to 3	39%	66%	-	0%
38	Schultz Creek	Mile 0 to 5	30%	-	-	0%
39	Shaw Brook	Beaver Dam River to Schultz Creek	27%	0%	-	0%
40	Beaver Dam River	Casper Creek to Mile 14	28%	-	0%	7%
41	Casper Creek	Mile 0 to 2	27%	-	-	0%
42	Beaver Dam River	Lau Creek to Casper Creek	22%	-	-	0%

Rock River TMDL

Reach	Waterbody Name	Waterbody Extents	Required Average Percent Reduction of TP from Baseline Load			Non-Permitted Urban Percentage of Baseline Load*
			Nonpoint Source	MS4	WWTF	
43	Lau Creek	Mile 0 to 6	24%	-	-	0%
44	Beaver Dam River	Mile 0 to Lau Creek	22%	-	-	0%
45	Maunsha River	Mile 13.21 to 31.8	35%	13%	-	1%
46	Maunsha River	Mile 5.5 to 13.2	37%	-	33%	2%
47	Maunsha River	Stony Brook to Mile 13.2	41%	-	73%	0%
48	Stony Brook	Mile 0 to 15	28%	-	-	0%
49	Maunsha River	Mile 0 to Stony Brook	29%	-	-	0%
50	Mud Creek	Mile 0 to 10	24%	-	-	0%
51	Crawfish River	Maunsha River to Mud Creek	30%	14%	0%	2%
52	Crawfish River	Beaver Dam River to Maunsha Creek	-	-	-	0%
53	Crawfish River	Rock River to Beaver Dam River	18%	-	0%	9%
54	Rock River	Bark River to Crawfish River	36%	61%	77%	0%
55	Bark River	Mile 35 to 41	54%	68%	79%	14%
56	Bark River	Scuppernong River to Mile 35	33%	19%	6%	2%
57	Spring Creek	Mile 0 to 5	49%	-	88%	9%
58	Steel Brook	Mile 3 to 4	26%	-	-	0%
59	Steel Brook, Scuppernong River, Bark River	Rock River to Steel Brook, Spring Creek	41%	54%	67%	4%
60	Rock River	Mile 213 to Bark River	23%	29%	29%	0%
61	Rock River	Mile 201 to 207	8%	6%	5%	17%
62	Pheasant Branch Creek	Mile 1 to 9	57%	70%	-	5%
63	Spring (Dorn) Creek	Mile 1 to 6	36%	14%	-	0%
64	Yahara River, Lake Mendota, Lake Monona	Nine Springs Creek to Spring (Dorn) Creek, Pheasant Branch Creek	41%	47%	29%	7%
65	Nine Springs Creek	Mile 0 to 6	43%	49%	35%	53%
66	Yahara River, Lake Waubesa, Lake Kegonsa	Mile 16 to Nine Springs Creek, Lake Waubesa	39%	37%	-	3%
67	Yahara River	Mile 16 to 22	5%	0%	-	6%
68	Yahara River	Mile 7 to 16	36%	52%	65%	0%
69	Yahara River	Mile 0 to 7	45%	72%	86%	3%
70	Rock River	Mile 193 to 201	29%	1%	-	0%
71	Rock River	Blackhawk Creek to Mile 193	33%	29%	-	9%
72	Blackhawk Creek	Mile 2 to 4	32%	0%	-	0%
73	Blackhawk Creek	Rock River to Mile 2	43%	51%	-	7%
74	Rock River	Mile 183 to Blackhawk Creek	21%	17%	-	18%
75	Markham Creek	Mile 0 to 5	34%	15%	-	0%
76	Rock River	Bass Creek to Mile 183	49%	75%	88%	18%
77	Stevens Creek	Mile 0 to 8	40%	-	-	0%
78	Bass Creek	Rock River to Stevens Creek	33%	4%	0%	1%
79	Rock River	Mile 171 to Bass Creek	40%	54%	70%	4%
80	Turtle Creek	Mile 24 to 32	49%	-	75%	19%
81	Turtle Creek	Rock River to Mile 24	34%	20%	1%	4%
82	Fox Lake		40%	-	-	12%
83	Lake Koshkonong		37%	37%	30%	4%
	Lake Sinnissippi		-	-	-	0%

Rock River TMDL

Appendix I. Required Percent Reduction of TSS from Annual Baseline Load

Note: Baseline load is defined in Section 4.2. Average percent load reduction is the average of the monthly average percent load reductions.

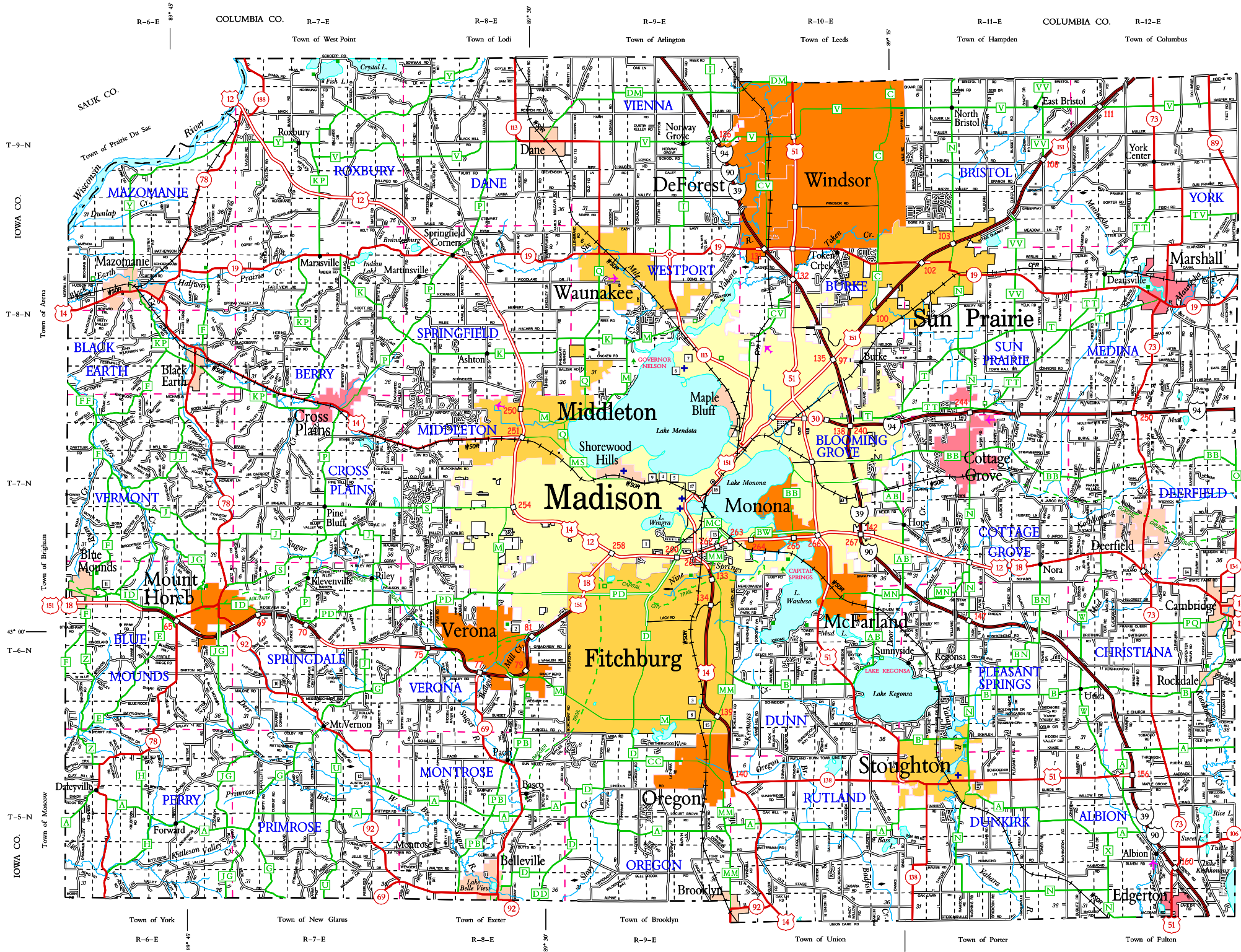
*Note that the non-permitted urban percentage of baseline load is not a percent reduction. This column is shown to facilitate division of nonpoint source load between agricultural and non-permitted urban sources. See Section 6.3 for specific allocation approach.

Reach	Waterbody Name	Waterbody Extents	Required Average Annual Percent Reduction of TSS from Baseline Load			Non-Permitted Urban Percentage of Baseline Load*
			Nonpoint Source	MS4	WWTF	
1	West Branch Rock River	South Branch Rock River to Mile 39	18%	-	-	2%
2	South Branch Rock River	Mile 3 to 20	20%	1%	0%	5%
3	South Branch Rock River	Mile 1 to 3	20%	26%	23%	58%
4	West Branch Rock River/Horicon Marsh	Mile 0 to South Branch Rock River	16%	-	11%	12%
5	Wayne Creek	Mile 4.1 to 4.8	52%	-	-	0%
6	Wayne Creek	Kohlsville River to Mile 4.1	36%	-	-	0%
7	Kohlsville River	Mile 0 to 9	36%	-	-	0%
8	Limestone Creek	Mile 0 to 1	24%	-	-	0%
9	East Branch Rock River	Kohlsville River to Limestone Creek	20%	-	-	0%
10	East Branch Rock River	Kummel Creek to Kohlsville River	24%	-	-	3%
11	Kummel Creek	Mile 14 to 18	19%	-	-	0%
12	Kummel Creek	Mile 0 to 14	19%	-	0%	2%
13	East Branch Rock River	Mile 11 to Kummel Creek	29%	-	1%	2%
14	East Branch Rock River	Gill Creek to Mile 11	33%	-	15%	9%
15	Gill Creek	Mile 0 to 6	38%	-	-	0%
16	Irish Creek	Mile 0 to 3	37%	-	-	0%
17	East Branch Rock River	Mile 0 to Irish Creek	40%	-	13%	0%
18	Rock River	Mile 296 to 305	24%	-	11%	64%
19	Dead Creek	Mile 0 to 3	14%	-	1%	9%
20	Rock River	Mile 270 to 293	23%	0%	0%	1%
21	Rock River	Oconomowoc River to Mile 270	19%	0%	0%	3%
22	Flynn Creek	Mile 0 to 6	36%	-	-	0%
23	Oconomowoc River	Mason Creek to Flynn Creek	33%	11%	-	1%
24	Mason Creek	Mile 0 to 5.2	43%	12%	-	0%
25	Oconomowoc River	Battle Creek to Mason Creek	29%	32%	17%	26%
26	Battle Creek	Mile 2.1 to 4.6	26%	29%	-	9%
27	Oconomowoc River	Rock River to Battle Creek	2%	0%	-	21%
28	Rock River	Mile 249 to Oconomowoc River	16%	0%	-	4%
29	Rock River	Johnson Creek to Mile 249	24%	7%	0%	1%
30	Johnson Creek	Mile 0 to 17.5	23%	0%	-	0%
31	Rock River	Crawfish River to Johnson Creek	13%	-	2%	36%
32	Alto Creek	Mile 0 to 6.15	23%	-	-	0%
33	Mill Creek, Beaver Dam Lake	Beaver Dam to Fox Lake	20%	9%	1%	12%
34	Beaver Dam River	Calamus Creek to Mile 30	22%	31%	33%	0%
35	Calamus Creek	Mile 0 to 17	14%	-	-	0%
36	Beaver Dam River	Mile 14 to Calamus Creek	20%	-	-	0%
37	Park Creek	Mile 0 to 3	35%	54%	-	0%
38	Schultz Creek	Mile 0 to 5	29%	-	-	0%
39	Shaw Brook	Beaver Dam River to Schultz Creek	26%	0%	-	0%
40	Beaver Dam River	Casper Creek to Mile 14	19%	-	3%	7%
41	Casper Creek	Mile 0 to 2	27%	-	-	0%
42	Beaver Dam River	Lau Creek to Casper Creek	13%	-	-	0%

Rock River TMDL

Reach	Waterbody Name	Waterbody Extents	Required Average Annual Percent Reduction of TSS from Baseline Load			Non-Permitted Urban Percentage of Baseline Load*
			Nonpoint Source	MS4	WWTF	
43	Lau Creek	Mile 0 to 6	30%	-	-	0%
44	Beaver Dam River	Mile 0 to Lau Creek	13%	-	-	0%
45	Maunsha River	Mile 13.21 to 31.8	35%	8%	-	1%
46	Maunsha River	Mile 5.5 to 13.2	30%	-	4%	1%
47	Maunsha River	Stony Brook to Mile 13.2	26%	-	4%	0%
48	Stony Brook	Mile 0 to 15	27%	-	-	0%
49	Maunsha River	Mile 0 to Stony Brook	28%	-	-	0%
50	Mud Creek	Mile 0 to 10	23%	-	-	0%
51	Crawfish River	Maunsha River to Mud Creek	23%	0%	1%	2%
52	Crawfish River	Beaver Dam River to Maunsha Creek	-	-	-	0%
53	Crawfish River	Rock River to Beaver Dam River	8%	-	0%	8%
54	Rock River	Bark River to Crawfish River	24%	6%	0%	0%
55	Bark River	Mile 35 to 41	39%	43%	28%	11%
56	Bark River	Scuppernong River to Mile 35	24%	0%	5%	1%
57	Spring Creek	Mile 0 to 5	34%	-	11%	5%
58	Steel Brook	Mile 3 to 4	34%	-	-	0%
59	Steel Brook, Scuppernong River, Bark River	Rock River to Steel Brook, Spring Creek	31%	15%	1%	3%
60	Rock River	Mile 213 to Bark River	7%	1%	0%	0%
61	Rock River	Mile 201 to 207	5%	2%	0%	16%
62	Pheasant Branch Creek	Mile 1 to 9	61%	70%	-	3%
63	Spring (Dorn) Creek	Mile 1 to 6	34%	11%	-	0%
64	Yahara River, Lake Mendota, Lake Monona	Nine Springs Creek to Spring (Dorn) Creek, Pheasant Branch Creek	49%	55%	42%	4%
65	Nine Springs Creek	Mile 0 to 6	41%	46%	35%	46%
66	Yahara River, Lake Waubesa, Lake Kegonsa	Mile 16 to Nine Springs Creek, Lake Waubesa	41%	37%	-	2%
67	Yahara River	Mile 16 to 22	7%	0%	-	4%
68	Yahara River	Mile 7 to 16	33%	18%	0%	0%
69	Yahara River	Mile 0 to 7	28%	21%	9%	2%
70	Rock River	Mile 193 to 201	30%	1%	-	0%
71	Rock River	Blackhawk Creek to Mile 193	37%	31%	-	4%
72	Blackhawk Creek	Mile 2 to 4	31%	0%	-	0%
73	Blackhawk Creek	Rock River to Mile 2	41%	49%	-	5%
74	Rock River	Mile 183 to Blackhawk Creek	23%	20%	7%	8%
75	Markham Creek	Mile 0 to 5	38%	19%	-	0%
76	Rock River	Bass Creek to Mile 183	23%	29%	26%	8%
77	Stevens Creek	Mile 0 to 8	42%	-	-	0%
78	Bass Creek	Rock River to Stevens Creek	29%	0%	3%	1%
79	Rock River	Mile 171 to Bass Creek	39%	37%	34%	1%
80	Turtle Creek	Mile 24 to 32	25%	-	1%	15%
81	Turtle Creek	Rock River to Mile 24	33%	7%	2%	3%
82	Fox Lake		34%	-	-	12%
83	Lake Koshkonong		35%	25%	5%	2%
	Lake Sinnissippi		-	-	-	0%

Attachment G – Dane County Highways Map



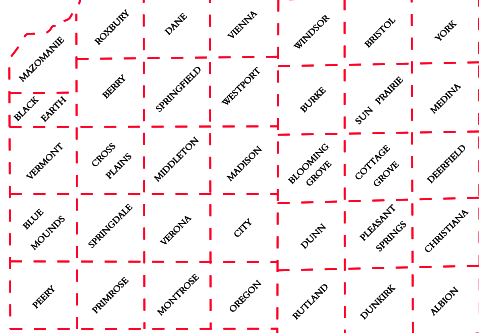
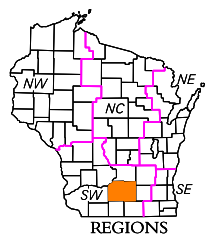
LEGEND

- Freeway
- Multilane Divided
- U.S. or State Hwy
- County Trunk Hwy
- Town Road
- Firelane
- Railroad
- State Trail
- Interchange
- Highway Separation
- Interstate Highway No.
- U.S. Highway No.
- State Highway No.
- County Highway Letter
- State Boundary
- County Boundary
- Civil Town Boundary
- Section Line
- Dam
- Hospital
- Airport
- County Seat
- Unincorporated Village
- Fish Hatchery
- Game Farm
- Public Hunt or Fish Grds.
- Public Camp & Picnic Grds.
- Ranger Station
- State Park
- County Park
- Without Facilities
- Rest Area
- Modern Facilities
- Wayside
- Rustic Facilities

- U.W. Arboretum 1
- Badger Prairie Health Care Center 2
- Oakhill Correctional Institution 3
- U.S. Forest Products Lab 4
- Univ. of Wisconsin - Madison 5
- Mendota Mental Health Institute 6
- Central Wisconsin Center for the Developmentally Disabled 7
- Wis. Corr. Ctr. System Headquarters 8
- Veterans Administration Hospital 9
- Donald Rock 10
- Cave of the Mounds 11
- Devils Chimney 12
- Alliant Energy Center 13
- Thompson Correctional Center 14
- Oregon Correctional Center 15
- Monona Terrace Convention Center 16
- Kohl Center 17

CIVIL TOWNS

GREEN CO. ROCK CO.



SECTION NUMBERING OF A TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

For boundaries of public hunting and fishing grounds please contact the Department of Natural Resources

MILES OF HIGHWAY as of Dec. 31, 2019

STATE..... 401
 COUNTY..... 516
 LOCAL ROADS..... 3380
 OTHER ROADS..... 21
 TOTAL FOR COUNTY..... 4249

Land Area (2010 Census)..... 1197 sq mi
 Population (2010 Census)..... 488073
 County Seat..... Madison

DANE CO.
 DEPARTMENT OF TRANSPORTATION
 Madison, Wisconsin

Corrected for
 JAN. 2021

Base compiled from U.S.G.S. Quadrangles
 1:100,000 Series

Attachment H – WPDES Permit No. WI-S058416-4



***STATE OF WISCONSIN
DEPARTMENT OF NATURAL RESOURCES***

**INDIVIDUAL PERMIT TO DISCHARGE UNDER THE
WISCONSIN POLLUTANT DISCHARGE ELIMINATION SYSTEM
WPDES PERMIT NO. WI-S058416-4**

In compliance with the provisions of ch. 283.33, Wis. Stats., and chs. NR 151 and 216, Wis. Adm. Code,

THE CITIES OF FITCHBURG, MADISON, MIDDLETON, MONONA, STOUGHTON, SUN PRAIRIE, AND VERONA; THE VILLAGES OF COTTAGE GROVE, DEFOREST, MAPLE BLUFF, MCFARLAND, SHOREWOOD HILLS, WAUNAKEE AND WINDSOR; THE TOWNS OF BLOOMING GROVE, BURKE, MADISON, MIDDLETON AND WESTPORT; DANE COUNTY; AND THE UNIVERSITY OF WISCONSIN – MADISON

are permitted to discharge storm water from all portions of the

MUNICIPAL SEPARATE STORM SEWER SYSTEMS

owned or operated by the co-permittees listed above 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 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

By: 
Eric S. Rortved
Storm Water Engineer & Permit Drafter

7/01/19
Date Permit Signed/Issued

PERMIT EFFECTIVE DATE: July 1, 2019

EXPIRATION DATE: June 30, 2024

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1. APPLICABILITY CRITERIA

1.1 Permit Description and Purpose

Each municipality listed as a co-permittee under this permit submitted a reissuance application letter to the Department of Natural Resources (hereinafter referred to as “Department”) pursuant to s. NR 216.09, Wis. Adm. Code, to be covered under a group WPDES municipal storm water discharge permit for storm water discharges from the group’s municipal separate storm sewer systems (MS4s) to waters of the state. The co-permittees under this permit are continuing to work together, potentially along with other MS4 general permittees, under an intermunicipal agreement (Madison Municipal Storm Water Partnership) to refine and implement an extensive joint information and education plan and have agreed to cooperate as appropriate on permit requirements.

This permit regulates storm water discharges in accordance with ch. 283, Wis. Stats. and subch. I of ch. NR 216, Wis. Adm. Code, and implements the non-agricultural and transportation facility performance standards of ch. NR 151, Wis. Adm. Code. A municipality that is a co-permittee under this permit is only responsible for permit conditions relating to discharges from the MS4 under its jurisdiction for which it is the owner or operator.

1.2 Permitted Area

This permit covers all areas under the ownership, control or jurisdiction of the co-permittees that contribute to discharges from a municipal separate storm sewer system (MS4) that receives runoff from 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 ch. NR 216, Wis. Adm. Code.

1.3 Co-Permittees

There are 21 municipalities (or co-permittees) covered under this permit including: The Cities of Fitchburg, Madison, Middleton, Monona, Stoughton, Sun Prairie, and Verona; the Villages of Cottage Grove, DeForest, Maple Bluff, McFarland, Shorewood Hills, Waunakee and Windsor; the Towns of Blooming Grove, Burke, Madison, Middleton and Westport; Dane County; and the University of Wisconsin – Madison.

As a state entity, the University Wisconsin - Madison owns, controls and/or has jurisdiction in lands outside of their responsible MS4 permit compliance area. The lands outside of their permit compliance area shall be accounted under this WPDES permit as in the jurisdiction of the applicable co-permittee where they reside.

1.4 Dane County

Specifically, for Dane County as a co-permittee, this permit only authorizes discharges of storm water from the MS4 owned or operated by Dane County that occur within the geographical boundaries of the other co-permittees.

1.5 Authorized Discharges

1.5.1 This permit authorizes storm water point source discharges from the co-permittee’s 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 3.3 of this permit.

1.5.2 A permanent pumped storm water discharge from an otherwise internally drained area may be authorized under this permit, provided all of the following:

- a. Written confirmation must be received from the Department's storm water program that the discharge is authorized under this permit. The co-permittee shall provide the Department with a pumping management plan and other information it deems relevant to determine if the discharge should be authorized under this permit.
- b. The pumped discharge shall be operated in a manner to prevent accumulated sediment from entering the pumped water intake.
- c. The discharge shall be operated in a manner to prevent downgradient erosion.

1.5.3 The City of Middleton is authorized to discharge pumped water from Tiedeman Pond, which will flow over a mile before entering Lake Mendota, with additional requirements in section 4.2.

Note: The pumped discharge from Tiedeman Pond was previously authorized under WPDES permit no. WI-0049956-1. Once this permit is reissued, the Department will send a letter to the City of Middleton terminating its coverage under WPDES permit no. WI-0049956-1.

1.5.4 The City of Stoughton is authorized to discharge pumped water from Paradise Pond, which will flow over a mile before entering the Yahara River, with additional requirements in section 4.4.

Note: Authorization under this WPDES permit does not exempt the discharge from compliance with all other applicable local, state and federal regulations.

1.6 Water Quality Standards

1.6.1 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, 140 and 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.

1.6.2 This permit does not authorize discharges that the Department determines will cause or have reasonable potential to cause or contribute to an exceedance above any applicable water quality standards.

1.7 Outstanding and Exceptional Resource Waters

1.7.1 The co-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. As of the issuance date of this permit, Black Earth Creek is an ORW and Sixmile Creek and the Sugar River are ERWs.

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

1.7.2 The co-permittee may not establish a new MS4 discharge of pollutants 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 pollutants to an ORW or ERW will not exceed background concentration levels within the ORW or ERW.

Note: 'New MS4 discharge of pollutants' is defined under section 7.16.

1.7.3 If the co-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 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 the co-permittee's effective date of coverage under WPDES permit nos. WI-S050075-1 or WI-S058416-3. The City of Stoughton and Village of Cottage Grove had an effective date of coverage of November 13, 2006 under WPDES permit no. WI-S050075-1 and the other 19 co-permittees had an effective date of coverage of July 1, 2009 under WPDES permit no. WI-S058416-3.
- b. The increased discharge would not result in a violation of water quality standards.

1.7.4 If the co-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.

1.8 Impaired Water Bodies and Total Maximum Daily Load Requirements

1.8.1 A TMDL was approved for the Rock River Basin by the Department and USEPA, which established sediment and total phosphorus Wasteload Allocations (WLAs) for permitted MS4s. Co-permittees shall comply with the TMDL provisions in Appendix A for discharge into the Rock River Basin.

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>

1.8.2 By March 31 of each odd-numbered year, the co-permittee shall determine whether any part of its MS4 discharges to an impaired water 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 co-permittee that determines that any part of its MS4 does discharge to a listed impaired water but for which there is no Department and USEPA approved Total Maximum Daily Load (TMDL) for the pollutant of concern, the co-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 pollutant(s) of concern that contribute to the impairment of the water body. This section of the co-permittee's program shall specifically identify control measures and practices that will collectively be used to try to eliminate the MS4's discharge of pollutant(s) of concern that contribute to the impairment of the water body 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 water bodies considered impaired under the Clean Water Act. The list is updated in even-numbered years. A list of Wisconsin impaired water bodies may be found on the Department's Internet site at: <http://dnr.wi.gov/topic/impairedwaters/>

1.8.3 The co-permittee may not establish a new MS4 discharge of pollutants of concern to an impaired water or increase the discharge of a pollutant of concern to an impaired water unless the new or increased discharge does not contribute to the receiving water's impairment, or the US Environmental Protection Agency and the Department have approved a Total Maximum Daily Load (TMDL) for the impaired water.

Note: ‘New MS4 discharge of pollutants’ and ‘pollutant of concern’ are defined under sections 7.16 and 7.20.

1.9 Wetlands

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

1.10 Endangered and Threatened Resources

The co-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.

1.11 Historic Property

The co-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 historic property pursuant to s. 44.40 (3), Wis. Stats.

1.12 General Storm Water Discharge Limitations

In accordance with s. NR 102.04, Wis. Adm. Code, co-permittee shall take all reasonable actions to prevent discharges from its MS4 that have an unreasonable effect on receiving water quality, human health, or aquatic life:

1.12.1 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.

1.12.2 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.

1.12.3 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.

1.12.4 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.

1.13 Transfers

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

1.14 Exclusions

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

1.14.1 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 a separate WPDES permit issued pursuant to s. 283.31, Wis. Stats.

1.14.2 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; growing of grain, grass, mint and seed crops; growing 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.

1.14.3 Other Excluded Discharges

Storm water discharges from industrial operations or land disturbing construction activity requires 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 from an MS4, this permit does not satisfy the need to obtain any other permits for those discharges. This exclusion does not apply to the co-permittee's responsibility to regulate construction sites within its jurisdiction in accordance with sections 3.4 and 3.5 of this permit.

1.14.4 Non-MS4 Discharge

Storm water discharges that do not enter an MS4.

1.15 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. GENERAL RESPONSIBILITIES FOR ALL CO-PERMITTEES

In addition to the requirements specified in sections 1 and 3 through 7, each co-permittee shall:

2.1 Minimize the discharge of pollutants from its MS4.

2.2 Implement the storm water management program and other pertinent requirements of this permit in all new areas added to the co-permittee's MS4 as the result of annexation by the co-permittee.

2.3 Implement the storm water management program and other pertinent requirements of this permit in all new areas added to the co-permittee's MS4 as the result of installation or taking jurisdiction of a new or existing MS4.

2.4 Individually or as agreed upon by the co-permittees, provide adequate financing, staff, equipment, and support capabilities to implement the requirements of this permit.

2.5 Comply with the conditions of this permit relating to discharges from the MS4 where it is the owner or operator.

2.6 Implement a storm water management program, as required by this permit, in portions of the municipality that discharge to an MS4.

2.7 Exercise and enforce its legal authority, as applicable, to control discharges to and from those portions of the MS4 that it owns or operates under its permitted area. This legal authority may be a statute, ordinance, permit, order or intermunicipal agreement, a series of contracts, or administrative rule in order to:

2.7.1 Control the contribution of pollutants to and the discharge of pollutants from the MS4.

2.7.2 Prohibit illicit discharges to the MS4.

2.7.3 Control the discharge of spills, dumping and disposal of materials other than storm water into the MS4.

2.7.4 Require compliance with conditions in ordinances, permits, contracts, orders or administrative rules.

2.7.5 Require compliance with the standards of ss. NR 151.11 and 151.23, Wis. Adm. Code, or equivalent local standards.

2.7.6 Require compliance with the standards of ss. NR 151.121 to 151.128 and 151.241 to 151.249, Wis. Adm. Code, or equivalent local standards.

2.7.7 Carry out all inspections, surveillance and monitoring procedures necessary to determine compliance with permit conditions including the prohibition of illicit discharges to the MS4.

Note: As a state entity, the University of Wisconsin – Madison has limited statutory authority than that of other municipal co-permittees regulated under this permit. See section 4.6 for the University of Wisconsin – Madison’s individual responsibility to meet the requirements of section 2.7.

2.8 Attend and participate in quarterly meetings of the co-permittees. Unless an alternative quarterly date or dates are agreed upon by the co-permittees, the quarterly meetings shall take place the first Tuesday of February, May, August, and November of each year. These meetings are to be used for review and approval schedules, receive work progress reports, and discuss issues pertaining to this permit or other relevant storm water management issues. Each co-permittee shall designate a representative to attend these meetings. The representative of the City of Madison shall provide the agenda, facilitate the conduct of the meetings, and provide a record of the proceedings in the form of minutes. The meetings shall be held at times and places determined by the co-permittees. Adequate notices of and agendas for the meetings shall be provided by the facilitator to the designated representatives for each co-permittee.

2.9 Cooperate with other co-permittees on sharing information and resources to facilitate storm water management activities on a regional or watershed basis and to avoid duplicative efforts.

2.10 Fulfill the commitments of an intermunicipal agreement to cooperate on storm water information and education.

2.11 Notify the affected co-permittee in the case of discovering a potential illicit discharge originating from its jurisdiction and discharging to the MS4 of the affected co-permittee.

2.12 Work cooperatively with other affected co-permittees in the case of discovering a potential illicit discharge of unknown source to determine the best actions to resolve the illicit discharge.

2.13 Submit information requested by the Department pertinent to the MS4, discharges from the system, activities related to implementation of the requirements of this permit, or other relevant information.

2.14 Meet with the Department on an as needed basis to discuss implementation of this permit or other relevant issues.

2.15 Keep contact information up-to-date and notify the Department in a timely manner when personnel changes occur for the appropriate contact person(s) knowledgeable about this permit and its implementation.

2.16 Respond to and resolve in timely manner complaints received from citizens and concerns raised by the Department relating to pollution and storm water issues within the co-permittee's jurisdiction.

2.17 Coordinate the requirements of this permit internally between the co-permittee's agencies, departments, and programs, and ensure that elected and municipal officials and appropriate staff are advised of this permit.

2.18 Implement the requirements of this permit in a manner that is consistent with the recommendations contained in priority watershed plans, the Dane County Water Quality Plan, and other storm water management plans funded by the Department and applicable to the co-permittee.

2.19 Incorporate the requirements of this permit in the development of master plans, neighborhood plans, development plans, and any other comprehensive planning activity to address water quality impacts from storm water discharges associated with implementation of these plans.

2.20 Undertake actions required by this permit in manner that is consistent and in conformance with other applicable regulatory programs.

Note: Examples of other regulatory programs that may be applicable are the U.S. Army Corps of Engineers 404 permit program and permits required under ch. 30, Wis. Stats.

3. PERMIT CONDITIONS

This permit establishes the following measurable goals, with a compliance schedule in section 5, for the co-permittee to maintain compliance with the minimum control measures for their storm water management program described under sections 3.1 through 3.6. The following permit conditions apply to the co-permittee, unless the Department issues a written determination that a condition is not appropriate under the circumstances. The co-permittee shall have a written storm water management program that describes in detail how the co-permittee intends to comply with the permit's requirements for each minimum control measure. The permit shall begin implementing any updates to its storm water management programs no later than March 31, 2021.

3.1 Public Education and Outreach

Each co-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 co-permittee shall implement the following measurable goals:

3.1.1 MAMSWaP Membership. Continue to be a member of the Madison Area Municipal Storm Water Partnership (MAMSWaP) information and education program. Alternatively, if a co-permittee discontinues to be a member of the MAMSWaP information and education program then they must develop and implement a work plan on their own that otherwise meets the requirements of section 3.1 of this permit.

3.1.2 MAMSWaP Education Plan. Participate in the implementation of the most recent *Madison Area Municipal Storm Water Partnership (MAMSWaP) 5-Year Information and Education Plan*, which are prepared on behalf of the co-permittees. By December 1 of each year, the co-permittees shall collectively develop an annual work plan to guide implementation of the MAMSWaP information and education plan for the following calendar year. The information and education plan shall establish measurable goals for the topic areas listed in Table 1 below.

Note: MAMSWaP information and education plan documents are available online at: <http://www.ripple-effects.com/mamswap>

3.1.3 Educator Coordinator Cooperation. Cooperate with and assist the person functioning in the Storm Water Education Coordinator position created pursuant to the information and education agreement by providing pertinent information requested by the coordinator to facilitate implementation of the information and education plan. This section is not applicable if the co-permittee discontinues participation in the MAMSWaP information and education program.

3.1.4 Topics. Each co-permittee is individually responsible to have its own public education and outreach plan, which should follow the MAMSWaP information and educational plan and be adapted to its own municipality. Each co-permittee shall address all eight topics in Table 1 at least once during the permit term with a minimum of six topics being addressed each year, except, co-permittees that are a City, Village, or Town 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. Co-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>

3.1.5 Delivery mechanism. The co-permittee shall use at least four public education delivery mechanisms each year. co-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. Co-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. Co-permittees that are a County shall use at least one from the Active/Interactive Mechanisms column in Table 2 each year.”

Note: A University 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 • Others 	<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

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

3.2 Public Involvement and Participation

Each co-permittee shall maintain its public involvement and participation program, which complies 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 co-permittee shall implement the following measurable goals:

3.2.1 Permit activities. The co-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, adoption or amendment of storm water related ordinances.

3.2.2 Delivery mechanism. The co-permittee shall identify the public involvement and participation delivery mechanism for each permit activity mentioned in section 3.2.1. Delivery mechanisms may include, but not be limited to, public workshop, presentation of storm water information, government event (public hearing, council meeting, etc.), citizen committee meeting, or website.

3.2.3 Volunteer activity. The co-permittee must implement at a minimum one of the following volunteer public involvement and participation programs per year: group best management

practice (BMP) installation/maintenance, storm drain stenciling, planting community rain garden, clean up events, stream monitoring, citizen committee meetings, public workshop, presentation of storm water information, or other hands-on events.

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

3.3 Illicit Discharge Detection and Elimination

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

3.3.1 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 co-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.

3.3.2 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 co-permittee shall select minor outfalls for annual on-going dry weather field screening during the term of the permit. The co-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 co-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 and criteria 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>

3.3.3 IDDE source investigation and elimination. Written procedures for responding to known or suspected illicit discharges. At a minimum, procedures shall be established for:

a. As soon as possible, 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 co-permittee staff and the public.

e. Notifying the Department immediately in accordance with ch. NR 706, Wis. Adm. Code, if the co-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 co-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 storm water program 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.

Note: The current storm water program contact is Eric Rortvedt and he may be notified via email at: Eric.Rortvedt@wisconsin.gov

h. Documentation of the following information:

- (1)** Dates and locations of IDDE screenings conducted in accordance with section 3.3.2.
- (2)** Reports of alleged illicit discharges received, including dates of the reports, and any follow-up actions taken by the co-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 co-permittee, including dates, to address discovered illicit discharges.

3.3.4 The co-permittee shall take appropriate action to remove known illicit discharges from its MS4 system discovered under section 3.3 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.

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

- a.** An illicit discharge that originates from the co-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.

3.3.6 The name, title and phone number of the individual(s) responsible for responding to reports of illicit discharges and spills shall be included in the illicit discharge response procedure.

3.4 Construction Site Pollutant Control

Except for the University of Wisconsin-Madison as identified under section 4.6 of this permit, the co-permittee shall implement and enforce its program to reduce the discharge of sediment and construction materials from construction sites. The co-permittee shall implement the following measurable goals:

3.4.1 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 co-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.

Note: The Department has guidance, dated February 2015, defining common plan of development at:

<https://dnr.wi.gov/topic/stormwater/documents/GuidanceCommonPlan.pdf>

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 practices 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 (MEP), 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 MEP, 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 3.10, 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

3.4.2 Erosion and sediment 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.

3.4.3 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.

3.4.4 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: Municipal construction site inspectors should 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 co-permittee shall inspect all construction sites, at a minimum, in accordance with the frequency specified in **Error! Reference source not found.** 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 construction 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 3.4.4.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.

3.5 Post-Construction Storm Water Management

Except for the University of Wisconsin – Madison as identified under section 4.6, the co-permittee shall implement and enforce its program to require control of discharges from areas of new development, infill, and redevelopment, after construction is completed. The co-permittee shall implement the following measurable goals:

3.5.1 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 co-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 practices 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 3.5.1.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 3.10, 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

3.5.2 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.

3.5.3 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 should be conducted for all construction sites (both publicly or privately sponsored) with greater than one acre of land disturbance.

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

3.5.4 Long-term maintenance, inspections and enforcement. Written procedures that will be used by the co-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 3.5.1.c and d of this permit. The procedures shall include:

- a. A mechanism for tracking regulated sites.
- b. A set inspection frequency of no less than once per permit term.
- c. Inspection documentation.
- d. Follow up enforcement with timeframes for corrective maintenance.

3.6 Pollution Prevention

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

3.6.1 Storm water management facilities. Update and maintain an inventory of municipally owned or operated storm water best management 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 best management practice:

- a. A key corresponding to the location of the BMP on the storm sewer system map required under section 3.8.
- 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 owned by another entity but used by the co-permittee to meet a water quality requirement in this permit, written documentation that the co-permittee has permission from the owner to use the BMP for this purpose.

3.6.2 For each BMP inventoried under section 3.6.1, the co-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>

3.6.3 Municipally owned facilities. The Storm Water Pollution Prevention Plans (SWPPPs) for municipal garages, municipal storage areas, and other sources of storm water pollution from municipal facilities located within the permitted area shall be maintained and updated annually as needed and shall include the information in sections 3.6.3.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 3.8.

(2) The contact information for the individual(s) 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 co-permittee's 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 co-permittee is not required to comply with section 3.6.3 if the co-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 co-permittee shall certify for no exposure for each facility at least once each permit term. The co-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.

3.6.4 Implement 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>

3.6.5 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 co-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 co-permittee shall maintain documentation of 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 3.1 of this permit. If the co-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 co-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 3.8. If the disposal location is outside of the MS4 boundary, then the co-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

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

- a. Contact information for the individual(s) 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. Alternatively, this information may be reported on a storm by storm basis, which will be more useful to correlate with air or pavement temperature and snow depth.
- 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 co-permittee is responsible for, and an estimate in acres of the total area of municipally-owned parking lots treated with deicing products by the co-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 3.8.

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 co-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.

3.6.7 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, shall be implemented in accordance with a site-specific nutrient application schedule based on appropriate soil tests.

Note: To assist co-permittees with this requirement, the Department has developed a technical standard and fact sheet 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

3.6.8 Environmentally sensitive Development. Consideration of environmentally sensitive land development designs for municipal projects, including green infrastructure and low impact development, 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>

3.6.9 Internal training and education. At a minimum, the co-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 3.6. 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 co-permittee shall inform contractors performing any services to implement section 3.6 of the permit requirements and expectations. The co-permittee shall also inform their elected officials of the permit requirements and expectations.

3.7 Storm Water Quality Management (Developed Urban Area Standard)

Each co-permittee shall continue to 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 151.121 through 151.126 or ss. 151.242 through 151.246, Wis. Adm. Code. The co-permittee shall implement the following measurable goals:

3.7.1 To the maximum extent practicable, the co-permittee shall implement and maintain storm water management practices necessary to meet the more restrictive total suspended solids reduction of the following:

a. As required under s. 281.16(2)(am)3., Wis. Stats., the co-permittee shall maintain source area controls, structural storm water management facilities, and non-structural storm water BMPs that the co-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.

b. Maintain 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 practices, and non-structural control practices implemented to achieve the 20% reduction in total suspended solids shall be maintained.

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:

http://dnr.wi.gov/topic/stormwater/standards/ms4_modeling.html. The co-permittee may elect to meet the applicable total suspended solids standard above on a watershed or regional basis by working with other co-permittee(s) to provide regional treatment that collectively meets the standard.

3.8 Storm Sewer System Map

3.8.1 Each co-permittee shall continue to maintain its own 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:

a. Identification of waters of the state, name and 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 municipal separate storm sewer conveyance systems.

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

c. 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 co-permittee's area may be obtained from the Department.

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

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

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

g. Identification of streets. Note that other geographic features such as railroads, airports, and water features may be identified.

3.8.2 The City of Madison shall maintain the common storm sewer system map for the entire group permit area. Each co-permittee is responsible for providing annual updates to the City of

Madison for updating the common storm sewer system map for inclusion in the annual report as outlined in section 3.9. The common storm sewer system map shall contain the following components:

- a. Delineation and identification of storm water drainage basins including watersheds, sub-watersheds, and sewersheds using the naming conventions developed by the City of Madison.
- b. Locations of major structural controls including retention, detention, and infiltration facilities.
- c. Locations of publicly owned parks, recreational areas, and other open lands such as environmental corridors and conservancies.
- d. Municipal boundaries for all co-permittees.
- e. Central Urban Service Area boundaries.
- f. Geographic features including streets, highways, railroads, airports, and water features.
- g. Township and Range System.
- h. Contours at a minimum interval of ten feet.

3.8.3 Each co-permittee shall ensure that the information provided on the common storm sewer system map for the co-permittee's areas of jurisdiction is updated annually to reflect improvements to the MS4 through December 31 of each year. Each co-permittee shall be responsible for delivering hard copy changes for the storm sewer system map to the City of Madison by January 31 each year.

3.8.4 The City of Madison shall submit the annually updated common storm sewer system map to the Department with the annual report as outlined in section 3.9.

3.9 Annual Report

Each co-permittee shall submit an annual report to the Department by **March 31 of the following year**. The co-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:

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

Note: Dane County will provide the information for the assessment of the information and education plan since it has taken the lead in the implementation of that plan. However, each co-permittee will be expected to report on its respective public information and education efforts.

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

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

3.9.4 Identification of any known water quality improvements or degradation in the receiving water to which the co-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.

3.9.5 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 3 of this permit or lack of progress towards meeting a measurable goal, the co-permittee shall initiate program changes to improve their effectiveness.

3.9.6 If applicable, notice that the co-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.

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

3.9.8. 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>

3.10 Cooperation

The co-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 co-permittee is ultimately responsible for compliance with the conditions of this permit. The co-permittee may rely on another municipality or contract with another entity to satisfy a condition of this permit if all the following are met:

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

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

3.10.3 The other municipality or entity agrees to implement a control measure or permit requirement on the co-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 an adequate storm water ordinance(s) within a town, the town would then not have to adopt its own ordinance. However, the town, as the co-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 co-permittee must evaluate that the entity is completing inspections as agree upon. The co-permittee should not assume that another entity

is implementing a permit condition as required because the co-permittee remains responsible for compliance with the conditions of this permit.

3.11 Amendments

The co-permittee shall amend a program required under this permit as soon as practicable if the co-permittee becomes aware that it does not meet a requirement of this permit. The co-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 co-permittee may include a deadline for amending and implementing the amendment.

3.12 Reapplication for Permit Coverage

To retain authorization to discharge after the expiration date of this permit, the co-permittee shall apply for reissuance of this permit in accordance with the requirements of s. NR 216.09, Wis. Adm. Code, at least 180 days prior to this permit's expiration date.

4. SPECIAL RESPONSIBILITIES FOR CERTAIN CO-PERMITTEES

In addition to the requirements specified in sections 1 through 3 of this permit, certain co-permittees have additional or special requirements that apply to them as follows:

4.1 City of Madison

The City of Madison shall meet the following requirements:

4.1.1 Facilitate and prepare and provide the agenda and minutes for the quarterly meetings required under section 2.8.

4.1.2 Manage and annually update the common storm sewer system map required under section 3.8.2 of this permit. Any apportioning of the funds needed to manage and update the storm sewer system map may be negotiated between the City of Madison and the co-permittees.

4.1.3 Establish new or updated intergovernmental agency agreement(s) with the University of Wisconsin to meet the requirements identified within section 4.6.2. The status of all draft intergovernmental agency agreements shall be reported in the annual report by the City of Madison to establish new or updated intergovernmental agency agreements by the expiration of this permit. Once a new or revised intergovernmental agency agreement is made, it shall be submitted with the next annual report.

4.2 City of Middleton

The City of Middleton is required to comply with the following:

4.2.1 The pumped discharge from Tiedeman Pond shall be operated in a manner to prevent accumulated sediment from discharging from Tiedeman Pond.

4.2.2 The discharge shall be operated in a manner to prevent downgradient erosion.

4.2.3 For the term of this permit, the City of Middleton's average annual pollutant load reductions applied to the drainage area to Tiedeman Pond have been calculated to be 79.7% for total suspended solids (TSS) and 47.2% for total phosphorus (TP).

Note: The above reductions were calculated using effluent monitoring data from 2006 to 2014 as compared to the WinSLAMM predicted annual average influent load. At next permit reissuance, the future pollutant reduction can be calculated using effluent monitoring data representing annual average conditions as compared to WinSLAMM predicted annual average influent load.

4.2.4 The WLA assigned to the Tiedeman Pond discharge permit no. WI-0049956-1 shall not be included in the percent reduction analysis required under Appendix A, section A.2, A.4 or A.5 of this permit.

4.2.5 Monitor the discharge from Tiedeman Pond at a location representative of the discharge from the pond as identified in Table 4. The sampling of total phosphorus and total suspended solids is only required in calendar years 2022 and 2023. The results shall be reported to the Department as indicated in section 6.22 of this permit.

Table 3: Sampling Point 001 – Tiedeman Pond Discharge

Parameter	Units	Sample Frequency	Sample Type
Flow Rate	MGD	Daily	Calculated
Phosphorus, Total*	mg/L	2/Month	Grab
Suspended Solids, Total*	mg/L	2/Month	Grab

* Sampling for total phosphorus and total suspended solids is only required in calendar years 2022 and 2023.

4.3 Village of Shorewood Hills

Establish new or updated intergovernmental agency agreement(s) with the University of Wisconsin to meet the requirements identified within section 4.6.2. The status of all draft intergovernmental agency agreements shall be reported in the annual report by the Village of Shorewood Hills to establish new or updated intergovernmental agency agreements by the expiration of this permit. Once a new or revised intergovernmental agency agreement is made, it shall be submitted with the next annual report.

4.4 City of Stoughton

The City of Stoughton is required to comply with the following:

4.4.1 The pumped discharge from Paradise Pond shall be operated in a manner to prevent accumulated sediment from discharging from Paradise Pond.

4.4.2 The discharge shall be operated in a manner to prevent downgradient erosion.

4.4.3 For the term of this permit, the City of Stoughton’s annual average pollutant load reductions applied to the drainage area to Paradise Pond have been calculated to be 82.1% for TSS and 56.0% for TP.

Note: The above reductions were based on WinSLAMM modeling of annual average conditions with a weir outlet as opposed to pumping. At next permit reissuance (or upon DNR concurrence of the treatment performance documented by analysis of the 2017 to 2021 monitoring data), the future treatment performance can be calculated using effluent monitoring data representing annual average conditions as compared to WinSLAMM predicted annual average influent load.

4.4.4 Monitor the discharge from Paradise Pond at a location representative of the discharge from the pond as identified in Table 5. The sampling of total phosphorus and total suspended solids is required through calendar year 2021. The results shall be reported to the Department as indicated in section 6.22 of this permit.

Table 5: Sampling Point 002 – Paradise Pond Discharge

Parameter	Units	Sample Frequency	Sample Type
Discharge Volume	MG	Daily	Calculated
Phosphorus, Total*	mg/L	2/Pumping Event	Grab
Suspended Solids, Total*	mg/L	2/Pumping Event	Grab

* Sampling for total phosphorus and total suspended solids is only through calendar year 2021.

4.5 Dane County

Dane County shall meet the following requirements:

4.5.1 As specified in the information and education agreement, maintain a half-time position to provide public information and education services under this permit on behalf of the co-permittees.

4.5.2 In consultation with the Department and other co-permittees, function as the lead agency in implementation of the information and education plan prepared on behalf of the co-permittees.

4.5.3 Provide updates on the status and implementation of the information and education plan at the quarterly meetings and provide information on plan implementation for the annual report required under section 3.9.

4.6 University of Wisconsin-Madison

As a state entity, the University of Wisconsin – Madison (University) has limited statutory authority to implement and enforce requirements of sections 3.4 and 3.5 of this permit. Therefore, their written storm water management program shall specify their collaboration with other government or non-government agencies, municipalities, or local or federal partners to establish the intent of sections 3.4 and 3.5.

In addition to the applicable requirements specified in sections 1 through 3 of this permit, the University of Wisconsin – Madison shall meet the following requirements:

4.6.1 In their storm water management plan, the University shall address how construction site pollutant control and post-construction storm water management is achieved by construction activity contracted and performed by the University, construction activity contracted by the University of Wisconsin System (UWS), and construction activity contracted by Department of Administration Division (DOA), Division of Facility Development and Management (DFDM), and how each of these construction administration options is consistent with the requirements of section 3.4 and 3.5.

4.6.2 Establish new or updated intergovernmental agency agreements with the Village of Shorewood Hills, the City of Madison, the United States, and any other applicable co-permittees. These intergovernmental agreements shall include, at a minimum:

- a. Defining responsibilities in regard to managing, inspecting, and reporting of all above ground and underground storm water conveyance into, out of, or through the permit area of the University.
- b. Means and methods of storm water and illicit discharge reporting requirements between the University and other co-permittees.
- c. The implementation and management of SWPPPs from lands or operations of the University outside of its permit jurisdictional area.

The status of all draft intergovernmental agency agreements shall be reported in the annual report by the University to establish new or updated intergovernmental agency agreements by the expiration of this permit. Once a new or revised intergovernmental agency agreement is made, it shall be submitted with the next annual report.

4.6.3 Continue to implement policies and procedures to the extent of its legal authority to control illicit discharges to and from those portions of the MS4 that it owns or operates consistent with

the requirements of section 3.3 of this permit.

4.6.4 To the maximum extent practicable, the University of Wisconsin – Madison is encouraged to utilize the resources available through its academic and research programs to facilitate compliance with the requirements of this permit.

5. COMPLIANCE SCHEDULE

The co-permittee shall comply with the specific permit conditions contained in sections 2 and 3 according to the schedule in this section 5 and Table 6. The co-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>

5.1 Impaired Waterbodies and Total Maximum Daily Loads

5.1.1 The co-permittee shall determine whether any part of its MS4 discharge to an impaired water body as required under section 1.8.2 of this permit **by March 31 of each odd-numbered year**.

5.1.2 If the co-permittee is subject to TMDL requirements under section 1.8, the co-permittee shall submit to the Department materials in accordance with the schedule as required in Appendix A of this permit.

5.2 Public Outreach and Education

The co-permittee shall submit to the Department the public education and outreach program developed for the term of this permit as required under section 3.1 of this permit by **March 31, 2021**. Include with the annual report submittal via the Department's electronic reporting system.

5.3 Public Involvement and Participation

The co-permittee shall submit to the Department the public involvement and participation program developed for the term of this permit as required under section 3.2 of this permit by **March 31, 2021**. Include with the annual report submittal via the Department's electronic reporting system.

5.4 Illicit Discharge Detection and Elimination

The co-permittee shall submit to the Department the illicit discharge detection and elimination program developed for the term of this permit as required under section 3.3.2 to 3.3.6 of this permit by **March 31, 2021**. Include with the annual report submittal via the Department's electronic reporting system.

5.5 Construction Site Pollutant Control

The co-permittee shall submit to the Department the construction site pollutant control program developed for the term of this permit as required under sections 3.4.2 to 3.4.4 of this permit by **March 31, 2021**. Include with the annual report submittal via the Department's electronic reporting system.

5.6 Post-Construction Storm Water Management

The co-permittee shall submit to the Department the post-construction storm water management program developed for the term of this permit as required under sections 3.5.2 to 3.5.4 of this permit by **March 31, 2021**.

5.7 Pollution Prevention

5.7.1 The co-permittee shall submit to the Department the municipal storm water management facility inventory as required under section 3.6.1 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.

5.7.2 The co-permittee shall submit to the Department the maintenance plan for municipal storm water management facilities as required under section 3.6.2 of this permit by **March 31, 2021**.

5.7.3 The co-permittee shall update SWPPPs for municipally owned properties as needed as required under section 3.6.3 of this permit. When a SWPPP is updated, it shall be submitted by **March 31 of each year** to the Department.

5.8 Storm Water Quality Management

The co-permittee shall report compliance with the developed urban area performance standards as required under section 3.7 of this permit by **March 31 of each year**.

5.9 Storm Sewer System Map

The co-permittee shall update the storm sewer system map as required under section 3.8 of this permit. When the MS4 map is updated, it shall be submitted by **March 31 of each year** to the Department.

5.10 Annual Report

The co-permittee shall submit to the Department an annual report as required under section 3.9 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 6: Compliance Schedule for Permit Requirements

PERMIT SECTION	ACTIVITY	COMPLIANCE DATE	COMMENTS
Section 1.8.1	Total Maximum Daily Load implementation	See Appendix A.	Applies to a co-permittee that discharges to the Rock River TMDL.
Section 1.8.2	Discharges to an impaired water body	By March 31 of each odd-numbered year thereafter	All co-permittees.
Section 3.1	Public Education and Outreach – Submit public education and outreach program for the permit term with annual report	March 31, 2021	All co-permittees
Section 3.2	Public Involvement and Participation – Submit public involvement and participation program for the permit term with annual report	March 31, 2021	All co-permittees
Section 3.3.2 to 3.3.6	Illicit Discharge Detection and Elimination – Submit illicit discharge detection and elimination program for the permit term with annual report	March 31, 2021	All co-permittees
Section 3.4.2 to 3.4.4	Construction Site Pollutant Control – Submit construction site pollutant control program for the permit term with annual report	March 31, 2021	All co-permittees
Section 3.5.2 to 3.5.4	Post-Construction Storm Water Management – Submit post-construction storm water management program for the permit term with annual report	March 31, 2021	All co-permittees
Section 3.6	Pollution Prevention – Section 3.6.1, submit the municipal storm water management facility inventory with annual report	March 31, 2021, and annually thereafter (if updates)	All co-permittees
	Pollution Prevention – Section 3.6.2, submit the maintenance plan for municipal storm water management facilities with annual report	March 31, 2021	All co-permittees
	Pollution Prevention – Section 3.6.3, submit SWPPPs for municipally owned properties with annual report	March 31 of each year reporting on previous calendar year (if updates)	All co-permittees
Section 3.7	Storm Water Quality Management – Report TSS percent reduction	March 31 of each year reporting on previous calendar year (if updates)	All co-permittees
Section 3.8.2	Common Storm Sewer Map	March 31, and annually thereafter (if updates)	City of Madison
Section 3.9	Submit Annual Report	March 31 of each year reporting on previous calendar year	All co-permittees

6. GENERAL CONDITIONS

The conditions in s. NR 205.07(1) and (3), Wis. Adm. Code, are incorporated by reference in this permit. The co-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.

6.1 Duty to Comply: The co-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.

6.2 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.

6.3 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 co-permittee's ability to meet the remaining scheduled due dates.

6.4 Noncompliance

6.4.1 Upon becoming aware of any co-permit noncompliance that may endanger public health or the environment, the co-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 co-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.

6.4.2 Reports of any other noncompliance not covered under General Conditions sections 6.3, 6.4.1, or 6.6. shall be submitted with the annual report. The reports shall contain all the information listed in General Conditions section 6.4.1.

6.5 Duty to Mitigate: The co-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.

6.6 Spill Reporting: The co-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>

6.7 Proper Operation and Maintenance: The co-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 include 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.

6.8 Bypass: The co-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 1.12 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.

6.9 Duty to Halt or Reduce Activity: Upon failure or impairment of storm water management practices identified in the storm water management program, the co-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.

6.10 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.

6.11 Additional Monitoring: If a co-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.

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

6.12.1 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;

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

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

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

6.13 Duty to Provide Information: The co-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 co-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 co-permittee shall also furnish the Department, upon request, copies of records required to be kept by the co-permittee.

6.14 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.

6.15 Other Information: Where the co-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.

6.16 Records Retention: The co-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 co-permittee shall retain records documenting implementation of the minimum control measures in sections 3.1 through 3.6 of this permit for a period of at least 5 years from the date the record was generated.

6.17 Permit Actions: As provided in s. 283.53, Wis. Stats., after notice and opportunity for a hearing, this permit may be modified, suspended or revoked, in whole or in part, for cause. If a co-permittee files a request for a permit modification, revocation or reissuance, or a notification of planned change or anticipated noncompliance, this action by itself does not relieve the co-permittee of any permit condition.

6.18 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.

6.19 Attainment of Water Quality Standards after Authorization: At any time after authorization, the Department may determine that the discharge of storm water from a co-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 co-permittee to do one of the following:

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

6.19.2 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.

6.20 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 co-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. To reapply for permit coverage, a co-permittee shall send a letter to the Department that includes proposed changes to the storm sewer system map, storm water management program and any other relevant change.

6.21 Need to Halt or Reduce Activity not a Defense: It is not a defense for a co-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.

Sections 6.22 through 6.25 apply to effluent sampling and monitoring result associated with the pumped discharges from Tiedeman Pond by the City of Middleton and Paradise Pond by the City of Stoughton.

6.22 Monitoring Results: Monitoring results obtained during the previous month shall be summarized and reported on a Department Wastewater Discharge Monitoring Report. The report may require reporting of any or all of the information specified below under 'Recording of Results'. This report is to be returned to the Department no later than the date indicated on the form. A copy of the Wastewater Discharge Monitoring Report Form or an electronic file of the report shall be retained by the permittee.

Monitoring results shall be reported on an electronic discharge monitoring report (eDMR). The eDMR shall be certified electronically by a responsible executive or officer, manager, partner or proprietor as specified in s. 283.37(3), Wis. Stats., or a duly authorized representative of the officer, manager, partner or proprietor that has been delegated signature authority pursuant to s. NR 205.07(1)(g)2, Wis. Adm. Code. The 'eReport Certify' page certifies that the electronic report form is true, accurate and complete.

If the permittee monitors any pollutant more frequently than required by this permit, the results of such monitoring shall be included on the Wastewater Discharge Monitoring Report.

The permittee shall comply with all limits for each parameter regardless of monitoring frequency. For example, monthly, weekly, and/or daily limits shall be met even with monthly monitoring. The permittee may monitor more frequently than required for any parameter.

6.23 Sampling and Testing Procedures: Sampling and laboratory testing procedures shall be performed in accordance with Chapters NR 218 and NR 219, Wis. Adm. Code and shall be performed by a laboratory certified or registered in accordance with the requirements of ch. NR 149, Wis. Adm. Code. Groundwater sample collection and analysis shall be performed in accordance with ch. NR 140, Wis. Adm. Code. The analytical methodologies used shall enable the laboratory to quantitate all substances for which monitoring is required at levels below the effluent limitation. If the required level cannot be met by any of the methods available in NR 219, Wis. Adm. Code, then the method with the lowest limit of detection shall be selected. Additional test procedures may be specified in this permit.

6.24 Recording of Results: The permittee shall maintain records which provide the following information for each effluent measurement or sample taken:

- the date, exact place, method and time of sampling or measurements;
- the individual who performed the sampling or measurements;
- the date the analysis was performed;
- the individual who performed the analysis;
- the analytical techniques or methods used; and
- the results of the analysis.

6.25 Reporting of Monitoring Results: The permittee shall use the following conventions when reporting effluent monitoring results:

- Pollutant concentrations less than the limit of detection shall be reported as < (less than) the value of the limit of detection. For example, if a substance is not detected at a detection limit of 0.1 mg/L, report the pollutant concentration as < 0.1 mg/L.

- Pollutant concentrations equal to or greater than the limit of detection, but less than the limit of quantitation, shall be reported and the limit of quantitation shall be specified.

7. DEFINITIONS USED IN THIS PERMIT

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

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

7.2 Department means the Wisconsin Department of Natural Resources.

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

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

7.5 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.

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

7.7 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 co-permittee or the Department identifies it as a significant source of a pollutant to waters of the state.

7.8 Impaired Water means a water body 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 water body's designated use.

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

7.10 Jurisdiction means the area where the co-permittee has authority to enforce its ordinance(s) or otherwise has authority to exercise control over a particular activity of concern.

7.11 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.

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

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

7.13.1 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.

7.13.2 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.

7.14 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.

7.15 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 the following criteria:

7.15.1 Owned or operated by a municipality.

7.15.2 Designed or used for collecting or conveying storm water.

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

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

7.16 New MS4 Discharge of Pollutants means an MS4 discharge that would first occur after the co-permittee's effective date of coverage under WPDES permit nos. WI-S050075-1 or WI-S058416-3 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 such permit. The City of Stoughton and Village of Cottage Grove had an effective date of coverage of November 13, 2006 under WPDES permit no. WI-S050075-1 and the other 19 co-permittees had an effective date of coverage of July 1, 2009 under WPDES permit no. WI-S058416-3.

7.17 Outfall means the point at which storm water is discharged to waters of the state or to a storm sewer of another MS4.

7.18 Permitted Area means the areas of land under the jurisdiction of the co-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.

7.19 Pollutant of Concern means a pollutant that is causing impairment of a water body.

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

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

7.22 Redevelopment means areas where development is replacing older development.

7.23 Riparian Landowners are the owners of lands bordering lakes and rivers.

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

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

7.26 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.

7.27 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.

7.28 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.

7.29 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.

7.30 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.

7.31 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.

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

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

Appendix A: MS4 Co-Permittees Subject to the Rock River TMDL

A.1 Applicability and Structure of Appendix.

A.1.1 Applicability. In accordance with section 1.8.1, this Appendix A applies to co-permittees subject to “Total Maximum Daily Loads for Total Phosphorus and Total Suspended Solids in the Rock River Basin,” approved by USEPA September 2011.

A.1.2 Structure of Appendix. This appendix is structured to provide co-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 co-permittees that are participating in an approved adaptive management plan. Section A.4 details requirements for co-permittees that can comply with the TMDL during this permit term. Section A.5 applies to co-permittees who have not been able to utilize sections A.3 or A.4. Section A.5 contains two compliance tracks; co-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 Table A. 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 target 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 co-permittee provided all of the following conditions are met:

- a. By October 31, 2023, the co-permittee submits the necessary data and documentation to the Department that demonstrates that the co-permittee meets the percent reductions stipulated in Table A for each reachshed that the MS4 discharges to and for each pollutant of concern.
- b. The documentation submitted by the co-permittee includes the policies, procedures, and regulatory mechanisms that the co-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 co-permittee receives written concurrence from the Department by April 30, 2024, that the co-permittee has achieved full TMDL compliance.

A.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 by the effective date of this permit the co-permittee has chosen to participate in an adaptive management project that has been approved by the Department the co-permittee shall continue to participate in the implementation of the adaptive management project.

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

A.4.1 By March 31, 2020, the co-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 co-permittee shall submit written verification that it has met the applicable requirements contained in section A.2.2.

A.5 Compliance Over Multiple Permit Terms. If the co-permittee cannot meet the requirements stipulated under sections A.3 or A.4, the co-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 co-permittee determines that the applicable requirements contained in section A.2.2 will not be achieved by October 31, 2023, then the co-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 co-permittee shall submit a written TMDL implementation plan to the Department identifying and describing the actions that the co-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.

The percent reductions under sections A.5.2.a and A.5.2.b are measured from the baseline assumptions for the Rock River TMDLs, which represent compliance with s. NR 151.13, Wis. Adm. Code, to the total reductions listed in Table A (see example calculation below). The baseline assumption for the Rock River TMDL is a 40% reduction from no-controls for TSS and a 27% reduction from no-controls for TP.

Note: Refer to the applicable TMDL reports for additional discussions on baseline.

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

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

a. Pursuant to the co-permittee's authority under s. 281.33(6)(a)2., Wis. Stats., the co-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 co-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 controls measures that may exist. The co-permittee may also establish TP reduction levels for redevelopment projects.

Note: The co-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 co-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 co-permittee takes a TSS and/or TP reduction credit. The co-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 co-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 co-permittee shall revise or promulgate a municipal ordinance that requires the submittal of record drawings for storm water management facility that the co-permittee takes a TSS and/or TP credit. The co-permittee shall require submittal of the record drawings 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 co-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 co-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 co-permittee shall inventory the condition of the conveyance systems and outfalls. Where erosion or scour is occurring, the co-permittee shall develop a schedule to stabilize the identified areas over a 5-year period.
- f. The co-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 water body for which a WLA has been assigned to the co-permittee. The co-permittee shall develop and implement a maintenance plan for each new structural BMP.
- g. The co-permittee shall conduct an analysis of the current municipal street cleaning program, to determine if additional pollutant loading reductions can be achieved. The co-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 co-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 co-permittee shall meet the following reporting requirements:

A.6.1 Compliance Determination Reporting. The co-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 co-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 co-permittees complying with a Department approved adaptive management plan under section A.3.2, by October 31, 2023, the co-permittee shall submit documentation to the Department to verify that the co-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 co-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 co-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 co-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 co-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 co-permittee is not achieving the requirements stipulated in section A.2, the co-permittee shall submit an updated written TMDL implementation plan to the Department that describes how the co-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 Table A. 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 practicable, 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 A: Rock River Basin TMDL Load Reductions Necessary to Meet TMDL Wasteload Allocations by TMDL Reachshed

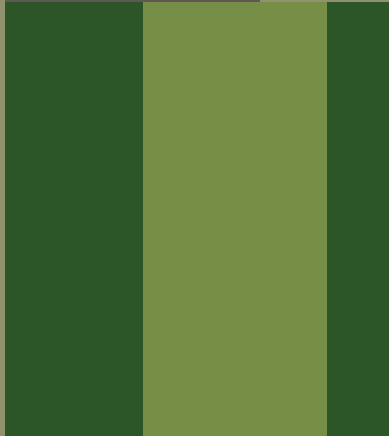
Reachshed Number (TMDL Subbasin)	Water Body Name	TSS % Reduction from No-controls	TP % Reduction from No-controls
45	Maunasha River	44.8	36.5
62	Pheasant Branch Creek	82.0	78.1
63	Spring (Dorn) Creek	46.6	37.2
64	Yahara River, Lake Mendota, Lake Monona	73.0	61.3
65	Nine Springs Creek	67.6	62.8
66	Yahara River, Lake Waubesa, Lake Kegonsa	62.2	54.0
67	Yahara River	40.0	27.0
68	Yahara River	50.8	65.0
69	Yahara River	52.6	79.6
83	Lake Koshkonong	55.0	54.0

Attachment I – 2023 Yahara WINS Annual Report



Yahara WINS Annual Report

2023



ABOUT YAHARA WINS

The Yahara Watershed Improvement Network, known as Yahara WINS, is a long-term initiative to achieve clean water goals for the Yahara watershed. In this effort, community partners, led by Madison Metropolitan Sewerage District, are collaborating on a strategy called watershed adaptive management in which all sources of phosphorus in the watershed work together to reduce nutrient runoff over 20 years. The work began in 2012 and following a four-year pilot effort, it has transitioned to the full-scale implementation throughout the whole watershed. 2023 marks the seventh full year of the initiative.

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Intergovernmental Agreement (IGA) Signatories

Towns

Blooming Grove
Burke
Cottage Grove
Dunn
Middleton
Westport

Villages

Cottage Grove
DeForest
Maple Bluff
McFarland
Shorewood Hills
Waunakee
Windsor

Cities

Fitchburg
Madison
Middleton
Monona
Stoughton
Sun Prairie

Others

Madison Metropolitan Sewerage District
Village of Oregon Wastewater Treatment Plant
Stoughton Utilities
UW-Madison
Wisconsin Department of Natural Resources

Interested Parties

Clean Lakes Alliance
Yahara Pride Farms
River Alliance of Wisconsin
U.S. Geological Survey
U.S. Environmental Protection Agency (EPA)
Madison Gas & Electric
Yahara Lakes Association
Dane County
Friends of Pheasant Branch
Wisconsin Department of Agriculture, Trade and Consumer Protection
Friends of Badfish Creek
Rock County
Columbia County
Rock River Coalition

Bold = Partner that has a funding agreement with Yahara WINS.

IGA Executive Committee Members

Voting Members

President: Martin Griffin,
Madison Metropolitan Sewerage District
Vice President: Tom Wilson,
Town of Westport
Secretary: Greg Fries,
City of Madison
Treasurer: Jeff Rau,
Village of Oregon
At-large member: Judd Blau,
Village of DeForest

Non-voting Advisory Members

Laura Hicklin, Dane County
Bob Uphoff, Yahara Pride Farms
James Tye, Clean Lakes Alliance



*Martye Griffin,
Yahara WINS
President*

President's Message

For centuries, the Yahara Lakes region has been inhabited by the Ho-Chunk people. Their name for the region, Teejop, means "Four Lakes." As reflected in the name, the lakes were central to Indigenous life.

Two hundred years ago, Europeans began to settle in what is now called Madison. With increasing settlements came increasing human waste. As Madison grew, waste was dumped directly into Lake Monona, fouling water quality.

Over fifty years ago, wastewater discharges to Lake Mendota ceased, but pollution from surface runoff continued introducing excessive nutrients to the lake system.

In 2017, Yahara WINS began as a formal project. 2023 marked the seventh full year of the 20-year project. While Yahara WINS is driven by the need to comply with Clean Water Act targets, adaptive management was selected as the compliance option because of its regional benefits to the entire watershed, rather than just downstream of a discharge point.

The Yahara WINS effort has only scratched the surface of the Yahara Lakes' history. In a few years, the project has provided an infusion of energy and resources into lake cleanup. However, it's important to evaluate the project in the context of the watershed's wider history.

The quality of the Yahara lakes today reflects decades of human activity. Years of phosphorus from countless storms are settled into stream sediments and lake beds. We can't expect to counteract decades of lake impacts in just a few short years. In addition to preventing new phosphorus contributions to the lakes, we will need to allow time for historical nutrients to cycle out of the lake system.

Although seven years is a blink of an eye in the grand scheme, Yahara WINS has made long strides in this first phase of the project. We have a strong network of committed partners whose contributions are generating tangible results. For each year of the project, we have seen higher-than-expected phosphorus reductions for the watershed. And the project has spurred innovations in phosphorus reduction that make Yahara WINS a national model for watershed management.

There are steep challenges ahead – not only are we contending with the legacy of historical phosphorus runoff, but climate change can bring intense storms that introduce significant runoff to the lakes. However, even in a short project period, we have seen promising signs that phosphorus reduction efforts are working. With this strong foundation, Yahara WINS is positioned to make long-term improvements in the watershed.

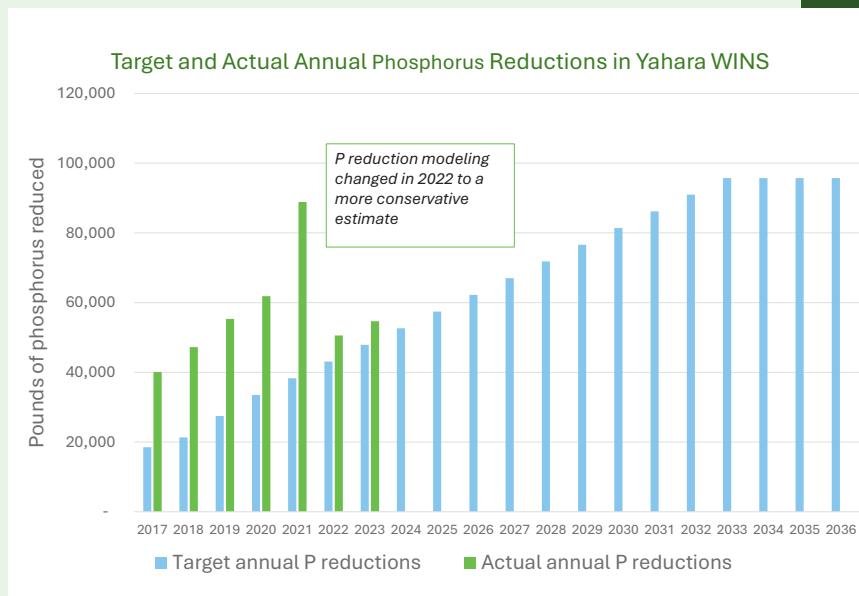
2023 PHOSPHORUS REDUCTIONS

2023 was a dry year in Wisconsin, and farmers struggled with drought conditions. While dry weather is challenging for farming, it also creates fewer opportunities for phosphorus to enter the waterways through storm runoff.

Despite a challenging farming year, Yahara WINS agricultural conservation partners maintained connections with hundreds of farmers across the watershed. With the help of Yahara WINS cost-share, these partners worked with farmers to prevent 54,541 pounds of phosphorus from entering water bodies in the watershed.

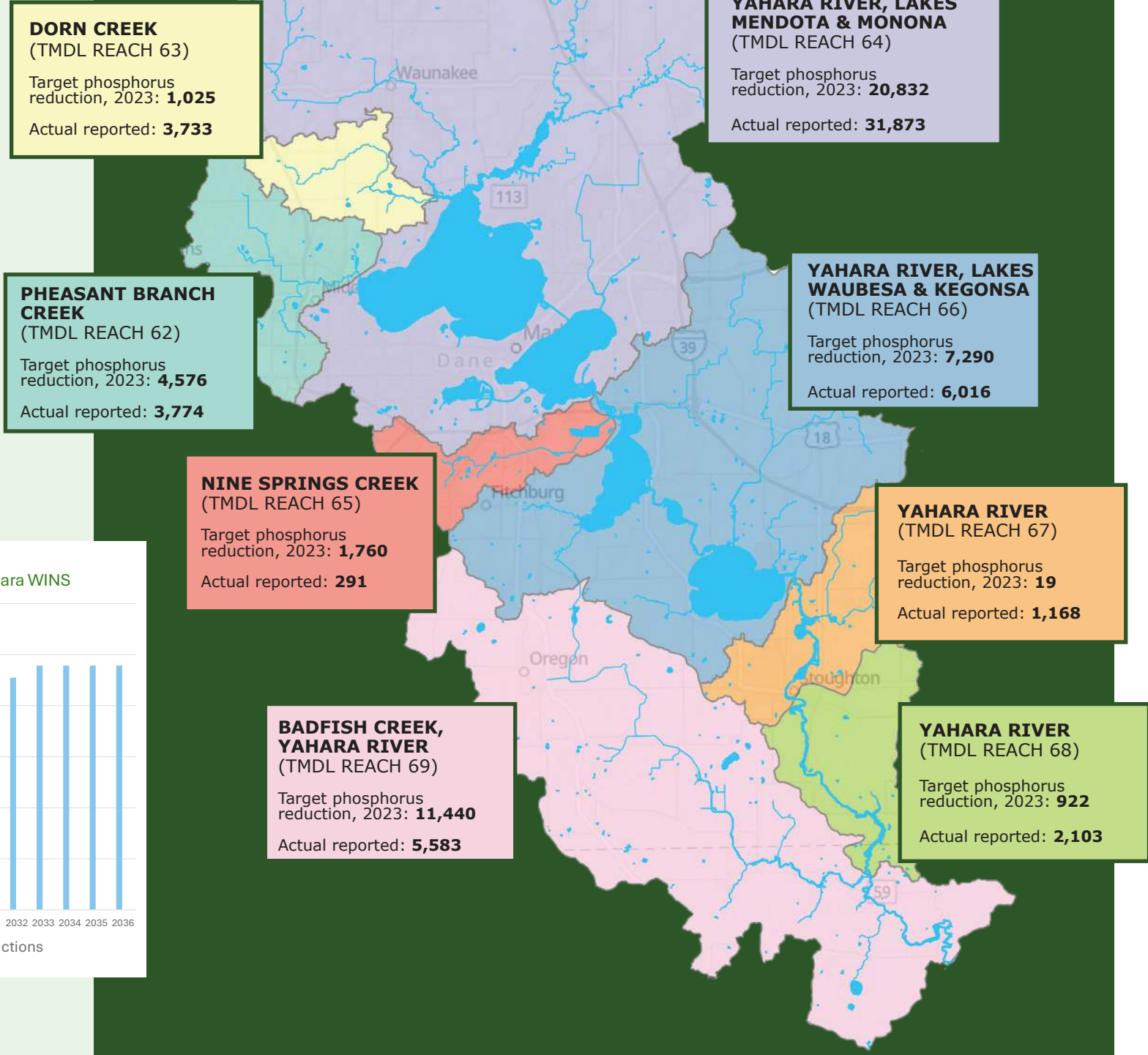
Once again, Yahara WINS exceeded its annual phosphorus reduction target from the cost model, which set a goal of 47,862 pounds of phosphorus for 2023.

The graph below shows the target phosphorus reductions by year along with the actual reported reductions.



Phosphorus Reductions by TMDL Reach in the Yahara Watershed

TMDL = Total Maximum Daily Load, the phosphorus budget for the watershed



Targets vs. Actual: Are we on track for meeting phosphorus reduction goals?

Phosphorus reduction targets for the watershed are geographically divided by reach, the subdivision of the watershed draining to a certain water body. At the outset of Yahara WINS, project planners set target phosphorus reductions by reach by estimating phosphorus reductions that were possible based on hypothetical conservation practices implemented in those reaches.

To date, the phosphorus reductions in some reaches have exceeded annual goals, while in other reaches, phosphorus reductions have not yet reached their annual targets. These differences are partly due to available opportunities. So far, the majority of phosphorus reductions through Yahara WINS have been achieved in Reach 64 (Yahara River, Lake Mendota and Lake Monona), which is a large area with many opportunities for nutrient management.

Meanwhile, it's more difficult to identify phosphorus reduction opportunities in reaches when there's not as much land available for runoff reduction projects. Reach 65 (Nine Springs Creek) is a small, heavily urbanized area with few possibilities for the types of conservation practices common in Yahara WINS to date. Since the project began, this reach has experienced new development, and available land for management practices has been further reduced.

In its first years, Yahara WINS made strides toward its goals by promoting low-cost, well-understood biological conservation practices like cover crops and strip tillage. Now, with a better understanding of the watershed, project planners will need to fine-tune phosphorus reduction strategies to focus on the remaining sources. What has worked in some reaches may not work in others, so future Yahara WINS practices implemented in each reach will depend on the area's unique attributes and needs.

IMPLEMENTING PARTNER HIGHLIGHTS

County conservation departments and farmer-led groups are instrumental to Yahara WINS. They have the expertise, trust and relationships that drive implementation of practices that reduce nutrient runoff. Yahara WINS provides funding to these partners, which use the funding to support planning and implementation of conservation practices.

County boundaries extend beyond the Yahara watershed's boundaries. The practices highlighted in this section are those that took place in the Yahara Watershed. Meanwhile, county conservation staff are also performing similar activities and providing cost-share outside the watershed. Yahara WINS funding helps busy county conservation staff focus on practices that reduce phosphorus in the Yahara watershed.

Here's a look at what implementing partners accomplished in 2023. For full partner reports, visit yaharawins.org/resources/annual-reports.

ROCK COUNTY LAND CONSERVATION DEPARTMENT (LCD)

- 106 pounds of phosphorus reduced from practices implemented in 2023
- 2 acres of cropland in perennial forage
- 22 acres of cropland in perennial vegetation
- Continued multi-year planning for a complex barnyard runoff control system for a 200-steer barnyard within 300 feet of the Yahara River
- Experienced significant staff turnover, including the previous Yahara WINS point person. Yahara WINS planners are providing guidance to Rock County LCD about identifying new projects in upcoming years during staffing transition.

DANE COUNTY LAND & WATER RESOURCES DEPARTMENT (LWRD)

- 23,218 pounds of phosphorus (from new and existing practices) reduced
- 60,000 acres in the Yahara Watershed in nutrient management plans
- 237 landowners/producers assisted
- 32 cost-share agreements for conservation practices and systems
- Established the Dane Demo Farms, a farmer network to test and showcase agricultural conservation practices that protect water quality. Two Demo Farms are in the Yahara Watershed. Find more information at demofarms.danecounty.gov.

YAHARA PRIDE FARMS (YPF)

- 31,217 pounds of phosphorus reduced from practices implemented in 2023, a 9% increase from the reduction in 2022
- 29,034 acres with conservation practices implemented
- \$490,254 allocated as cost-share for conservation practices, with an additional \$583,216 invested by participating farmers; Yahara WINS provided \$425,000 to YPF in 2023 as part of its service agreement
- 78 farms participated in YPF cost-share programs in 2023; 13 farms participated for the first time in 2023
- 10 practices were eligible for YPF cost-share. The practices associated with the highest total phosphorus reductions were overwintering cover crops (8,513 pounds reduced) and low-disturbance manure injection (9,799 pounds reduced).

Yahara WINS Farmer Profile: Luke Laufenberg, Laufenberg Farms

Laufenberg Farms, established in 1899, is a sixth-generation family farm between Waunakee and Middleton (near the headwaters of Dorn Creek, a Lake Mendota tributary). The farm raises dairy cows and pigs and runs a store for meats raised on the farm. Luke Laufenberg manages about 700 acres of land to feed the animals. He is also a YPF board member.

Soil health conservation practices are a mainstay on the farm. For eight years, Laufenberg has been implementing practices to keep the land green (with no exposed soil) to prevent erosion and maintain soil health for future generations:

- Cereal rye is used as a cover crop for planned corn acres (silage and grain). Corn is planted into the cereal rye in the spring.
- In the first year of establishing a three-year alfalfa rotation, oats are seeded with the alfalfa. Oats grow fast, so they hold onto the soil until the alfalfa is established to protect against soil erosion.

The effect of these practices is evident. The pictures below show Laufenberg acres after a wet spring and a field with similar characteristics, but no conservation practices. While other fields in the area had visible gully erosion, creating channels to deliver phosphorus runoff to nearby streams, there was no sign of erosion on Laufenberg fields where vegetation held the soil and nutrients in place.



Gully erosion is visible cutting across a nearby field. This indicates that channels of runoff have flowed across the field, carrying soil and nutrients.

In this Laufenberg field, there is no visible evidence of erosion. Planting has helped keep soil in place.



EXPLORING CARBON TRADING POTENTIAL FOR YAHARA WINS

Many practices that reduce phosphorus runoff have the added benefit of sequestering carbon. Yahara WINS planners are exploring the potential to capitalize on the climate benefits of conservation practices implemented through the project, which could draw new sources of funding.

In 2024, Yahara WINS is entering into an agreement with Local Choice Marketing, LLC to submit an application for a Regional Conservation



Partnership Program (RCPP) grant. The grant is intended to support the creation of a local carbon trading market. In carbon trading, there is a type of carbon credit that can be calculated and certified to represent the quantity of carbon dioxide (and other greenhouse gases) sequestered by a certain practice, such as planting cover crops. Carbon emitters, like local industries, could then purchase credits to offset their emissions. The sale of these types of credits generated through practices that Yahara WINS promotes could be another revenue source for Yahara WINS partners.

Meanwhile, the District is working with Virridy, a company working to quantify climate benefits of avoided technology construction. Through Yahara WINS, wastewater utilities are avoiding the significant greenhouse gas emissions associated with building tertiary treatment, like advanced filtration systems, to remove phosphorus. These avoided emissions can be quantified and certified as credits to be sold on the voluntary carbon market.

Virridy has already quantified potential carbon credits and projected revenues if the District were to participate in the market. By implementing Yahara WINS rather than constructing treatment technology, Virridy estimates that approximately 72,673 tons of greenhouse gas emissions will be avoided over the project lifespan. The project has already generated about 31,905 creditable tons since it began in 2017.

Yahara WINS partners can expect updates on these carbon trading potentials in 2024 and future years.

Photo: A completely vegetated field managed with no-till farming is an example of a practice that can sequester carbon and translate to carbon credits on a carbon market.



The new boat landing area off County Highway A. Photo courtesy of Friends of Badfish Creek.



A kayaker on Badfish Creek. Photo courtesy of Friends of Badfish Creek.

BADFISH CREEK PADDLING STORIES

Yahara WINS isn't just about meeting a number on a permit. It's about keeping the waters in the watershed safe and usable for wildlife and humans. Badfish Creek, the central water body to reach 69 at the southern end of the watershed, illustrates the importance of water quality for recreation.

Badfish Creek is a popular stream for paddlers, making it a valuable recreational waterway. From March 14 to December 31, 2021, a trail camera just below the Old Stage Road boat landing recorded over 2000 people in 1,500 boats.

In 2023, the Friends of Badfish Creek Watershed group approached the District about opening up land along County Highway A for a better boat launch for paddlers on the creek. The District transferred three acres along the creek to the Town of Rutland, allowing the Friends group to start construction on a boat landing with funding from the Stoughton Area Community Foundation.

Here's what Badfish Creek means to members of Friends of Badfish Creek Watershed:

Miles paddled: "In less than 4.5 years, I've paddled portions of the creek 84 times for a distance over 500 miles." – Andrew Hoernemann

Memorable experiences: "Seeing owls, herons, egrets, deer, muskrats, mink, turtles and other wildlife is very encouraging." – Jim Post

Favorite section to paddle: "Our favorite section has been Old Stage to Riley Road (not too long), but we just did Old Stone to Old Stage and liked that as well." – Kathy Dutilly

Changes to the creek in the years you've been paddling: "On the surface, the Badfish doesn't seem to have changed a lot in the 17 years I've been paddling/observing. But learning about contaminants in the stream (phosphorus, *E. coli*, sediment, etc.) has changed my perception: the Badfish needs and deserves our protection..." – Lynne Diebel

WATER QUALITY MONITORING

U.S. GEOLOGICAL SURVEY (USGS) DATA SUMMARY

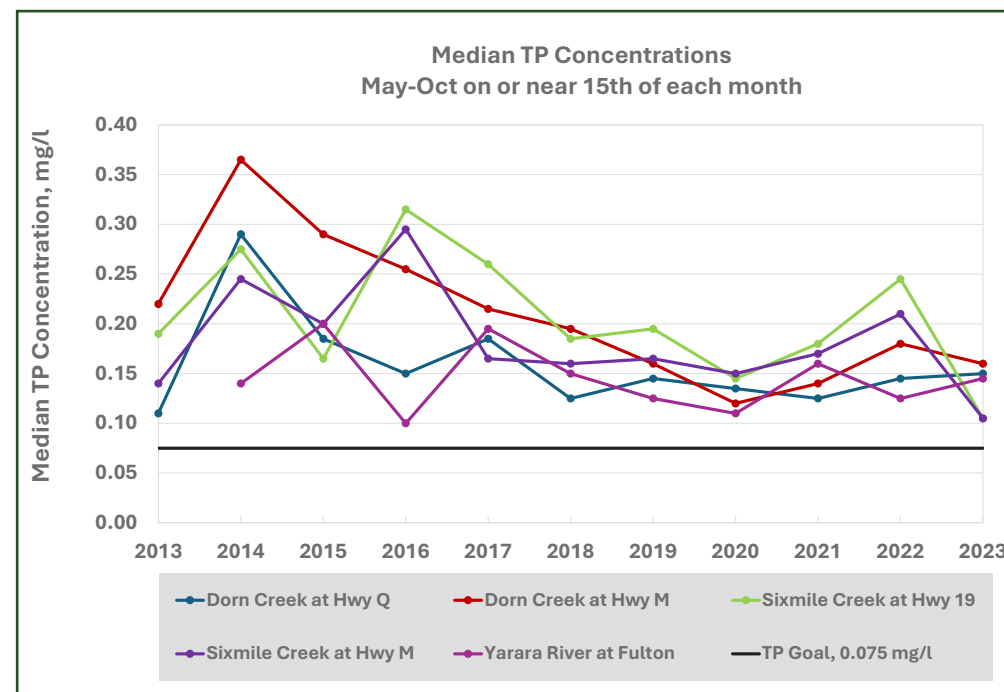
The USGS maintains several monitoring stations in the Yahara watershed, measuring water quality indicators including flow, phosphorus, sediment, nitrogen, and chloride. Five of those stations are funded by Yahara WINS and provide insight into phosphorus loading into various waterways throughout the watershed. The USGS assesses annual data over a water year (WY) (Oct. 1 of the previous year through Sept. 30 of the current year) to take into account snowfall in the winter starting the year.

According to the USGS's end-of-year summary, these trends were observed for the watershed in WY 2023:

- Dry weather continued in 2023, with drought conditions in the spring and summer. Compared to an annual average rainfall of

37 inches, 31 inches fell at the Dane County airport in 2023.

- Total phosphorus loading from the four major tributaries to Lake Mendota was less than 30,000 pounds, compared to an average annual load of about 62,000 pounds looking at the period from 1990 to 2023.
- Median in-stream phosphorus concentrations for Yahara WINS monitoring sites were at or slightly below the long-term values for most sites.
- There were more beach closings on Lake Mendota in 2023 due to blue-green algae and/or *E. coli*, even though phosphorus concentrations were relatively low. This occurrence emphasizes that lakes are complex systems whose health can't be assessed just based on one variable. Water temperature, shoreline topography, wind, and other factors also affect blue-green algae growth, not just phosphorus concentrations.



This graph shows the growing season (May-October) median total phosphorus (TP) concentration at the five USGS sites funded by Yahara WINS. The USGS also monitors seven additional sites in the watershed for TP concentrations. The "Looking Ahead" section of this report includes more information about the use and interpretation of this full data set.

2023 IN-STREAM PHOSPHORUS CONCENTRATIONS

USGS samples for the project area were collected on the 15th of every month during the growing season (May-October). The median of these values is reported for each location. Most of these samples reflect baseflow conditions when the stream is not experiencing higher flow due to storm runoff.

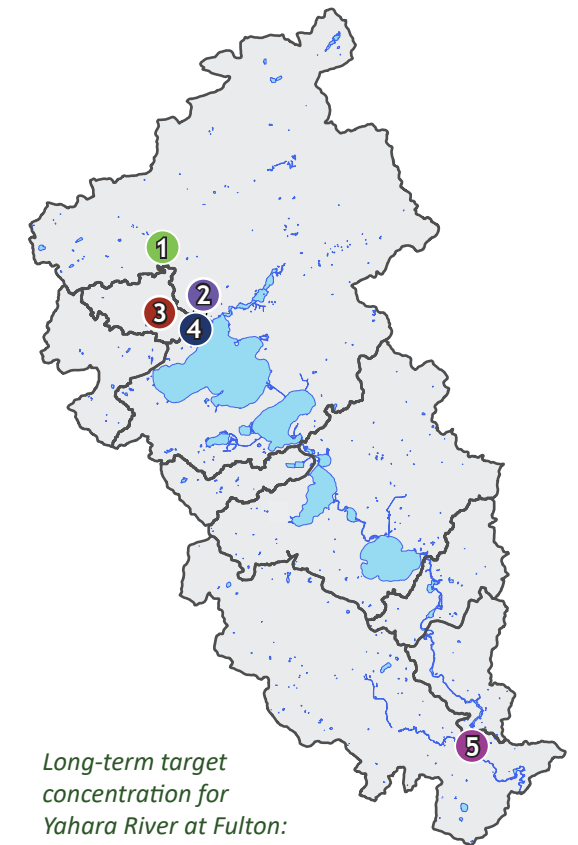
1) Sixmile Creek at Highway 19
2023 concentration: 0.11 mg/L

2) Sixmile Creek at Highway M
2023 concentration: 0.11 mg/L

3) Dorn Creek at Highway M
2023 concentration: 0.16 mg/L

4) Dorn Creek at Highway Q
2023 concentration: 0.15 mg/L

5) Yahara River at Fulton
2023 concentration: 0.14 mg/L



Long-term target concentration for Yahara River at Fulton: 0.10 mg/L

ROCK RIVER COALITION ANNUAL SUMMARY

Rock River Coalition (RRC) has an annual agreement with Yahara WINS to receive funding to support its water monitoring program in the Yahara River watershed, which yields additional water quality data to help measure project progress. In 2023, over 96 RRC volunteers monitored 56 sites throughout the watershed. In addition to assessing baseline water quality indicators like dissolved oxygen, clarity and temperature at all sites, volunteers collected nutrient samples at 44 of these sites. Stream samples are brought to the district lab for analysis and entered into the Surface Water Integrated Monitoring System (SWIMS) database, the Wisconsin Department of Natural Resources (WDNR) repository for surface water data.

RRC also conducts outreach about Yahara WINS and related initiatives. It shared one StoryMap in 2023, "Macroinvertebrate Monitoring in the Yahara Watershed," and several articles in its monthly e-newsletters to volunteers and community members. Staff and volunteers provided stream monitoring demonstrations for Friends of Pheasant Branch's Master Naturalist class, UW-Madison Conservation of Biodiversity class, Waunakee Village Center family outings, and Expand Your Horizons STEM event for middle school girls. They also presented about Yahara WINS and related monitoring efforts to the Wisconsin Lakes and Rivers Partnership. RRC also hosts several continuing education events including the Yahara WINS Season Kick-Off and Yahara WINS Gathering for volunteers.

Read the full RRC annual report at link.madsewer.org/rrc-2023

FINANCIALS

Yahara WINS is funded primarily by signatories to its Intergovernmental Agreement (IGA), which contribute to the project proportionate to the amount of phosphorus they need to reduce under the TMDL. This funding is then distributed to partners contracted for services with Yahara WINS, including implementing conservation practices and conducting watershed monitoring.

In the 2023 budget, two expenditures were removed: the General P Reduction Funding and Innovation Grant Program expenditures. These items remain removed in the 2024 budget.

The main change to the 2024 budget compared to the 2023 budget is the addition of \$58,000 budgeted for cost model updates in 2024.

Over 70 percent of the 2024 expenditures will directly support phosphorus reduction activities. Additionally, the funds temporarily held in the designated operating reserve will ultimately be used to support future phosphorus reduction activities.

2023 ADOPTED BUDGET (rounded to the nearest \$100)

Unencumbered carryover from 2022	\$0
REVENUE	
IGA participants	\$1,514,470
Income from grants, other MOUs, etc.	\$0
MGE Foundation	\$5,000
Savings account interest	\$4,000
<i>Total Revenue</i>	<i>\$1,523,470</i>
Total Revenue plus unencumbered carryover	\$1,523,470
EXPENDITURES	
Phosphorus reduction	
Dane County phosphorus reduction services agreement	\$540,000
Rock County phosphorus reduction services agreement	\$150,000
Yahara Pride Farms phosphorus services agreement	\$425,000
Subtotal	\$1,115,000
Water quality monitoring or modeling	
Water quality monitoring analytical services (MMSD)	\$65,000
USGS joint funding agreement	\$75,000
Rock River Coalition water quality monitoring	\$40,000
Subtotal	\$180,000
Supporting services	
MMSD service agreement	\$60,000
Financial audit	\$11,000
Communications	\$5,000
Legal services agreement	\$4,000
Subtotal	\$80,000
Transfer of funds to designated operating reserve	\$147,000
Total Expenditures	\$1,522,000
Revenue minus expenditures (potential unencumbered carryover)	\$1,470

2024 ADOPTED BUDGET (rounded to the nearest \$100)

Unencumbered carryover from 2023	\$0
REVENUE	
IGA participants	\$1,524,920
Income from grants, other MOUs, etc.	\$0
MGE Foundation	\$5,000
Savings account interest	\$4,000
<i>Total Revenue</i>	<i>\$1,533,920</i>
Total Revenue plus unencumbered carryover	\$1,533,920
EXPENDITURES	
Phosphorus reduction	
Dane County phosphorus reduction services agreement	\$540,000
Rock County phosphorus reduction services agreement	\$150,000
Yahara Pride Farms phosphorus services agreement	\$425,000
Subtotal	\$1,115,000
Water quality monitoring or modeling	
Water quality monitoring analytical services (MMSD)	\$65,000
USGS joint funding agreement	\$75,000
Rock River Coalition water quality monitoring	\$40,000
Cost Model Update	\$58,000
Subtotal	\$238,000
Supporting services	
MMSD service agreement	\$60,000
Financial audit	\$11,000
Communications	\$5,000
Legal services agreement	\$4,000
Subtotal	\$80,000
Transfer of funds to designated operating reserve	\$100,000
Total Expenditures	\$1,533,000
Revenue minus expenditures (potential unencumbered carryover)	\$920

The 2024 budget and associated budget narrative can be found on the Yahara WINS website, yaharawins.org.

LOOKING AHEAD

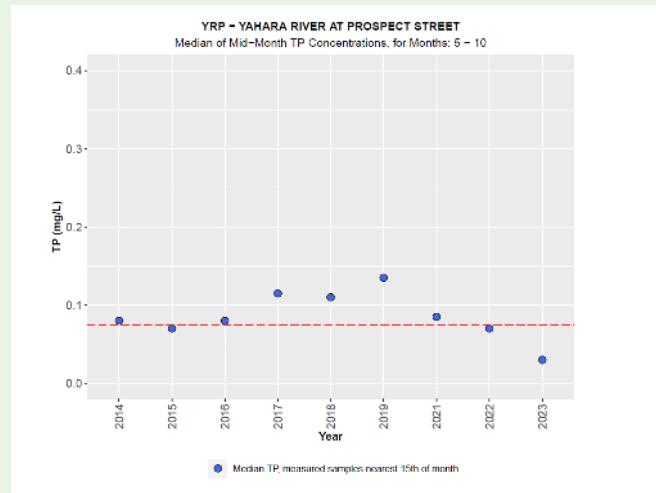
FIVE-YEAR REVIEW OF PROJECT

As part of the adaptive management project reporting schedule in the Madison Metropolitan Sewerage District's discharge permit, the Wisconsin Department of Natural Resources (WDNR) requires a report on the project every five years to ensure it's on track. In 2024, the District is completing its first of these five-year reports.

Yahara WINS, as an adaptive management project, is the District's compliance strategy for phosphorus. That is, Yahara WINS needs to succeed for the District to comply with its permit. If Yahara WINS does not succeed, the District and other participating wastewater treatment plants will be required to make expensive upgrades to their facilities for additional phosphorus removal. Wastewater phosphorus removal technology will reduce phosphorus concentrations in downstream receiving waters, but will not improve water quality in the Yahara lake system.

The District and other project partners, including county conservation departments, have participated in ongoing conversations with the WDNR about project progress and recommended improvements. These periodic reviews will help provide assurance to the District and Yahara WINS partners that the project is on the right track.

The District thanks the project partners who have provided information and time to this review. The detailed five-year report will be submitted to the WDNR in July 2024.



Interpreting the Full Watershed Data Set

For the five-year report, the USGS helped Yahara WINS compile monitoring data. The five-year report will be made available on the Yahara WINS website once it is accepted and approved by WDNR.

Through consultation with USGS, 10 sites were chosen that had the most consistent representative data, each site representing seven to 10 years of monitoring. While it's still too early to definitively tie phosphorus-reducing practices to in-stream water quality, we're seeing encouraging downward trends in phosphorus concentrations near the project point of compliance, as seen in the data for the Yahara River at Prospect Street site shown above.

There's a need for caution in interpreting short-term data sets like this one. Besides the efforts of Yahara WINS partners, there are other variables that affect stream phosphorus levels, such as climate change, precipitation levels, and severity and timing of storms. With a long enough data set, we can start to identify longer-term trends beyond annual variability. If downward trends continue despite other variables, we can more confidently attribute phosphorus reductions to practices implemented on the land.

COST MODEL UPDATES

The Yahara WINS cost model is a guiding tool for project strategy. The cost model looks at the needed phosphorus reductions per watershed reach, the practice mix estimated to achieve those reductions, and the total cost of those practices. The estimated project cost then is broken down into partner allocations based on their phosphorus reduction requirements out of the Rock River TMDL.

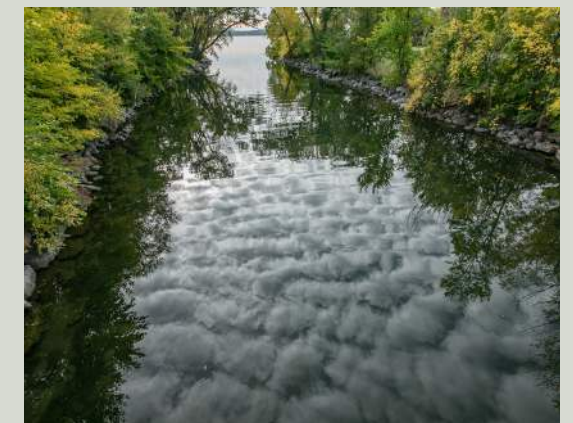
The cost model is in need of revisiting to reflect worldwide financial changes and lessons learned about the watershed in the course of the project. The cost of implementing phosphorus reduction practices has gone up faster than the model anticipated due to major disruptions like the pandemic and global conflicts. Brick-and-mortar supplies, seed, and conservation equipment have become more expensive in recent years.

Additionally, because the stream reaches in the watershed have different characteristics, the reviewed cost model will need to be less one-size-fits all and instead tailor cost estimates to specific reaches. More urbanized reaches, for example, will likely require more engineered solutions, which are more expensive than agricultural practices.

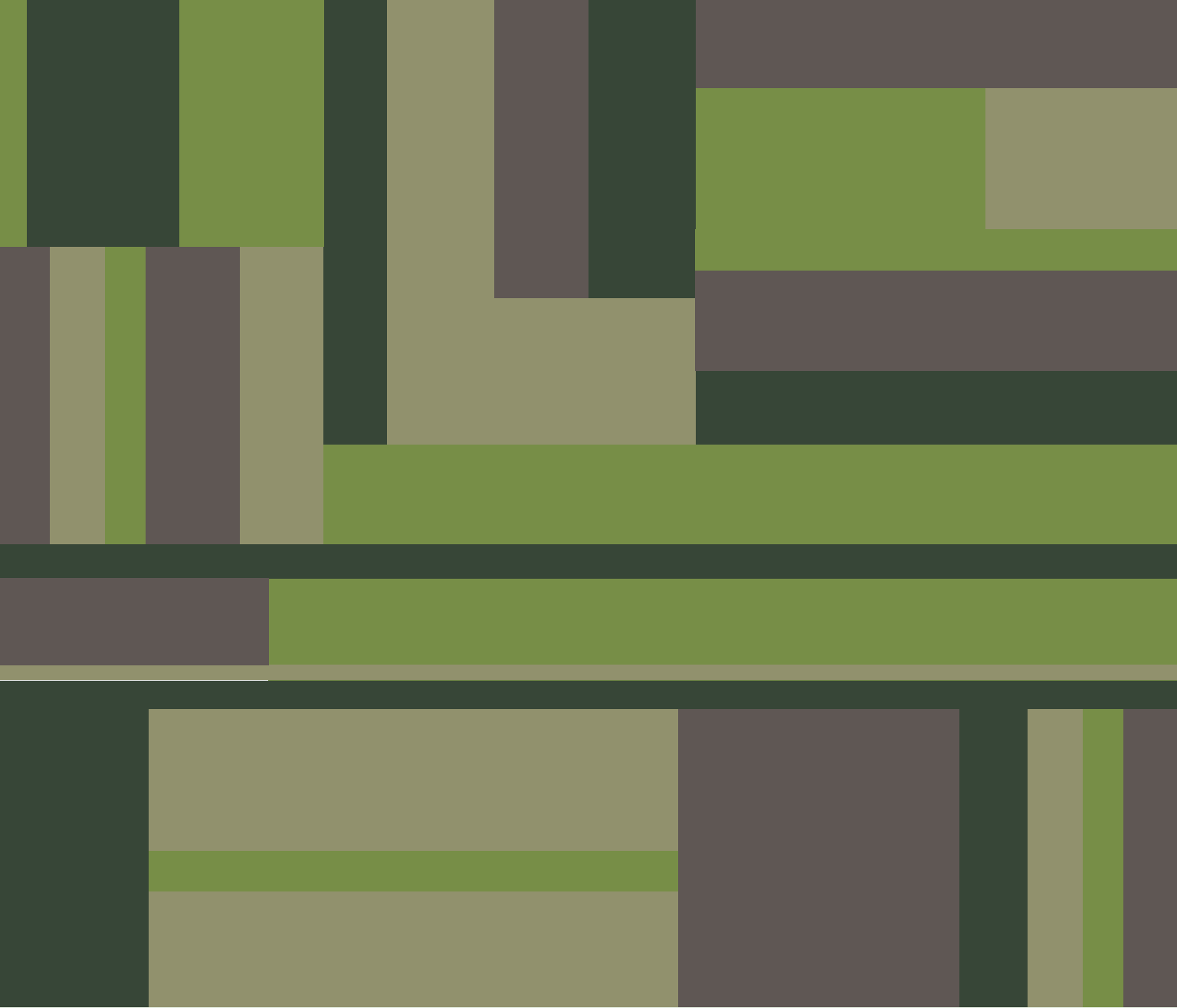
In 2024, Yahara WINS planners will be working with a consultant to update the cost model to reflect current conditions. The purpose of this revision is to ensure that Yahara WINS has sufficient funding to continue to achieve yearly phosphorus reduction goals.



A bridge crosses the Yahara River.
Photo courtesy of Michael W. Rausch.



Yahara River flowing through the Isthmus.
Photo courtesy of Michael W. Rausch.



Yahara WINS
1610 Moorland Road
Madison, WI 53713

www.yaharawins.org

Attachment J – Intergovernmental Agreement for an Adaptive Management Plan for the Yahara Watershed

**INTERGOVERNMENTAL AGREEMENT FOR
AN ADAPTIVE MANAGEMENT PLAN
FOR THE YAHARA WATERSHED**

WHEREAS, Wis. Stat. § 66.0301, entitled "Intergovernmental cooperation," provides that any municipality (defined as including but not limited to any state agency, city, village, town, county, sanitary district, metropolitan sewerage district or sewer utility district) may contract with other municipalities for the furnishing of services, and the joint exercise of any power or duty required or authorized by law;

WHEREAS, the U.S. Environmental Protection Agency (EPA) has approved Total Maximum Daily Loads for Total Phosphorus and Total Suspended Solids (TSS) in the Rock River Basin (the "Rock River TMDL" or "TMDL"), which includes the Yahara Watershed as shown on Exhibit A;

WHEREAS, municipalities who own Publicly Owned Treatment Works (POTWs) and/or Municipal Separate Storm Sewer Systems (MS4s) in the Yahara Watershed are required to meet surface water quality standards and/or not exceed wasteload allocations for phosphorus and TSS pursuant to the provisions of Wis. Admin Code § NR 217 and/or the Rock River TMDL;

WHEREAS, Wis. Admin Code § NR 217.18 allows sources holding a Wisconsin Pollutant Discharge Elimination System (WPDES) permit the option known as adaptive management which involves developing an Adaptive Management Plan involving point and nonpoint sources to achieve water quality standards and TMDL allocations;

WHEREAS, Wis. Stat. § 283.13 (7) allows adaptive management to be used to address TMDL allocations for both phosphorus and TSS over four permit terms;

WHEREAS, in 2012 Madison Metropolitan Sewerage District (District) developed an adaptive management pilot project with other interested parties within the Yahara watershed as set forth in a Memorandum of Understanding for an Adaptive Management Pilot Project in the Yahara Watershed;

WHEREAS, on December 14, 2014, the District entered into a Memorandum of Understanding with the Wisconsin Department of Natural Resources (DNR) regarding the manner in which a full scale Adaptive Management Plan for the Yahara Watershed would be developed and evaluated;

WHEREAS, the District has committed to developing an Adaptive Management Plan to fulfill its phosphorus compliance obligations under its WPDES permit and fulfill the phosphorus TMDL obligations of other permittees;

WHEREAS, the undersigned municipalities within the Yahara Watershed, (Parties) wish to join together to jointly participate in the Adaptive Management Plan;

WHEREAS, the Parties desire to create an intergovernmental agreement and form a group known as "The Yahara Watershed Improvement Network (Yahara WINS) Group" or simply "the Group";

WHEREAS, the Parties desire to create a commission that will administer such participation, information gathering, projects and activities of the Group all as set forth in this Agreement;

WHEREAS, the Parties desire to implement this Agreement in a collaborative, cooperative, manner to advance the Adaptive Management Plan;

WHEREAS, the Parties to this Agreement anticipate that the Group will contract and work collaboratively with agricultural producers, non-governmental organizations, county agencies and other entities to advance the Adaptive Management Plan;

NOW THEREFORE, in consideration of the mutual covenants herein contained and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the Parties agree to create this Intergovernmental Agreement for an Adaptive Management Plan for the Yahara Watershed (“Agreement”) as follows:

1. GOALS OF THE GROUP.

The Parties hereby agree to cooperate to exercise their municipal powers jointly for:

- a. Providing review and comments on the Adaptive Management Plan prepared by the District;
- b. Contracting with consultants, legal counsel, and other parties to further the development, implementation and evaluation of the Adaptive Management Plan;
- c. Coordinating or contracting with the DNR and other pertinent agencies, units of local government, and non-governmental organizations and entities to achieve the goals of the Adaptive Management Plan;
- d. Pooling resources in accordance with the provisions of cost allocations in Exhibit B to achieve the goals of the Adaptive Management Plan.
- e. Achieving compliance with WPDES permit requirements related to the Rock River TMDL.

2. MEMBERS OF THE GROUP

- a. In General. The members of the Group (“Members”) created by this Agreement are the Wisconsin municipalities (defined as including but not limited to any state agency, city, village, town, county, sanitary district, metropolitan sewerage district or sewer utility district) who own Publicly Owned Treatment Works (POTWs) and/or Municipal Separate Storm

Sewer Systems (MS4s) or municipalities who have land within areas served by the Adaptive Management Plan, and which have duly executed identical counterparts or copies of the Agreement pursuant to Section 3 (“Members” collectively and “Member” individually) on or before April 15, 2016.

b. Changes in Membership. Additional Wisconsin municipalities may become Members of the Group with the consent of a majority of the Members by becoming Parties to this Agreement on the condition that payments be made to cover their share of costs based on their phosphorus allocation for the years from the date of this Agreement to their membership date. Members may cease to be Members and Parties to this Agreement pursuant to Section 12.

c. Representative to the Group. All Group Members shall designate a representative and an alternate representative. A Member may remove or replace its representative to the Group at will, with or without cause, at any time. All designations of representatives, alternatives and replacements shall be made in writing, signed on behalf of the Member and delivered to the Secretary of the Executive Committee. Each Member’s representative shall have the authority to act on the Member’s behalf at meetings held under Section 5.

3. AUTHORITY OF MEMBERS TO PARTICIPATE.

a. This Agreement is entered into pursuant to authority granted under Wis. Stat. § 66.0301. Each municipality identified in Section 2. a. that wants to become a member of the Group shall authorize participation in this Agreement by resolution or other binding action by the governing body or person authorized to act for such municipality.

b. By authorizing participation, each Member agrees to the terms and conditions of this Agreement, to the establishment of the Executive Committee created by this Agreement and to appoint a Member representative to the Group;

c. A copy of the document authorizing participation shall be sent to and be maintained on file with the Executive Committee.

4. POWERS OF THE GROUP

The Group, acting through Group Member Representatives, shall have the following powers:

a. To elect the members of the Executive Committee as set forth in Section 6.

b. To approve the five-year and annual budgets under Section 8.

c. To approve the bylaws proposed by the Executive Committee.

d. To share information and advise the Executive Committee on all matters including elements of the Adaptive Management Plan.

5. MEETINGS OF THE GROUP

a. The Group shall meet no less than four times per year.

b. A quorum shall be a majority of the Group Member Representatives and must include the representatives from the District and any other member who contributes at least one fifth of the allocated cost under Exhibit B. If a quorum is not present the members present may meet and share information, but no action may be taken.

c. Unless otherwise expressly provided by this Agreement, all votes of the Group Member Representatives shall be by a majority of the Group Member Representatives present at a meeting where there is a quorum.

d. All meetings shall be open meetings and require public notice in accordance with Wisconsin's open meeting laws. The Group shall encourage the participation of other interested parties including agricultural producers and nongovernmental entities.

6. EXECUTIVE COMMITTEE

a. Creation of Executive Committee. There is created a five member Executive Committee which will be a commission under Wis. Stat. § 66.0301(2) and (3), to administer the joint activities of the Yahara WINS Group. This commission shall be formally referred to as THE YAHARA WINS EXECUTIVE COMMITTEE, and referred to in this Agreement as the "Executive Committee". This Executive Committee shall operate as a governmental body under Wis. Stat. § 19.82(1).

b. Members of the Executive Committee. The Executive Committee shall be comprised of five Member representatives and two non-Member advisors.

(1) The Executive Committee members shall include a representative from the Madison Metropolitan Sewerage District and a representative from any Member, other than the District, who contributes at least one fifth of the allocated cost under Exhibit B. Of the remaining members, one must be from a city or village, one from a town, and one will be an at large position. Member representatives for the cities and villages participating in this agreement will vote to select their representative to the Executive Committee, and Member representatives for the towns participating in this agreement will vote to select their representative to the Executive Committee, and the Member representatives of the group as a whole will vote to select the at large representative.

(2) Recognizing the key collaborative roles played by Dane County and members of the agricultural community in the Adaptive Management Pilot Project and their

anticipated roles as this Agreement moves forward, Dane County and the Yahara Pride Farm Group may each appoint an advisor to the Executive Committee. The Executive Committee may in its discretion appoint additional advisors. The advisors shall be given notice of all Executive Committee meetings and may participate in such meetings as non-voting members.

c. Term. The term of the three elected members of the Executive Committee shall be for five year terms and the elected members may be reelected for one or more additional terms.

d. Purposes and Powers of the Executive Committee.

(1) To make, amend and repeal bylaws and rules related to the purpose and operation of the Group subject to approval by the Group.

(2) To invest funds not required for immediate disbursement in properties or securities as permitted by state law.

(3) To make and execute contracts and other instruments of any name or type necessary or convenient for the exercise of the powers granted herein, including contracts with engineers, legal counsel, administrative staff and other consultants.

(4) To accept contributions of capital from Members or third parties.

(5) To do all acts and things necessary or convenient for the conduct of its business and the general welfare of the Group and the Parties and to carry out the purposes and powers granted to it by this Agreement.

(6) To sue, and be sued, complain and defend in all courts, and also, appear in or before applicable governmental agencies administrative tribunals and legislative bodies.

e. No Compensation. The members of the Executive Committee shall serve without compensation, provided, however, that the Executive Committee shall have discretion to

reimburse members of the Executive Committee for reasonable expenses incurred for special services to the Executive Committee.

f. Quorum. A quorum shall be a majority of the members of the Executive Committee and must include the representative from the District and the representative of any Member (other than the District) who contributes at least one fifth of the allocated cost under Exhibit B. No action may be taken in the absence of a quorum.

g. Voting. The members of the Executive Committee shall vote upon matters in the following manner:

(1) Voting in General. Unless otherwise expressly provided by this Agreement, the bylaws, or some other subsequent action of the Executive Committee, all votes shall be by a majority of the members of the Executive Committee present at a meeting where there is a quorum.

(2) Voting on Matters Which May Affect WPDES Permit Compliance. The Executive Committee shall provide written notice to all Members of any Executive Committee proposed or recommended action potentially affecting any Member's WPDES permit, other than the development and implementation of the Adaptive Management Plan. Such actions include the following: (i) the development or implementation of terms and conditions of a WPDES permit; (ii) a violation of a WPDES permit, (iii) a WPDES permit modification or revocation (iv) a change in WPDES permit limits or compliance plan; or (v) any other action that could jeopardize a Member's WPDES permit compliance. Any Member so notified has 30 days from the date of the notice to provide a written objection to the Secretary of the Executive Committee to any such actions that affect its WPDES permit. In such a case, no final action may be taken by the Executive Committee without the further written consent of the objecting Member.

(h) Meeting. The Executive Committee shall meet no less frequently than quarterly. Additional meetings may be held at the request of any member of the Executive Committee.

7. OFFICERS.

a. Officers of the Executive Committee. The Officers of the Executive Committee are a President, a Vice-President, a Secretary, a Treasurer and such other Officers as the Executive Committee may designate. The President shall be the District representative. The Vice-President, Secretary, Treasurer and any other officers shall be elected by the members of the Executive Committee from among the members of the Executive Committee and shall serve five year terms.

b. Dual Signature Required. The signatures of two officers shall be required on all forms of approval for payment, and all legally binding documents executed in the name of the Executive Committee or the Group.

c. Duties. Unless otherwise determined by the Executive Committee, the duties of the officers shall include the following:

(1) President. The President shall be the principal executive officer of the Executive Committee, shall preside at all meetings of the Executive Committee and set the agenda.

(2) Vice-President. In the absence of the President, or in the event of his or her inability or refusal to act, the Vice-President shall perform the duties of the President.

(3) Secretary. The Secretary shall keep minutes of the meetings of the Executive Committee in one or more books provided for that purpose; see that all notices are duly given in accordance with this Agreement, or as required by law; and be custodian of the

Executive Committee's records. The Secretary shall take such actions as are prudent and necessary to maintain the public records at the offices of the District in accordance with Wisconsin's public records laws.

(4) Treasurer. The Treasurer shall have charge and custody of and be responsible for all funds and securities of the Group and shall have charge of the financial records of the Group. The Treasurer will work with District staff to set up a segregated account for the funds of the Group. The Treasurer shall take such actions as are prudent and necessary to maintain the public records at the offices of the District in accordance with Wisconsin's public records laws.

d. Removal. An officer other than the President may be removed from office with cause upon a majority vote of the members of the Executive Committee.

8. BUDGET

The Executive Committee shall prepare budget documents as follows:

a. Project Budget. The 20 year adaptive management cost to Members and the associated annual cost are listed in Exhibit B to this Agreement.

b. Five Year Budget. The Executive Committee shall break down the 20 year adaptive management costs into five year intervals corresponding with the estimated permit terms. The Five Year Budget shall be approved by a majority of the Member Representatives present in the meeting of the Group in which action on the Project Budget is taken. The Five Year Budget shall be updated no less than every five years and approved by the Group. Estimated project costs shall be allocated equally over the 20 year Adaptive Management Plan period to the extent practicable.

c. Annual Budget. The Executive Committee shall prepare a detailed annual budget of the estimated expenditures associated with the Adaptive Management Plan for the next calendar year, and present the annual budget to the Group for review no later than September 30th of each year. The annual budget shall be consistent with the Five Year Budget approved in Section 8 (b), and shall be approved by October 31st of each year by a majority of the Member Representatives of the Group present at the meeting in which action on the annual budget is taken. The Executive Committee shall send invoices to Members consistent with the annual cost shown in Exhibit B, subject to any revision consistent with Section 9 of this Agreement on or before December 15 of each year. The first invoice under this Agreement will be sent to Members on or before December 15, 2016 and will be for the calendar year 2017. Invoices will be sent to Members annually thereafter on or before December 15th of each year. Payments based on each annual invoice shall be made in two equal installments. The first installment shall be made on or before February 28th of each year and the second installment shall be made on or before June 30th of each year.

d. Funds for 2016 are based on a continuation of annual payments made by the participants to the Adaptive Management Pilot Project at the same funding level as 2015. The Executive Committee shall receive any such payments to further the purposes of this Agreement and subject to the audit and reporting requirements set forth in Section 10.

9. CHARGES TO MEMBERS.

a. Costs shall be allocated among Members as shown in Exhibit B, except as otherwise provided in this Section. Cost allocations in Exhibit B are based on phosphorus load reductions and are determined by multiplying the total adaptive management project cost by the fraction of the total pounds of required project phosphorus reduction needed by each Member to

meet its TMDL allocation under current conditions. For example, if the required phosphorus reduction of an individual member is equal to 5 percent of the total pounds of phosphorus reduction from all sources in this adaptive management project, that member is assigned 5 percent of the total project cost. For the purpose of Exhibit B, required phosphorus reductions were determined as follows:

(1) **Point Source Members:** For the purpose of this section, Point Source Members are those members who own or operate facilities identified in Appendices P, Q, R and S of the Rock River TMDL. The required phosphorus reduction is determined by subtracting the TMDL allocated phosphorus load from the current condition phosphorus load, with the current condition phosphorus load defined as the most recent five year average load (2010 thru 2014) using data obtained from the DNR. For all Point Source Members, the allocated phosphorus load is consistent with the allocation specified in the TMDL. For Point Source Members that own or operate POTWs, required phosphorus reductions also factor in the need to meet the interim concentration limits specified in Section 14 (b).

(2) **MS4 Members:** For the purpose of this section MS4 Members are those Members who own Municipal Separate Storm Sewer Systems as identified in Appendices T, U, and V of the Rock River TMDL, except that the University of Wisconsin-Madison shall also be considered an MS4 Member. The required phosphorus reduction for MS4 Members is determined by subtracting the TMDL allocated phosphorus load from the TMDL baseline phosphorus load.

b. Members shall commit to payment in accordance with the schedule in Exhibit B.

c. Notwithstanding Exhibit B, it is recognized that MS4 Members may update stormwater modeling consistent with the DNR guidance document titled "TMDL Guidance for MS4

Permits: Planning, Implementation and Modeling Guidance” (October 20, 2014). If the updated modeling is reviewed and approved by DNR, and shows a required annual phosphorus reduction that is different than what was used to develop the cost allocation in Exhibit B, the cost for that MS4 Member in Exhibit B will be adjusted as follows:

$$\text{Exhibit B Cost} \times \left[\frac{\text{Revised phosphorus reduction (lb/yr)}}{\text{Initial phosphorus reduction (lb/yr)}} \right] = \text{Revised Cost}$$

If the revised phosphorus reduction information is received by the Executive Committee on or before September 1st of any year, the revised cost will be applied to all years going forward. For example, if data is received on or before September 1, 2017 that results in a revised cost being calculated, that revised cost will be applied to annual payments beginning in 2018. Additionally, a true-up will be allowed at the end of every five year WPDES permit term to reflect practices that may have been added during that WPDES permit term that result in a revised phosphorus reduction and therefore a revised cost, provided those reductions are in excess of the baseline reductions in Section 14 (a). Revised costs would be calculated using the above formula and would be applied to annual payments going forward.

d. If an MS4 makes an initial payment in 2017 based on Exhibit B and subsequently submits information that results in a revised cost that is less than shown in Exhibit B, the amount of overpayment shall be credited to the MS4 over the next four year period in equal annual installments. If an MS4 makes an initial payment in 2017 based on Exhibit B and subsequently submits information that results in a revised cost that is greater than shown in Exhibit B, the underpayment shall be recovered from the MS4 over the next four year period in equal annual installments.

e. Notwithstanding Exhibit B, the costs for Point Source Members will be revised at the end of 2016 using the most recent five year phosphorus load averaging period if it is different than the averaging period used in developing the cost allocations in Exhibit B. The cost will be adjusted as follows:

$$\text{Exhibit B Cost} \times \left[\frac{\text{Revised phosphorus reduction (lb/yr)}}{\text{Initial phosphorus reduction (lb/yr)}} \right] = \text{Revised Cost}$$

The revised cost will be applied to the years going forward. Additionally, a recalculation of the phosphorus load will be made at the end of every five year WPDES permit term using the most recent five year average and will be used to calculate a revised cost, which will be applied to annual payments for the years going forward. The revised cost will be calculated using the formula in this section.

f. MS4 Members and Point Source Members participating in this agreement may choose to accomplish some of their TMDL required phosphorus reduction independently and therefore “purchase” only a portion of their required phosphorus reduction through adaptive management. In this case, the Exhibit B cost or the Revised Cost (whichever is applicable) will be adjusted by multiplying it by the fraction of the required phosphorus reduction that is purchased through adaptive management. For example if an MS4 Member or Point Source Member purchases ninety-five percent of its required phosphorus load through adaptive management, the cost would be revised as follows:

$$\text{Exhibit B Cost or Revised cost (whichever is applicable)} \times 0.95 = \text{Adjusted Cost}$$

g. MS4 Members and Point Source Members choosing to purchase only a portion of their required phosphorus reduction through adaptive management agree that they must have a plan in place to accomplish the portion not purchased. The plan should identify significant anticipated milestones. In addition, they agree to provide a summary to the Group at a frequency of at least once every two years specifying progress made in achieving the reductions not accomplished through adaptive management.

MS4 Members and Point Source Members shall specify at the time they execute this agreement the portion of their required phosphorus reduction, expressed in pounds per year, which they will accomplish independently. The adaptive management project costs will be reviewed at least 360 days prior to the end of a five-year WPDES permit term for which the Adaptive Management Plan is a permit condition. The costs may be adjusted based on this review and upon approval by a majority of the Members. Adjustments (if any) may result in either a lower or higher charge to members going forward. Adjustments (if any) in the charge to Members will be made at the start of the next five-year WPDES permit term and will be made proportional to the required phosphorus reduction of Members. Adjustments will be reflected in the Five Year Budget under Section 8.

10. AUDIT AND REPORTING

a. The Executive Committee shall arrange for a financial audit of the Group's financial records on an annual basis by an independent accounting firm using generally accepted accounting principles.

b. The Executive Committee shall prepare an annual report and provide it to all Members and to other government agencies as may be required. In addition to containing

financial information, the annual report shall describe activities undertaken and progress made over the preceding year with respect to implementation of the Adaptive Management Plan. The annual report shall review the effectiveness of the measures undertaken as part of the Adaptive Management Plan and to the extent possible document the amount of phosphorus reduced by each of the project elements implemented under this Adaptive Management Plan. The annual report shall be distributed to the Group and published on the Group's website by June 30th of each year.

11. LIABILITY OF THE EXECUTIVE COMMITTEE AND/OR GROUP.

a. In the event any costs or expenses are imposed on the Group or the Executive Committee as a result of any judicial or administrative proceeding or settlement thereof, and the liability is not directly attributable to the conduct of a specific Member or Members, the costs and expenses shall be treated as a cost of the Group to be allocated among all Members proportional to the phosphorus reduction associated with each Member as determined consistent with this Agreement.

b. If any costs or expenses are imposed on the Group or the Executive Committee as a result of any judicial or administrative proceeding or settlement thereof, and the liability is directly attributable to the conduct of a specific Member or Members, the costs and expenses shall be allocated among those Members whose actions caused the imposition of the costs or expenses to the Group or Executive Committee, in proportion to their responsibility as determined by the presiding official of the judicial or administrative proceeding, or if no such determination, by the Executive Committee. Any member of the Executive Committee who represents a Member with an interest in the determination shall recuse themselves from all participation on the Executive Committee as to that issue. Any Member not satisfied with the

decision of the Executive Committee can request the issue be resolved through mediation. The costs of mediation are to be borne equally by each Member to the mediation.

12. TERM OF AGREEMENT AND WITHDRAWAL.

a. The term of this Agreement shall begin on April 15, 2016 and will generally coincide with the term of the approved Adaptive Management Plan which is anticipated to be approximately 20 years from approval.

b. This Agreement shall terminate upon conclusion of the Adaptive Management Plan or termination of the Adaptive Management Plan if the Adaptive Management Plan is terminated by DNR. This Agreement may also be terminated at a duly noticed meeting of the Group, upon a two thirds vote by Member Representatives of the Group to terminate the Agreement, at least 270 days prior to the end of a WPDES permit term for which the Adaptive Management Plan is a permit condition. In no event shall termination become effective prior to the end of a WPDES permit term.

c. An individual Member may withdraw from the Agreement by providing notice at least 270 days prior to the end of a five-year WPDES permit term for which the Adaptive Management Plan is a permit condition, if the Member has paid its contribution for the five year WPDES permit period.

13. ADAPTIVE MANAGEMENT ADMINISTRATION

a. The Adaptive Management Plan shall be prepared by the District. The purpose of the Adaptive Management Plan when implemented is to fulfill the phosphorus TMDL obligations of Members, after accounting for baseline requirements that Members are required to

meet individually pursuant to Section 14, and after accounting for adjustments that may be made pursuant to Section 9. TSS reductions associated with phosphorus reduction practices will also be quantified as part of the Adaptive Management Plan. If this Agreement is in effect prior to the submittal of the Adaptive Management Plan to DNR by the District, then the District shall submit the Adaptive Management Plan to the Group for review and comment at least 60 days prior to District submittal to DNR.

b. Every five years as the WPDES permits come up for renewal, the District will prepare any amendment to the Adaptive Management Plan necessary to achieve the project goals and approval by the DNR. The District shall submit any Adaptive Management Plan amendments to the Group for review and comment at least 90 days prior to District submittal to DNR.

c. The District shall be responsible for administration and management of the Adaptive Management Plan and related activities, including contract management. The District will also serve as the primary contract laboratory for analysis of routine parameters (e. g. phosphorus, TSS, and nitrogen) from water samples collected as part of the adaptive management project, and can recover associated analytical costs from the Group.

14. ADAPTIVE MANAGEMENT PERMITTEE PROVISIONS

a. All MS4 Members participating in this Agreement are individually responsible for meeting the TMDL baseline conditions for sediment (TSS) and phosphorus control. The baseline condition for MS4 Members is 40% TSS control and 27% phosphorus control. These reductions must be achieved within each stream reach that they discharge to as identified in the TMDL. Trading with another MS4 member located within the same stream reach that has exceeded the baseline condition can be used to meet the baseline condition, but trade

agreements are the responsibility of the participating Members and are not addressed directly through this Agreement.

b. All POTWs participating in this Agreement are required to meet an annual average effluent phosphorus concentration of 0.6 mg/L by the end of the first full WPDES permit term following implementation of the DNR approved Adaptive Management Plan, and an annual average effluent concentration of 0.5 mg/L by the end of the second full WPDES permit term following implementation of the DNR approved Adaptive Management Plan.

c. In the event the Adaptive Management Plan is terminated by DNR prior to the end of the original term of the Adaptive Management Plan, or if at the end of the adaptive management period DNR determines that the phosphorus and sediment (TSS) allocations identified in the TMDL have not been met for a stream reach, Members will be individually responsible for taking any additional steps needed to achieve compliance with phosphorus and sediment (TSS) reduction requirements in their WPDES permits. This could include converting to a water quality trading program that is consistent with applicable DNR guidance. Verifiable phosphorus and sediment (TSS) reductions or “credits” achieved through the adaptive management project will be distributed to Members proportionate to the Charges to Members under Section 9 of this Agreement, but use in a water quality trading program is subject to applicable DNR guidance.

d. In the event municipal boundaries change during the term of this Agreement, as land transfers from one municipality to another, the associated phosphorus load reduction and the associated payment responsibility also transfers to the new municipality.

e. Upon completion or termination of the adaptive management project, any funds remaining in the segregated account for the Group following payment of all project

expenses, shall be returned to members of the Group in direct proportion to the contribution made by each member of the Group.

15. NONDISCRIMINATION

In the performance of services under this Agreement, the Parties agree not to discriminate against any employee or applicant because of race, religion, marital status, age color, sex handicap, national origin or ancestry, income level or source of income, arrest record or conviction record, less than honorable discharge, physical appearance, sexual orientation, gender identity, political beliefs, or student status.

16. MISCELLANEOUS

a. Municipal Liability. Nothing in this Agreement shall constitute a waiver of any limitations on municipal or state agency liability that may exist as a matter of law, including but not limited to limitations in Wis. Stat. ch. 893.

b. Counterparts. This Agreement may be executed in counterparts, and the signatures of each party on separate copies of the Agreement shall be fully effective to bind each of them to the Agreement with any other party that signs any separate copy of the Agreement.

c. Entire Agreement. This Agreement supersedes any prior studies, memoranda, letters or oral discussions or understandings about the participation of any of the Members in this joint project. This Agreement represents the entire agreement of the Parties as to organization and the goals of the Group.

d. Amendment or Modification. No amendment or modification may be made to this Agreement except in writing signed by a two thirds majority of all Members.

e. Choice of Law. This Agreement shall, in general, be governed by and construed in accordance with the laws of the State of Wisconsin.

f. Exclusive Benefit. This Agreement is for the exclusive benefit of the Parties and their successors in interest and shall not be deemed to give any legal or equitable right, remedy or claim to any other entity or person.

g. No Joint Venture. This Agreement does not establish or evidence a Joint Venture or partnership between the Parties. No Party is liable for another Party's actions as a result of entering into this Agreement.

h. Succession. All the terms, provisions and conditions herein contained shall inure to the benefit of and be binding upon the Parties and their respective successors and assigns, including future governing bodies of the respective Members.

i. Notice. Any notice required or given under this Agreement shall be effective if mailed by U. S. mail, postage prepaid, to the representatives at the addresses set forth after the signatures below, or any substituted address or representative as is filed with the Secretary of the Executive Committee.

IN WITNESS WHEREOF, the Parties, by their duly authorized representatives, have executed this Agreement on the dates set forth below:

By:

Date of Execution

Municipality Name

(Authorized Representative Signature)

(Authorized Representative Typed Name)

(Authorized Representative Title)

Address:

Exhibit A: Map of the Yahara Watershed

Exhibit B: Preliminary Cost Allocations
(Note: Section 9 outlines how preliminary costs can be adjusted)

Member	Required Phosphorus Reduction (lbs/yr)	Annual Adaptive Management Cost
Blooming Grove, Town	460	\$23,000
Bristol, Town	412	\$20,000
Burke, Town	1,139	\$56,000
Cottage Grove, Town	635	\$31,000
Cottage Grove, Village	240	\$12,000
DeForest, Village	837	\$41,000
DNR-Fish Hatch	209	\$10,000
Dunkirk, Town	553	\$27,000
Dunn, Town	703	\$35,000
Fitchburg, City	2,141	\$105,000
Madison, City	15,836	\$779,000
Madison, Town	580	\$29,000
Maple Bluff, Village	181	\$9,000
McFarland, Village	736	\$36,000
Middleton, City	2,370	\$117,000
Middleton, Town	475	\$23,000
MMSD (BFC) WWTP	10,444	\$514,000
Monona, City	862	\$42,000
Oregon WWTP	1,619	\$80,000
Pleasant Springs, Town	432	\$21,000
Shorewood Hills, Village	221	\$11,000
Stoughton WWTP	109	\$5,000
Stoughton, City	229	\$11,000
Sun Prairie, City	634	\$31,000
University of Wisconsin-Madison	431	\$21,000
Waunakee, Village	1,091	\$54,000
Westport, Town	940	\$46,000
Windsor, Village	1,351	\$66,000

Entities that executed the IGA

- City of Fitchburg
- City of Madison
- City of Middleton
- City of Monona
- City of Stoughton
- City of Sun Prairie
- Village of Cottage Grove
- Village of DeForest
- Village of Maple Bluff
- Village of McFarland
- Village of Waunakee
- Village of Windsor
- Village of Shorewood Hills
- Town of Blooming Grove
- Town of Cottage Grove
- Town of Dunn
- Town of Middleton
- Town of Westport
- UW-Madison
- Wisconsin Department of Natural Resources
- Madison Metropolitan Sewerage District
- Village of Oregon (WWTP)
- Stoughton Utilities (WWTP)

Attachment K – Ordinance Updates

ARTICLE II. EROSION CONTROL AND STORMWATER MANAGEMENT

Sec. 30-19. Introduction.

- (a) *Authority.* This article is adopted under the authority granted by ~~Wis. Stats. § 62.234(2)~~, ~~Wis. Stats. § 62.11(5)~~.
- (b) *Findings and purpose.* The city finds that urbanizing land uses have accelerated the process of soil erosion, runoff and sediment deposition in surface waters within the city. It is, therefore, declared to be the purpose of the article to control and, if possible, prevent soil erosion and minimize stormwater runoff increases and, thereby, to preserve the natural resources, control floods and prevent impairment of property, protect the quality of public waters, preserve wildlife and conservancy areas, and protect and promote the health, safety and general welfare of the people of the city.
- (c) *Applicability.* This article applies to use of lands within the incorporated boundaries of the city and the public and private lands subject to extraterritorial review as provided by Wis. Stats. ch. 236.
- (d) *Abrogation and greater restrictions.* This article is not intended to repeal, abrogate, annul, impair, or interfere with any existing easement, covenants, deed restrictions, agreements, rules, regulations, ordinances or permits previously adopted or issued pursuant to law. However, wherever this article imposes greater restrictions, the provisions of this article shall govern.
- (e) *Interpretation.* In its interpretation and application, the provisions of this article shall be held to be the minimum requirements and shall be liberally construed in favor of the city and shall not be deemed a limitation or repeal of any other power granted by state law.

(Comp. Ords. 2009, § 27.01)

Sec. 30-20. Definitions.

The following words, terms and phrases, when used in this article, shall have the meanings ascribed to them in this section, except where the context clearly indicates a different meaning:

Affected means that a regulated activity has significantly:

- (1) Caused negative impacts on water quality or the use or maintenance of land or business; or
- (2) Endangered one's health, safety, or general welfare.

Agricultural means related to or used for the production of food and fiber, including but not limited to, general farming, livestock and poultry enterprises, grazing, nurseries, horticulture, viticulture, truck farming, forestry, sod production, cranberry production and wild crop harvesting. Clearing and grubbing of an area or structural development are not agricultural activities.

Average annual rainfall means measured precipitation in Madison, Wisconsin, between March 12 and December 2, 1981.

Bank erosion means the removal of soil or rock fragments along the banks or bed of a stream channel resulting from high flow after rain events.

Best management practice means a practice, technique, or measure that is an effective, practical means of preventing or reducing soil erosion or water pollution, or both, from runoff both during and after land development activities. These can include structural, vegetative or operational practices.

City engineer means the ~~municipal employee or contracted entity~~ Director of Public Works or their designee designated by the common council as the local approval authority responsible for administering this article.

Closed Watershed means an area that does not have a surface outlet, with water only able to leave through evaporation, infiltration, or mechanical means. For the purposes of this ordinance, the following are considered closed watersheds:

- (a) Internally drained watersheds that are at least 20,000 square feet in area and at least 1 foot in depth from invert to lowest surface outlet.
- (b) Watersheds with no surface outlet discharges from a 2-year, 24-hour design storm.
- (c) Areas that have historically not drained through surface outlets, as determined by the city engineer.

Cold water community means surface waters capable of supporting a community of cold water fish and other aquatic life, or serving as a spawning area for cold water fish species as provided in Wis. Admin. Code § NR 102.04(3)(a).

Connected imperviousness means an impervious surface that is directly connected to a separate storm sewer or water of the state via an impervious flow path.

Construction site erosion control means preventing or reducing soil erosion and sedimentation from land disturbing activity.

Deep tilling means a practice that is implemented to restore soil structure to pre-developed conditions by cutting a series of horizontal ridges and depressions in the soil perpendicular to the direction of flow.

Direct conduits to groundwater means wells, sinkholes, swallets, fractured bedrock at the surface, mine shafts, non-metallic mines, tile inlets discharging to groundwater, quarries, or depressional groundwater recharge areas over shallow fractured bedrock.

Effective infiltration area means the area of the infiltration system that is used to infiltrate runoff and does not include the area used for site access, berms or pretreatment.

Erosion (soil erosion) means the detachment and movement of soil or rock fragments by water, wind, ice or gravity.

Excavation means any act by which organic matter, earth, sand, gravel, rock or any other similar material is cut into, dug, quarried, uncovered, removed, displaced, relocated or bulldozed and shall include the resulting conditions.

Existing development means buildings and other structures and impervious area existing prior to August 22, 2001.

Fill means any act by which earth, sand, gravel, rock or any other material is deposited, placed, replaced, pushed, dumped, pulled, transported, or moved to a new location and shall include the resulting conditions.

Financial security instrument means a surety bond, performance bond, maintenance bond, irrevocable letter of credit, or similar guarantees submitted to the city to ensure that requirements of article are carried out in compliance with the stormwater management plan.

Flood/flooding means a temporary rise in the level of water which results in the inundation of areas not ordinarily covered by water.

Green Infrastructure means practices that use plant or soil systems, permeable pavement, or other permeable surfaces or substrates, stormwater harvest and reuse, or landscaping to store, infiltrate, or evapotranspire stormwater and reduce flows to sewer systems or to surface waters. Green Infrastructure includes, but is not limited to, the following practices: rainwater harvesting/reuse, rain gardens, bioretention systems, infiltration basins, planters that are connected to roof drainage, vegetated swales, permeable pavement, green roofs, and rain barrels.

Groundwater protection area means wellhead protection area restricted zones as identified in article IX of chapter 22, areas within 100 feet of a private well, and areas where seasonal high groundwater is less than five feet below ground surface.

Gully erosion means a severe loss of soil caused by or resulting in concentrated flow of sufficient velocity to create a defined flow channel.

Heavily disturbed site means a site where an area of land is subjected to significant compaction due to the removal of vegetative cover or earthmoving activities, including filling.

Hydrologic soil group (HSG) has the meaning used in the runoff calculation methodology promulgated by the United States Natural Resources Conservation Service Engineering Field Manual for Conservation Practices.

Illicit connection means any drain or conveyance, whether on the surface or subsurface, which allows the discharge of sanitary waste to the public stormwater system and any connections to the public stormwater system from indoor drains.

Illicit discharge means any discharge of a potentially polluting substance directly or through stormwater that reaches a municipal storm sewer system, drainage way, wetland, waterbody or groundwater, except those authorized by a Wisconsin Pollutant Discharge Elimination System (WPDES) permit or other discharge not requiring a WPDES permit such as landscape irrigation, individual residential car washing, diverted stream flows, uncontaminated groundwater infiltration, uncontaminated pumped groundwater, discharges from potable water sources, foundation drains, air conditioning condensation, irrigation water, flows from riparian habitats and wetlands, and similar discharges. These and other discharge exceptions do not apply if the discharge is identified by Public Health Madison and Dane County as a source of pollution to the waters of Dane County.

~~Illicit discharge means any discharge to the public stormwater system that is not composed entirely of stormwater runoff except discharges with a state pollutant discharge elimination system permit or other discharges permitted by the city.~~

Impervious surface means any land cover that prevents rain or melting snow from soaking into the ground, such as roofs (including overhangs), roads, sidewalks, patios, driveways and parking lots. For purposes of this article, all road, driveway or parking surfaces, including gravel surfaces, shall be considered impervious, unless specifically designed to encourage infiltration and approved by the city engineer.

Infiltration, for the purposes of this article, refers to any precipitation that does not leave the site as surface runoff.

Infiltration system means a device or practice such as a basin, trench, rain garden or swale designed specifically to encourage infiltration, but does not include natural infiltration in pervious surfaces such as lawns, redirecting of rooftop downspouts onto lawns or minimal infiltration from practices such as swales or roadside channels designed for conveyance and pollutant removal only.

Internally drained watershed means any drainage basin or watershed that does not discharge stormwater during a storm of 24-hour duration and two-year recurrence interval with the land in its pre-development condition.

Land disturbing activities means any land alterations or disturbances that may result in soil erosion, sedimentation, or change in runoff including, but not limited to, removal of ground cover, grading, excavating, and filling of land.

Lightly disturbed site means a site where an area of land is subjected to minor compaction due to the limited removal of vegetative cover or earthmoving activities.

Local land division ordinance means any county, city, village or town ordinance adopted under Wis. Stats. ch. 236 to regulate the division of land.

Maximum extent practicable (MEP) means a level of implementing best management practices in order to achieve a performance standard specified in this article which takes into account the best available technology, cost effectiveness and other competing issues such as human safety and welfare, endangered and threatened resources, historic properties and geographic features. MEP allows flexibility in the way to meet performance standards and may vary based on the performance standard and site conditions.

New development means any of the following activities:

- (1) Structural development, including construction of a new building or other structures;
- (2) Expansion or alteration of an existing structure that results in an increase in the surface dimensions of the building or structure;
- (3) Land disturbing activities; or
- (4) Creation or expansion of impervious surface.

Non-erosive velocity means a rate of flow of stormwater runoff, usually measured in feet per second, that does not erode soils. Non-erosive velocities vary for individual sites, taking into account topography, soil type, and runoff rates.

Non-stormwater discharge means any discharge to the public stormwater system that is not composed entirely of stormwater runoff.

Peak flow means the maximum rate of flow of water at a given point in a channel, watercourse, or conduit resulting from the predetermined storm or flood.

Pervious surface means any land cover that permits rain or melting snow to soak into the ground.

Plan means an erosion control plan required by section 30-22 or a stormwater management plan required by section 30-23.

Plan review agency means the city public works department or a contracted entity charged by the city with the responsibility for reviewing stormwater and erosion control plans under this article.

Plat review officer means the city planning and zoning department or a contracted entity charged by the city with the responsibility for reviewing land divisions, certified survey maps or subdivision plats, or any combination thereof, under Wis. Stats. ch. 236.

Post-development refers to the extent and distribution of land cover types anticipated to occur under conditions of full development of the submitted plan. This term is used to match pre-development and post-development stormwater peak flows as required by this article.

Potentially Polluting Substance means any substance which may cause pollution if discharged to waters of Fitchburg, including but is not limited to, fuel oil, gasoline, solvents, industrial liquids or fluids, milk, grease trap and septic tank wastes, sanitary sewer wastes, storm sewer catch basin wastes, oil or petroleum waste, dredged soil, solid waste, incinerator residue, sewage, garbage or garbage leachate, refuse, munitions, chemical wastes, biological materials, radioactive substances, wrecked or discarded equipment, waste from mobile sources, industrial, municipal and agricultural waste.

Pre-development refers to the extent and distribution of land cover types present before the initiation of the proposed land development activity, assuming that all land uses prior to land disturbing activity are in good condition as described in the Natural Resources Conservation Service Technical Release 55, "Urban Hydrology for Small Watersheds" (commonly known as TR-55). This term is used to match pre-development and post-development stormwater peak flows as required by this article. In a situation where cumulative impervious surface created after August 21, 2001, exceeds the 20,000-square-foot threshold, the pre-development conditions shall be those prior to the proposed land disturbance.

Public stormwater system means all public storm sewers, drainage conduits, drainage conveyances, municipal streets, roadside ditches, curb and gutter, catch basins, storm drain inlets, channels, detention basins, and public greenways, and all improvements thereto, which are operated to collect, convey, store, absorb, inhibit, treat, use or reuse stormwater runoff to prevent or reduce flooding, environmental degradation, and water pollution.

Recharge means the portion of the average annual rainfall that infiltrates into the soil and becomes groundwater. The term "recharge" does not include evaporation, transpiration, or runoff from the site.

Redevelopment means any construction, alteration or improvement exceeding 4,000 square feet of land disturbance performed on sites where the existing site is predominantly developed as commercial, industrial, institutional or multifamily residential uses. Projects may include a mix of redevelopment and new impervious surfaces. New impervious surfaces added as a result of redevelopment are subject to section 30-23(1).

Runoff curve number (RCN) has the meaning used in the runoff calculation methodology promulgated by the United States Natural Resources Conservation Service Engineering Field Manual for Conservation Practices.

Sediment means solid earth material, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by air, water, gravity or ice, and has come to rest on the earth's surface at a different site.

Sedimentation means the deposition of eroded soils at a site different from the one where the erosion occurred.

Sheet and rill erosion means a loss of soil caused by sheet flow or shallow concentrated flow, and characterized by an absence of channeling or a relatively uniform loss across the exposed upper layer of the soil or shallow irregular scouring of the soil surface.

Site means the bounded area described in an erosion control plan or stormwater management plan.

Slope means the net vertical rise over horizontal run, expressed as a percentage, which represents a relatively homogeneous surface incline or decline over the area disturbed.

Soil loss rate means the rate, usually measured in tons per acre per year, at which soil is transported beyond the perimeter of a given control site and which occurs as a result of sheet and rill erosion. This term does not apply to soil movement resulting from concentrated flow such as gully or bank erosion.

Storm events means the precipitation amounts that occur over a 24-hour period that have a specified recurrence interval for the county. For example, one-year, two-year, ten-year and 100-year storm events mean the precipitation amounts that occur over a 24-hour period that have a recurrence interval of one, two, ten and 100 years, respectively.

Stormwater means the flow of water which results from, and which occurs during and immediately following, a rainfall or snowmelt or icemelt event.

Stormwater management means any measures taken to permanently reduce or minimize the negative impacts of stormwater runoff quantity and quality after land development activities.

Stormwater runoff/runoff means the waters derived from rains falling or snowmelt or icemelt occurring within a drainage area, flowing over the surface of the ground and collected in channels, watercourses or conduits.

Street reconstruction means removal and replacement of the road subgrade, where existing stormwater conveyance systems are modified.

Structure means any human made object with form, shape and utility, either permanently or temporarily attached to, placed upon, or set into the ground, streambed or lake bed.

Unnecessary hardship means that circumstance where special conditions, which were not self-created, affect a particular property and make strict conformity with regulations unnecessarily burdensome or unreasonable in light of the purposes of this article.

USLE means universal soil loss equation.

(Comp. Ords. 2009, § 27.02; Ord. No. 2014-O-06, § 2, 3-25-2014)

Sec. 30-21. Legislative findings and intent.

- (a) The city finds that construction site erosion and uncontrolled stormwater runoff from land disturbing and land development activities have significant adverse impacts upon regional water resources and the health, safety, property and general welfare of the community, and diminish the public enjoyment and use of natural resources. Specifically, soil erosion and stormwater runoff can:
- (1) Carry sediment, nutrients, pathogens, organic matter, heavy metals, toxins and other pollutants to regional lakes, streams and wetlands;
 - (2) Diminish the capacity of water resources to support recreational and water supply uses and a natural diversity of plant and animal life;
 - (3) Clog existing drainage systems, increasing maintenance problems and costs;
 - (4) Cause bank and channel erosion;
 - (5) Increase downstream flooding;
 - (6) Reduce groundwater recharge, which may diminish stream base flows and lower water levels in regional lakes, ponds and wetlands;
 - (7) Contaminate drinking water supplies;
 - (8) Increase risk of property damage and personal injury; and
 - (9) Cause damage to agricultural fields and crops.
- (b) The city also finds that effective sediment and stormwater management depends on proper planning, design, and timely installation of conservation and management practices and their continuing maintenance.
- (c) The purpose of this article is to set forth the minimum requirements for construction site erosion control and stormwater management that will diminish threats to public health, safety, public and private property and natural resources of the city.
- (d) This article is intended to regulate construction site erosion and stormwater runoff, to accomplish the following objectives:
- (1) Promote regional stormwater management by watershed;
 - (2) Minimize sedimentation, water pollution from nutrients, heavy metals, chemical and petroleum products and other contaminants, flooding and thermal impacts to the water resources of the city;

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- (3) Promote infiltration and groundwater recharge;
 - (4) Protect functional values of natural watercourses and wetlands;
 - (5) Provide a set of performance standards that are consistent with the standards set forth by the county;
 - (6) Achieve an appropriate reduction in sediment load rates to downstream waters compared to no controls for all new development, redevelopment, and street reconstruction;
 - (7) Ensure no increase in temperature of stormwater post-construction in order to protect cold water communities;
 - (8) Ensure no increase in the rate of surface water drainage from sites during or after construction; and
 - (9) Protect public and private property from damage resulting from runoff or erosion.

(Comp. Ords. 2009, § 27.03; Ord. No. 2014-O-06, § 2, 3-25-2014)

Sec. 30-22. Applicability of requirement for erosion control permits.

Unless expressly exempted by section 30-24, an erosion control permit under section 30-26 shall be required and all construction site erosion control provisions of this article shall apply to any of the following activities in the city:

- (1) Land disturbing activity in excess of 4,000 square feet;
- (2) Land disturbing activity that involves the excavation or filling, or a combination of excavation and filling, in excess of 400 cubic yards of material;
- (3) Land disturbing activity that disturbs more than 100 linear feet of road ditch, grass waterway or other land area where surface drainage flows in a defined open channel; including the placement, repair or removal of any underground pipe, utility or other facility within the cross section of the channel;
- (4) Any new public or private roads or access drives longer than 125 feet;
- (5) Development that requires a subdivision plat or certified survey map, as defined in the applicable local land division ordinances;
- (6) Any installation of utilities in which underground conduits, cables, piping, wiring, water mains, sanitary sewers, storm sewers, etc., will be laid, repaired, replaced, or enlarged, which will involve more than 300 linear feet of trenching or earth disturbance;
- (7) Land disturbing activity that disturbs less than 4,000 square feet of land, including the installation of access drives, that the city engineer determines to have a high risk of soil erosion or water pollution, or that may significantly impact a lake, stream, or wetland area. Examples of activities with a high risk of soil erosion or water pollution may include, but are not limited to, land disturbance on erodible soil or disturbance adjacent to lakes, rivers, streams or wetlands All such determinations made by the city engineer shall be in writing, unless waived by applicant.

(Comp. Ords. 2009, § 27.04; Ord. No. 2014-O-06, § 2, 3-25-2014)

Sec. 30-23. Applicability of requirement for stormwater control permits.

Unless otherwise exempted by section 30-24, a stormwater control permit under section 30-26 shall be required and all stormwater management provisions of this article shall apply to any of the following activities within the city:

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- (1) Any development after August 22, 2001, that results in the cumulative addition of 20,000 square feet of impervious surface to the site;
 - (2) Any development that requires a subdivision plat or certified survey map as defined in applicable local land division ordinances;
 - (3) Redevelopment, as defined in section 30-20;
 - (4) Other land development activities, including, but not limited to, redevelopment or alteration of existing buildings and other structures, that the city engineer determines may significantly increase downstream runoff volumes, flooding, soil erosion, water pollution or property damage, or significantly impact a lake, stream, or wetland area. All such determinations shall be made in writing unless waived by the applicant.

(Comp. Ords. 2009, § 27.05; Ord. No. 2014-O-06, § 2, 3-25-2014)

Sec. 30-24. Exemptions and clarifications.

- (a) The following activities are exempt from all requirements of this article: any activity directly related to the planting, growing and harvesting of agricultural crops except the construction of a building or other structure.
- (b) The following activities are exempt from the construction site erosion control provisions of section 30-22:
 - (1) One- and two-family dwelling units regulated under the Wisconsin Uniform Dwelling Code adopted in chapter 35. Land disturbing activities in excess of one acre, or not associated with the construction of a dwelling, are not exempt from this article. The city shall regulate these sites during the period that residential building permits are in effect, consistent with then-existing state uniform dwelling code requirements.
 - (2) Construction of public buildings and buildings that are places of employment relating to activities specifically regulated by the state department of commerce during the period that department of commerce-authorized building permits are in effect and specific erosion control procedures on these construction sites are effective, pursuant to Wis. Stats. § 281.33.
 - (3) State building projects subject to Wis. Stats. § 13.48(13) and state highway projects subject to Wis. Admin. Code ch. Trans 401.
- (c) The following activities are exempt from the infiltration standards described in section 30-28(b)(6), pertaining to stormwater performance standards.
 - (1) Redevelopment sites.
 - (2) New development sites with less than ten percent connected imperviousness based on complete development of the post-construction site, provided the cumulative area of all impervious surfaces is less than one acre.
 - (3) Agricultural facilities and practices.
 - (4) Areas where the infiltration rate of the soil is less than 0.6 inches/hour measured at the bottom of the proposed infiltration system where the soil layer is not easily removed or manipulated.
 - (5) Expansion of municipal or county roads.
 - ~~(5) Parking areas and access roads less than 5,000 square feet for commercial and industrial development.~~
 - ~~(6) Roads in commercial, industrial and institutional land uses, and arterial roads.~~

(d) Notwithstanding the language of subsection (b)(2) of this section, activities unrelated to actual building construction shall be subject to all the requirements of this article. These activities shall include, but are not limited to:

- (1) Land disturbing activity prior to excavation for foundation work;
- (2) Landscaping;
- (3) Installation of driveways, parking areas and sidewalks;
- (4) Earthwork on an area greater than 4,000 square feet on sites not directly related to structural concerns; and
- (5) Development of ponds and channelized watercourses, commercial parks, and landing strips or airport runways.

(e) Notwithstanding the language of subsection (b)(3) of this section, the following activities are subject to the requirements of this article:

- (1) Buildings and activities of municipalities;
- (2) Buildings and activities of school districts; and
- (3) Local highway and municipal street projects.

(Comp. Ords. 2009, § 27.06; Ord. No. 2014-O-06, § 2, 3-25-2014)

Sec. 30-25. Regulations for lands not otherwise subject to the provisions of this article.

Notwithstanding any other provisions of this article, it shall be a violation of this article for any condition to be established, maintained, or allowed to be maintained, that results in excessive runoff or erosion to adjacent land, public streets or water bodies. Penalties and remedies may be sought for such activities as provided in section 30-26. Erosion and runoff are excessive when in the opinion of the city engineer, an unsafe condition results in the streets, undue sedimentation occurs in water bodies, runoff endangers downstream property owners or their property, or the public health and safety or general welfare of the citizens of the city is harmed.

(Comp. Ords. 2009, § 27.07)

Sec. 30-26. Erosion and stormwater control permits and administration.

(a) *Start of land disturbing activity.* No activity meeting the criteria described in section 30-22 or 30-23 shall occur and no zoning permit may be issued, until an erosion control and stormwater control permit is issued by the city engineer.

(b) *Application materials.* The applicant must provide the following when requesting a permit:

- (1) Completed application form.
 - a. The application must be signed by the landowner or include a notarized statement signed by the landowner authorizing the applicant to act as the landowner's agent and bind the landowner to the terms of this article.
 - b. If a landowner appoints an agent to submit an application pursuant to subsection (b)(1)a of this section, the landowner shall be bound by all of the requirements of this article and the terms of any permit issued to the agent.
- (2) Fees as required by section 30-32.

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- (3) If required by section 30-22, an erosion control plan meeting all the standards of section 30-27.
 - (4) If required by section 30-23, a stormwater management plan meeting all of the standards of section 30-28 and a draft maintenance agreement as described in section 30-28(a)(11).
 - (5) Copies of permits or permit applications or approvals required by any other governmental entity.
 - (6) A proposed timetable and schedule for completion and installation of all elements of approved erosion control and stormwater management plans and a detailed schedule for completion of construction.
 - (7) An estimate of the cost of completion and installation of all elements of the approved erosion control and stormwater management plans.
 - (8) Evidence of financial responsibility to complete the work proposed in the plan. The city engineer may require a financial security instrument sufficient to guarantee completion of the project.
- (c) *Approval process.*
- (1) The city engineer shall verify that the permit application is complete under subsection (b) of this section. Plan review staff shall review the plan(s) for compliance with the standards identified in sections 30-27 and 30-28.
 - (2) Within ten business days for erosion control plans and 15 business days for stormwater control plans, plan review staff shall either approve the submitted plan or notify the city engineer of any deficiencies. Staff engaged in this review and approval process shall be certified where appropriate by the state department of commerce for this purpose.
 - (3) The city engineer shall notify the applicant in writing of any deficiency in the proposed plan and the applicant shall be given an opportunity to correct any deficiency.
 - (4) Where installed stormwater practices will be privately owned, an affidavit which describes the property by legal description, notifying future prospective purchasers of the existence of a stormwater permit issued under this article and applicable plan, timetables and potential liability imposed by subsection (h)(3) of this section for failure to bring the property into compliance with this article after notification, shall be recorded with the county register of deeds prior to issuance of an erosion and stormwater control permit. The foregoing information shall also be noted on every plat and certified survey map.
 - (5) Upon approval of the plan, the erosion control or stormwater management permit shall be issued by the city engineer after the applicant has met all other requirements of this article.
- (d) *Permit conditions.*
- (1) The plan shall be implemented prior to the start of any land disturbing activity and shall be maintained over the duration of the project. Stormwater components of the plan shall be maintained in perpetuity.
 - (2) The permittee is responsible for successful completion of the erosion control plan and the stormwater management plan. The permittee shall be liable for all costs incurred, including environmental restoration costs, resulting from noncompliance with an approved plan.
 - (3) Application for a permit shall constitute express permission by the permittee and landowner for the city engineer to enter the property for purposes of inspection under subsection (e) of this section or curative action under subsection (h)(3) of this section. The application form shall contain a prominent provision advising the applicant and landowner of this requirement.
 - (4) All incidental mud-tracking off-site onto adjacent public thoroughfares shall be cleaned up and removed by the end of each working day using proper disposal methods.

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- (5) A copy of the approved permit and erosion control plan shall be kept on the project site, in a place readily accessible to contractors, engineers, city inspection staff and other authorized personnel.

(e) *Inspections.*

- (1) Application for a permit under this article shall constitute permission by the applicant and landowner for the city engineer to enter upon the property and inspect during the construction phase prior to the inspections pursuant to subsections (e)(5) and (6) of this section, as necessary to confirm compliance with the requirements of this article.
- (2) The permittee shall inspect the site weekly and within 24 hours after every rainfall of 0.5 inches or more. The permittee shall submit copies of the inspections to the city engineer.
- (3) The permittee shall notify the city engineer within ten days after installation of all practices in an approved erosion control plan and achievement of soil stabilization.
- (4) The city engineer shall inspect the property to verify compliance with the erosion control plan within ten days of notification of soil stabilization.
- (5) The permittee shall notify the city engineer and submit drawings documenting construction within ten days after installation of all practices in an approved stormwater management plan. A professional engineer shall submit as-built certification to ensure that constructed stormwater management practices and conveyance systems comply with the specifications included in the approved plans. At a minimum, as-built certification shall include a set of drawings comparing the approved stormwater management plan with what was constructed. Other information shall be submitted as required by the city engineer.
- (6) The city engineer shall inspect the property to verify compliance within thirty days of notification.
- (7) Maintenance is the responsibility of the owner, and facilities are subject to inspection and orders for repairs. Annual maintenance reports must be submitted to the city engineer in accordance with section 40-896.

(f) *Permit transfers.*

- (1) When a permittee and landowner act to transfer an interest in property subject to an approved plan prior to completion of the proposed steps to attain soil stabilization, the permittee must secure approval from the city.
- (2) When a permittee and landowner transfer ownership, possession or control of real estate subject to either or both an uncompleted erosion control or stormwater management plan, the successor in interest to any portion of the real estate shall be responsible to control soil erosion and runoff and shall comply with the minimum standards provided in this article.
- (3) When ownership, possession or control of property subject to an uncompleted erosion control or stormwater management plan, or both, is transferred, the former owner (seller) shall notify the new owner (buyer) as to the current status of compliance with notice to the authority, and provide a copy of the erosion control plan or stormwater management plan, or both.
- (4) Transfers of interest in real estate subject to an approved, uncompleted plan may be conducted consistent with this article under any of the following arrangements:
 - a. The transferee shall file a new, approved erosion control or stormwater management plan, or both, with the city.
 - b. The transferee shall obtain an approved assignment from the city as sub-permittee to complete that portion of the approved plan regulating soil erosion and runoff on the transferee's property.

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- c. The permittee shall provide the city with a duly completed and executed continuing surety bond or certified check in an amount sufficient to complete the work proposed in the approved plan; at the time of transfer the permittee may seek to reduce the surety bond or certified check to the appropriate amount to complete remaining work. If the transferor enters into escrow agreements with transferees to complete an approved plan, these funds shall be available to the city to attain plan compliance. When an approved erosion control plan and, if required, a stormwater management plan are or are not completed as proposed, the city may use the surety bond to complete remaining work to achieve plan compliance.
- (g) *Plan or permit amendments.* Any proposed modifications to approved plans, construction schedules or alterations to accepted sequencing of land disturbing site activities shall be submitted to the city engineer for approval prior to implementation of said changes.
- (h) *Enforcement.*
- (1) **Stop work order.** Whenever the city engineer finds any noncompliance with the provisions of this article, the city engineer shall attempt to communicate with the owner or person performing the work to obtain immediate and voluntary compliance if such person is readily available. If the owner or person performing the work is not readily available, that person refuses to voluntarily comply immediately or the noncompliance presents an imminent danger or will cause or threatens to cause bodily injury or damage to off-site property, including, but not limited to, off-site runoff, the city engineer shall post in a conspicuous place on the premises, a stop work order which shall cause all activity not necessary to correct the noncompliance to cease until noncompliance is corrected.
- a. The stop work order shall provide the following information: date of issuance, identification of the property subject to the stop work order, reason for posting and the signature of the inspector posting the order.
- b. It shall be a violation of the article for the unauthorized removal of the stop work order from the premises.
- (2) In addition to posting a stop work order, the city engineer shall provide notification to the owner or contractor by personal service, written notice by certified mail, electronic mail, or facsimile transmission.
- a. The permittee, landowner and contractor shall have 24 hours from the time and date of notification by the city engineer to correct any noncompliance with the plan when notification is by either personal communication of noncompliance to owner or contractor or their respective agents or written notice sent by certified mail to owner or contractor.
- b. If notice is not provided under subsection (h)(2)a of this section, the permittee and landowner shall have 72 hours to correct any noncompliance with the plan when notification is by posting notice in a conspicuous place on the site or sending notice by electronic mail or facsimile transmission to owner or contractor.
- (3) If any noncompliance is not corrected within the time periods specified in subsection (h)(2)a or b of this section, the permittee and landowner authorize the city engineer to take any action, to perform any work, or commence any operations necessary to correct conditions upon the subject property where notice of noncompliance has been issued to bring the property into conformance with plan requirements. The permittee and landowner further consent to reimburse the authority for the total costs and expenses of the aforementioned actions, said reimbursement may be collected as a special charge upon the property for current services rendered as provided by law.
- (4) If the permittee has filed an appeal under section 30-31(a)(1) prior to the expiration of the time for compliance under subsection (h)(2) of this section, the city engineer may take action, perform work or

correct conditions only to the extent necessary to protect against or correct an imminent hazard or a condition that will cause or threatens to cause personal injury or damage to off-site property.

(i) *Penalties.*

- (1) Any person, owner, occupant or other user of the premises who violates, disobeys, omits, neglects or refuses to comply with or resists the enforcement of any of the provisions of this article shall be subject to a forfeiture as listed in the forfeiture/bond/deposit schedule. Each day that a violation exists shall constitute a separate offense.
- (2) Any person who has the ability to pay any forfeiture entered against him or her under this article but refuses to do so may be confined in the county jail until such forfeiture is paid, but in no event to exceed 30 days. In determining whether an individual has the ability to pay a forfeiture, all items of income and all assets may be considered regardless of whether or not such income or assets are subject to garnishment, lien or attachment by creditors.
- (3) As a substitute for or as an addition to forfeiture actions under subsection (i)(1) of this section or corrective action under subsection (h)(3) of this section, the city attorney is authorized to seek enforcement of any part of this article by court action seeking injunctive relief. It shall not be necessary for the city attorney to take corrective action or prosecute for forfeiture before resorting to injunctive relief.

(j) *Fees.*

- (1) The permit fee shall be payable at the time an application for either an erosion control or a stormwater management permit, or both, is submitted.
- (2) Permit Fee Doubled: When an applicant or landowner begins work in excess of permit thresholds prior to permittee approval or written approval of city engineer, the applicable fees shall be double.

(k) *Timeframe and expiration.*

- (1) Erosion control plan timetables and construction schedules must begin within one year of the date the permit application is filed.
- (2) All permit applications shall expire upon the earlier of:
 - a. One year from the date the applicant is notified of an application deficiency, if the applicant has not submitted additional information to adequately address the deficiency within the year; or
 - b. The completion date listed on the approved permit. The completion date shall be no more than three years from the date of application.

(Comp. Ords. 2009, § 27.08; Ord. No. 2014-O-06, § 2, 3-25-2014)

Sec. 30-27. Erosion control plan requirements.

- (a) *Plan materials.* Erosion control plans required under section 30-22 may include consideration of adjoining landowners' cooperative efforts to control transport of sediment and except as specifically exempted below, shall include at a minimum, the following information:
- (1) Property lines, lot dimensions, and limits of disturbed area;
 - (2) Limits of impervious area, including buildings. Include all public and private roads, interior roads, driveways, parking lots, and indicate type of paving and surfacing material;
 - (3) All natural and artificial water features including, but not limited to, lakes, ponds, streams (including intermittent streams), and ditches; and areas of natural woodland or prairie. The plan must show

ordinary high-water marks of all navigable waters, 100-year flood elevations and delineated wetland boundaries. A certified flood zone determination may be required at the applicant's expense;

- (4) All erosion control measures to be installed;
 - (5) Cross sections of and profiles of channels, swales, and road ditches;
 - (6) Culvert and/or storm pipe sizes;
 - (7) Direction of flow of runoff;
 - (8) Watershed size for each drainage area;
 - (9) Design discharge for ditches and structural measures;
 - (10) Runoff velocities;
 - (11) Fertilizer and seeding rates and recommendations;
 - (12) Detailed description and proposed completion schedule of each element of the erosion control plan, including time schedules for stabilization of ditches and slopes;
 - (13) Provision for sequential steps mitigating erosive effect of land disturbing activities to be followed in appropriate order and in a manner consistent with accepted erosion control methodology suitable to proposed sites and amenable to prompt re-vegetation, including calculations, such as the universal soil loss equation (USLE), demonstrating the erosion control performance standards under subsection (c) of this section will be met;
 - (14) Provisions to prevent mud-tracking off-site onto public thoroughfares during the construction period;
 - (15) Provisions to disconnect impervious surfaces, where feasible;
 - (16) Provisions to prevent sediment delivery to, and accumulation in, any proposed or existing stormwater conveyance systems;
 - (17) Copies of permits or permit applications required by any other unit of government or agency;
 - (18) Existing and proposed elevations (referenced to the North American Vertical Datum of 1988) and existing and proposed contours in the area, where deemed necessary;
 - (19) Itemized estimated cost (including labor) for installation of all elements of the erosion control plan; and
 - (20) Any other information necessary to reasonably determine the location, nature and condition of any physical or environmental features of the site.
- (b) *Erosion control performance standards.*
- (1) Proposed design, suggested location and phased implementation of effective, practicable erosion control measures for plans shall be designed, engineered and implemented to achieve the following results:
 - a. Prevent gully and bank erosion;
 - b. Limit total off-site permissible annual aggregate soil loss for exposed areas resulting from sheet and rill erosion to an annual, cumulative soil loss rate not to exceed 7.55.0 tons per acre annually; and
 - c. Discharges from new construction sites must have a stable outlet capable of carrying designed flow as required in section 30-28(b)(4), at a non-erosive velocity. Outlet design must consider flow capacity and flow duration. This requirement applies to both the site outlet and the ultimate outlet to stormwater conveyance or water body.

d. Prevent or reduce all of the following:

1. The deposition of soil from being tracked onto streets by vehicles.
2. The discharge of sediment from disturbed areas into on-site storm water inlets.
3. The discharge of sediment from disturbed areas into adjacent waters of the state.
4. The discharge of sediment from drainage ways that flow off the site.
5. The discharge of sediment by dewatering activities.
6. The discharge of sediment eroding from soil stockpiles existing for more than 7 days.
7. The transport by runoff of chemicals, cement and other building compounds and materials on the construction site during the construction period.

- (2) Plan compliance under subsection (c)(1) of this section shall be determined using the U.S. Natural Resources Conservation Service Technical Guide or another commonly accepted soil erosion methodology approved by the county conservationist, that considers season of year, site characteristics, soil erodibility and slope.
- (3) Erosion control measures for plan approval need not attempt to regulate soil transportation within the boundaries of the applicant's site.

(Comp. Ords. 2009, § 27.09; Ord. No. 2014-O-06, § 2, 3-25-2014)

Sec. 30-28. Stormwater management plan requirements.

- (a) *Plan materials.* Stormwater management plans shall satisfy all of the requirements in subsection (b) of this section, and shall address at a minimum the following information:
 - (1) A narrative describing the proposed project, including an implementation schedule for planned practices;
 - (2) Identification of the entity responsible for long term maintenance of the project;
 - (3) A topographic map of the site location, including the contiguous properties, existing drainage patterns and watercourses affected by the proposed development of the site and the existing vegetative cover;
 - (4) A map showing drainage areas for each watershed area;
 - (5) A summary of runoff peak flow rate calculations, by watershed area, including:
 - a. Pre-development peak flow rates;
 - b. Post-development peak flow rates with no detention;
 - c. Post-development peak flow rates with detention;
 - d. Assumed runoff curve numbers (RCNs), which shall be consistent with Table 2 in section 30-35(a) for pre-development conditions; and
 - e. Time of concentration (Tc) used in calculations;
 - (6) A complete site plan and specifications, signed by the Professional Engineer who designed the stormwater management system(s) and measures. All plans shall be drawn to an easily legible scale, shall be clearly labeled, and shall include, at a minimum, all of the following information:
 - a. Property lines and lot dimensions;

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- b. All buildings and outdoor uses, existing and proposed, including all dimensions and setbacks;
 - c. All public and private roads, interior roads, driveways and parking lots. Show traffic patterns and type of paving and surfacing material;
 - d. All natural and artificial water features, including, but not limited to lakes, ponds, streams (including intermittent streams), and ditches. Show ordinary high-water marks of all navigable waters, 100-year flood elevations and delineated wetland boundaries, if any. If not available, appropriate flood zone determination or wetland delineation, or both, may be required at the applicant's expense;
 - e. Depth to bedrock;
 - f. Depth to seasonal high water table;
 - g. The extent and location of all soil types as described in the county soil survey, slopes exceeding 12 percent, and areas of natural woodland or prairie;
 - h. Existing and proposed elevations (referenced to the North American Vertical Datum of 1988, where available) and existing and proposed contours in the area requiring a grading and filling permit;
 - i. Elevations, sections, profiles, and details as needed to describe all natural and artificial features of the project;
 - j. Soil erosion control and overland runoff control measures, including runoff calculations as appropriate;
 - k. Detailed construction schedule;
 - l. Copies of permits or permit applications required by any other governmental entities or agencies;
 - m. Location of all stormwater management practices;
 - n. All existing and proposed drainage features;
 - o. The location and area of all proposed impervious surfaces;
 - p. The limits and area of the disturbed area; and
 - q. Any other information necessary to reasonably determine the location, nature and condition of any physical or environmental features;
- (7) Calculations demonstrating the stormwater management performance standards under subsection (b) of this section will be met;
 - (8) Engineered designs for all structural management practices;
 - (9) A description of methods to control oil and grease or written justification for not providing such control;
 - (10) If required under subsection (b)(6) of this section, a description and plans to control temperature of runoff; and
 - (11) A maintenance plan and schedule for all permanent stormwater management practices as recorded on the affidavit required in section 30-26(c)(4).
 - (12) A summary of infiltration calculations including:
 - a. Pre-development infiltration volume.
 - b. Calculated infiltration volume goal.

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- c. Achieved post-development infiltration volume.
- (b) *Stormwater management performance standards.* Proposed design, suggested location and phased implementation of effective, practicable stormwater management measures for plans shall be designed, engineered and implemented to achieve the following results:
- (1) *Sediment control.*
- a. For new development, by design, one of the following methods shall be used:
- i. Reduce total suspended solids load leaving the site by 80 percent, based on the average annual rainfall, as compared to no runoff management controls. This method requires the use of a continuous model such as SLAMM, P8 or equivalent, and the use of approved grain size distribution curves and rainfall data. These files are managed and maintained by the Wisconsin Department of Natural Resources and are available on its website. No person shall be required to exceed an 80 percent total suspended solids reduction, for the site as a whole, to meet the requirements of this subdivision. This analysis shall use approved procedures and shall assume no re-suspension of particles.
- ii. Retain soil particles greater than five microns on the site, as measured during a one-year 24-hour storm event. This analysis shall use approved procedures and shall assume no re-suspension of particles.
- b. For redevelopment, by design, one of the following methods shall be used:
- i. Reduce, to the maximum extent practicable, total suspended solids load leaving the redeveloped site by 80 percent, based on the average annual rainfall, as compared to no runoff management controls. This method requires the use of a continuous model such as SLAMM, P8 or equivalent, and the use of approved grain size distribution curves and rainfall data. These files are managed and maintained by the Wisconsin Department of Natural Resources and are available on its website. No person shall be required to exceed a sixty (60) percent total suspended solids reduction, as compared to no controls, for new parking areas to meet the requirements of this section. This analysis shall use approved procedures and shall assume no re-suspension of particles.
- ii. Retain soil particles greater than five microns on the site, as measured during a one-year 24-hour storm event. This analysis shall use approved procedures and shall assume no re-suspension of particles.
- c. For street reconstruction, by design
- i. Reduce the total suspended solids load leaving the site by 40 percent, based on the average annual rainfall, as compared to no runoff management controls., according to approved procedures, and assuming no sediment resuspension.
- (2) *Oil and grease control.* For all stormwater plans for commercial or industrial developments and all other uses where the potential for pollution by oil or grease, or both, exists, the first 0.5 inches of runoff will be treated using the best oil and grease removal technology available. This requirement may be waived by the plan reviewer only when the applicant can demonstrate that installation of such practices is not necessary.
- (3) *Runoff rate control; hydrologic calculations.* All runoff calculations shall be according to the methodology described in the Natural Resources Conservation Service's Technical Release 55, "Urban Hydrology for Small Watersheds" (commonly known as TR-55), or other methodology approved by the county conservationist. The maximum pre-development runoff curve number and minimum post-

development runoff curve numbers that may be used in the calculations are shown in section 30-35. The post-development soil permeability class for heavily disturbed sites shall be lowered one permeability class unless deep tilling or similar practices have been implemented to restore soil structure to pre-developed conditions. Lightly disturbed areas require no permeability class modification.

(4) *Runoff rate control; design standards.*

- a. Except for redevelopment, all stormwater facilities shall be designed, installed and maintained to effectively accomplish the following:
 - i. Maintain pre-development peak runoff rates for the one-year, 24-hour storm event (2.49 inches over 24-hour duration using the NRCS MSE4 storm distribution).
 - ii. Maintain pre-development peak runoff rates for the two-year, 24-hour storm event (2.84 inches over 24-hour duration using the NRCS MSE4 storm distribution).
 - iii. Maintain pre-development peak runoff rates for the ten-year, 24-hour storm event (4.09 inches over 24-hour duration using the NRCS MSE4 storm distribution).
 - iv. Maintain pre-development peak runoff rates for the 100-year, 24-hour storm event (6.66 inches over 24-hour duration using the NRCS MSE4 storm distribution).
 - ~~iv.v.~~ Maintain pre-development peak runoff rates for the 200-year, 24 hour storm event (7.53 inches over 24-hour duration using the NRCS MSE4 storm distribution).
 - vi. Safely pass storm events in excess of the ~~100~~500-year, 24-hour storm event (~~6.66~~8.94 inches over 24 hours duration using the NRCS MSE4 storm distribution).
 - vii. Pre-existing detention on the site shall be taken into account as part of proposed detention calculations. At a minimum, the pre-existing detention volume shall be estimated and shall be considered to be a base amount of storage required for the site prior to completing any pre- to post-storm rate matching. Effectively the pre-existing detention volume shall be added to the volume required to meet the pre- to post-rate controls.
 - viii. Downstream system capacity shall be analyzed to determine the safe capacity of the off-site drainage system. No release rates in excess of this safe capacity shall be allowed.
 - ix. Overflow elevations shall be calculated through the development to assure that the 100-year design storm flows through the streets and is confined to the public Right-of-Way. Further the 500-year design storm flood elevation shall be routed through the development to determine flood elevations. The 500-year design storm is allowed to flood private property, but lowest entrance elevations of structures shall be set to prevent structural flooding during the 500-year design storm.
- b. For redevelopment with a proposed impervious cover that exceeds 80% of the existing site impervious cover, stormwater facilities shall be designed, installed and maintained to effectively accomplish the following:
 - i. Reduce peak runoff rates from the site by 15% compared to existing conditions during a 10-year design storm.
 - ii. Reduce runoff volumes from the site by 5% compared to existing conditions based on average annual rainfall.
 - iii. The required rate and volume reductions shall be completed, using green infrastructure that captures at least the first ½ inch of rainfall over the total site impervious area. If

additional stormwater controls are necessary beyond the first ½ inch of rainfall, either green or non-green infrastructure may be used.

- c. For sites being developed within a Plat or CSM having a stormwater management plan previously approved for rate control at the Plat/CSM level, with rate control standards that included a maximum control requirement of the 100-year storm design storm, provide on-site detention storage to control the incremental difference between the 100-year and 200-year design storm as applicable.

The required volume of detention to be provided shall be calculated by the following method:

- i. Determine the runoff from the undeveloped site in compliance with the standards of this ordinance for the 100 and 200 year design storms.
 - ii. Determine the runoff from the proposed site in the 100 and 200 year design storms.
 - iii. Complete a TR-55 based analysis to determine the volume of detention storage theoretically required to detain the post development 100 and 200 year design storms to the predevelopment discharge rates.
 - iv. If the development provided 100 year detention at the plat level, subtract the volume needed by the 100 year event from the volume needed by the 200 year design storm. That volume shall be provided on site and an outlet structure shall be designed to use that volume in the post development 100-year design storm.
 - v. For Closed Watersheds, predevelopment modeling shall include closed watershed areas. Sites that drain to closed watersheds must be designed with: (i) an emergency drawdown or pumping plan, and (ii) detention storage capacity for back to back 100-year 24-hour design storms.
- (5) *Outlets.* Discharges from new construction sites must have a stable outlet capable of carrying designed flow as required in subsection (b)(4) of this section, at a non-erosive velocity. Outlet design must consider flow capacity and flow duration. This requirement applies to both the site outlet and the ultimate outlet to stormwater conveyance or water body.
- (6) *Infiltration.* The stormwater management plan shall include the following provisions and practices to increase the infiltration of runoff at sites outside of groundwater protection areas:
- a. *Residential development.* For both residential and non-residential developments, design practices to infiltrate sufficient runoff volume so that post-development infiltration volume shall be at least 90 percent of the pre-development infiltration volume, based upon average annual rainfall. If when designing appropriate infiltration systems, more than two percent of the site is required to be used as effective infiltration area, the applicant may alternately design infiltration systems and pervious surfaces to meet or exceed the estimated average annual recharge rate. The annual pre-development recharge rate shall be determined from the Wisconsin Geological and Natural History Survey's 2012 report, *Groundwater Recharge in Dane County, Estimated by a GIS-Based Water-Balanced Model* or subsequent updates to this report, or by a site specific analysis using other appropriate techniques. If this alternative design approach is taken, at least two percent of the site must be used for infiltration.
 - b. *Internally drained watersheds.* For both residential and non-residential sites located wholly or in part within an internally drained watershed, practices shall be designed to infiltrate as close to 100 percent as practicable of the average annual pre-development infiltration volume, regardless of the effective area of the infiltration system. Under no circumstances shall the reduction in runoff volume be less than 90 percent of the difference between the predevelopment annual

runoff volume at a site and the post-development annual runoff volume at that site to be retained on site.

- c. *Pretreatment.* Before infiltrating runoff, pretreatment shall be required for parking lot runoff and for runoff from new road construction in commercial, industrial and institutional areas that will enter an infiltration system. The pretreatment shall be designed to protect the infiltration system from clogging prior to scheduled maintenance and to protect groundwater quality. Pretreatment design shall be performed in accordance with the technical standards and specifications referenced in section 30-30.
- d. *Deep tilling or similar practices.* Deep tilling or similar practices shall be implemented to restore soil structure to pre-developed conditions. The depth of tilling shall be at least two inches below the hardpan layer or compacted zone, as determined by a soil probe or soil penetrometer, up to a maximum depth of 36 inches. The maximum spacing of the cuts is five feet.
- e. *Prohibitions.* Notwithstanding subsections (b)(6)a through d of this section, infiltration systems may not be installed in any of the following areas:
 1. Areas associated with tier 1 industrial facilities identified in Wis. Admin. Code § NR 216.21(2)(a) including storage, loading, rooftop and parking.
 2. Storage and loading areas of tier 2 industrial facilities identified in Wis. Admin. Code § NR 216.21(2)(b).
 3. Fueling and vehicle maintenance areas.
 4. Areas within 1,000 feet up gradient or within 100 feet down gradient of direct conduits to groundwater.
 5. Areas without proper separation distance from bottom of the infiltration system to the elevation of seasonal high groundwater or the top of bedrock. Infiltration practices shall be located so that the characteristics of the soil and the separation distances between the bottom of the infiltration system and the elevation of seasonal high groundwater or the top of bedrock are in accordance with Table 1. below:

Table 1. Separation Distances and Soil Characteristics		
Source Area	Separation Distance	Soil Characteristics
Industrial, Commercial, Institutional, Parking Lots and Roads	5 Feet or More	Filtering Layer
Residential Arterial Roads	5 Feet or More	Filtering Layer
Roofs Draining to Subsurface Infiltration Practices	1 Foot or More	Native or Engineered Soil with Particles Finer than Coarse Sand
Roofs Draining to Surface Infiltration Practices	Not Applicable	
All Other Impervious Source Areas	3 Feet or More	Filtering Layer

6. Areas with runoff from industrial, commercial and institutional parking lots and roads and residential arterial roads with less than five feet separation distance from the bottom of the infiltration system to the elevation of seasonal high groundwater or the top of bedrock.
7. Areas within 400 feet of a community water system well as specified in Wis. Admin. Code § NR 811.16(4) for runoff infiltrated from commercial, industrial and institutional land uses or regional devices for residential development.

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8. Areas where contaminants of concern, as defined in Wis. Admin. Code § NR 720.03(2) are present in the soil through which infiltration will occur.
- f. *Alternate use of runoff.* Where alternate uses of runoff are employed, such as for toilet flushing, laundry or irrigation, such alternate use shall be given equal credit toward the infiltration volume required by this section.
- g. *Minimizing groundwater pollution.* According to Wis. Admin. Code ch. NR 151, infiltration systems designed in accordance with this section shall, to the extent technically and economically feasible, minimize the level of pollutants infiltrating to groundwater and shall maintain compliance with the preventive action limit at a point of standards application in accordance with Wis. Admin. Code ch. NR 140. However, if site-specific information indicates that compliance with the preventive action limit is not achievable, the infiltration system may not be installed or shall be modified to prevent infiltration to the maximum extent practicable.
- (7) *Thermal control reduction.* The stormwater management plan shall include provisions and practices to reduce the temperature of runoff for sites located within the watershed of a river or stream identified by the state department of natural resources as:
- a. A cold water community as identified through Wis. Admin. Code § NR 102.04(3)(a), Wis. Admin. Code ch. NR 104, and Class I, Class II, and Class III Trout Streams identified in "Wisconsin Trout Streams," DNR publication PUB-FH-806-2002 or its successor.
- b. Rivers or streams proposed by the state department of natural resources as cold water communities and class I, II, and III trout streams.
- (8) *Thermal control continued.* The stormwater management plan does not have to meet the requirement in subsection (b)(7) of this section if the applicant can justify by use of a model approved by the city engineer and the county conservationist that practices are not necessary because the temperature increase of runoff from the site post-development will be zero.
- (9) *Thermal control affected watersheds.* A current list and maps of affected watersheds shall be available for reference at the office of the city engineer.
- (c) *Stormwater management goals.* The following standards shall be met whenever technically feasible without financial hardship as determined by the city engineer, and proposed design, suggested location and implementation of practices to meet these goals shall be included in plans:
- (1) For existing development, design practices to retain soil particles greater than 20 microns on the site (40 percent reduction) resulting from a one-year 24-hour (2.5 inches over 24 hours duration) storm event, according to approved procedures, and assuming no sediment resuspension. For certain watersheds (e.g. Nine Springs Creek watershed), there may be a higher TSS percentage reduction required based on the Rock River Total Maximum Daily Load (TMDL) criteria.
- (2) For street reconstruction, design practices to retain soil particles greater than 20 microns on the site (40 percent reduction) resulting from a one-year, 24 hour (2.5 inches over 24 hours duration) storm event, according to approved procedures, and assuming no sediment resuspension.
- (3) For new construction, design practices to retain soil particles greater than 5 microns on the site (80 percent reduction) resulting from a two-year 24-hour storm event (2.9 inches over 24 hours duration), according to approved procedures, and assuming no sediment resuspension.
- (4) For new residential and non-residential development outside of groundwater protection areas, infiltrate per subsection (b)(6)a of this section.

(Comp. Ords. 2009, § 27.10; Ord. No. 2014-O-06, § 2, 3-25-2014; Ord. No. 2020-O-09, § 1, 4-14-2020; Ord. No. 2020-O-11, § 1, 4-14-2020)

Sec. 30-29. Off-site stormwater management.

- (a) Off-site stormwater management is allowed, provided that all of the following conditions for the off-site facility are met:
 - (1) The facility is in place;
 - (2) The facility is designed and adequately sized to provide a level of stormwater control that at least meets the article standards;
 - (3) The facility has a legally obligated entity responsible for its long-term operation and maintenance.
- (b) At the discretion of the city engineer, new development will be allowed where the off-site stormwater management facility is not yet in place provided that all of the following conditions are met:
 - (1) A temporary on-site stormwater management facility is constructed meeting the requirements of section 30-28(b), except section 30-28(b)(4)d;
 - (2) The permanent off-site stormwater management facility is constructed within one year of completing the new development;
 - (3) The temporary on-site stormwater management facility is maintained until the permanent off-site stormwater management facility is completed.

(Comp. Ords. 2009, § 27.11; Ord. No. 2014-O-06, § 2, 3-25-2014)

Sec. 30-30. Technical standards and specifications.

The design of all best management practices designed to meet the requirements of this article shall comply with the following technical standards:

- (1) Natural resources conservation service's "Wisconsin Field Office Technical Guide, Article 4" or its successor;
- (2) Applicable construction or erosion control technical standards by the state department of natural resources;
- (3) The "Dane County Erosion Control and Stormwater Management Manual" or any other technical methodology approved by the county conservationist; ~~and~~
- ~~(4) State department of natural resources' "Wet Detention Basin Conservation Practice Standard Code 1001" or its successor.~~

(Comp. Ords. 2009, § 27.12)

Sec. 30-31. Appeals and variances.

- (a) *Appeals.*
 - (1) Any person aggrieved by any decision of the city engineer pursuant to this article may appeal to the board of appeals. Such appeal shall be taken within 30 days after the challenged decision. Notice of appeal setting forth the specific grounds for the appeal shall be filed with the city engineer and the city clerk. The zoning administrator shall forthwith transmit to the board of appeals the record upon which the action appealed from was taken.

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- (2) The secretary of the board of appeals shall fix a reasonable time for the hearing of the appeal and publish a class 2 notice thereof under Wis. Stats. ch. 985 as well as give due notice to the parties in interest, and decide the same within a reasonable time. Upon the hearing any party may appear in person or by agent or attorney.
 - (3) The board of appeals may, in conformity with the provisions of this article, reverse or affirm, wholly or partly, or modify the order, requirement, decision or determination appealed from and may make such order, requirement decision or determination as ought to be made, and shall have all the powers of the officer from whom the appeal is taken.
 - (4) The concurring vote of a majority of the board of appeals shall be necessary to reverse the decision of the city engineer.
- (b) *Variances.*
- (1) An applicant may include in the application a request for a variance from the requirements of section 30-27 or 30-28. No variance shall be granted unless the applicant demonstrates and the city engineer, after consultation with the county conservationist, finds that all of the following conditions are present:
 - a. Enforcement of the standards set forth in this article will result in unnecessary hardship to the landowner;
 - b. The hardship is due to exceptional physical conditions unique to the property;
 - c. Granting the variance will not adversely affect the public health, safety or welfare, nor be contrary to the spirit, purpose and intent of this article;
 - d. The project will have no impact upon any of the stated purposes of this article as set forth in section 30-20;
 - e. The applicant has proposed an alternative to the requirement from which the variance is sought that will provide equivalent protection of the public health, safety and welfare, the environment and public and private property;
 - f. The net cumulative effect of the variance will not impact downstream conditions; and
 - g. Existing regional facilities are shown to meet the performance standards of this article.
 - (2) If all of the conditions set forth in subsection (b)(1) of this section are met, a variance may only be granted to the minimum extent necessary to afford relief from the unnecessary hardship, with primary consideration to water quality.
 - (3) A variance from the provisions of section 30-28(b)(1), (2), and (7) may only be granted if:
 - a. The applicant has met the requirements of subsection (b)(1) of this section; and
 - b. The applicant will be denied all reasonable and beneficial use of the property if the variance is denied.

(Comp. Ords. 2009, § 27.13)

Sec. 30-32. Activities requiring special plan commission approval (parcel size of five acres or more).

- (a) In addition to obtaining the approval of the city engineer as required under section 30-26, any land disturbing activity that occurs on a parcel of land five acres or more in size and where the disturbance falls

under the requirements of section 30-22, shall be subject to plan commission review and action under this section, unless:

- (1) A valid land division improvement agreement with the city is in place for the parcel.
 - (2) The parcel is an approved, or legal nonconforming mineral extraction site, although filling of a mineral extraction area is covered by the provisions of this section unless an approved restoration plan is in place and on file with the city.
 - (3) The land disturbing activity on the parcel is related to a valid and already approved architectural or design review request, or conditional use.
 - (4) The land disturbing activity on the parcel is an agricultural land use or gardening activity.
 - (5) The land disturbing activity is a building project having received at least a permit-to-start, or an activity having received other government approvals such as for a septic system.
 - (6) Governmental operations involving road, stormwater management or utility projects. Private utility company projects.
- (b) An applicant for a land disturbing activity subject to plan commission review shall submit four full size sets, and one set reduced to 11 inches x 17 inches of all the information required under section 30-26(b) to the planning department at least three weeks before the plan commission meeting at which the applicant desires to have initial consideration.
- (c) The city engineer and the city planner shall review the application for compliance with the requirements of the article and make a report thereon to the plan commission. The plan commission shall consider, but is not bound by, the city engineer's and city planner's report in reaching its determination.
- (d) Upon submittal of proper information in a timely manner the plan commission shall review the information and has the authority to:
- (1) Allow the land disturbing activity to proceed, approve with modifications and/or conditions, request additional information, or reject the erosion control application. Action shall occur within 60 days of submittal of a complete application.
 - (2) In case of request for additional information, the plan commission shall note generally what type of information is required and shall act on the request within 45 days of the date of submittal of the requested information.
 - (3) In case of rejection, the reasons for rejection shall be noted in the plan commission minutes, and rejection shall relate to the plan commission review standards identified in subsection (e) of this section.
- (e) The plan commission's determination shall be based upon whether the proposed land disturbing activity meets all of the following standards:
- (1) The land disturbing activity will not be detrimental to the public health, safety, morals, comfort, or general welfare.
 - (2) The establishment of the land disturbing activity will not impede the normal and orderly development and improvement of the parcel or surrounding lands, and will promote sound economic growth.
 - (3) The proposed erosion control activities are sufficient to prevent and control water pollution, control soil erosion, and to prevent and control adverse effects on spawning grounds, fish and aquatic life.
 - (4) The plan will not cause substantial change to the existing grades such that there will be a negative effect on the direction, velocity and amount of stormwater flow from the site onto public waterways, drainage channels or to adjoining or nearby lands.

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- (5) Truck or vehicular traffic shall not cause the depositing of mud or dirt onto the public rights-of-way.
 - (6) The land disturbing activity shall be properly staged as to limit the amount of site disruption at any point in time.
 - (7) The method and manner of fill placement is appropriate for future planned use.
- (f) If the plan commission grants approval, conditionally approves, or approves with modifications, then the city engineer and the zoning administrator shall complete their review under section 30-26. If the plan commission denies the request, the applicant shall be notified by the planning and zoning department or the city engineer's office, with the reasons for denial outlined to the applicant. The applicant shall have the right to appeal the plan commission decision as provided in section 30-31. Any such appeal shall be filed in writing with the city clerk within ten days of the date of the notification of disapproval.
- (g) All provisions of this article remain in force and effect. If the requirements of this section are more stringent or provide for additional standards, the requirements of this section shall apply.

(Comp. Ords. 2009, § 27.14)

Sec. 30-33. Permit fees.

The city engineer may establish a fee schedule for erosion control and stormwater management permits or charge the developer for staff time associated with the review of the permit application. In addition to the base fee, the applicant shall pay the actual costs incurred by the city from any consultant or agent with whom the city may contract to provide services relating to the administration of this Code. The city shall bill the applicant for such charges, which shall be paid within 30 days. Any unpaid charges shall be assessed to the subject property as a special charge pursuant to Wis. Stats. 66.0627 and placed on the tax roll. Fees shall be as set forth in the annual budget appendix fee schedule.

(Comp. Ords. 2009, § 27.15; Ord. No. 2019-O-20, § 1, 8-13-2019)

Sec. 30-34. Illicit discharges.

- (a) *Prohibition of illicit discharges.* It shall be unlawful for any person, firm, or corporation to discharge or cause to be discharged, into the public stormwater system or any waterway within the city, any materials other than stormwater runoff or permitted discharges allowed under subsection (c) of this section. Prohibited discharges include, but are not limited to, pollutants or any liquids containing pollutants that cause or contribute to a violation of applicable water quality standards. The commencement, conduct, or continuance, of any illicit discharge to the public stormwater system is prohibited.
- (b) *Prohibition of illicit connections.* It shall be unlawful for any person, firm, or corporation to construct, use, maintain, or continue the existence of an illicit connection to the public stormwater system.
- (1) This prohibition expressly includes, without limitation, illicit connections made in the past, regardless of whether the connection was permissible under law or practices applicable or prevailing at the time of the connection.
 - (2) It shall be considered a violation of this article to convey sanitary waste to the public stormwater system or allow such a conveyance to continue.
- (c) *Permitted discharges.* The following nonstormwater discharges are not considered illicit discharges if done in a nonpolluting manner: water line flushing, irrigating, diverting stream flows, uncontaminated groundwater pumping, discharging from potable water sources, foundation drains, air conditioning condensation, lawn

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watering, individual car washing, flow from riparian habitats and wetlands, dechlorinated swimming pool water, street wash water, and water from firefighting.

- (d) *Spills or accidentally discharged wastes.* All persons delivering, hauling, disposing, storing, discharging, or otherwise handling potentially polluting substances, solid or liquid, such as, but not limited to the following; agricultural chemicals and other chemicals, fuel oil, gasoline, solvents, industrial liquids or fluids, milk, grease trap and septic tank waste, sewage sludge, sanitary sewer wastes, oil, or petroleum products or wastes, shall comply with the following:
- (1) Immediately clean up any such spilled material to prevent its becoming a hazard to health or safety or directly or indirectly causing the pollution of the waterways within the jurisdiction of the city.
 - (2) Any such spilled material that cannot adequately be cleaned up by the responsible party or parties shall be immediately reported to the city police department so that assistance can be given by the proper agency.
 - (3) The party or parties responsible for the release, escape, or discharge of spilled materials may be held financially liable for the cost of any clean up deemed necessary or desirable and undertaken by the city or its designated agent, in an effort to minimize the potential effects of the discharged materials.
 - (4) It shall be unlawful for any person to store any potentially polluting substances unless such substances are stored in such a manner as to securely prevent them from escaping onto the ground surface and/or into any street, storm sewer, ditch, or drainageway, or waterway within the jurisdiction of the city.

(Comp. Ords. 2009, § 27.16)

Sec. 30-35. Runoff curve numbers.

- (a) Maximum pre-development runoff curve numbers used in such calculations shall be those shown in Table 2. The TR-55-specified curve numbers for other land uses shall be used. Heavily disturbed sites will be lowered one permeability class for hydrologic calculations. Lightly disturbed areas require no modification. Where practices have been implemented to restore soil structure to pre-developed conditions, no permeability class modification is required.

Table 2. Maximum Pre-development Runoff Curve Numbers				
Land Use	Hydrologic Soil Group			
	A	B	C	D
Woodland	30	55	70	77
Grassland/ Cropland	39	61	71	78
Cropland	51	68	78	83

- (b) Minimum post-development runoff curve numbers shall be those in Table 3:

Table 3. Minimum Post-Development Runoff Curve Numbers				
Average percent impervious area for land use (including streets)	Hydrologic Soil Group			
	A	B	C	D
12	46	65	77	82
20	51	68	79	84
25	54	70	80	85
30	57	72	81	86
38	61	75	83	87
65	77	85	90	92

72	81	88	91	93
77	86	91	94	95
85	89	92	94	95

(Comp. Ords. 2009, § 27.16(app. A); Ord. No. 2014-O-06, § 2, 3-25-2014)

Secs. 30-36—30-58. Reserved.