Professional

Engineering

Services

Stormwater Quality Management Plan

Report

City of

Whitewater, WI, and

University of

Wisconsin–Whitewater

December 2017

STRAND ASSOCIATES®

Report for

City of Whitewater, Wisconsin and University of Wisconsin-Whitewater

Stormwater Quality Management Plan

Prepared by:

STRAND ASSOCIATES, INC.®
910 West Wingra Drive
Madison, WI 53715
www.strand.com

December 2017

STRAND ASSOCIATES®

TABLE OF CONTENTS

TABLE OF CONTENTS Continued

TABLE OF CONTENTS Continued

TABLE OF CONTENTS Continued

TABLE OF CONTENTS Continued

SECTION 1
INTRODUCTION

1.01 BACKGROUND

This project was prompted by the need for the City of Whitewater, Wisconsin (City), and the University of Wisconsin-Whitewater (UWW) to update previous stormwater planning efforts for the City and UWW. For the City, this consists of the *2008 Stormwater Quality Management Plan* and *March 2011 Update* by Strand Associates, Inc.® For the UWW, this consists of the *2008 UWW Stormwater Quality Management Plan* and *December 2008 Update* by Strand Associates, Inc.® Other stormwater planning efforts for UWW include the *2009 Stormwater Management Plan* by Norris and Associates, Inc. and the 2014 UWW Comprehensive Campus Master Plan. In addition, the City and UWW are United States Environmental Protection Agency (USEPA) National Pollutant Discharge Elimination System (NPDES)/Wisconsin Pollutant Discharge Elimination System (WPDES) permitted areas. The City and UWW are considered significant contributors under NR 216. A significant contributor is an entity that discharges to waters of the state pollutants that contribute to or have the reasonable potential to contribute to an exceedence of a water quality standard. This permit program is aimed at reduction of pollutants associated with nonpoint source stormwater runoff. The effective date of the current permit is May 1, 2014, and it is subject to renewal on April 30, 2019. The permit is titled *General Permit to Discharge Under the Wisconsin Pollutant Discharge Elimination Systems: WPDES Permit No. WI-S050075-2*. A copy of the permit is provided in Appendix A.

This plan updates and improves on identified measures to improve the quality of nonpoint source stormwater runoff discharging to Cravath Lake, Tripp Lake, Whitewater Creek, Spring Brook, Galloway Creek, and other City and UWW natural resources while being consistent with the requirements of the permit. An overview of current stormwater management infrastructure, policies, and programs in the City and UWW is included within this report, as well as a plan for future improvements. Figure 1.01-1 shows the City and UWW boundary, City parks, and public works buildings.

This report is comprised of seven sections:

1. Sections 1 provides introductory and general information regarding stormwater management practices (SMPs) and methodologies used in the study.

2. Section 2 provides information about the contributing watershed.

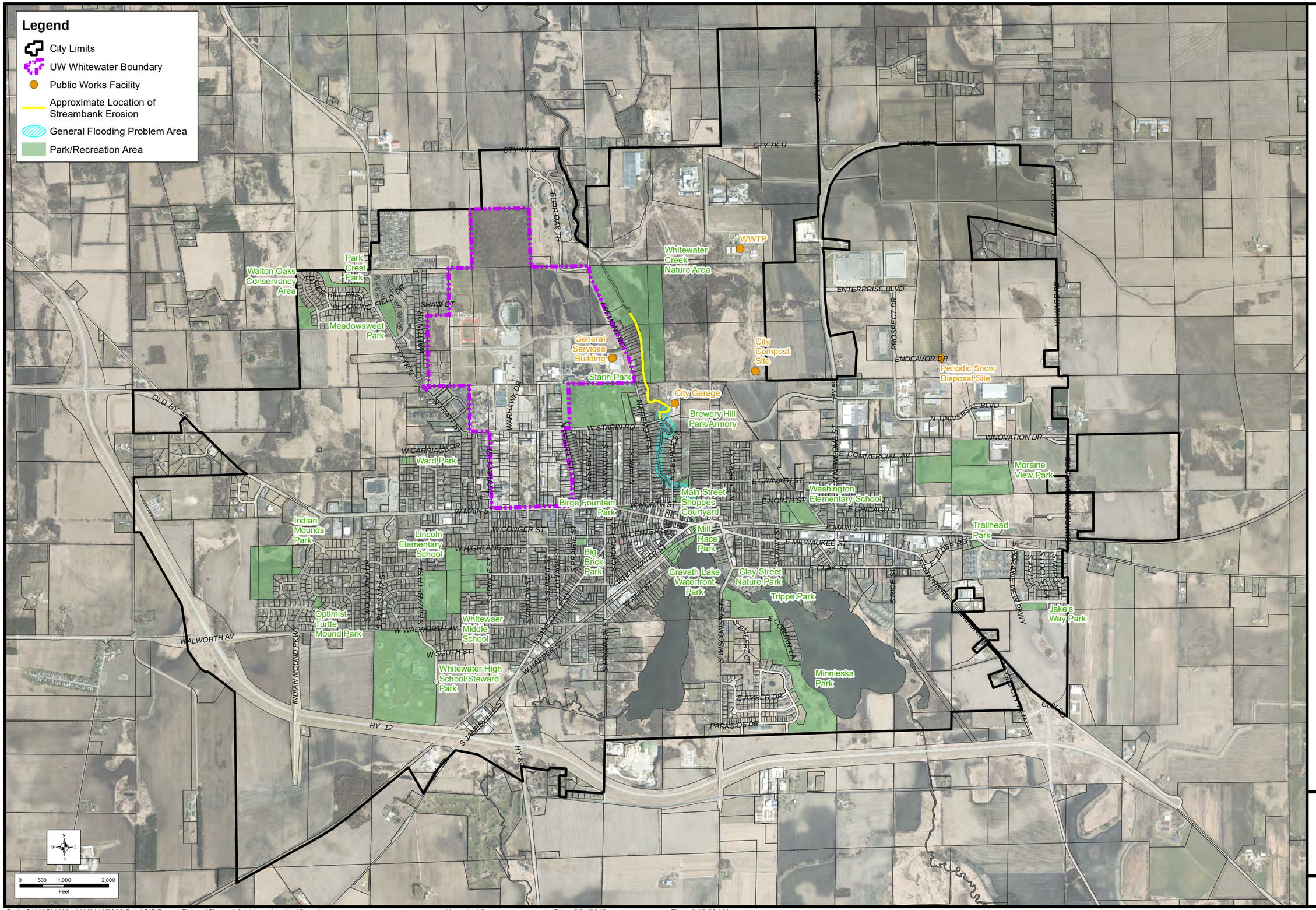
3. Sections 3A and 3B provide an overview of current policies, practices, and issues in the City and UWW, respectively, and recommend possible modifications for consideration to improve nonpoint source runoff quality.

4. Section 4 summarizes water quality modeling for baseline and current conditions in the City and UWW and summarizes the pollutant reductions each achieves in the Rock River Basin total maximum daily load (TMDL) reaches.

5. Section 5 discusses stormwater management alternatives investigated and the potential for watershed adaptive management and water quality trading (WQT).

6. Section 6 provides a possible funding and implementation plan.

This project is funded by a Wisconsin Department of Natural Resources Urban Nonpoint Source and Stormwater (WDNR UNPS&SW) Grant (Grant No. LR14-64291-15A).



LOCATION MAP

TMDL STORMWATER PLAN
CITY OF WHITEWATER
WALWORTH AND JEFFERSON COUNTIES

STRAND ASSOCIATES®

FIGURE 1.01-1
1407.088

Path: S:\MAD\1400--1499\1407\088\Data\GIS\Report Figures\Figure 1.01-1 Location 11x17.mxd User: davidk Date: 5/31/2017 Time: 8:15:56 AM

1.02 PLAN OBJECTIVES AND CRITERIA

A. Regulatory Issues

A primary concern in land development has historically been quickly draining stormwater runoff. Typically, curbs, gutters, and storm sewer systems have been constructed to provide for efficient stormwater drainage. Unfortunately, along with efficiently transporting stormwater runoff, storm sewers are also efficient at conveying accumulated pollutants from parking lots, streets, rooftops, lawns, and other areas to adjacent waterways. Sediment, heavy metals, pesticides, nutrients, bacteria, and oxygen-demanding organic waste from pollutant "source areas" have been recognized as a cause of water quality degradation in our streams, lakes, ponds, and other water resources. Drainage of developed lands employing a "rural" road cross section with grassed swales somewhat mitigates the effect of development but solely is not able to meet Wisconsin Department of Natural Resources (WDNR) stormwater quality goals.

In recognition of the potential harmful impacts of stormwater runoff, regulations have been implemented at the federal and state level. In response to the 1987 Amendments to the Clean Water Act (CWA), the USEPA developed Phase I of the NPDES Stormwater Program in 1990. The Phase I program addressed sources of stormwater runoff that had the greatest potential to negatively impact water quality. Under Phase I, USEPA required NPDES permit coverage for stormwater discharges from medium and large municipal separate storm sewer systems (MS4s) located in incorporated areas or counties with populations of 100,000 or more.

Subsequent to the Phase I program, in October 1999, the USEPA adopted "Phase II" NPDES stormwater runoff requirements, applicable to municipalities located in "urbanized areas" (UAs) and MS4s serving populations over 10,000, as defined by the United States Census Bureau. A UA is a land area comprising one or more places and the adjacent densely settled surrounding area that together have a residential population of at least 50,000 and an overall population density of at least 500 people per square mile. The City and UWW are considered Phase II municipalities.

The City's and UWW's stormwater permit requires implementation of the following measures and tracking of these measures through identification of measurable goals.

1. Public Education and Outreach: Implementation of a public education and outreach program to increase community awareness of stormwater pollution impacts on waters of the state, thereby encouraging changes in public behavior to reduce such impacts.

2. Public Involvement and Participation: Public involvement and participation in efforts to reduce nonpoint source pollutant discharges and inform the public of permit-required activities.

3. Illicit Discharge Detection and Elimination: Development of an illicit discharge detection and elimination program with the primary goal of eliminating nonstormwater discharges to the storm sewer system. A primary component of this program is development of mapping to identify storm sewer outfalls to adjacent water bodies. In addition, the illicit discharge ordinance should be updated.

4. Construction Site Pollution Control: Development of a program to reduce pollutants in stormwater runoff from construction activities that result in a land disturbance of greater than or equal to one acre. This includes requesting authority to regulate erosion control at public buildings from the Wisconsin Department of Commerce pursuant to s. 101.1205(4), Wis. Stats. It should be noted the City and UWW are required to administer a program as restrictive as the requirements in WDNR's NR 151 (see Appendix B).

5. Postconstruction Stormwater Management: Development of a program to control the quality of stormwater runoff from new development and redevelopment projects after construction is completed that disturb an area greater than or equal to one acre.

6. Pollution Prevention: Development and implementation of an operation and maintenance program to prevent pollution and facilitate good housekeeping practices for municipal operations.

7. Stormwater Quality Management: Development and implementation of a municipal stormwater management program that, to the "maximum extent practicable" as documented by stormwater quality modeling, achieves a reduction in total suspended solids (TSS) in the WPDES-designated area of at least 20 percent**.** The City and UWW are also subject to the TSS and total phosphorus (TP) wasteload allocations (in the form of a percent reduction) included in the Rock River Basin TMDL.

8. Storm Sewer System Map: Development of a storm sewer system map of the MS4.

9. Annual Report: Submittal of an annual report to the WDNR documenting permit-related activities.

10. Cooperation: By written agreement, implement the City's and UWW's permit with another municipality or contract with another entity to perform one or more of the conditions of the permit.

In Wisconsin, the WDNR is responsible for administering the USEPA Stormwater Permit Program. The WDNR administers this program through Wisconsin Administrative Code NR 216, which requires affected municipalities to implement the minimum control measures listed above to the maximum extent practicable. To better define maximum extent practicable, the WDNR has adopted specific stormwater management performance standards as defined in the NR 151 administrative rules.

As part of the permit, the City and UWW must also comply with Impaired Waterbodies and TMDL Requirements. The impaired waterbody requirements require the City and UWW to include a written section in the stormwater management program that discusses control measures and practices that will be implemented to collectively eliminate the pollutant of concern from discharging into the impaired waterbody. The City and UWW are within the Rock River Basin TMDL, which was approved in September 2011. To comply with the TMDL requirements, the City and UWW must adhere to the compliance schedule below.

Submitted with the annual report due on March 31, 2016, must be an updated storm sewer system map of the MS4 including the following:

1. The current municipal boundary.

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

Included with the annual report due March 31, 2018, the City and UWW must submit a tabular summary that contains the following for each MS4 drainage boundary associated with each TMDL reachshed and for each pollutant of concern:

1. The City's and UWW's percent reduction needed to comply with their TMDL wasteload allocation from the no-controls modeling condition. The no-controls modeling condition means taking zero credit for stormwater control measures that reduce the discharge of pollutants.

2. The modeled MS4 annual average pollutant load without any stormwater control measures.

3. The modeled MS4 annual average pollutant load with existing stormwater control measures.

4. The percent reduction in pollutant load achieved calculated from the no-controls condition and the existing controls condition.

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

If the City and UWW are not achieving the applicable percent reductions needed to comply with their TMDL wasteload allocation for each TMDL reachshed, a written plan must be submitted to the WDNR that describes how the City and UWW will make progress toward achieving compliance and must include the following:

1. Recommendations and options for stormwater control measures that will be considered to reduce the discharge of each pollutant of concern.

2. A proposed schedule for implementation of the recommendations and options identified.

3. A cost-effectiveness analysis for implementation of the recommendations and options identified.

B. Plan Objectives

The objectives of this plan are consistent with goals of the USEPA and the WDNR in addressing nonpoint source runoff sources. These objectives include the following:

1. Improve the quality of water in receiving waterways, which include Cravath Lake, Tripp Lake, Whitewater Creek, Spring Brook, Galloway Creek, and groundwater recharged by infiltrated stormwater.

2. Increase citizen awareness of issues associated with stormwater runoff.

3. Implement best management practices (BMPs) to comply with USEPA and WDNR requirements.

C. BMPs

The WDNR defines BMPs as structural or nonstructural measures, practices, techniques, or devices employed to avoid or minimize soil, sediment, or pollutants carried in runoff to waters of the state. A BMP may include any program, technology, process, siting criteria, operational method, measure, or device that controls, prevents, removes, or reduces pollution. Nonstructural measures may include public information and education of homeowners to reduce their impacts on nonpoint source pollution and "source controls," such as street sweeping and leaf collection. Structural BMPs may include construction of wet detention basins, infiltration basins, vegetated swales, and similar measures.

An effective stormwater management program will include a mixture of structural and nonstructural BMPs and effective source controls to reduce nonpoint source runoff to receiving waterways. This report will discuss or recommend a series of City- and UWW-wide and basin-specific BMPs to reduce nonpoint source runoff to Cravath Lake, Tripp Lake, Whitewater Creek, Spring Brook, Galloway Creek, and other waters of the state.

1.03 SCOPE OF STUDY

This study was undertaken to meet the requirements of the NPDES/WPDES stormwater permitting program. Primary tasks included development of an updated stormwater management plan for the City and UWW, which are summarized as follows.

A. Administration and Meetings

1. Assist in submittal of up to four quarterly grant progress reports and reimbursement requests. Prepare and submit the WDNR Final Report (Form 3400-189).

2. Participate in up to six meetings as follows:
   a. Meeting No. 1–Kickoff Meeting
   b. Meeting No. 2–Progress Meeting
   c. Meeting No. 3-Progress Meeting
   d. Meeting No. 4–Progress Meeting to discuss draft plan
   e. Meeting No. 5–Presentation of final plan to the City
   f. Meeting No. 6–Presentation of final plan to the UWW

B. Stormwater Quality Modeling, Alternatives Analysis, and Implementation Plan

1. Provide up to two days of field survey and inventory of existing stormwater BMPs in the City and UWW.

2. Provide up to three double-ring infiltrometer tests in grass-lined swales on the UWW campus.

3. Provide an updated stormwater system map for the City and UWW consistent with WPDES Permit No. WI-S050075-2 based on information provided by the City and UWW.

4. Provide a tabular summary for City and UWW consistent with WPDES Permit No. WI-S050075-2.

5. Provide updated City-wide and UWW-wide stormwater quality modeling to be consistent with the WDNR's MS4-TMDL modeling guidance. Modeling will be performed in WinSLAMM for total suspended solids (TSS) and total phosphorus (TP).

6. Identify and analyze up to three alternatives for TMDL compliance within the City and UWW limits consisting of a combination of the various implementation methods being considered. Provide a figure, analysis, and opinion of probable cost for each alternative.

   a. Ordinance review and updates.

   b. Structural management practices.

   c. Operational management practices.

   d. Streambank stabilization.

7. Provide a written section in the plan discussing the mechanism for achieving TMDL compliance through pollutant trading and watershed adaptive management. A concept-level cost to achieve TMDL compliance through pollutant trading and watershed adaptive management will be developed for comparison with TMDL compliance within the City and UWW limits.

8. Develop a stormwater quality implementation plan considering amount of benefits, available funding, land availability, and related issues for the City and UWW. The implementation plan will include prioritization of improvements, potential schedule of improvements, and a budgeting plan including identification of potential funding sources. This plan will consist of a table within the TMDL Stormwater Plan for the City and UWW.

C. Stormwater Program Updates

1. Review and discuss revisions to the City's and UWW's Public Education and Outreach and Public Involvement and Participation programs that are complementary to the Rock River Stormwater Group efforts.

2. Review and discuss revisions to the City's and UWW's construction site erosion control ordinances to be consistent with the February 2012 NR 151 revisions.

3. Review and discuss revisions to the City's and UWW's stormwater management ordinances to be consistent with the February 2012 NR 151 revisions.

4. Review and discuss revisions to the City's and UWW's Illicit Discharge Detection and Elimination programs and ordinances to be consistent with the WDNR's March 2012 guidance document.

5. Review and discuss revisions to the existing City's and UWW's Stormwater Pollution Prevention programs.

6. Provide information on the City's and UWW's deicing activities based on information provided by the City and UWW.

D. Stormwater Utility Rate Review and Update

Review the City's stormwater utility and the impact on the rates for implementing stormwater control measures to meet the TMDL requirements.

E. TMDL Stormwater Plan

Prepare a TMDL Stormwater Plan and submit to the City and UWW in draft and final formats. Submit two copies of the draft and final plan to the City and UWW in a hard-copy format. Provide a portable document format file copy of the draft and final plan to each entity.

1.04 DEFINITIONS

The following definitions and abbreviations are presented as an aid to the reader.

Average sediment depth–The average depth of deposited sediment measured over the entire pond area.

Average current normal pool depth–The average depth of water measured over the entire pond area. This is the difference between the water surface and the top of sediment.

Average current total pond depth–The average depth of the pond if all deposited sediment were removed. This is the difference between the water surface and the existing bottom of the pond.

Best management practices–Also known as BMPs, structural or nonstructural measures, practices, techniques, or devices that are employed to avoid or minimize soil, sediment, or pollutants carried in runoff to waters of the state.

Catch basins–An inlet to a storm sewer equipped with a sediment sump and sometimes a hood on its outlet pipe to the downstream storm sewer.

Control structure–The manmade structure that controls the water released from a stormwater facility to the outfall.

Curve number–The Soil Conservation Service has devised a method of computing the runoff from an area based on a system of curve numbers. The curve number for an area of land is obtained by examining the land use and soil type of the land area.

Design storm–A hypothetical discrete rainstorm characterized by a specific duration, temporal distribution, rainfall intensity, return frequency, and total depth of rainfall.

Detention basin–A stormwater management structure that temporarily detains runoff and discharges it through a hydraulic structure to a stream or receiving waterway.

Drainage basin–A geographical area that contributes surface water runoff to a particular point.

Erosion–The process by which soil, rocks, and other land forms are worn away by repetitive wind, water, or ice activity.

Final stabilization–When all land disturbing construction activities at the construction site have been completed and a uniform perennial vegetative cover has been established with a density of at least 70 percent of the cover for the unpaved areas and areas not covered by permanent structures or that employ equivalent permanent stabilization measures.

Flume–The structure or channel upstream of the stormwater facility used to convey stormwater to the facility.

Forebay–The area of the pond near the inlet where heavy sediments are encouraged to settle out of the stormwater that enters the pond.

Illicit discharge–Any discharge to a municipal separate storm sewer system that is not composed entirely of runoff, except discharges authorized by a WPDES permit or any other discharge not requiring a WPDES permit such as water line flushing, landscape irrigation, individual residential car washing, fire-fighting, and similar discharges.

Impervious surface–A ground cover such as concrete, rooftops, asphalt, gravel, or other surface that inhibits precipitation or runoff from infiltrating or penetrating the surface. A surface that releases as runoff all or most of the precipitation that falls on it.

In-fill development–Development that occurs in an undeveloped area that is located within or is surrounded by a developed area.

Infiltration–The entry of precipitation or runoff into or through the soil.

Inlet–An entryway to the storm sewer system usually located at street corners and low points.

Karst feature–An area or surficial geological feature subject to bedrock dissolution so that it is likely to provide a conduit to groundwater, and may include caves, enlarged fractures, mine features, exposed bedrock surfaces, sinkholes, springs, seeps, or swallets.

Maximum extent practicable (MEP)–A level of implementing BMPs to achieve a performance standard that 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.

New development–Development resulting from the conversion of previously undeveloped land or agricultural land uses.

Outfall–The piping, channel, or other equipment downstream of a control structure used to transfer water out of the control structure to the surrounding environment.

Performance standard–A narrative or measurable number specifying the minimum acceptable outcome for a facility or practice.

Recurrence interval–The probability that a given rainfall event will occur in a given year. For example, a 100-year rainfall event has a 1 percent chance of occurring in a given year (1/100 = 0.01 = 1 percent), a 5-year rainfall event has a 20 percent chance of occurring in a given year (1/5 = 0.20 = 20 percent).

Redevelopment–Areas where development is replacing older development.

Retention basin–A stormwater management structure that captures stormwater runoff and does not discharge to a surface water body. The water is discharged by infiltration or evaporation.

Separate storm sewer–A conveyance or system of conveyances including roads with drainage systems, streets, catch basins, curbs, gutters, ditches, constructed channels or storm drains, which meets all the following criteria:

a. Is designed or used for collecting water or conveying runoff.
b. Is not part of a combined sewer system.
c. Is not draining to a stormwater treatment device or system.
d. Discharges directly or indirectly to waters of the state.

Sheet flow runoff–Water, usually storm runoff, flowing in a thin layer over the ground; also called overland flow.

Subbasin–The parts of a drainage basin that, when combined, create the entire drainage basin for a facility.

Time of concentration (Tc)–"… the time for runoff to travel from the hydraulically most distant point of the watershed to a point of interest within the watershed," SCS, 1986.

Time distribution of rainfall–The amount of rainfall that has fallen during a storm event versus the amount of time that has elapsed during a storm event.

Total maximum daily load (TMDL)–The amount of a pollutant a stream, river, or lake can receive before exceeding water quality standards.

Weir–A wall spanning the control structure. When the water level of the pond reaches the top of the weir, water flows over the weir and out of the pond.

BMP	Best Management Practices
City	City of Whitewater
CWA	Clean Water Act
CWFP	Clean Water Fund Program
CWP	Center for Watershed Protection
EIF	Environment Improvement Fund
FEMA	Federal Emergency Management Agency
HSG	Hydrologic Soils Groups
IDDE	Illicit Discharge Detection and Elimination
GIS	Geographic Information System
MAMSWaP	Madison Area Municipal Stormwater Partnership
MEP	maximum extent practicable
MMSD	Milwaukee Metropolitan Sewerage District
MS4	Municipal Separate Storm Sewer System
NPDES	National Pollutant Discharge Elimination System
NRCS	National Resource Conservation Service
PAH	polynuclear aromatic hydrocarbons
PCB	polychlorinated biphenyls
SEWRPC	Southeastern Wisconsin Regional Planning Commission
SLAMM	Source Loading and Management Modeling
SMP	stormwater management practices
SCS	Soil Conservation Service
Tc	time of concentration
TMDL	total maximum daily load
TP	total phosphorus
TSS	total suspended solids
UA	urbanized areas
USEPA	United States Environmental Protection Agency
UWW	University of Whitewater, Wisconsin
WDNR	Wisconsin Department of Natural Resources
WDNR UNPS&SW	WDNR Urban Nonpoint Source and Stormwater Construction Grant
WPDES	Wisconsin Pollutant Discharge Elimination System
WQT	water quality trading

SECTION 2
CONTRIBUTING WATERSHED CHARACTERISTICS

2.01 WATERSHED DESCRIPTION

This section describes land characteristics in the City and UWW that impact stormwater runoff. Stormwater runoff and nonpoint pollutant loading from a watershed depend on physical characteristics such as watershed size and topography, land use, soil types, degree of saturation, and type of drainage system (such as storm sewers and open channels). Figure 2.01-1 (in pocket folder at back of Section 2) shows the drainage system and drainage basin boundaries in the City and UWW and storm sewer/culverts, detention ponds, floodplains, wetlands, and outfalls.

A. Population and Land Use

City of Whitewater

The City is located in Walworth and Jefferson Counties. According to the Year 2010 Census, the population of the City is 14,390. The total municipal area of the City is approximately 9.06 square miles.

Existing land use in the City is shown in Figure 2.01-2 and graphically summarized in Figure 2.01-3. It should be noted this figure is not a zoning map, rather it identifies SLAMM land use designations. Detailed land use for each watershed is included in Table 2.01-1 (located after Page 2-3).

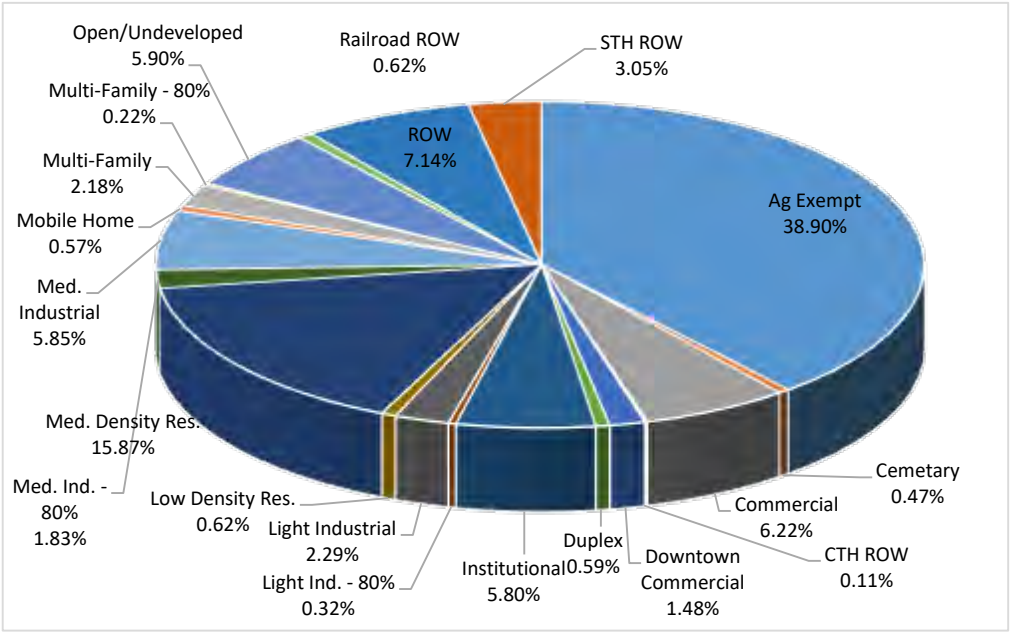
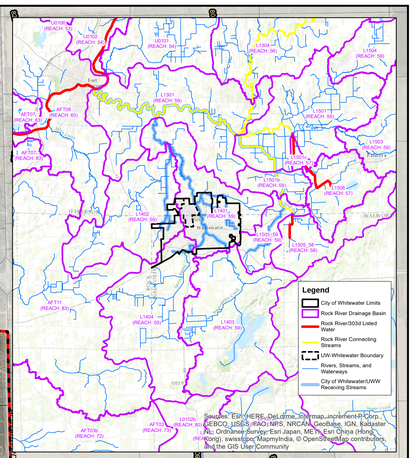


Figure 2.01-3 General Land Use Classification-City of Whitewater

WPDES No.	Permit No.	Permittee Name	Site Name	Location Address	Mailing Address	City
1	0044938	Noncontact Cooling Water	WHITEWATER MANUFACTURING CO.	1108 Bluff Road	1108 E BLUFF RD	WHITEWATER, WI
2	0046507	Concrete Products Operations	LYCON INC WHITEWATER - PLT #6	N9092 Franklin St	P.O. BOX 427, 1110 HARDING ST	JANESVILLE, WI
3	0046523	Swimming Pool	UNIVERSITY OF WISCONSIN WHITEWATER	800 West Main St	800 West Main St	WHITEWATER, WI
4	0046540	Potable Water Treatment & Conditioning	GENERAC POWER SYSTEMS WHITEWATER	757 North Newcomb Rd	PO BOX 8	WAUKESHA, WI
5	0046540	Potable Water Treatment & Conditioning	CITY OF WHITEWATER WATER UTILITY WELL 9	S OF Indian Mound and Walworth St	P.O. BOX 178	WHITEWATER, WI
6	0046540	Potable Water Treatment & Conditioning	CITY OF WHITEWATER WATER UTILITY WELL 8	COMMERCIAL AVENUE	P.O. BOX 178	WHITEWATER, WI
7	0046540	Potable Water Treatment & Conditioning	CITY OF WHITEWATER WATER UTILITY WELL 6	1104 CARRIAGE DRIVE	P.O. BOX 178	WHITEWATER, WI
8	S058831	Storm Water Scrap Recycling	KIENBAUM IRON & METAL SOUTH	564 N. Jefferson Street	P. O. BOX 276	WHITEWATER, WI
9	S066666	Storm Water No Exposure	POPE TRANSPORT INC	N331 Hwy 59	PO BOX 687	WHITEWATER, WI
10	S066666	No Exposure Certification	HUSCO INTERNATIONAL (ANNEX)	1171 Universal Blvd.	W239 N219 PEWAUKEE RD	WAUKESHA, WI
11	S066666	Storm Water No Exposure	HUSCO INTERNATIONAL	1116 Universal Blvd.	W239 N219 PEWAUKEE RD	WAUKESHA, WI
12	S066666	Storm Water No Exposure	GOLDEN STATE FOODS	729 Executive Drive	18301 VON KARMAN AVE	IRVINE, CA
13	S067857	Storm Water Industrial Tier 2 Permit	WHITEWATER MANUFACTURING CO.	1108 Bluff Road	1108 E BLUFF RD, WHITEWATER	WHITEWATER, WI
14	S067857	Storm Water Industrial Tier 2 Permit	WEILER AND COMPANY, INC.	1116 E. Main Street	1116 E MAIN ST	WHITEWATER, WI
15	S067857	Storm Water Industrial Tier 2 Permit	SCHENCK ACCURATE INC	746 E Milwaukee St	746 E MILWAUKEE ST	WHITEWATER, WI
16	S067857	Storm Water Industrial Tier 2 Permit	POLYMER TECHNOLOGIES	420 N. Universal Blvd.	1000 ALLISON RD	MUNDELEIN, IL
17	S067857	Storm Water Industrial Tier 2 Permit	MAJOR TRANSPORT INC	W3411 State Rd 59	1501 E WISCONSIN ST	DELAVAN, WI
18	S067857	Storm Water Industrial Tier 2 Permit	LYCON INC WHITEWATER - PLT #6	N9092 Franklin St	P.O. BOX 427, 1110 HARDING ST	JANESVILLE, WI
19	S067857	Storm Water Industrial Tier 2 Permit	LSP WHITEWATER LIMITED PARTNER	111 Country Highway U	402 E MAIN ST	BOZEMAN, MT
20	S067857	Storm Water Industrial Tier 2 Permit	HYPRO INC.*	840 Executive Dr	600 S JEFFERSON ST	WATERFORD, WI
21	S067857	Storm Water Industrial Tier 2 Permit	GENERAC POWER SYSTEMS WHITEWATER	757 North Newcomb Rd	PO BOX 8	WAUKESHA, WI
22	S067857	Storm Water Industrial Tier 2 Permit	CLINTON POWER COMPANY	848 E Commercial Avenue, Whitewater	611 LANDWEHR RD	NORTHBROOK IL
23	S067857	Storm Water Industrial Tier 2 Permit	ANDERSON MACHINE SERVICE INC	369 Newcomb St	211 COLLINS RD	JEFFERSON, WI

* HYPRO INC. FACILITY IS NOW TROSTEL INC.



Legend

UW Whitewater Boundary
City Limits
Drainage Basins

UW Whitewater Land Use
- Driveway
- Impervious
- Open/Undeveloped
- Parking Lot
- Pervious
- Rooftop
- Sidewalk
- Street

City of Whitewater Land Use
- Ag Exempt
- CTH ROW
- Cemetary
- Commercial
- Commerical
- Downtown Commercial
- Duplex
- Institutional
- Light Ind. - 80%
- Light Industrial
- Low Density Res.
- Med. Density Res.
- Med. Ind. - 80%
- Med. Industrial
- Mobile Home
- Multi-Family
- Multi-Family - 80%
- Open/Undeveloped
- ROW
- Railroad ROW
- STH ROW

N

1,000 500 0 1,000 Feet

SLAMM LAND USE

TMDL STORMWATER PLAN
CITY OF WHITEWATER
WALWORTH AND JEFFERSON COUNTIES, WISCONSIN

STRAND ASSOCIATES®

FIGURE 2.01-2
1407.088

Path: S:\MAD\1400–1499\1407.088\Data\GIS\Report Figures\Figure 2.01-2 SLAMM Land Use 22x34.mxd User: davidk Date: 11/3/2016 Time: 9:00:42 AM

UWW

The UWW is located in Walworth and Jefferson Counties. According to the UWW website, the student enrollment during the 2015-2016 academic year was approximately 12,325. The total area of the UWW is approximately 0.64 square mile.

Existing land use in the UWW is shown in Figure 2.01-2 and graphically summarized in Figure 2.01-4. Detailed land use for each watershed is included in Table 2.01-2 (located after Page 2-3).

Existing land use is based on geographic information system (GIS) data provided by the City and UWW and supplemented by field investigation.

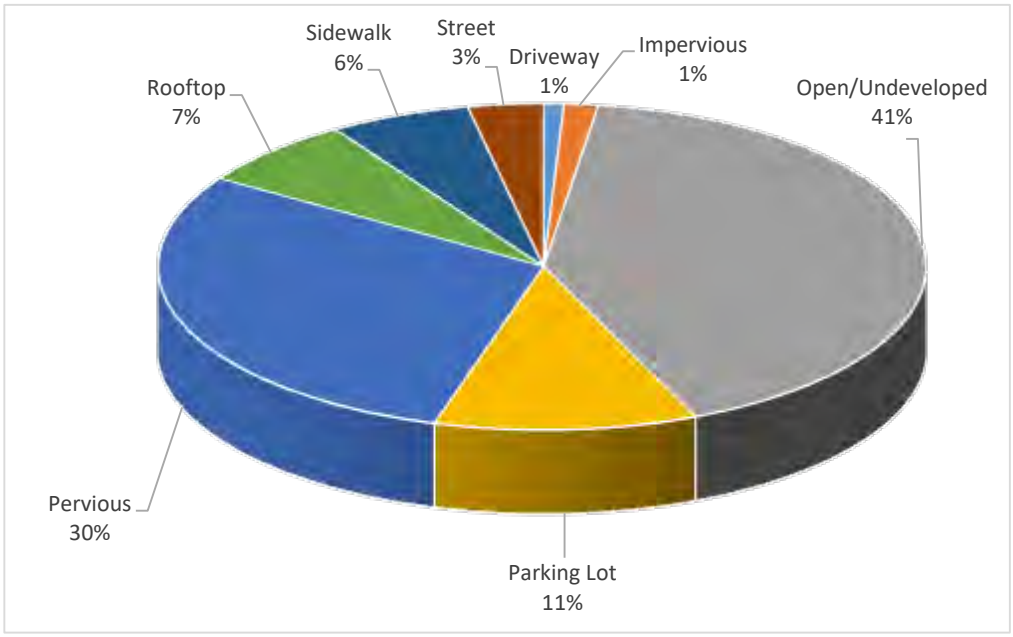


Figure 2.01-4 General Land Use Classification-UWW

B. Watershed Description

The City and UWW are located within the Whitewater Creek Watershed. The Whitewater Creek Watershed includes a 4,477-acre area that drains portions of northwestern Walworth and southern Jefferson Counties. According to the Lower Rock River Water Quality Management Plan (DNR-2001), historical development of land for agriculture and current development of land for residential areas are responsible for the draining of many wetlands and the ditching and straightening of some streams in the watershed. This watershed has a high susceptibility for groundwater contamination based on DNR groundwater susceptibility mapping. The City is the major municipality located within the watershed and its wastewater treatment plant discharges to Whitewater Creek. The drainage systems for the City drain to several waterbodies surrounding the City including flow overland or through ditches, storm sewers, or culverts to Whitewater Creek, Cravath Lake, Tripp Lake, Spring Brook (which drains to Cravath Lake), and a tributary to Galloway Creek. The UWW drains primarily to Whitewater Creek by overland flow and through storm sewers.

Watershed designations are based on the watershed's receiving waterbody. The watershed designations are as follows: Whitewater Creek (WC-xx), Cravath Lake (CL-xx), Tripp Lake (TP-xx), Spring Brook (SB-xx), and Galloway Creek (GC-xx). Numerous basin boundaries differ from the basins in the *2008 Stormwater Plan* and *2011 Stormwater Plan Update* to account for drainage basins to stormwater BMPs, new and redevelopment, and the expanded municipal boundary. The basin number designations used in this plan are similar to those used in the *2008 Stormwater Plan* and *2011 Stormwater Plan Update*; however, the basin boundaries and numbering were adjusted in accordance with WDNR requirements.

Tripp Lake is included on the State's 303(d) list of impaired waters, as shown in Table 2.01-3. This list is derived from data available on the WDNR Surface Water Data Viewer. A waterbody is considered impaired if (1) the current water quality does not meet the numeric or narrative criteria in a water quality standard, or (2) the designated use that is described in Wisconsin Administrative Code is not being achieved. The WDNR addresses impaired waters by analyzing the waterbody to create a TMDL as described below.

A TMDL is defined as the amount of a pollutant a stream, river, or lake can receive before exceeding water quality standards. The WDNR has released a Rock River TMDL that is available on the WDNR website. TMDL basins are broken up into separate reachsheds, which are delineated based on the stream segment, lake, or reservoir the area drains to. The City and the UWW are located within one reachshed, Reach 59. Reach 59 drains to Steel Brook, Scuppernong River, and the Bark River, and it has a TMDL for TP and TSS. The Rock River Basin TMDL wasteload allocations for Reach 59 in the form of a percent reduction are included in Table 2.01-4.

A TMDL is also a plan to reduce the amount of specific pollutants reaching an impaired lake or stream to the extent that water quality standards will be met. As part of the TMDL, the amount of a pollutant that the water can tolerate and still meet water quality standards must be identified. That identified amount is allocated between point sources (wasteload allocation) and nonpoint sources (load allocation). As part of the TMDL, the WDNR identifies how it will implement the TMDL. Wasteload allocations will be implemented through the WPDES permit program. Load allocations will be implemented through Wisconsin's nonpoint source program. The USEPA provides final approval of all TMDLs.

Table 2.01-1 SLAMM Land Use By Subbasin (Acres) To City Boundary (Including Exempt Areas)

Basin	Ag Exempt	Cemetery	Commercial	CTH ROW	Downtown Commercial	Duplex	Institutional	Light Industrial - 80%	Light Industrial	Low Density Res.	Medium Density Res.	Med. Industrial - 80%	Medium Industrial	Mobile Home	Multi-Family	Open/ Undeveloped	Railroad ROW	ROW	STH ROW	Total
CL-1					2.41		0.10				5.52							4.00		12.04
CL-10					0.00		0.03									0.00		0.25		0.28
CL-11	11.39	20.79					16.95				30.17					0.00		0.34		79.63
CL-12					1.61						2.52					0.00		0.12		4.25
CL-13							1.80				6.51					0.00		0.06		8.36
CL-14											39.29					0.00		0.03		39.33
CL-15			0.00								0.50									5.31
CL-2					3.24		0.06				4.13						0.65	2.71		10.80
CL-3					3.63		5.65		0.46		8.03						1.78	7.29		27.31
CL-4.1			5.05		0.34	5.16	3.31				63.81						0.53	19.60		99.21
CL-4.2			2.28		2.56	1.98	3.79				30.04						0.83	16.16		61.26
CL-4.3			0.64				0.07		3.17		18.17					0.00	1.14	4.54		28.51
CL-4.4	0.08		4.23				0.00				3.96						2.39	3.66		14.47
CL-5																		0.10		0.75
CL-6		3.92					0.37				1.66					3.63		1.89		11.47
CL-7					0.35		1.31									0.00	1.22	0.38		3.26
CL-8					2.07		0.12									0.00	1.43	0.43		4.06
CL-9					0.33		0.58									0.00	0.39			1.31
GC-1	0.91		32.23				5.73				9.88					0.00		12.99		62.01
GC-1.1	1.47																	0.82		2.29
GC-1.2			1.30															0.00		1.31
GC-10.1											14.05					3.55		3.30		20.90
GC-10.2	0.05									0.00	11.81					0.68		3.87		16.42
GC-10.3	0.02										0.76					3.25		0.00		4.04
GC-10.4											5.04					0.00		1.23		6.27
GC-10.5											2.65							0.54		3.19
GC-12 CITY	0.00		16.36			0.52				2.02	10.56			0.02		0.00		10.94		57.73
GC-13 CITY	35.85		5.25								0.06			30.03		0.00		0.24		72.69
GC-14	120.09															0.00		3.25	61.69	185.04
GC-14.1	0.05										0.07					0.00		2.03		2.16
GC-2	8.00		15.18				22.40				79.42							27.64		157.28
GC-2.1	2.53		12.88				0.01											0.00		15.43
GC-3	2.27		1.97							0.23								1.02	0.30	5.79
GC-3.1	119.50															0.05		0.36	6.75	126.66
GC-4	0.00						0.49				6.31					0.00		1.32		8.13
GC-5			1.30			0.27					2.21							1.05		5.15
GC-5.1			2.64		0.00	0.04	0.19				0.60							1.58		5.16
GC-6			17.13				1.21				9.68							7.77		36.63
GC-7	139.16		21.17		17.87	0.67	2.45			1.65	5.53					0.00		1.41		190.11
GC-7.1			10.05															0.00		10.05
GC-8	0.04									2.73						36.03			5.25	44.04
GC-8.1							3.49													3.49
GC-8.2							5.07													5.07
GC-8.3	0.07									5.06						0.00		0.94	0.08	6.15
GC-9	42.20										0.01					0.00				42.21
GC-9.1	11.31		0.01							5.26	0.00					0.00		0.23		16.82

Basin	Ag Exempt	Cemetery	Commercial	CTH ROW	Downtown Commercial	Duplex	Institutional	Light Industrial - 80%	Light Industrial	Low Density Res.	Medium Density Res.	Med. Industrial - 80%	Medium Industrial	Mobile Home	Multi-Family	Open/ Undeveloped	Railroad ROW	ROW	STH ROW	Total
SB-1	0.15		1.01				1.02				4.46					0.72		3.39		12.91
SB-1.1	2.39															1.34		0.55		7.25
SB-10							13.85													13.85
SB-11	66.56		2.38				13.50											1.08		83.52
SB-11.1	0.47																	2.95		3.43
SB-2			1.47			0.77					3.96					0.62	1.14	2.14		10.10
SB-3.1						0.22	30.44				12.56							1.46		44.69
SB-3.2	5.89		6.36			0.68	4.28				35.80						0.41	8.08		61.48
SB-4	24.80		1.64								2.56					0.96	1.21	0.16		31.32
SB-4.1			5.00								5.98						0.56	0.91	0.00	12.45
SB-5	7.92					0.00	38.47				23.39						0.36	13.33	0.00	83.48
SB-6	202.10		11.29				1.08				0.00						8.18			222.65
SB-7	3.02															12.04				15.06
SB-8	27.80						0.43				0.83					0.00				29.06
SB-8.1	3.35						1.21									0.00		0.69		5.24
SB-8.1 OS													4.01					0.31		4.32
SB-9	20.10										13.39					1.27		0.19		36.72
SB-9.1	0.35										0.03							0.96		1.34
TL-1					0.38	0.25					4.94							2.67		10.68
TL-10																				15.39
TL-11			0.00				0.01				4.06					0.00				5.92
TL-12							0.16				13.76					0.00				14.96
TL-13							5.29				10.43							3.64		21.11
TL-14																5.98		0.00		5.99
TL-15			4.32			5.34					1.13					0.00				12.54
TL-16			5.38								0.99									6.38
TL-17	6.48		6.13		0.29	0.47					6.24							2.95		23.74
TL-18			2.81												1.01					3.81
TL-2			1.62		8.82		0.22		0.31		11.57						0.31	6.97		31.58
TL-3											0.89					2.67		0.53		4.09
TL-4							0.01				3.71							1.47		5.19
TL-5											14.70					0.08		5.00		20.81
TL-6											16.28					1.16		4.37		21.82
TL-6.1											0.01					2.40		0.83		6.47
TL-7											16.76					40.67		0.35		59.23
TL-8																23.33				23.33
TL-9	92.89		4.75								0.40					20.14		0.04		118.22
TL-9.1	0.28		3.95			1.34					2.11							0.92		8.60
WC-1.2 CITY							0.70				1.38							0.07		2.14
WC-1.3 CITY							3.05													3.05
WC-10					0.93						0.03							0.06		1.02
WC-11						0.02	1.48				8.68					0.00		0.31		10.49
WC-12.1	0.11					1.44	1.19				19.92					3.52		2.69		28.87
WC-12.2						0.95					0.26					0.00		0.56		1.77
WC-12.3											3.17							0.68		3.85
WC-12.4						1.28					3.35					0.00				4.62
WC-12.5					0.43						6.58							0.39		7.39

Basin	Ag Exempt	Cemetery	Commercial	CTH ROW	Downtown Commercial	Duplex	Institutional	Light Industrial - 80%	Light Industrial	Low Density Res.	Medium Density Res.	Med. Industrial - 80%	Medium Industrial	Mobile Home	Multi-Family	Open/ Undeveloped	Railroad ROW	ROW	STH ROW	Total
WC-13							0.10				11.57					11.73				23.40
WC-14	0.47		7.45				3.30				2.18					4.63		0.24		18.27
WC-14.1			0.30				0.22				0.33							0.80		1.65
WC-14.2							0.62									2.37		1.97		4.96
WC-14.3	0.81										2.21					0.07		1.51		4.59
WC-15 CITY											1.03					1.34		0.38		2.75
WC-15.1	3.09															0.00		0.44		3.53
WC-15.2	3.34															6.41				9.75
WC-15.3																		2.28		13.78
WC-15.4																		0.21		4.77
WC-15.5	1.96										0.00					1.16		5.29		22.83
WC-15.6	0.01			0.48							0.00					3.69		0.03		4.21
WC-16	40.94												5.77							46.71
WC-16.1	1.39																	0.00		1.39
WC-17	8.35																	0.00		8.35
WC-17.1	0.00																	1.37		1.37
WC-18.1	2.13												3.89							6.02
WC-18.2	0.17									0.13			20.72							21.02
WC-18.2 OS	2.80									2.38										5.18
WC-19	0.14												25.41							25.55
WC-2 CITY			4.81		7.19	0.06	5.11		0.30		5.41							17.14		44.14
WC-2.1			0.01								1.61									1.80
WC-2.2			0.83								0.01									0.84
WC-20	1.32		9.72	1.64									21.81							34.49
WC-20E	58.19			1.66																59.85
WC-20N	134.55			0.03																134.58
WC-21													16.08							16.08
WC-22	4.35												39.54							43.88
WC-23	16.18															84.75				100.93
WC-24	94.51												0.41			18.03				112.96
WC-25	23.20		0.79				0.02				0.03							0.41		24.46
WC-25.1	8.00										0.00							2.25		10.24
WC-26	15.91		1.36		3.39	0.43	12.95				20.78						1.72	8.87		65.41
WC-26.1	8.54																	0.45		8.99
WC-27	5.78																			5.78
WC-27.1	1.20																	0.89		2.09
WC-28	26.34		2.46				0.28				4.36							0.45		33.89
WC-28.1	0.00										2.48									2.48
WC-28.2	5.62																	1.53		7.15
WC-29	0.27		9.08		0.17	0.55	0.37	0.56	0.06		16.74		1.46				0.49	11.89		41.64
WC-3	0.01				0.20	0.06	0.11				13.89							6.70		20.98
WC-30			0.88		0.29	0.38			2.62		9.23						1.38	4.19		18.98
WC-31			8.18			0.09	0.00	1.11			9.75							1.92		21.05
WC-32									0.02		3.62		10.33					0.12		14.09
WC-32.2	0.00						3.48						0.00					0.06		3.55
WC-33.1	0.46		5.48		0.32		2.68				0.60		13.55			0.34		6.58		30.01
WC-33.1A			6.19													0.00				6.19

Basin	Ag Exempt	Cemetery	Commercial	CTH ROW	Downtown Commercial	Duplex	Institutional	Light Industrial - 80%	Light Industrial	Low Density Res.	Medium Density Res.	Med. Industrial - 80%	Medium Industrial	Mobile Home	Multi-Family	Open/ Undeveloped	Railroad ROW	ROW	STH ROW	Total
WC-33.1B			2.44															0.17		2.61
WC-33.2							2.25													2.25
WC-34			0.07		0.88				1.58				3.77							6.31
WC-35							0.74						3.80					1.54		6.08
WC-36			0.61						0.02				9.31			5.00				14.93
WC-37			2.67				11.60	15.20	38.13				8.00				0.12	1.33		77.05
WC-37.1									6.82									0.00		6.82
WC-38			4.96				0.00					0.39	14.17					3.19		22.71
WC-39	0.01		15.31				0.62					4.78	0.58					1.56		22.87
WC-4					0.89	0.35	2.24				7.78							3.83		15.09
WC-40.1	10.14		0.00									4.71	0.05					0.74		15.64
WC-40.2	0.00		0.00				0.15					9.94	5.64					2.77		18.49
WC-41	0.01											26.79	8.53					0.02		35.37
WC-42	0.00											7.64	0.59					0.01		8.24
WC-43				0.00						0.01			11.04							11.05
WC-43.1												0.00	1.37					1.13		2.50
WC-43.2												6.98						0.07		7.05
WC-44N	0.87												15.45							16.31
WC-44N.1													6.26							6.26
WC-44S												10.01	0.44					4.04		14.49
WC-45	234.52									0.01		0.00	13.54							248.07
WC-45 OS				0.40						2.88										3.28
WC-46	79.70											25.09	0.56					0.00		105.36
WC-47	5.27																			5.27
WC-48	0.02		1.60				10.96		14.65	0.00			36.60					7.22		71.06
WC-48 OS	3.27									5.49								0.00		8.76
WC-49									21.44	0.00								0.00		21.44
WC49 OS										3.72								0.28		4.00
WC-49.1									18.28	0.01							0.63	1.82		20.74
WC-49.1 OS	8.54									1.14							0.40	0.00		10.08
WC-49.2	118.29									0.00										118.29
WC-5.1 CITY						0.38	28.32				4.29					0.00		4.27		37.25
WC-5.2 CITY	0.01		1.00		3.51	0.09	0.42				7.93					0.00		4.36		17.71
WC-5.3							1.14				0.18							0.00		1.32
WC-50			3.30				0.49		0.01		12.32						0.66	5.74		22.83
WC-51.1											3.86				1.57			1.47		6.91
WC-51.2							0.21				2.12							0.82		3.15
WC-51.3	1.48						0.17				1.96							0.27		3.88
WC-52	60.22		1.72								0.00				8.78			1.27		72.00
WC-52NW	0.08															6.10		0.11		6.29
WC-53	0.00						2.10				0.86							1.45		4.41
WC-54			18.16				2.78		5.30		2.81						2.11	6.10		39.48
WC-55	0.30		2.91		2.07	0.82			7.04		6.78		0.44				2.79	6.70		29.84
WC-56					10.34													1.87		12.20

Basin	Ag Exempt	Cemetery	Commercial	CTH ROW	Downtown Commercial	Duplex	Institutional	Light Industrial - 80%	Light Industrial	Low Density Res.	Medium Density Res.	Med. Industrial - 80%	Medium Industrial	Mobile Home	Multi-Family	Open/ Undeveloped	Railroad ROW	ROW	STH ROW	Total
WC-6											1.88					0.00		0.28		2.17
WC-60			0.76		0.18	4.27					8.31							3.87		18.27
WC-61			0.34		1.25	0.57	11.19		0.06		35.22							7.69		56.32
WC-62 CITY	29.62			1.46																31.08
WC-65 CITY							2.64											0.00		2.64
WC-66			6.72			1.45					0.75							0.11		9.03
WC-7			0.09				4.44									1.37		0.02		5.92
WC-8					0.15		2.20				1.00					0.00		0.87		4.22
WC-9			0.15		1.92		0.78		0.32									1.48		4.64
Z-1	62.98												0.11							63.09
Z-2	0.00												5.54							5.54
Z-3	7.72																			7.72
Z-4	0.39		0.04				0.06				6.37					0.23	0.01	5.66	86.84	99.62
Total	2053.14	24.71	328.12	5.68	78.03	30.88	306.28	16.86	120.59	32.72	837.58	96.33	308.77	30.05	11.36	311.34	32.86	376.88	160.91	5278.33

Table 2.01-2 SLAMM Land Use By Subbasin (Acres) Within UWW Boundary (Including Exempt Areas)

ID	Driveway	Impervious	Open Undeveloped	Parking Lot	Pervious	Rooftop	Sidewalk	Street	Total
GC-12 UW			4.08						4.08
GC-13 UW			24.75						24.75
WC-1.1 UW		0.00	4.28	3.18	4.54	0.07	0.24	1.31	13.63
WC-1.2 UW	0.02	0.95	7.60	8.26	12.45	4.52	1.86	2.77	38.44
WC-15 UW		0.26	17.54	0.28	1.81		0.78	1.10	21.77
WC-2 UW	0.02			2.66	2.37	0.86	0.72	0.01	6.63
WC-5 UW	0.01			1.15	2.49	0.71	1.38	1.73	7.52
WC-5.1 UW			0.96	0.01	0.25		0.06	0.24	1.53
WC-5.2 UW				0.51	3.79	1.58	1.61	0.09	7.73
WC-5.3 UW				0.01	0.23			0.07	0.31
WC-57.1 UW	0.10			0.65	1.88	0.93	0.64	0.16	4.38
WC-57.2 UW	0.08				2.35	0.36	0.60		3.39
WC-57.3 UW	0.05			3.47	3.30	0.47	1.07	0.11	8.46
WC-57.4 UW				0.55	3.14	1.67	0.77		6.13
WC-58.1 UW	1.66	2.88	16.40	1.50	12.94	0.62	0.82		36.83
WC-58.2 UW	0.16		6.59	7.92	34.33	5.82	3.93	3.83	62.58
WC-59.1 UW	0.63			3.56	9.19	5.22	4.28		22.87
WC-59.2 UW	0.23			1.30	7.01	3.22	2.70		14.45
WC-62 UW	0.01		86.50		1.29		0.39	0.18	88.37
WC-63 UW	0.02	1.73		7.46	8.62	0.31	1.57	0.60	20.33
WC-64 UW	0.40		0.08	1.12	5.73	1.18	0.62	0.21	9.34
WC-65 UW	0.05			1.23	3.04	0.36	0.15	0.54	5.37
Total	3.45	5.83	168.79	45.01	120.75	27.90	24.21	12.95	408.87

Table 2.01-3 Impaired Waters

Water Body	Major Watershed	Attainable Use	Supporting Attainable Use	NPS Rank	303d Listed/Category/Impairment/ Pollutant/Sources	Priority Watershed	TMDL Priority	ORW/ERW
Tripp Lake	Whitewater Creek	Full Body Contact-Swimming, Boating FAL	Fully Supporting	Not Ranked	-Yes -PS/NPS -Excess Algal Growth -Total Phosphorus -NA	No	Low	No

FAL Fish and Aquatic Life
ERW Exceptional Resource Water
ORW Outstanding Resource Water

Table 2.01-4 Rock River Basin TMDL Wasteload Allocations per Reach

Reach	Rock River TMDL TSS	Rock River TMDL TP
59	49%	66%

2.02 LOCAL SOURCE AREAS AND OUTFALLS

A. Pollutant Source Areas

In addition to land use, pollutant loading from urban areas is dependent on the characterization of "source areas." Various urban source areas will contribute different quantities of runoff and associated pollutants depending on their characteristics. For instance, impervious areas such as roadways and parking lots will generally generate more runoff and pollutants than pervious areas such as lawns and gardens, especially for smaller more frequent storms. However, pervious areas will contribute a larger portion of the runoff and pollutants as storm events get larger. For the smallest of rainfall events, almost all runoff and pollutants will be generated by impervious area. Rooftops contribute to increased runoff volumes but tend to contribute fewer pollutants than parking lots or streets.

Impervious cover in a watershed can be organized into two main categories:

1. Rooftops–Created by buildings, homes, garages, stores, warehouses, and other buildings.

2. Transport systems–Impervious cover created by roads, sidewalks, driveways, and parking lots.

For modeling purposes, all impervious surface area is described in two basic ways (1) total impervious area or (2) effective impervious area. The total impervious area in a watershed includes all impervious cover, both rooftops and transport systems. The effective impervious area is the portion of total impervious cover that is directly connected to the storm drain network. Often, roof drains are directed to lawns or other pervious surfaces, allowing some stormwater runoff to infiltrate, which removes these rooftops from effective impervious area.

B. Stormwater Drainage System

1. Description of Drainage System

The City owns and maintains a drainage system consisting of inlets, catch basins, manholes, storm sewers, ditches, and associated appurtenances. The drainage system ultimately discharges to Whitewater Creek, Cravath Lake, Tripp Lake, Spring Brook, or Galloway Creek either directly or through storm sewer outlets or indirectly via grassed ditches, swales, and wetlands.

The City owns and maintains storm sewers located under Main Street, North Prince Street, West Starin Road, North Prairie Street, and Lauderdale Drive. UWW campus staff maintain all other storm sewers within its boundary. The campus drains primarily through storm sewers and ditches which ultimately discharge to Whitewater Creek with some overland drainage westerly to Galloway Creek.

Historically, stormwater management in Whitewater has focused on draining stormwater from developed areas as quickly as possible. BMPs are primarily focused on construction of engineered drainage systems consisting of graded ditches, curb and gutter, and storm sewer. More recently, the City and UWW have required construction of stormwater BMPs as required by ordinance for the City (and per WI DOA-DFD policies, procedures, and guidelines for UWW) if applicable to a development. Stormwater BMPs are a mix of privately maintained BMPs, City-owned BMPs, and UWW-owned BMPs. The City requires Stormwater Maintenance Agreements with owners of the privately-maintained BMPs through City ordinance.

2. Outfall Locations

According to Table 4.04-1 in the 2008 Stormwater Plan, there are 59 storm sewer outfalls (ditches, storm sewers or culverts) in the City of which 24 are major outfalls. According to Figure 3-9 in the 2009 Stormwater Management Plan by Norris & Associates, Inc., there are 4 storm sewer outfalls in the UWW. Outfalls are defined as ditches or culverts that discharge either to a Waters of the State or to an adjacent MS4. For purposes of this plan, we have updated the number, location, and type (major, minor, priority major, and priority minor) of outfalls following the WDNR's 2012 IDDE Guidance document.

Outfall and major outfall locations are identified in Figure 2.01-1 (in pocket folder at back of Section 2).

3. Existing City Stormwater Management Issues

a. Erosion and Water Quality Issues

(1) Streambank Erosion Issues–Figure 1.01 shows locations of known streambank erosion along Whitewater Creek in the City. In 2015, the City completed construction of a streambank restoration project along Whitewater Creek from West North Street to West Starin Road. There are no streams within the UWW campus.

(2) Stormwater Quantity Issues–Figure 1.01 shows locations of known significant flooding, mainly in the North George Street area associated with structures within the Whitewater Creek floodplain. The City also experiences nuisance flooding at a number of intersections during significant storm events. The City generally seeks to make feasible conveyance improvements during street reconstruction projects. In 2001, the City completed construction of a 100-year capacity storm sewer system upgrade on Starin Road from Prince Street to Whitewater Creek.

The UWW campus experiences mainly nuisance flooding at intersections during significant storm events. In 2012, the UWW constructed a flood relief bioswale along the west side of Prairie Street from Lauderdale Drive to Schwager Drive to address flooding experienced along Lauderdale Drive north of Tutt Hall along with a local storm sewer system serving the west side of Tutt Hall and a check valve on the storm sewer system between Tutt Hall and Wellers Hall. The UWW benefits from the Starin Road 100-year capacity storm sewer system upgrade constructed by the City in 2001.

2.03 TOPOGRAPHY, SOILS, AND PRECIPITATION

A. Topography

Topographic features, particularly slope steepness, have a direct bearing on the potential for soil erosion and the sedimentation of surface waters. Slope steepness affects the velocity and, accordingly, the erosive potential of runoff. As a result, steep slopes may place limitations on urban development and contribute to high levels of nonpoint source pollution associated with construction sites.

The primary drainage features are Whitewater Creek, Cravath Lake, and Tripp Lake. Whitewater Creek bisects the City from north to south, and Cravath and Tripp Lakes are located in the south and southeastern portions of the City. The central and eastern portions of the City are flat with predeveloped drainage achieved through excavation of a network of ditches ultimately discharging northerly to Whitewater Creek. Primary drainage in these areas is through streets and storm sewers discharging to these ditches. For the most part, land within the City drains toward these waterways. Elevations range from 870 feet above sea level in the southwestern portion of the City to approximately 795 feet above sea level in the north central portion of the City. UWW drains predominantly toward Whitewater Creek with some overland flow toward Galloway Creek.

B. Soils

The amount of stormwater runoff produced by a storm event is impacted by the types of soil underlying the watershed. Soils having a high percentage of sand and gravel will absorb and infiltrate a higher percentage of stormwater runoff than will soils having high clay content. This means that sandy soil generally produces less runoff than clayey soil.

The Natural Resource Conservation Service (NRCS) classifies soil types in categories known as Hydrologic Soil Groups (HSG). Group A soils consist of sandy soils having high infiltration rates and low runoff potential. Group B soils have moderately fine to moderately coarse textures and moderate runoff potential. Group C soils are typically sandy clay loam soils having moderately fine to fine textures and a low infiltration capacity. Group D soils have a very low infiltration capacity and have high runoff potential. Examples of Group D soils are clays, soils with a permanent high water table, and shallow soils over nearly impervious material.

Soil types in the City and UWW were determined by NRCS soils maps. Soils used for the purposes of this plan are identified in Tables 2.03-1 and 2.03-2 and illustrated in Figure 2.03-1. According to the Jefferson and Walworth County, Wisconsin, Soils Survey, published by the United States Department of Agriculture in cooperation with the Research Division of the College of Agricultural and Life Sciences, University of Wisconsin, local soils in the City and UWW are HSG B soils. Infiltration rates for the Group B soils range from 0.15 to 0.30 inches per hour.

Legend

- City Boundary
- UW Whitewater Boundary

Soil Texture

- Clayey
- Sandy
- Silty
- Water

City of Whitewater		University of Wisconsin-Whitewater	
Soil Texture	**Percentage**	**Soil Texture**	**Percentage**
Clayey	5%	Clayey	0%
Sandy	34%	Sandy	69%
Silty	57%	Silty	31%
Water	4%	Water	0%

0 500 1,000 2,000 Feet

SOILS MAP

TMDL STORMWATER PLAN
CITY OF WHITEWATER
WALWORTH AND JEFFERSON COUNTIES

STRAND ASSOCIATES®

FIGURE 2.03-1
1407.088

Path: S:\MAD\1400--1499\1407\088\Data\GIS\Report Figures\Figure 2.03-1 Soils 11x17.mxd User: davidk Date: 11/3/2016 Time: 8:58:32 AM

Table 2.03-1 Soils Summary-City of Whitewater

Symbol	Soil Name	HSG	Area (Acres)	Percent of Total Area
Ad	Adrian	A/D	1.96	0.04%
AzA	Aztalan	C	65.06	1.19%
BoC	Boyer	B	17.01	0.31%
BpB	Boyer	B	2.17	0.04%
CrD2	Casco	B	2.39	0.04%
DcA	Del Rey	C	32.31	0.59%
Fn	Fluvaquents	B/D	2.80	0.05%
FsB	Fox	B	11.18	0.20%
GwB	Griswold	B	122.13	2.23%
GwC2	Griswold	B	45.23	0.83%
HeB	Hebron	B	46.21	0.84%
Ht	Houghton	A/D	2.67	0.05%
KdA	Kibbie	B	3.36	0.06%
KeB	Kidder	B	34.05	0.62%
KeC2	Kidder	B	32.55	0.59%
KfB	Kidder	B	57.82	1.05%
KfC2	Kidder	B	64.92	1.18%
KfD2	Kidder	B	10.74	0.20%
LaB	Lamartine	C	31.64	0.58%
MgB	Martinton	C	252.59	4.61%
MmA	Matherton	B	1.67	0.03%
Mr	Milford	B/D	329.08	6.00%
Ot	Otter	B/D	10.93	0.20%
Pa	Palms	A/D	97.30	1.78%
RaA	Radford	B	5.90	0.11%
RtC2	Rotamer	B	1.35	0.02%
RtD2	Rotamer	B	0.51	0.01%
SbB	St. Charles	B	5.32	0.10%
SkB	Saylesville	C	35.22	0.64%
Sm	Sebewa	B/D	2.97	0.05%
Sn	Sebewa, clayey substratum	B/D	193.23	3.53%
SoB	Sisson	B	2.88	0.05%
Ud	Udorthents	B	13.11	0.24%
VrB	Virgil	B	14.54	0.27%
Wa	Wacousta	B/D	9.90	0.18%
WmA	Wasepi	B	4.97	0.09%
Ac	Adrian	A/D	37.45	0.68%

Symbol	Soil Name	HSG	Area (Acres)	Percent of Total Area
Am	Alluvial land	B	45.78	0.84%
AzA	Aztalan	C	115.60	2.11%
BpB	Boyer	B	14.16	0.26%
BpC2	Boyer	B	0.35	0.01%
CeB2	Casco	B	1.09	0.02%
CkD2	Casco	B	5.47	0.10%
CrE2	Casco	B	2.73	0.05%
CtB	Chelsea	A	6.31	0.12%
Cw	Colwood	B/D	18.21	0.33%
CyA	Conover	C	4.87	0.09%
DdA	Dodge	B	31.69	0.58%
DdB	Dodge	B	22.54	0.41%
Dt	Drummer	B/D	31.05	0.57%
EbA	Elburn	B	296.20	5.40%
FoB	Fox	B	3.97	0.07%
FsA	Fox	B	28.97	0.53%
GP	Pits, gravel	A	4.74	0.09%
GsB	Griswold	B	231.81	4.23%
GsC2	Griswold	B	15.06	0.27%
GsD2	Griswold	B	1.99	0.04%
GwA	Griswold variant	C	15.82	0.29%
HeB	Hebron	B	113.11	2.06%
Ht	Houghton	A/D	95.62	1.74%
JuA	Juneau	B	6.71	0.12%
KlA	Kendall	B	35.78	0.65%
KwB	Knowles	B	92.15	1.68%
KyA	Knowles variant	B/D	33.61	0.61%
LDF	Landfill		2.15	0.04%
LyB	Lorenzo	B	1.26	0.02%
LyC2	Lorenzo	B	2.99	0.05%
Mf	Marsh	A/D	12.14	0.22%
MgA	Martinton	C	13.54	0.25%
MmA	Matherton	B	26.00	0.47%
MpB	McHenry	B	120.85	2.21%
MpC	McHenry	B	20.77	0.38%
MpC2	McHenry	B	30.03	0.55%
MvB	Miami	B	157.57	2.88%
MxB	Miami	B	324.27	5.92%
MxC2	Miami	B	212.19	3.87%

Symbol	Soil Name	HSG	Area (Acres)	Percent of Total Area
MxD2	Miami	B	38.83	0.71%
MxE2	Miami	B	1.35	0.02%
MyA	Miami	B	14.65	0.27%
MyB	Miami	B	4.75	0.09%
MzfA	Mundelein	B	18.68	0.34%
Na	Navan	D	268.41	4.90%
Pa	Palms	A/D	39.99	0.73%
Ph	Pella	B/D	176.34	3.22%
PsA	Plano	B	259.64	4.74%
PsB	Plano	B	465.55	8.49%
PsC	Plano	B	39.77	0.73%
QUA	Quarry		3.78	0.07%
RaA	Radford	B	1.93	0.04%
ScA	St. Charles	B	17.37	0.32%
ScB	St. Charles	B	15.17	0.28%
ShA	Saylesville	C	6.17	0.11%
ShB	Saylesville	C	18.38	0.34%
Sm	Sebewa	B/D	33.90	0.62%
W	Water greater than 40 acres		198.16	3.62%
Wa	Wallkill	C/D	1.00	0.02%
WhA	Warsaw	B	32.54	0.59%
WhB	Warsaw	B	5.32	0.10%
WhC2	Warsaw	B	0.09	0.00%
Ww	Wet alluvial land	B/D	14.54	0.27%

Symbol	Soil Name	HSG	Area (Acres)	Percent of Total Area
AzA	Aztalan	C	1.44	0.35%
DcA	Conover	D	2.39	0.58%
GsB	Griswold	C	8.34	2.04%
GwB	Griswold variant	B	19.14	4.68%
GwC2	Griswold variant	B	6.36	1.56%
KeB	Juneau	B	54.56	13.35%
KeC2	Juneau	B	6.53	1.60%
KfB	Juneau	B	10.44	2.55%
KfC2	Juneau	B	41.68	10.20%
KfD2	Juneau	B	22.81	5.58%
KlA	Kendall	B/D	17.02	4.16%
LaB	Knowles variant	B/D	51.68	12.64%
MgB	Martinton	C	6.18	1.51%
MmA	Matherton	B/D	3.12	0.76%
Mr	McHenry	C/D	6.19	1.51%
MvB	Miami	B	81.36	19.90%
MxC2	Miami	B	13.27	3.25%
Ph	Pella		1.34	0.33%
PsB	Plano	B	0.03	0.01%
RtD2	Rodman	B	5.00	1.22%
SkB	Saylesville	C	3.85	0.94%
Sn	Sebewa	B/D	29.83	7.30%
Ud	Troxel	A	10.31	2.52%
Wa	Wallkill	B/D	5.92	1.45%

Table 2.03-2 Soils Summary-UW-Whitewater

C. Precipitation

The depth and duration of rainfall in a watershed for a given storm event has a major impact on the amount of stormwater runoff produced.

Expected rainfall depths for the City and UWW from National Oceanic and Atmospheric Administration (NOAA) Atlas 14, Volume 8, Version 2, for storm events of various frequencies are summarized in Table 2.03-3.

Recurrence Interval and Precipitation Frequency Estimates[1] (inches)						
Storm Duration	**2 Years[a]**	**5 Years[a]**	**10 Years[a]**	**25 Years**	**50 Years**	**100 Years**
5 Minutes	0.413	0.514	0.598	0.711	0.797	0.882
10 Minutes	0.605	0.753	0.875	1.04	1.17	1.29
15 Minutes	0.737	0.918	1.07	1.27	1.42	1.57
30 Minutes	1.04	1.30	1.51	1.80	2.01	2.23
60 Minutes	1.34	1.71	2.01	2.41	2.72	3.03
2 Hours	1.64	2.11	2.50	3.03	3.43	3.83
3 Hours	1.82	2.35	2.80	3.42	3.89	4.37
6 Hours	2.13	2.72	3.22	3.94	4.52	5.11
12 Hours	2.46	3.02	3.53	4.28	4.91	5.57
24 Hours	2.81	3.41	3.95	4.77	5.45	6.18
48 Hours	3.21	3.96	4.63	5.59	6.37	7.18
72 Hours	3.49	4.52	4.96	5.97	6.79	7.64
7 Days	4.36	5.22	5.97	7.08	7.99	8.94
10 Days	4.49	5.88	6.69	7.86	8.81	9.80

[a] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS)

Source: NOAA Atlas 14

Table 2.03-3 Expected Rainfall Depths from NOAA Atlas 14

Water quality modeling for this study was completed using WinSLAMM v10.2.1. For stormwater quality modeling purposes, the 5-year average annual rainfall for the Madison area (WisReg–Madison Five Year Rainfall.ran) is used with run dates for our modeling of March 12 to December 2 (nonwinter season) as required by the WDNR.

2.04 CURRENT STORMWATER PRACTICES AFFECTING STORMWATER QUALITY

This section summarizes existing programs that impact stormwater runoff in the study area. Information in this section is intended to identify existing conditions for stormwater pollutant load modeling.

A. Street Sweeping

Location	Street Sweeping Frequency
City of Whitewater-Major Arterial and Downtown Streets	One Pass Every Two Weeks
City of Whitewater-All Other Streets	One Pass Every Two Weeks
UWW	Twice per Year

Table 2.04-1 Approximate Street Sweeping Schedule

Street sweeping, while historically conducted primarily for aesthetic and maintenance purposes, is an effective stormwater management practice. The City performs street sweeping with a mechanical street sweeper on every public street within the City boundary approximately once every two weeks. Major arterial and downtown streets are swept 30 times a year and all other streets are swept 24 times per year (2 times in winter, 8 times in spring, 6 times in summer, and 8 times in fall). The UWW contracts with the City to sweep with a mechanical sweeper every street within the UWW boundary twice every year, in the spring and fall.

Table 2.04-1 lists the City's and UWW's current street sweeping schedule. Figure 2.04-1 graphically shows the City's and UWW's street sweeping schedule. Street sweeping is completed by City Public Works staff. For purposes of stormwater quality modeling, the street condition in WDNR's standard land use files was used. Figure 2.04-2 shows the street drainage type in the City and UWW.

B. Catch Basin Cleaning

Prior to 2007, City construction standards required inclusion of a 1-foot depth sump in all new catch basins. Current WDNR guidance requires that a sump be greater than 1-foot depth to gain pollutant reduction credit. After 2007, the City changed its construction standards to a 2-foot depth sump in all new catch basins, which allows pollutant reduction credit to be taken. Section 4 describes the modeling methodology used for sumps installed after 2007 during street reconstruction projects. There is limited information on the existence of sumps on the UWW campus; therefore, sumps are not included in the modeling. If more information is gained on the location and depth of sumps on the UWW campus, it is recommended that they be included in the SLAMM modeling in the future.

C. Stormwater Detention Basins, Bioretention Basins, and Infiltration Basins

Within the City's MS4 area there are 9 dry detention basins, 30 wet detention basins, 9 bioretention basins, and no infiltration basins. Within the UWW boundary, there are no dry detention basins, 1 wet detention basin and 3 bioretention basins, and no infiltration basins. The WDNR previously did not give stormwater quality credit to dry detention basins because of their propensity to resuspend sediment during storm events; however, recent guidance now allows credit to be taken for dry basins (not modeled if a concrete-lined invert, modeled as a swale if outlet structure invert is level with bottom of basin, and modeled as bioretention basin if the outlet structure invert is elevated above the bottom of basin). This guidance can be found in Appendix C. Figure 2.01-1 shows the locations of the BMPs.

D. Grass-Lined Ditches/Swales

The WDNR gives stormwater quality credit to areas drained by grass-lined ditches/swales. The majority of the City and the UWW are drained by curb and gutter with only a few locations of grass-lined swales. Locations of grass-lined swales are shown on Figure 2.04-2.

E. Routine Inspection and Maintenance of Stormwater Facilities

For the City, Superintendent of Streets/Parks, Chuck Naas, is directly responsible to handle inspections and maintenance of stormwater facilities. For the UWW, Building and Grounds Supervisor, Steve Bertagnolii, is directly responsible to handle inspections and maintenance of stormwater facilities. The City and UWW perform the inspection and maintenance activities as described in Tables 2.04-2 and 2.04-3.

Generally, the City maintains stormwater facilities for public streets only on the UWW campus, with campus staff responsible for parking lots and related facilities.

Legend

Frequency

- Once Every Two Weeks
- Twice a Year (Fall and Spring)
- City Limits
- UW Whitewater Boundary

CTY TK U
CTY TK D
HY 59
BLUFF RD
HOWARD RD
ENTERPRISE BLVD
PROSPECT DR
E EXECUTIVE DR
N UNIVERSAL BLVD
INNOVATION DR
E COMMERCIAL AV
GRANT ST
E CRAVATH ST
E NORTH ST
E CHICAGO ST
E MAIN ST
E MILWAUKEE ST
E CLAY ST
E BLUFF RD
ELKHORN RD
SASH LA
OLD CTY TK P
COX RD
E COBURN LA
E AMBER DR
E LAKE VIEW DR
E PARKSIDE DR
S WISCONSIN ST
S GREEN ST
S RICE ST
BUR OAK TR
FREMONT RD
LOWER HILL PASS
BLOOMING FIELD DR
BLACK RIVER CT
WALTON DR
CTY TK N
HILL CREST DR
OLD HY 12
S PEARSON LA
W STARIN RD
N PRAIRIE ST
N TRATT ST
N PRINCE ST
N FRANKLIN ST
N PARK ST
N FREMONT ST
N GEORGE ST
N JEFFERSON ST
N NEWCOMB ST
W MAIN ST
W CONGER ST
W CENTER ST
W BLACKHAWK DR
W HIGHLAND ST
W HIGH ST
W PECK ST
W WHITEWATER ST
W ANN ST
S FRANKLIN ST
S WHITON ST
S PRINCE ST
S ELIZABETH ST
S WOODLAND DR
S ARMOR DR
TURTLE MOUND LA
W WALWORTH AV
WALWORTH AV
W SOUTH ST
W HARPER ST
W CAINE ST
S JANESVILLE ST
INDIAN MOUND PKWY
HY 12
HY 89
HY 59

0 500 1,000 2,000
Feet

STREET CLEANING PROGRAM

TMDL STORMWATER PLAN
CITY OF WHITEWATER
WALWORTH AND JEFFERSON COUNTIES

STRAND ASSOCIATES®

FIGURE 2.04-1
1407.088

Path: S:\MAD\1400--1499\1407\088\Data\GIS\Report Figures\Figure 2.04-1 Street Cleaning 11x17.mxd User: davidk Date: 11/3/2016 Time: 9:05:57 AM

Legend

City Limits

UW Whitewater Boundary

Road Drainage Type

Curb and Gutter

Curb and Gutter/Grass Swale

Curb and Gutter/Unde...

Grass Swale

Grass Swale/Unde...

Undeveloped

0 500 1,000 2,000 Feet

STREET DRAINAGE

TMDL STORMWATER PLAN
CITY OF WHITEWATER
WALWORTH AND JEFFERSON COUNTIES

STRAND ASSOCIATES®

FIGURE 2.04-2
1407.088

Path: S:\MAD\1400--1499\1407\088\Data\GIS\Report Figures\Figure 2.04-2 Street Drainage 11x17.mxd User: davidk Date: 11/3/2016 Time: 10:00:18 AM

Activity	Frequency	Responsible Party	Comments
Catch Basin Cleaning	Quarter of City each year equating to once every two years. Main arterial streets once per year.	Superintendent of Streets/Parks	As required by City's NR 216 permit.
Storm Sewer Maintenance	As needed. Inspected monthly and after major storm events	Superintendent of Streets/Parks	
Road Crossing Culverts	As needed.	Superintendent of Streets/Parks	
Grass-Lined Swale/Ditch/Driveway Culvert Maintenance (City Right-of-Way)	As needed.	Superintendent of Streets/Parks	
Stormwater BMP Maintenance	Per Appendix G	Superintendent of Streets/Parks	

Table 2.04-2 City Inspection and Maintenance Activities

Activity	Frequency	Responsible Party	Comments
Catch Basin Cleaning	As needed.	Building and Grounds Supervisor	As required by UWW's NR 216 permit.
Storm Sewer Maintenance	As needed.	Building and Grounds Supervisor	
Road Crossing Culverts	As needed.	Building and Grounds Supervisor	
Grass-Lined Swale/Ditch/Driveway Culvert Maintenance (UWW Right-of-Way)	As needed.	Building and Grounds Supervisor	
Stormwater BMP Maintenance	Per Appendix G	Building and Grounds Supervisor	

Table 2.04-3 UWW Inspection and Maintenance Activities

SECTION 3
EVALUATION OF CURRENT CITY PRACTICES

3.01 CURRENT STORMWATER POLICIES AND PRACTICES

This section summarizes existing plans and programs in the City. Information included in this section is intended to identify baseline conditions, as required by the City's WPDES Stormwater Discharge Permit. Section 3.02 recommends program modifications for compliance with Stormwater Permit requirements and reduction of annual pollutant loading to City water resources.

A. Public Education and Outreach

The City partnered with the UWW and they have developed a Memorandum of Understanding to detail each of their responsibilities. The City is involved with the RRSG that was established in 2008 to develop an educational program, materials, and workshops to increase citizens' awareness of stormwater issues. A complete list of RRSG's public education and outreach plan can be found at the following link: https://cleanwaterbrightfuture.files.wordpress.com/2015/01/2015-rrsg-work-plan_final.pdf. The City implements RRSG's plan, along with the following program.

1. Illicit Discharges

The City welcomes any comments, questions, or concerns from the public and employees about any type of illicit discharges into the City's stormwater system.

2. Material Management

The City provides stormwater information resources on the City website (http://www.whitewater-wi.gov/stormwater-utility), currently including stormwater utility information, the City's MS4 permit, and the current MS4 Annual Report. A link to the RRSG is also on the City website.

The City website has details regarding recycling at the following link: http://www.whitewater-wi.gov/refuse-recycling

3. Yard Waste and Fertilizer/Pesticide Use

City staff collects bagged leaf and yard waste on specified days during the year. The yard waste must be in clear bags and placed on the curb only on City designated days. The City website has details regarding brush collection at the following link:

http://www.whitewater-wi.gov/residents/frequently-asked-questions/1736-leaf-and-yard-waste-collection

The City does not have a formal program to regulate the private use of lawn and garden fertilizers, pesticides, and herbicides, but rather provides good housekeeping practices information through the City website.

4. Management of Streambanks/Shorelines

The City encourages appropriate management of streambanks, shorelines, and ravines within the City through the RRSG public education and outreach plan. The City recently completed a streambank restoration project along Whitewater Creek from West North Street to West Starin Road. Figure 3.01-1 shows a picture of the Whitewater Creek project.

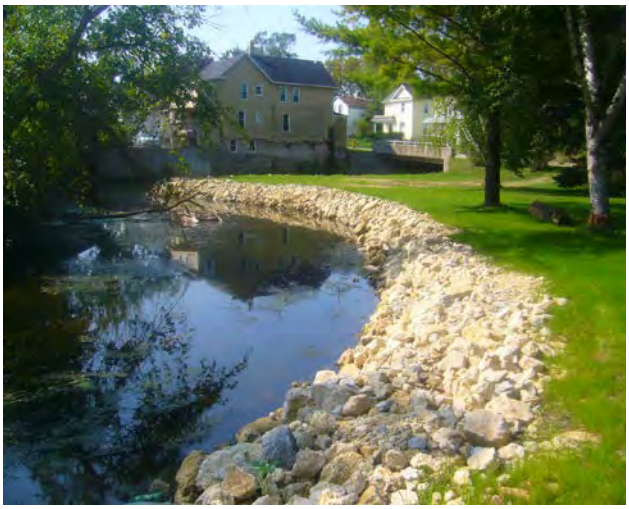


Figure 3.01-1 2015 Whitewater Creek Streambank Restoration

5. Promotion of Infiltration

The City's Erosion Control and Stormwater Management Requirements document (Section 2.02.(C)) encourages all new developments to demonstrate infiltration, where applicable, in the stormwater management design.

6. Design/Installation/Maintenance Information and Education Program

Developers of new building or redevelopment sites are required to submit an erosion control and stormwater management application before land disturbing activities occur. As required by the application, developers must prepare a grading, drainage, and erosion control plan and a pre- and post-development flow analysis to document there will be no adverse impacts to neighboring properties or to the City's stormwater management system. The analysis also requires identification of the appropriate erosion control measures for the development activity.

7. Locations of Stormwater Concern

The City MS4 discharges into one impaired water, Tripp Lake. Whitewater Creek is proposed to be added to the WDNR's impaired waters list for TP.

8. Promotion of Environmentally Sensitive Land Development

The City educates developers on environmentally sensitive land development by requiring conformance with NR 216 and NR 151.

The following existing plans promote environmentally sensitive land development designs by developers and designers.

a. *City of Whitewater Comprehensive Plan, Adopted February 2, 2010*

This report is intended to guide the City through growth and development for 20 years from when it was adopted and to help ensure continued and enhanced community prosperity. The plan provides an overview of the City's natural resources and recommends the protection of environmental corridors and other environmentally sensitive lands.

b. *The State of the Rock River Basin*, WDNR PUBL WT 668 2002, April 2002.

This plan provides an overview of the quality of land and water resources in the basin, identifies resource issues and threats that keep the land and water resources from meeting their full potential and actions currently underway to address these issues and threats, and outlines specific actions the WDNR and its many partners can put into practice to improve, protect, or maintain the quality of the basin's resources

B. Public Involvement and Participation

The City's Common Council meets twice a month, during which residents may voice concerns or complaints regarding stormwater issues. The City then proactively deals with these concerns and complaints. In addition, the City currently does or has done the following.

1. Provides public notice of all public meetings.

2. Includes information and education materials produced by the Rock River Stormwater Group on the City's website.

C. Illicit Discharge Detection and Elimination

1. Continued Enforcement of the Illicit Discharge Control Ordinance

a. Current City Ordinance (Chapter 16.20) prohibits illicit discharges and/or connections to the MS4 and waters of the state. The program follows the required activities outlined in Section 2.3 of the City's stormwater permit. The City's Superintendent of Streets/Parks is in charge of detection and follow-up on complaints and provides appropriate enforcement. City employees are instructed to report any type of illicit discharge into the City's stormwater system. The City also receives input from concerned City residents.

During 2014, there were no reported illicit connections to the City's stormwater management system.

b. The City directs residents to use the Walworth and Jefferson County Household Hazardous Waste Collection Facilities and directs them to the following websites for additional information:

http://www.co.walworth.wi.us/Public%20Works/Public%20Works%20-%20Solid%20Waste%20Division/PublicServicePrograms.aspx#Clean%20Sweep

http://www.jeffersoncountywi.gov/departments/departments_s-z/solid_waste_air_quality_clean_sweep/index.php

c. The Whitewater Fire Department (http://www.whitewaterfire.org/) is the first responder for all nonhazardous material spills and has a policy in place to contain and clean up most spills. The municipal contact person is called for nonhazardous spills as well.

2. Dry Weather Field Screening

The City storm sewer system is mapped with all City-maintained outfalls noted and the contributing watershed areas shown. Dry weather screening of all minor and major outfalls was performed in 2013 and 2014. No illicit discharges were found.

3. Procedures for Responding to Known or Suspected Illicit Discharges

At the present time, the City is following the procedures included in its adopted Illicit Discharge Detection and Elimination (IDDE) Program included in Section 4 of the 2008 Stormwater Management Plan.

D. Construction Site Erosion Pollutant Control

1. Erosion Control Ordinance

The City has an existing Construction Site Control Ordinance (Chapter 16.18) available on the City website that references the City's Erosion Control and Stormwater Management Requirements document that contains the erosion control requirements. As part of this plan, modifications will be recommended to bring the City's erosion control requirements into conformance with current NR 151 standards, if necessary. See comments in Section 3.02 D.

2. Erosion Control Ordinance Site Review Procedures and Enforcement

The City currently administers this ordinance through the City's Public Works and Neighborhood Services Departments. The City reviews Stormwater Management and Erosion Control Plans for new site developments and performs inspection to verify conformance with plans. During construction, the Public Works Department has the jurisdiction for construction-site pollution control and provides plan review and monthly inspection services. Weekly inspection forms are also required to be sent to the Public Works Department office during construction. During site inspections, staff members recommend proactive steps and corrective actions, as necessary. If violations are noted, they are required to be fixed prior to the continuation of construction activities. The City's erosion control ordinance includes enforcement provisions (see Section 16.18.120).

E. Postconstruction Stormwater Management

1. Postconstruction Stormwater Management Ordinance

The City currently has an existing *Post-Construction Runoff Ordinance* (Chapter 16.16) available on the City website that references the City's *Erosion Control and Stormwater Management Requirements* document that contains the erosion control requirements. As part of this plan, modifications will be recommended to bring the City's postconstruction stormwater management requirements into conformance with current NR 151 standards, if necessary. See comments in Section 3.02 E.

2. Postconstruction Stormwater Management Ordinance Site Review Procedures and Enforcement

The City currently administers this ordinance through the City's Public Works Department. Applicable development plans are reviewed for conformance with the *Post-construction Runoff Ordinance*. During construction, the Superintendent of Streets/Parks checks for conformance with approved plans for postconstruction stormwater BMPs on an as-needed basis and site visits are documented. During site inspections, staff members recommend proactive steps and corrective actions, as necessary. If violations are noted, they are required to be fixed prior to the continuation of construction activities. The City's postconstruction stormwater management ordinance includes enforcement provisions.

F. Pollution Prevention–Municipal Operations

1. Maintenance of Existing Municipally Owned/Operated Stormwater BMPs

As described in Section 2.04, the City provides maintenance of stormwater BMPs per Appendix G.

2. Street Sweeping

As described in Section 2.04, the City performs street sweeping with a Pelican mechanical street sweeper on every public street within the City boundary approximately once every two weeks. Major arterial and downtown streets are swept 30 times a year and all other streets are swept 24 times a year (2 times in winter, 8 times in spring, 6 times in summer, and 8 times in fall). Material collected by street sweeping is generally disposed of at the City's compost site in the fall. The rest of the year, material is stored on a site near the Public Works Garage, which has a runoff detention area. It is then hauled to a fill site after a few months. Table 3.01-1 shows details on the City's street sweeping program. The City currently does not track this information but is recommended to do so starting in 2017 including separate tracking of sweeping on the UWW campus.

	2011	2012	2013	2014	2015
Solids Captured (CY or Tons)	Information Not Available	Information Not Available	Information Not Available	Information Not Available	Information Not Available
Miles/Month	Information Not Available	Information Not Available	Information Not Available	Information Not Available	Information Not Available

Table 3.01-1 Street Sweeping Quantity Summary

3. Catch Basin Cleaning

As described in Section 2.04, the City performs catch basin cleaning approximately once every two years with catch basins on main arterial streets cleaned once a year. The City keeps records for cleaning and repairs of catch basins but does not keep records of the tonnage of solids collected. It is recommended that the City begin compiling this information starting in 2017. Material collected by catch basin cleaning is generally disposed of at the City's compost site in the fall. The rest of the year, material is stored on a site near the Public Works Garage, which has a runoff detention area. It is then hauled to a fill site after a few months. Table 3.01-2 shows information on the City's catch basin cleaning program.

	2011	2012	2013	2014	2015
Solids Collected (tons)	Information Not Available	Information Not Available	Information Not Available	Information Not Available	Information Not Available

Table 3.01-2 Solids Collected from Catch Basin Cleaning

4. Deicing and Snow Removal

The City's snow and ice control policy is available at the following website. Additional information is included in Table 3.01-3.

http://www.whitewater-wi.gov/images/stories/public_works/streets_forestry/snowicepolicy.pdf

Table 3.01-4 shows the City salt and sand usage in the period from 2011 to 2015, for which no information is available. It is recommended that the City begin compiling this information starting in 2017. Table 3.01-5 shows the rainfall and snowfall amounts at the MSN as obtained from the NOAA website. The average rainfall amount is 36.69 inches each year, and the average snowfall each winter season is 50.68 inches. Higher than average seasonal snowfall is an indicator of the potential for a higher level of deicer usage and is requested to be tracked by WDNR.

Item	Description
Winter Roadway Maintenance Contact	Chuck Naas Superintendent of Streets/Parks 262-473-0542 (office) 262-903-9511 (cell) cnass@whitewater-wi.gov
Enclosed Salt Storage Building	Public Works Garage 150 East Starin Road Salt Storage Building Capacity: 2,000 tons of salt Salt/Sand Storage Building Capacity: 2,000 tons of salt/sand
Snow Disposal Location	Periodic snow disposal is located at the dead end on the east end of Endeavor Drive in the City Industrial Park. In the spring of each year, after the snow has melted, this area is swept with a street sweeper. Sweepings are disposed of at a licensed landfill.
Deicing Products Used and Amount	Deicing: 88 percent sand/12 percent road salt mixture. Salting (Major arterials only): 100 percent road salt pre-wetted with salt brine (water with 23% salt content) See Table 3.01-4
Type of Deicing Equipment Used	Snow plow trucks, brine tanks with spray nozzles, and sanders with conveyor systems and spinners.
Anti-icing, equipment calibration, and salt reduction strategies considered	Anti-icing: Salt brine (water with 23 percent salt content) applied to major arterials only prior to storm events (starting in 2015-2016 winter). Equipment Calibration: Spreaders are calibrated at start of winter season and at half-way point of winter season. Salt Reduction Strategies: The City applies deicing materials to intersections, hill, bridges, curves, and locations of significant traffic movement. Straight roadway sections and minor streets are treated only if ice is present and temperatures that would melt the ice are not expected. Plowing typically begins when snow depths are greater than 2 inches on the pavement. Salting typically begins when snow depths are 2 inches or greater, or less if combined with freezing and icing conditions.
Snowfall/Rainfall Amounts	See Table 3.01-5

Table 3.01-3 Winter Roadway Maintenance Details

Application	Winter Season				
	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016
Rock Salt (Tons)	Information Not Available	Information Not Available	Information Not Available	Information Not Available	Information Not Available
Sand (Tons)	Information Not Available	Information Not Available	Information Not Available	Information Not Available	Information Not Available

Table 3.01-4 Deicer Usage by City (Tons)

Item	Description
Winter Roadway Maintenance Contact	Chuck Naas Superintendent of Streets/Parks 262-473-0542 (office) 262-903-9511 (cell) cnass@whitewater-wi.gov
Enclosed Salt Storage Building	Public Works Garage 150 East Starin Road Salt Storage Building Capacity: 2,000 tons of salt Salt/Sand Storage Building Capacity: 2,000 tons of salt/sand
Snow Disposal Location	Periodic snow disposal is located at the dead end on the east end of Endeavor Drive in the City Industrial Park. In the spring of each year, after the snow has melted, this area is swept with a street sweeper. Sweepings are disposed of at a licensed landfill.
Deicing Products Used and Amount	Deicing: 88 percent sand/12 percent road salt mixture. Salting (Major arterials only): 100 percent road salt pre-wetted with salt brine (water with 23% salt content) See Table 3.01-4
Type of Deicing Equipment Used	Snow plow trucks, brine tanks with spray nozzles, and sanders with conveyor systems and spinners.
Anti-icing, equipment calibration, and salt reduction strategies considered	Anti-icing: Salt brine (water with 23 percent salt content) applied to major arterials only prior to storm events (starting in 2015-2016 winter). Equipment Calibration: Spreaders are calibrated at start of winter season and at half-way point of winter season. Salt Reduction Strategies: The City applies deicing materials to intersections, hill, bridges, curves, and locations of significant traffic movement. Straight roadway sections and minor streets are treated only if ice is present and temperatures that would melt the ice are not expected. Plowing typically begins when snow depths are greater than 2 inches on the pavement. Salting typically begins when snow depths are 2 inches or greater, or less if combined with freezing and icing conditions.
Snowfall/Rainfall Amounts	See Table 3.01-5

Table 3.01-3 Winter Roadway Maintenance Details

Application	Winter Season				
	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016
Rock Salt (Tons)	Information Not Available	Information Not Available	Information Not Available	Information Not Available	Information Not Available
Sand (Tons)	Information Not Available	Information Not Available	Information Not Available	Information Not Available	Information Not Available

Table 3.01-4 Deicer Usage by City (Tons)

	2011 Rainfall (in)	2011 Snowfall (in)	2012 Rainfall (in)	2012 Snowfall (in)	2013 Rainfall (in)	2013 Snowfall (in)	2014 Rainfall (in)	2014 Snowfall (in)
January	1.30	20.2	1.41	13.4	2.87	8.9	0.66	12.4
February	1.60	23.8	1.03	7.3	2.42	22.8	1.24	12.0
March	2.96	6.5	2.61	6.6	2.41	15.2	1.26	8.2
April	3.62	2.0	2.85	0	5.83	0.3	5.14	1.0
May	2.41	0	3.19	0	6.58	0	3.48	0
June	3.55	0	0.31	0	10.86	0	9.55	0
July	1.85	0	4.00	0	4.00	0	1.08	0
August	3.06	0	1.59	0	1.52	0	5.43	0
September	3.31	0	1.33	0	3.19	0	1.84	0
October	1.36	0	4.56	0	1.90	0	3.10	0.2
November	3.35	1.6	0.90	0.1	2.20	3.5	1.55	8.3
December	2.23	2.5	2.60	23.5	1.62	22.1	1.02	0.1
Totals	**30.60**	**56.6**	**26.38**	**50.9**	**45.40**	**72.8**	**35.35**	**42.2**

Table 3.01-5 Rainfall and Snowfall at Madison Dane County Regional Airport

5. Leaf and Grass Clipping Management

The City administers a leaf collection program for two weeks in late October and twice in the spring of each year. This program includes collection of bagged (in biodegradable bags) leaf and grass clippings left at the curb by residents. Collected material is disposed of at the City compost site located at the north end of Jefferson Street. Collected material is windrowed and turned once per week. The seasoned compost is available at no cost to City residents. No records are currently maintained of material collected or disposed of. The program has not substantially changed over the past 10 years. It is recommended that the City begin compiling this information starting in 2017. Upon collection of three years of data, evaluate the general trends and effectiveness of the program, and identify potential improvements to the program that will reduce phosphorus loads to waterbodies in the City. Also, stay abreast of the WDNR's research and progress toward issuing a pollutant reduction credit for improved leaf management. More information about the program can be found at the following links.

http://www.whitewater-wi.gov/residents/frequently-asked-questions/1736-leaf-and-yard-waste-collection
http://www.whitewater-wi.gov/residents/frequently-asked-questions/1769-compost-site-open

Table 3.01-6 shows information on the City's leaf collection program.

	2011	2012	2013	2014	2015
Leaves Collected (CY)	Information Not Available	Information Not Available	Information Not Available	Information Not Available	Information Not Available

Table 3.01-6 Leaf Collection

6. Municipal Garage and Storage Area Management

The City owns and operates the following facilities: Public Works Garage, Whitewater Municipal Building, Wastewater Treatment Plant, and Water Treatment Plant, Water Well Nos. 6, 8, and 9. Only the Public Works Garage has outdoor storage areas. A stormwater pollution prevention plan (SWPPP) for the Public Works Garage (see Figure 3.01-2) is included in Appendix D.

Figure 3.01-2 Public Works Garage (150 East Starin Road)

7. Turf Maintenance Policies

The City applies high nitrogen fertilizer at the rate of 150 pounds per acre where required in the spring under ideal conditions to the following locations:

- Starin Park
- Tripp Park
- Cravath Lake Waterfront Park
- Moraine View Park
- Hospital Hill Recreation Center
- Brewery Hill Park/Armory
- Indian Mounds Park
- Whitewater Creek Nature Area
- Wastewater Treatment Plant

Application rates are based on soils tests performed by Public Works staff. The City has a licensed pesticide/herbicide applicator on staff with renewal every two years. The City maintains records of applications. Nutrients are typically applied immediately and not stored. The City has not tracked fertilizer use in the past. It is recommended that the City begin compiling this information starting in 2017. Table 3.01-7 shows information on the City's fertilizer usage.

Year	Property	Amount of Fertilizer (lbs)	Acreage
2011	Information Not Available	Information Not Available	Information Not Available
2012	Information Not Available	Information Not Available	Information Not Available
2013	Information Not Available	Information Not Available	Information Not Available
2014	Information Not Available	Information Not Available	Information Not Available
2015	Information Not Available	Information Not Available	Information Not Available

Table 3.01-7 City Fertilizer Usage

8. Inform Department of Public Works Staff of Permit Requirements

Public Works staff is periodically educated in stormwater management-related issues through short courses and seminars conducted by RRSG, the UW-Extension Office, Central States Water Environment Association, and Wisconsin Wastewater Operator's Association.

The City is a member of the Municipal Environment Group that provides documentation or information regarding changes in the municipal stormwater discharge permit to the appropriate City staff.

9. Measures to Reduce Municipal Sources of Stormwater within Source Water Protection Areas

The City is served by municipal sanitary sewer and water. The municipal sanitary sewer discharges to the Whitewater Wastewater Treatment Plant that discharges treated water to Whitewater Creek. The City has a wellhead protection plan and ordinance (Ordinance 1383, adopted 1997) for Well No. 9. The wellhead protection area is subject to land use and development restrictions because of the high threat of contamination.

G. Stormwater Quality Management

The City adopted a stormwater pollution management plan in 2008. In 2011, the 2008 report was updated with water quality modeling updates. The report, herein, updates the previous efforts.

H. Storm Sewer System Map

The City has an existing storm sewer system map. Maps included in this document augment the existing map to meet the requirements of the stormwater permit. The maps and figures are listed in the Table of Contents.

I. Annual Report

The City submitted an annual report to the WDNR meeting the March 31, 2016, deadline.

J. Cooperation

The City and UWW are cooperating with the Rock River Stormwater Group in permit compliance efforts.

3.02 RECOMMENDED STORMWATER MANAGEMENT PROGRAM

To comply with the terms of the WPDES permit, we recommend the following program.

An outside consultant may need to be retained to address some of the recommended activities outlined in this section. Costs for the recommended activities are outlined in Table 6.03-1.

A. Public Education and Outreach

We recommend continuation of the City's program to educate City employees and residents of measures they can take to reduce nonpoint source discharges to surrounding water resources. The information and education program is intended to raise awareness among individuals and organizations concerning stormwater runoff and the measures that can be taken to minimize its harmful effects. The program would include the activities of measurable goals, anticipated completion dates, and responsible parties as shown in Table 3.02-1. In addition, we recommend continuation of the City's participation in Rock River Stormwater Group (RRSG) and partnership with the UWW.

B. Public Involvement and Participation

We recommend the implementation of the following public involvement and participation activities with their associated measurable goals, responsible parties, and anticipated completion dates, as described in Table 3.02-2.

C. IDDE Plan

1. IDDE Ordinance and Program

The City has an existing IDDE ordinance and program included in Section 4 of the *2008 Stormwater Management Plan*. Figure 3.02-1 has been updated to show major, minor, priority major, and priority minor outfalls based on the City's current storm sewer system. Section 2.3 of the City's stormwater permit requires ongoing dry weather field screening of outfalls during the term of the permit including field screening of selected outfalls on an annual basis (i.e., priority outfalls) and field screening of all major outfalls once during the 5-year permit term. This is consistent with the WDNR's 2012 IDDE Guidance document.

The City completed IDDE inspections of all minor and major outfalls in 2013 and 2014 and found no illicit discharges. Table 3.02-3 provides a listing of all of the City's outfalls and Table 3.02-4 shows the priority minor, priority major, and major outfalls and their future screening schedule.

Legend

Outfall

- Priority Major (30)
- Priority Minor (9)
- Non-Priority Major (4)
- Non-Priority Minor (40)
- City Storm Sewer
- UW Whitewater Boundary
- City Limits
- Drainage Basins

N

1,000 500 0 1,000 Feet

OUTFALL SCREENING LOCATIONS
CITY OF WHITEWATER
TMDL STORMWATER PLAN
CITY OF WHITEWATER
WALWORTH AND JEFFERSON COUNTIES, WISCONSIN

STRAND ASSOCIATES®

FIGURE 3.02-1
1407.088

Table 3.02-1 Public Education and Outreach Plan and Measurable Goals

	Activity	Measurable Goal	Responsible Party	Anticipated Completion Date
1	Complete one presentation to the City Council and interested citizens upon completion of this plan discussing the plan contents.	One meeting	Superintendent of Streets/Parks and Strand Associates, Inc.®	January 2018
2	Annually, dedicate a portion of one City Council meeting to the discussion of the Annual Report submitted for the previous year's permit compliance activities.	One meeting each year, starting in 2018.	Superintendent of Streets/Parks	April or May 2018
3	The City will have available stormwater management-related materials at City Hall prepared by organizations such as WDNR and Rock River Stormwater Group. Materials will promote detection of illicit discharges, promote proper management of lawn and garden waste, waste oil, pet waste, and household waste. It will also include promotion of good streambank and shoreline management, infiltration of stormwater runoff where feasible, and general stormwater pollution prevention techniques.	Have the following available starting in 2018. 1. Lawn, pet, and household waste. 2. Fertilizer/Pesticide Management. 3. Hazardous waste and oil management and illicit discharges. 4. Streambank and Shoreline Management. 5. Infiltration. Note: Brochures will be numbered to track usage.	Superintendent of Streets/Parks	Ongoing
4	Continue the City's current program of providing information on the stormwater utility, MS4 permit, Annual Report, and Stormwater Management Ordinance on the City website. Evaluate expanding the Stormwater Utility page to include additional enhancements, such as posting of information leaflets or pamphlets as provided by others, a means for the general public to post stormwater management quantity or quality issues or concerns, links to construction site and post construction stormwater management policies and forms, a link to the illicit discharge detection ordinance, and links to additional groups and agencies of interest (i.e., Environmental Protection Agency, UW-Extension, WDNR, RRSG, etc.). Also, provide a link in this same location to a Household Hazardous Waste website and other stormwater-related websites.	Evaluate updating the City website to include additional links.	City Staff	Ongoing
5	The City will publish periodic articles in a City newsletter/publication to promote detection of illicit discharges, promote proper management of lawn and garden waste, waste oil, pet waste, and household waste. It will also include promotion of good streambank and shoreline management, infiltration of stormwater runoff where feasible, and general stormwater pollution prevention techniques.	One Stormwater Management article each year starting in 2018.	Superintendent of Streets/Parks	Complete by December 31 of each year.
6	Develop a stormwater or erosion control-related newspaper article for publishing in the local newspaper.	One article each year starting in 2018. Note: Obtain newspaper circulation data for publishing dates of the article(s) to track distribution of message.	Superintendent of Streets/Parks	Complete by May 1 of each year.
7	During concept plan review, the City will continue to promote environmentally sensitive land development designs by developers and designers.	On as-needed basis as development occurs.	City Staff	On as-needed basis as development occurs.
8	Participate in the Joint Public Education Program for the RRSG	Participate in joint activities.	City Staff	As required by joint agreement.
9	Track public education and outreach activities for annual reporting to the WDNR. Tracking should include amount of materials distributed and related information regarding the items above.	Once each year.	Superintendent of Streets/Parks	Once each year.

Table 3.02-2 Public Involvement and Participation Plan and Measurable Goals

	Activity	Measurable Goal	Responsible Party	Anticipated Completion Date
1	Continue to public notice all public meetings.	Ongoing	City of Whitewater	Ongoing
2	Continue to work with RRSG for planning and participating in public involvement events.	Ongoing	Superintendent of Streets/Parks	Complete by August 30, annually
3	Continue to establish policy for receiving and addressing stormwater management issues. This includes providing a standard form to residents with stormwater concerns (see Appendix E), performing a stormwater review based on the submitted form, and responding within a reasonable time frame. Stormwater complaint forms will be maintained in a file at City Hall.	Ongoing	City of Whitewater	Ongoing .
4	Hold an annual meeting to update City officials, residents, regulatory agencies, local contractors, and interested stakeholders on progress of the City's stormwater program. Distribute City's MS4 Annual Report to City Council Members.	One meeting each year, starting in 2018; held in conjunction with annual meeting described in Public Education and Outreach above.	Superintendent of Streets/Parks	First meeting in May 2018
5	Track public involvement and participation activities for annual reporting to WDNR.	Once each year.	Superintendent of Streets/Parks	Once each year.
6	Continue reporting updates of stormwater management activities and issues in the weekly "City Manager's Report."	Ongoing	City of Whitewater	Ongoing
7	Distribute City's MS4 Annual Report to local interest groups and the UWW.	Once each year.	City of Whitewater	Completed by May 31, annually.

Table 3.02-3 City Outfalls

Outfall	Location	Contributing Basins	Contributing Area (ac)	Major/Minor	Priority	Watershed	Material	Size (in)
CL-12	S. Wisconsin St. bridge	CL-12	12.0	Minor	Non-Priority	Cravath Lake	RCP	15
CL-13	Cravath Lake Waterfront Park (south)	CL-3	27.3	Minor	Priority	Cravath Lake	RCP	24
CL-2	Railroad bridge & Cravath Lake (east)	CL-1, CL-2	10.8	Minor	Non-Priority	Cravath Lake	RCP	24
CL-4.3	W. Ann St.	CL-4.1, CL-4.2, CL-4.3, CL-4.4	203.5	Major	Priority	Cravath Lake	Unknown	Unknown
CL-5	S. Wisconsin St. bridge	CL-5	0.8	Minor	Non-Priority	Cravath Lake	RCP	18
CL-6	S. Wisconsin St. bridge	CL-6	11.5	Minor	Non-Priority	Cravath Lake	RCP	15
CL-7	Cravath Lake Waterfront Park (north)	CL-7	3.3	Minor	Priority	Cravath Lake	RCP	12
CL-8	E. Main St. bridge (southeast)	CL-8	4.1	Minor	Priority	Cravath Lake	RCP	12
GC-10.1-1	North of Tower Hill Pass	GC-10.1	6.35	Minor	Non-Priority	Galloway Cr.	RCP	24
GC-10.1-2	South of W Peninsula La	GC-10.1	2.05	Minor	Non-Priority	Galloway Cr.	RCP	12
GC-10.1-3	West of N Tratt St and Northeast of Tower Hill Pass	GC-9.1, GC-10.5, GC-12 CITY, GC-12 UW	77.7	Major	Non-Priority	Galloway Cr.	HERCP	30
GC-10.2	Park Crest Bioretention Basin 2 Inlet West of Stonfield Ln	GC-10.2	27.6	Minor	Non-Priority	Galloway Cr.	RCP	30
GC-1-1	Northwest side of W Main Street over Creek	GC-1	1.3	Minor	Non-Priority	Galloway Cr.	Ditch	NA
GC-1-2	NW of E. Main St. & Indian Mound Pkwy	GC-1	67.2	Major	Priority	Galloway Cr.	RCP	36
GC-2.1	West of Meadowview Ct and Indian Mound Pkwy	GC-2	127.1	Major	Priority	Galloway Cr.	RCP	42
GC-3	Northwest of Old HY 12 and S Pearson Ln	GC-1.1, GC-3	7.7	Minor	Non-Priority	Galloway Cr.	Pipe	18
GC-4	West of Eagle Ct cul-de-sac	GC-4	8.1	Minor	Non-Priority	Galloway Cr.	RCP	15
GC-6	Northwest of N Hyer La and W Florence St	GC-6	36.6	Major	Priority	Galloway Cr.	RCP	36
GC-7	North of Yoder Ln and west of N Hyer Ln	GC-5	5.1	Minor	Non-Priority	Galloway Cr.	RCP	12
GC-8.3	Northwest of W Pearson Ct	GC-8, GC-8.3	7.5	Minor	Non-Priority	Galloway Cr.	Pipe	12
SB-11-1	East of Indian Mound Pkwy	SB-11.1	2.7	Minor	Non-Priority	Spring Brook	RCP	21
SB-11-2	East of Indian Mound Pkwy	SB-11.1	0.8	Minor	Non-Priority	Spring Brook	RCP	12
SB-11-3	West of Whitewater High School baseball fields	SB-5	29.7	Minor	Priority	Spring Brook	Pipe	30
SB-3.2-2	Intersection of STH 89 & S. Janesville St. (Railroad)	SB-3.1, SB-3.2	106.2	Major	Priority	Spring Brook	Ditch	NA
SB-3.2-1	West of W South St and S Prince St	SB-3.2, SB-3.1	82.794	Major	Priority	Spring Brook	RCP	24x18
SB-4	South of East end of W South St	SB-3.2	7.7	Minor	Non-Priority	Spring Brook	RCP	15
SB-5	South of S Elizabeth St	SB-5	25.7	Minor	Priority	Spring Brook	RCP	19x30
SB-6	South end of Indian Mound Pkwy	Z-4	6.3	Minor	Non-Priority	Spring Brook	RCP	21"
SB-9	South of S. Grant St. & W. Caine St. intersection	SB-1, SB-1.1	18.1	Minor	Non-Priority	Spring Brook	Ditch	NA
TL-12	South of S. Esterly St. & E. Clay St.	TL-12	10.7	Minor	Non-Priority	Tripp Lake	HERCP	21x15
TL-13-1	North Inlet to Waters Edge South Wet Pond 1	TL-13	17.488	Minor	Priority	Tripp Lake	RCP	27
TL-13-2	East Inlet to Waters Edge South Wet Pond 1	TL-13	2.46	Minor	Non-Priority	Tripp Lake	RCP	24
TL-17	Northeast of the E Clay St and State St	TL-17	2.3	Minor	Non-Priority	Tripp Lake	Pipe	Unknown
TL-2	South of S. Dann St. & E. Clay St.	TL-2, WC-26	31.6	Minor	Non-Priority	Tripp Lake	HERCP	57x38
TL-3	West end of E. Coburn Ln	TL-3	4.1	Minor	Non-Priority	Tripp Lake	CMP	21
TL-6	Inlet to Waters Edge South Wet Pond 3	TL-6	21.8	Minor	Non-Priority	Tripp Lake	RCP	12
TL-6.1	Inlet to Wasters Edge South Dry Pond 4	TL-6.1	3.4	Minor	Non-Priority	Tripp Lake	RCP	24
TL-7-1	S. Ehlert Ct	TL-4, TL-7	5.2	Minor	Non-Priority	Tripp Lake	CMP	18
TL-7-2	Inlet to Waters Edge South Wet Pond 2	TL-5	20.8	Minor	Non-Priority	Tripp Lake	RCP	27
WC-12.1-1	N. George St	WC-12.1, WC-14.2	30.9	Minor	Non-Priority	Whitewater Cr.	Ditch	NA
WC-12.1-2	West of 342 N Jefferson St	WC-12.1	2.0	Minor	Non-Priority	Whitewater Cr.	RCP	15"
WC-12.2	N. George St	WC-12.2	1.8	Minor	Non-Priority	Whitewater Cr.	Ditch	NA
WC-12.4	N. George St	WC-12.3, WC-12.4	3.9	Minor	Non-Priority	Whitewater Cr.	Ditch	NA
WC-13-1	East of Burr Oak Tr and Fremont Rd	WC-15 UW	0.9	Minor	Non-Priority	Whitewater Cr.	Pipe	Unknown
WC-13-2	N. Fremont St and E Lauderdale Dr intersection	WC-13	153.9	Major	Priority	Whitewater Cr.	RCP	42
WC-14	N. Jefferson St	WC-14	23.1	Major	Priority	Whitewater Cr.	Ditch	NA
WC-14.2	Inlet to Starin Road Wet Pond 1	WC-14.2, WC-14.3	9.5	Minor	Non-Priority	Whitewater Cr.	RCP	12"
WC-15.5-1	Prairie Village Wet Pond 1 West Inlet	WC-15.5	8.148	Minor	Non-Priority	Whitewater Cr.	RCP	15
WC-15.5-2	East Inlet of Prairie Village Wet Detention Pond 1	WC-15.3, WC-15.4, WC-15.5	28.4	Minor	Non-Priority	Whitewater Cr.	Pipe	15

Outfall	Location	Contributing Basins	Contributing Area (ac)	Major/Minor	Priority	Watershed	Material	Size (in)
WC-2 CITY	W. North St. bridge (west)	WC-2 CITY, WC-2 UW, WC-2.1, WC-2.2, WC-57.4 UW, WC-61	63.0	Major	Priority	Whitewater Cr.	RCP	42
WC-21	CTH U & LSP Power entrance	WC-19, WC-21	60.0	Major	Priority	Whitewater Cr.	Ditch	NA
WC-25.1	Inlet to Starin Road Wet Pond 2	WC-25.1	2.58	Minor	Non-Priority	Whitewater Cr.	RCP	30
WC-26	North of Cravath St	WC-26	65.4	Major	Priority	Whitewater Cr.	HERCP	36"x24"
WC-27.1	Inlet to Starin Road Wet Pond 3	WC-27.1, WC-28.2	9.24	Major	Non-Priority	Whitewater Cr.	RCP	36
WC-29	E. Commercial Ave	WC-29	41.2	Major	Priority	Whitewater Cr.	RCP	42
WC-3	W. North St. bridge (east)	WC-3	21.0	Minor	Non-Priority	Whitewater Cr.	RCP	21
WC-30	NE of E. Chicago St & N. East St	WC-30	19.0	Major	Priority	Whitewater Cr.	RCP	30
WC-31	NE of E. Chicago St & N. East St	WC-31	21.1	Minor	Non-Priority	Whitewater Cr.	Ditch	NA
WC-32.2	East side of Armory	WC-33.1, WC-33.1A, WC-33.1B, WC-32.2	33.9	Major	Priority	Whitewater Cr.	Ditch	NA
WC-35	Midway along Industrial Dr	WC-35	6.1	Major	Priority	Whitewater Cr.	RCP	12
WC-37	Technology Park Wet Detention Pond 4 Outlet	WC-49, WC-49 OS	25.4	Major	Priority	Whitewater Cr.	RCP	36
WC-37.1	North of Technology Park Wet Detention Pond 1	WC-37.1	6.8	Major	Priority	Whitewater Cr.	Ditch	NA
WC-38	Intersection of Industrial Dr & Universal Blvd	WC-38	24.4	Major	Priority	Whitewater Cr.	RCP	30
WC-4	E. Main St. bridge (northeast)	WC-4	15.1	Minor	Non-Priority	Whitewater Cr.	RCP	15
WC-40.2-1	Endeavor Dr	WC-33.1, WC-33.1A, WC-40.2, WC-42	26.9	Major	Non-Priority	Whitewater Cr.	RCP	42
WC-40.2-2	Endeavor Dr	WC-40.1, WC-40.2	15.7	Major	Non-Priority	Whitewater Cr.	RCP	24
WC-43.2	Enterprise Blvd & STH 59	WC-43.1 WC-43.2	9.6	Major	Priority	Whitewater Cr.	RCP	48
WC-45	Inlet to Pond at East end of Enterprise Blvd and N Prospect Dr	WC-45	14.5	Major	Priority	Whitewater Cr.	RCP	24
WC-46	East end of Enterprise Blvd and N Prospect Dr	WC-41, WC-44N, WC-44N.1	28.2	Major	Priority	Whitewater Cr.	RCP	42
WC-48-1	Southwest of N Technology Dr and Innovation Dr	WC-48	5.1	Minor	Priority	Whitewater Cr.	Unknown	24
WC-48-2	North Inlet to Whitewater Innovation Center Wet Pond	WC-48, WC-48 OS, Z-2	85.3	Major	Priority	Whitewater Cr.	RCP	48
WC-48-3	East Inlet to Whitewater Innovation Center Wet Pond	WC-48	3.55	Major	Priority	Whitewater Cr.	RCP	12
WC-49.1-1	North of Technology Park Wet Detention Pond 2	WC-49.1, WC-49.1 OS	30.8	Major	Priority	Whitewater Cr.	Pipe	30
WC-49.1-2	South inlet to Technology Park Wet Pond 2	WC-49.1	8.33	Major	Priority	Whitewater Cr.	RCP	30
WC-5.1 CITY	NE corner of W. Starrin Rd & N. Fremont St	WC-5.1 CITY, WC-5.1 UW, WC-57.1 UW, WC-51.3 UW, WC-61, WC-60, WC-63 UW, WC-64 UW, WC-65 UW	242.9	Major	Priority	Whitewater Cr.	RCP	(2) 48x72
WC-50	North of E. Bluff Rd & S. Locust Ln	WC-50, WC-51.2, WC-51.3	47.6	Minor	Non-Priority	Whitewater Cr.	RCP	30
WC-54-1	West Inlet to Technology Park Wet Pond 3	WC-54	3.1	Major	Priority	Whitewater Cr.	RCP	15
WC-54-2	North of E. Bluff Rd & S. Loraine View Pkwy	WC-51.1, WC-53, WC-54	48.0	Major	Priority	Whitewater Cr.	RCP	48
WC-55	North of E Main St	WC-55, WC-66	38.9	Major	Priority	Whitewater Cr.	RCP	2(36)
WC-6	W. Starrin Rd. bridge (center)	WC-6	2.2	Minor	Non-Priority	Whitewater Cr.	Unknown	Unknown
WC-7	North of W Starin Road and Whitewater Creek	WC-7	5.2	Minor	Priority	Whitewater Cr.	RCP	24
WC-9	Brewery Hill Park / Armory	WC-9	4.6	Major	Priority	Whitewater Cr.	Unknown	48

Notes:

1 - Major outfalls are defined as outfalls that are 36 inches in diameter (or equivalent cross-sectional area) or larger and are associated with a drainage area of 50 acres or larger. Outfalls with an inside diameter of 12 inches or more are also classified as major outfalls if they receive stormwater runoff from land zoned for industrial activity with 2 or more acres of industrial activity.
2 - Priority outfalls can be major or minor outfalls that have a higher potential for illicit discharge. Contributing drainage area characteristics or land uses that should be considered when selecting priority outfalls include:

- History of known or suspected illicit discharges reported within the last five years.
- Sections of storm sewer and/or sanitary sewer infrastructure that have exceeded or are approaching their design/useful life.
- Contributing drainage areas with 80 or more percent impervious.
- Business or industrial parks with frequent changes in property ownership or operations.
- Schools or other institutional facilities.
- Commercial or industrial operations that generate wastewater or wash water including food processing, metal plating or machining shops, auto and scrap recyclers, commercial car washes and chemical manufacturers or users.

Table 3.02-4 City Priority Outfall Screening Schedule

Outfall	Location	Contributing Area (ac)	Watershed	Material	Size (in)	Major/Minor	Predominant Land Use	Screening Frequency	Priority	Reason for Priority	Screening Location	Screening Frequency					
												2017	2018	2019	2020	2021	2022
CL-13	Cravath Lake Waterfront Park (south)	27.3	Cravath Lake	RCP	24	Minor	Med. Density Res.	Once Every Year	Priority	Institutional Land Use	24" Pipe Outlet, east of W. Ann St. & S. Fremont St.	X	X	X	X	X	X
CL-4.3	W. Ann St.	203.5	Cravath Lake	Unknown	Unknown	Major	Med. Density Res.	Once Every Year	Priority	Institutional Land Use	??" Pipe Outlet, east of W. Ann St.	X	X	X	X	X	X
CL-7	Cravath Lake Waterfront Park (north)	3.3	Cravath Lake	RCP	12	Minor	Institutional	Once Every Year	Priority	Institutional Land Use	12" Pipe Outlet, North side of Park	X	X	X	X	X	X
CL-8	E. Main St. bridge (southeast)	4.1	Cravath Lake	RCP	12	Minor	Commercial	Once Every Year	Priority	Institutional Land Use	12" Pipe Outlet, southeast side of bridge	X	X	X	X	X	X
CL-9	South of E Main St on West Side of Cravath Lake	1.4	Cravath Lake	Unknown	Unknown	Minor	Institutional	Once Every Year	Priority	Institutional Land Use	Pipe Outlet into north end of Cravath Lake north of railroad tracks on west bank	X	X	X	X	X	X
GC-10.1-3	West of N Tratt St and Northeast of Tower Hill Pass	77.7	Galloway Cr.	HERCP	30	Major	Med. Density Res.	Once Every 5 Years	Non-Priority	Non-Priority	30" Pipe Outlet into Skyway Park Swale West of N Tratt St	X	--	--	--	--	X
GC-1-2	NW of E. Main St. & Indian Mound Pkwy	67.2	Galloway Cr.	RCP	36	Major	Commercial	Once Every Year	Priority	Institutional Land Use	36" Pipe Outlet, NW corner of E. Main St. and Indian Mound Pkwy	X	X	X	X	X	X
GC-2.1	West of Meadowview Ct and Indian Mound Pkwy	127.1	Galloway Cr.	RCP	42	Major	Med. Density Res.	Once Every Year	Priority	Institutional Land Use	42" Pipe Outlet into wetland West of Meadowview Ct and Indian Mound Pkwy	X	X	X	X	X	X
GC-6	Northwest of N Hyer La and W Florence St	36.6	Galloway Cr.	RCP	36	Major	Commercial	Once Every Year	Priority	Institutional Land Use	36" Pipe Outlet, NW corner of N. Hyer Ln and W. Florence St	X	X	X	X	X	X
SB-11-3	West of Whitewater High School baseball fields	29.7	Spring Brook	Pipe	30	Minor	Med. Density Res./Institutional	Once Every Year	Priority	Institutional Land Use	30" Pipe Outlet, West of Whitewater High School	X	X	X	X	X	X
SB-3.2-2	Intersection of STH 89 & S. Janesville St. (Railroad)	106.2	Spring Brook	Ditch	NA	Major	Medium Density Res.	Once Every Year	Priority	Institutional Land Use	Ditch at Intersection of STH 89 & S. Janesville St. (Railroad)	X	X	X	X	X	X
SB-3.2-1	West of W South St and S Prince St	82.794	Spring Brook	RCP	24x18	Major	Med. Density Res./Institutional	Once Every Year	Priority	Institutional Land Use	24x18 Outlet In between W South St and W South St	X	X	X	X	X	X
SB-5	South of S Elizabeth St	25.7	Spring Brook	RCP	19x30	Minor	Institutional	Once Every Year	Priority	Institutional Land Use	19x30" Outlet on south end of S Elizabeth St near Tennis Courts	X	X	X	X	X	X
TL-13-1	North Inlet to Waters Edge South Wet Pond 1	17.488	Tripp Lake	RCP	27	Minor	Med. Density Res./Institutional	Once Every Year	Priority	Institutional Land Use	27" Pipe Outlet into Waters Edge South Wet Pond 1 from North	X	X	X	X	X	X
WC-13-2	N. Fremont St and E Lauderdale Dr intersection	153.9	Whitewater Cr.	RCP	42	Major	Institutional	Once Every Year	Priority	Institutional Land Use	42" Pipe Outlet at N. Fremont and E Lauderdale Dr intersection	X	X	X	X	X	X
WC-14	N. Jefferson St	23.1	Whitewater Cr.	Ditch	NA	Major	Commercial	Once Every Year	Priority	Industrial Land Use	Ditch outlet on the North side of N. Jefferson St.	X	X	X	X	X	X
WC-2 CITY	W. North St. bridge (west)	53.4	Whitewater Cr.	RCP	42	Major	ROW	Once Every Year	Priority	Institutional Land Use	42" Pipe Outlet, West side of W. North St. bridge	X	X	X	X	X	X
WC-21	CTH U & LSP Power entrance	60.0	Whitewater Cr.	Ditch	NA	Major	Med. Industrial	Once Every Year	Priority	Industrial Land Use	Ditch outlet at the Wastewater Treatment Plant entrance	X	X	X	X	X	X
WC-26	North of Cravath St	65.4	Whitewater Cr.	HERCP	36"x24"	Major	Medium Density Res./Institutional	Once Every Year	Priority	Institutional Land Use	36"x24" Pipe Outlet North of Cravath Street	X	X	X	X	X	X
WC-27.1	Inlet to Starin Road Wet Pond 3	9.24	Whitewater Cr.	RCP	36	Major	ROW	Once Every 5 Years	Non-Priority	Non-Priority	36" Pipe Outlet into Starin Road Wet Pond 3 from North	X	--	--	--	--	X
WC-29	E. Commercial Ave	41.2	Whitewater Cr.	RCP	42	Major	Med. Density Res.	Once Every Year	Priority	Institutional Land Use	42" Pipe Outlet, East side of E. Commercial Ave.	X	X	X	X	X	X
WC-30	NE of E. Chicago St & N. East St	19.0	Whitewater Cr.	Pipe	30	Major	Med. Density Res.	Once Every Year	Priority	Industrial Park	30" Pipe Outlet NE of E. Chicago St & N. East St	X	X	X	X	X	X
WC-32.2	East side of Armory	33.9	Whitewater Cr.	Ditch	NA	Major	Commercial	Once Every Year	Priority	Institutional Land Use	48" Pipe Outlet, East side of the Executive Dr. & N. Universal Blvd.	X	X	X	X	X	X
WC-35	Midway along Industrial Dr	6.1	Whitewater Cr.	RCP	12	Major	Med. Industrial	Once Every Year	Priority	Industrial Park	12" Pipe Outlet, midway along Industrial Dr.	X	X	X	X	X	X
WC-37	Technology Park Wet Detention Pond 4 Outlet	25.4	Whitewater Cr.	RCP	36	Major	Light Industrial	Once Every Year	Priority	Industrial Park	36" Pipe Outlet from Technology Park Wet Detention Pond 4	X	X	X	X	X	X
WC-37.1	North of Technology Park Wet Detention Pond 1	6.8	Whitewater Cr.	Ditch	NA	Major	Light Industrial	Once Every Year	Priority	Industrial Park	Inlet to Technology Park Wet Detention Pond 1	X	X	X	X	X	X

Outfall	Location	Contributing Area (ac)	Watershed	Material	Size (in)	Major/Minor	Predominant Land Use	Screening Frequency	Priority	Reason for Priority	Screening Location	Screening Frequency					
												2017	2018	2019	2020	2021	2022
WC-38	Intersection of Industrial Dr & Universal Blvd	24.4	Whitewater Cr.	RCP	30	Major	Med. Industrial	Once Every Year	Priority	Industrial Park	30" Pipe Outlet, NE corner of Industrial Dr. & Universal Blvd.	X	X	X	X	X	X
WC-40.2-1	Endeavor Dr	26.9	Whitewater Cr.	RCP	42	Major	Agriculture	Once Every 5 Years	Non-Priority	Non-Priority	24" Pipe Outlet, Endeavor Dr. ditch	X	--	--	--	--	X
WC-40.2-2	Endeavor Dr	15.7	Whitewater Cr.	RCP	24	Major	Med. Industrial	Once Every 5 Years	Non-Priority	Non-Priority	42" Pipe Outlet, Endeavor Dr. ditch	X	--	--	--	--	X
WC-43.2	Enterprise Blvd & STH 59	9.6	Whitewater Cr.	RCP	48	Major	Light Industrial	Once Every Year	Priority	Industrial Park	48" Pipe Outlet, West of STH 59 and Enterprise Blvd	X	X	X	X	X	X
WC-45	Inlet to Pond at East end of Enterprise Blvd and N Prospect Dr	14.5	Whitewater Cr.	RCP	24	Major	Med. Industrial	Once Every Year	Priority	Industrial Park	24" Pipe Outlet from wetland southeast of Generac Bioretention Basin 3	X	X	X	X	X	X
WC-46	East end of Enterprise Blvd and N Prospect Dr	28.2	Whitewater Cr.	RCP	42	Major	Med. Industrial	Once Every Year	Priority	Industrial Park	42" Pipe Outlet Southeast of WC-45 outlet at West end of E Enterprise Blvd	X	X	X	X	X	X
WC-48-1	Southwest of N Technology Dr and Innovation Dr	5.1	Whitewater Cr.	Unknown	24	Minor	Institutional/Med. Industrial	Once Every Year	Priority	Institutional Land Use	24" Pipe Outlet into ditch Southeast of N Technology Dr and Innovation Dr	X	X	X	X	X	X
WC-48-2	North Inlet to Whitewater Innovation Center Wet Pond	85.3	Whitewater Cr.	RCP	48	Major	Institutional/Med. Industrial	Once Every Year	Priority	Industrial Park	48" Pipe into Whitewater Innovation Center Wet Pond from North	X	X	X	X	X	X
WC-48-3	East Inlet to Whitewater Innovation Center Wet Pond	3.55	Whitewater Cr.	RCP	12	Major	Light Industrial	Once Every Year	Priority	Industrial Park	12" Pipe into Whitewater Innovation Center Wet Pond from East	X	X	X	X	X	X
WC-49.1-1	North of Technology Park Wet Detention Pond 2	30.8	Whitewater Cr.	Pipe	30	Major	Light Industrial	Once Every Year	Priority	Industrial Park	30" Pipe Outlet into Technology Park Wet Pond 2 from East	X	X	X	X	X	X
WC-49.1-2	South inlet to Technology Park Wet Pond 2	8.33	Whitewater Cr.	RCP	30	Major	Light Industrial	Once Every Year	Priority	Industrial Park	30" Pipe Outlet into Technology Park Wet Pond 2 from Southeast	X	X	X	X	X	X
WC-5.1 CITY	NE corner of W. Starrin Rd & N. Fremont St	242.9	Whitewater Cr.	RCP	(2) 48x72	Major	Institutional	Once Every Year	Priority	Institutional Land Use	Outlet of 48"x72" pipe, NE corner of W. Starrin Rd. & N. Fremont St.	X	X	X	X	X	X
WC-54-1	West Inlet to Technology Park Wet Pond 3	3.1	Whitewater Cr.	RCP	15	Major	Light Industrial	Once Every Year	Priority	Industrial Park	15" Pipe Outlet into Technology Park Wet Pond 3 from Southwest	X	X	X	X	X	X
WC-54-2	North of E. Bluff Rd & S. Loraine View Pkwy	48.0	Whitewater Cr.	RCP	48	Major	Commercial	Once Every Year	Priority	Institutional Land Use	48" Pipe Outlet, North of E. Bluff Rd. & S. Loraine View Pkwy.	X	X	X	X	X	X
WC-55	North of E Main St	38.9	Whitewater Cr.	RCP	2(36)	Major	Light Industrial/ Commercial	Once Every Year	Priority	Industrial Park	Double 36" Pipe Outlet north of E Main St and east of N East St	X	X	X	X	X	X
WC-7	North of W Starin Road and Whitewater Creek	5.2	Whitewater Cr.	RCP	24"	Minor	Institutional	Once Every Year	Priority	Institutional Land Use	24" Pipe Outlet, East side of Public Work Facility	X	X	X	X	X	X
WC-9	Brewery Hill Park / Armory	4.6	Whitewater Cr.	Unknown	48	Major	Commercial	Once Every Year	Priority	Institutional Land Use	48" Pipe Outlet near Brewery Hill Park/Armory and west of Whitewater Creek	X	X	X	X	X	X

2. Measurable Goals

We recommend implementation of the following activities with their associated measurable goal, responsible party, and anticipated completion date as described in Table 3.02-6.

	Activity	Measurable Goal	Responsible Party	Anticipated Completion Date
1	Continue to implement the illicit discharge detection and elimination program described in Section 3.02 C.	See above	Superintendent of Streets/Parks	Ongoing
2	Conduct field screening for illicit discharges as described in Section 3.02 C. using the blank field screening form in Appendix F. Note the modified outfalls to be screened and modified outfall screening schedule.	See above	Superintendent of Streets/Parks	By Nov. 15, annually
3	Track the illicit discharge detection and elimination program activities for annual reporting to WDNR.	Once each year	Superintendent of Streets/Parks	Once each year

Table 3.02-5 Illicit Discharge Detection and Elimination Plan and Measurable Goals

D. Construction Site Pollution Control

1. Ordinance Revisions

A review of the City's ordinance (Chapter 16.18) in comparison to the May 2013 version of NR 151 reveals the following necessary revisions in Table 3.02-6. It is recommended that the City incorporate these changes in to the City ordinance by way of updates to the City's Erosion Control and Stormwater Management Requirements document. NR 151 is included in Appendix B.

Section in Erosion Control and Stormwater Management Requirements document	Activity
Section 2.01 B. Required Best Management Practices	ADD the verbiage from NR 151.11 (6m) as Section 2.01 C.

Table 3.02-6 Construction Site Pollution Control Ordinance Revisions

2. Measureable Goals

Section 3.01 documents existing City activities. It is recommended that the City continue those activities and supplement them with the recommendations included in Table 3.02-7.

	Activity	Measurable Goal	Responsible Party	Anticipated Completion Date
1	Continue administration and enforcement of existing Construction Site Erosion Ordinance.	Ongoing	City of Whitewater	Ongoing
2	Review and adopt the Erosion Control and Stormwater Management Requirements document revisions in Table 3.02-6.	Ongoing	Superintendent of Streets/Parks	March 2018
3	Document the number of erosion control permits issued each year.	Ongoing	Superintendent of Streets/Parks	Ongoing
4	Document the number and nature of inspections and enforcement actions conducted to ensure compliance with the erosion control ordinance. Develop a standard inspection form to document inspections.	Ongoing, with goal of seeking a 10 percent reduction in site violations. Develop form in 2017 and begin use of form in 2018.	Superintendent of Streets/Parks	Ongoing. Develop form in 2018 and begin use of form in 2019.

Table 3.02-7 Construction Site Pollution Control Plan and Measurable Goals

E. Postconstruction Stormwater Management

1. Ordinance Revisions

A review of the City's ordinance (Chapter 16.16) in comparison to the May 2013 version of NR 151 reveals the following necessary revisions in Table 3.02-8. It is recommended that the City incorporate these changes in to the City ordinance by way of updates to the City's Erosion Control and Stormwater Management Requirements document. NR 151 is included in Appendix B.

Section in Erosion Control and Stormwater Management Requirements document	Activity
Section 1.02 A. Precipitation Depths	ADD as 1.02 A.3., the following verbiage: "3. NOAA Atlas 14, Precipitation-Frequency Atlas of the United States, Volume 8 Version 2.0, U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Weather Service, 2013."
Section 1.02 B. Precipitation Distribution	ADD as 1.02.B.3. "3. NRCS Wisconsin MSE3 or MSE4 distribution."
Section 2.02 A. Total Suspended Solids	CHANGE the first sentence of Section 2.02.A.1. a. to read as follows per NR 151.122: "a. For new and infill development, …"
Section 2.02 B. Peak Discharge	CHANGE the 2.02.B.1. to read as follows per NR 151.123: "1. By design, BMPs shall be employed to maintain or reduce the peak runoff discharge rates, to the maximum extent practicable, as compared to pre-development conditions for the 1- through 100-year design storm applicable to the development site."
Section 2.02 B. Peak Discharge	CHANGE the maximum predeveloped curve numbers for A, B, C, and D soils in Table 2.02-1 to 55, 69, 78, and 83 per NR 151.123.
Section 2.02 C. Runoff Volume	REPLACE the existing verbiage in 2.02.C. Runoff Volume with the following per NR 151.124: "C. Runoff Volume Developments shall be required to infiltrate stormwater, as applicable, following the provisions of NR 151.124."
Section 2.02 E. Protective Areas	CHANGE Table 2.02-2 to read as follows per NR 151.125:

Type of Resource	Protective Area
Outstanding and Exceptional Resource Water	75 feet
Perennial/Intermittent Streams per USGS Map	50 feet
Lakes	50 feet
Wetlands (Not Highly Susceptible or Less Susceptible)	50 feet
Highly Susceptible Wetlands per NR 151.125	75 feet
Less Susceptible Wetlands per NR 151.125	10 percent of the average wetland width, but no less than 10 feet nor more than 30 feet.
Other Waterways with Drainage Areas Greater Than 130 Acres	10 feet

Section 2.02 E. Protective Areas	ADD as 2.02 E. 6. and 7 the verbiage from NR 151.125 (h) and (j). CHANGE 2.02.E.6. Stormwater Conveyance Systems to 2.02.F. Stormwater Conveyance Systems.

Table 3.02-8 Postconstruction Stormwater Management Ordinance Revisions

2. Measureable Goals

Section 3.01 documents existing City activities. It is recommended that the City continue those activities and supplement them with the recommendations included in Table 3.02-9.

	Activity	Measurable Goal	Responsible Party	Anticipated Completion Date
1	Continue administration and enforcement of the stormwater ordinance.	Ongoing	City of Whitewater	Ongoing
2	Review and adopt the Erosion Control and Stormwater Management Requirements document revisions in Table 3.02-8.	See Table 3.02-8	City of Whitewater	March 2018
3	Document the number of stormwater management permits issued each year.	Ongoing	Superintendent of Streets/Parks	Ongoing
4	Document the number and nature of inspections and enforcement actions conducted to ensure compliance with the Postconstruction Stormwater Management Ordinance. Develop a standard inspection form to document inspections.	Ongoing, with goal of seeking a 10 percent reduction in site violations. Develop form in 2018 and begin use of form in 2019.	Superintendent of Streets/Parks	Ongoing. Develop form in 2018 and begin use of form in 2019.
5	Initiate a program to gather all existing maintenance agreements for privately-owned stormwater BMPs. Obtain maintenance agreements retroactively if it is found that any are missing. Continue the requirement that owner's seeking a stormwater utility credit for a BMP must have a recorded maintenance agreement and yearly reporting.	Gather all existing agreements.	Superintendent of Streets/Parks	Report progress on gathering of agreements in March 31, 2018, MS4 annual report.
6	Initiate a program to require yearly reporting from owners of private BMPs showing that BMPs are being properly maintained. Continue the requirement that owner's seeking a stormwater utility credit for a BMP must have a recorded maintenance agreement and yearly reporting.	Develop program in 2018 and initiate program in 2019.	Superintendent of Streets/Parks	Develop program in 2018 and initiate program in 2019.

Table 3.02-9 Postconstruction Stormwater Management Plan and Measurable Goals

F. Pollution Prevention for Municipal Operations

In Section 3.01, we documented existing City activities. We recommend that the City continue those activities and supplement them with the recommendations included in Table 3.02-10.

	Activity	Measurable Goal	Responsible Party	Anticipated Completion Date
1	Maintenance of Existing Municipally Owned/Operated Stormwater BMPs–Continue to maintain stormwater facilities. Maintenance of stormwater facilities should be in accordance with the Stormwater Facility Maintenance program document provided in Appendix G. Track these maintenance operations.	Ongoing per Appendix G.	City of Whitewater	Ongoing
2	Street Sweeping–Continue existing program. In 2018, begin tracking of quantities and miles of streets swept each year. Street sweeping material shall be disposed of at a licensed landfill. If street sweeping material is to be reused, the City must obtain a low-hazard waste exemption from WDNR's Solid Waste Program using the WDNR's Low Hazard Waste Exemption for Reuse of Street Sweepings Application (Form 4400-289).	Track quantities for annual reporting. Change to landfill disposal or obtain a low-hazard waste exemption from WDNR to allow reuse.	Superintendent of Streets/Parks	Track quantities for annual reporting. Switch to landfill disposal immediately until a low-hazard waste exemption is obtained.
3	Catch Basin Cleaning–Continue existing program. In 2018, begin tracking of quantities removed from catch basins each year. Complete map of catch basins in the City including sump depth.	Complete map. Continue catch basin cleaning.		Map-December 2018 Cleaning-Yearly by November 15
4	Deicing and Snow Removal–Continue current operations and look for possible ways to decrease deicer use while still maintaining public safety. References regarding deicers include: -WisDOT Highway Maintenance Manual, Chapter 35 -http://www.dot.wisconsin.gov/business/extranet Also, track the quantity of salt and deicer used by the City each year. Track monthly precipitation amounts.	Ongoing and report annually.	City of Whitewater	Ongoing
5	Leaf and Grass Management–Continue current program. In 2018, begin tracking the quantities of leaves collected each year. After 3 years of quantity tracking, evaluate general trends and effectiveness of program for potential improvements that would reduce TP load to waterbodies.	Ongoing and report annually.	City of Whitewater	Ongoing
6	Municipal Garage and Storage Area Management–Continue existing operations. Track quantity of used oil recycled each year. Implement SWPPP recommendations included in Appendix D.	Ongoing and report annually.	City of Whitewater	Ongoing
7	Turf Maintenance Policies–Continue existing program. In 2018, begin tracking the type, quantity, and location of fertilizer usage each year.	Ongoing and report annually.	Superintendent of Streets/Parks	Ongoing
8	Measures to Reduce Municipal Sources of Stormwater Within Source Water Protection Areas–The City should continue existing practices.	Ongoing and report annually.	Superintendent of Streets/Parks	Ongoing
9	Track Pollution Prevention for Municipal Operations for annual report to DNR.	Once each year	Superintendent of Streets/Parks	Once each year

Table 3.02-10 Pollution Prevention for Municipal Operations Plan and Measurable Goals

G. Stormwater Quality Management

The City currently meets the 20 percent reduction in the annual average mass of TSS discharging from the City's MS4 to surface waters of the state as described in Section 4. Section 5 provides an alternatives

analysis to look at cost-effective ways to attain Rock River Basin TMDL compliance for TP and TSS reduction requirements. Section 7 recommends stormwater planning activities to meet the Rock River Basin TMDL TP and TSS reduction requirements.

We recommend implementation of the following activities with their associated measurable goals, responsible parties, and anticipated completion dates, as described in Table 3.02-11.

	Activity	Measurable Goal	Responsible Party	Anticipated Completion Date
1	Implement recommended activities to bring the City into compliance with the Rock River Basin TMDL TP and TSS reduction requirement as described in Section 5 and 7 of this plan.	Achieve Rock River Basin TMDL TP and TSS reduction requirements per the implementation plan provided in Section 5 and 7 of this plan.	City of Whitewater	A short-term (current permit term) and long-term implementation plan is provided in Sections 5 and 7 of this plan.

Table 3.02-11 Stormwater Quality Management Plan and Measurable Goal

H. Storm Sewer System Map

The storm sewer system maps submitted in this plan meet the WPDES permit requirements. We recommend the storm sewer system map be updated on an annual basis as needed to be submitted with the Annual Report. We recommend implementation of the following activities with their associated measureable goals, responsible parties, and anticipated completion dates, as described in Table 3.02-12.

	Activity	Measurable Goal	Responsible Party	Anticipated Completion Date
1	Annual update of storm sewer system map.	Once each year, if needed because of development in the City.	Superintendent of Streets/Parks	Yearly by March 1, if needed.

Table 3.02-12 Storm Sewer System Map Plan and Measurable Goal

I. Annual Report

The WPDES stormwater permit requires the City to submit an annual report for each calendar year by March 31 of the following year.

According to the Wisconsin Department of Administration (DOA) website, the population of the City is 14,390 (Year 2010 Census), which determines the annual permit fee.

We recommend implementation of the following activities with their associated measurable goals, responsible parties, and anticipated completion dates as described in Table 3.02-13.

	Activity	Measurable Goal	Responsible Party	Anticipated Completion Date
1	Compilation of tracked permit activities.	Once each year	Superintendent of Streets/Parks	Once each year, by March 1.
2	Preparation and submittal of annual report.	Once each year	Superintendent of Streets/Parks	Once each year, by March 31.
3	Phase II Permit Fee ($2,000) under NR 216.08 for population of between 12,500 and 14,999 in the City.	Once each year	Superintendent of Streets/Parks	Payable by June 30 each year.

Table 3.02-13 Annual Report and Permit Fee Plan and Measurable Goals

J. Cooperation

Continue partnership with the UWW and the other RRSG municipalities on public education and outreach and public involvement and participation.

SECTION 3
EVALUATION OF CURRENT UNIVERSITY OF WISCONSIN-WHITEWATER PRACTICES

3.01 CURRENT STORMWATER POLICES AND PRACTICES

This section summarizes existing plans and programs at the UWW. Information included in this section is intended to identify baseline conditions as required by the UWW's WPDES Stormwater Discharge Permit. Section 3.02 recommends program modifications for compliance with Stormwater Permit requirements and reduction of annual pollutant loading to UWW water resources.

A. Public Education and Outreach

The UWW has partnered with the City and they have developed a Memorandum of Understanding to detail each of their responsibilities. The UWW has also entered into the Rock River Stormwater Group (RRSG) to develop an educational program, materials, and workshops to increase citizens' awareness of stormwater issues. A complete list of RRSG's public education and outreach plan can be found at the following link: https://cleanwaterbrightfuture.files.wordpress.com/2015/01/2015-rrsg-work-plan_final.pdf. The UWW implements RRSG's plan, along with the following program. The UWW also maintains supplemental data that is submitted as part of the annual report at the following link: http://www.uww.edu/sustainability/campus-operations/water

1. Illicit Discharges

The UWW welcomes any comments, questions, or concerns from the public and employees about any type of illicit discharges into the UWW's stormwater system. The UWW periodically provides the campus community with illicit discharge information.

2. Material Management

The UWW distributes brochures regarding stormwater management information to students, faculty, staff, and campus visitors.

The UWW provides information and educational materials produced by the RRSG on the stormwater management program through the UWW's website (http://www.uww.edu/sustainability/campus-operations/water). Public service announcements relative to stormwater management goals and guidelines are periodically broadcasted through campus media outlets. Informational and educational stormwater management podcasts/videocasts are also occasionally developed and posted to the campus website.

Additionally, the UWW website has details regarding hazardous waste disposal and refuse and recycling programs at the following links:

http://www.uww.edu/adminaffairs/riskmanagement/waste/hazardous-waste-mini-guide
http://www.uww.edu/adminaffairs/fpm/recycling/recycling-plan

3. Yard Waste and Fertilizer/Pesticide Use

The UWW grounds staff chips and processes most yard waste. A small composting site is also available for excess yard waste.

The UWW applies fertilizers to flower, shrub, and tree beds twice a year, once during the spring and once during the fall. About 1,400 pounds of a 10-10-10 fertilizer and about 1,400 pounds of a 9-23-30 fertilizers are used annually. Round-Up is applied across campus grounds through a spot application process.

4. Management of Streambanks/Shorelines

The UWW encourages appropriate management of streambanks, shorelines, and ravines within the UWW. The UWW has no streambanks on campus but has shorelines along the wetland north of Prairie Street.

5. Promotion of Infiltration

Development on the UWW campus is initiated by the UWW and Wisconsin Department of Administration Division of Facilities Development (WI DOA-DFD). Developments generally are required to follow the infiltration requirements stated in the local ordinance (City Stormwater Management Ordinance) and the NR 151 code.

6. Design/Installation/Maintenance Information and Education Program

Appropriate erosion control and stormwater BMPs are required through the WI DOA-DFD *Civil and Sitework Guidelines* and a draft Policy and Procedure Manual.

7. Locations of Stormwater Concern

The UWW MS4 discharges into Whitewater Creek and Galloway Creek. Whitewater Creek is proposed to be added to the WDNR's impaired waters list for TP.

8. Promotion of Environmentally Sensitive Land Development

The UWW stays educated on environmentally sensitive land development by requiring conformance with NR 216 and NR 151.

The following existing plans promote environmentally sensitive land development designs by developers and designers.

1. *University of Wisconsin-Whitewater Comprehensive Campus Master Plan, Draft, 2014.*

This plan provides a summary of stormwater-related issues on the UWW campus and provides general information on the stormwater requirements needed for permit compliance, which includes the implementation of sustainable green stormwater infrastructure.

2. *The State of the Rock River Basin*, WDNR PUBL WT 668 2002, April 2002.

This plan provides an overview of the quality of land and water resources in the basin, identifies resource issues and threats that keep the land and water resources from meeting their full potential and actions currently underway to address these issues and threats, and outlines specific actions the WDNR and its many partners can put into practice to improve, protect, or maintain the quality of the basin's resources.

B. Public Involvement and Participation

The UWW works with and participates in RRSG's public involvement and participation plan. In 2014, the UWW Science and Outreach Coordinator worked with RRSG to develop a curriculum and purchase materials to demonstrate a nonpoint source/watershed model in classrooms. A trial run was performed in October 2014 at UWW's Passport to Science event, and the first classroom visit was scheduled to occur in January 2015. A complete list of RRSG's public involvement program can be found at the following link: https://cleanwaterbrightfuture.files.wordpress.com/2015/01/2015-rrsg-work-plan_final.pdf.

C. Illicit Discharge Detection and Elimination (IDDE)

1. Continued Enforcement of the State of Wisconsin Administration Code, University of Wisconsin System, Chapter 18: Conduct on University Lands.

   a. Current administrative code, UWS 18.06 (3)(b), prohibits the discharges of pollutants to stormwater or storm sewers on or serving university lands. The program follows the required activities outlined in Section 2.3 of the UWW's stormwater permit.

   b. The UWW directs campus employees and students to use the Hazardous Waste Management Mini-Guide and directs them to the following website for additional information: http://www.uww.edu/sustainability/campus-operations/waste.

2. Dry Weather Field Screening

The UWW storm sewer system is mapped with all UWW-maintained outfalls noted and the contributing watershed areas shown.

3. Procedures for Responding to Known or Suspected Illicit Discharges

At the present time, the UWW is following the procedures included in Section 4 of the City's *2008 Stormwater Management Plan*. We recommend that the UWW follow the IDDE program recommended in Section 3.02.C of this report.

D. Construction Site Erosion Pollutant Control

1. Erosion Control Ordinance

Development on the UWW campus is initiated by the UWW and WI DOA-DFD. Developments generally are required to follow erosion control requirements stated in the local ordinance (City's Erosion Control Ordinance) and the current NR 151 code. Appropriate erosion control and stormwater BMPs are required through the WI DOA-DFD's Civil and Sitework Guidelines, Erosion Control Specification, Section 31 25 00, and a draft Policy and Procedure Manual. These documents are kept updated with the current NR 151 requirements.

2. Erosion Control Specification Site Review Procedures and Enforcement

Development projects on the UWW are overseen by a WI DOA/DFD project manager and a UWW project manager (Jeff Klamik). Typically, development projects are designed by a consultant who is also involved in construction observation of the project. Construction oversight follows the requirements of Section 2.4 of the UWW's stormwater permit.

3. Permits Issued

The design consultant prepares an erosion control plan for the project. If necessary, the design consultant applies for a Water Resources Application for Project Permits (WRAPP). The construction contractor for the project is required to follow the erosion control plan and any modifications to the erosion control plan that are necessary because of the contractor's means and methods of construction. The contractor is required to follow the Construction Site Storm Water Runoff General Permit requirements as obtained from the WRAPP.

E. Postconstruction Stormwater Management

1. Postconstruction Stormwater Management Guidelines

Development on the UWW campus is initiated by the UWW and WI DOA-DFD. Developments generally are required to follow postconstruction stormwater management requirements stated in the local ordinance (City Postconstruction Runoff Ordinance) and the current NR 151 code. Appropriate erosion control and stormwater BMPs are required through the WI DOA-DFD's Civil and Sitework Guidelines and a draft Policy and Procedure Manual. These documents are kept current with the current NR 151 requirements.

2. Postconstruction Stormwater Management Plan Site Review Procedures and Enforcement

Development projects on the UWW are overseen by a WI DOA/DFD project manager and a UWW project manager (Jeff Klamik). Typically, development projects are designed by a consultant who is also involved in construction observation of the project. Construction oversight follows the requirements of Section 2.4 of the UWW's stormwater permit.

3. Permits Issued

The design consultant prepares a postconstruction stormwater management plan for the project, if applicable. If necessary, the design consultant applies for a Water Resources Application for Project Permits (WRAPP). The construction contractor for the project is required to follow the postconstruction stormwater management plan as well as any modifications to the plan that are necessary due to the contractor's means and methods of construction. The Contractor is required to follow the Construction Site Storm Water Runoff General Permit requirements as obtained from the WRAPP.

F. Pollution Prevention–Municipal Operations

1. Maintenance of Existing Municipally Owned/Operated Stormwater BMPs

As described in Section 2.04, the UWW provides maintenance of stormwater BMPs on an as-needed or periodic basis.

2. Street Sweeping

As described in Section 2.04, the City performs street sweeping on the UWW's campus streets twice a year, in the spring and fall. Table 3.01-1 provides a list of the UWW street sweeping quantities. This information has not been collected in the past. It is recommended that the UWW request that this information be tracked by the City and provided to UWW starting in 2017.

	2011	2012	2013	2014	2015
Solids Captured (CY or Tons)	Not available	Not available	Not available	Not available	Not available
Miles/Month	Not available	Not available	Not available	Not available	Not available

Table 3.01-1 Street Sweeping Quantity Summary

3. Catch Basin Cleaning

As described in Section 2.04, the City cleans the catch basins on public roads on UWW's campus once every 2 years, and UWW staff cleans the remainder of catch basins on campus**.** It is recommended that the City keep records for cleaning and repairs of catch basins and solids collected starting in 2017 on Warhawk Drive and Schwager Drive. There is limited information on the existence of sumps on the UWW campus; therefore, sumps are not included in the modeling. If more information is gained on the location and depth of sumps on the UWW campus, it is recommended that they be included in the SLAMM modeling in the future. Table 3.01-2 shows information on the UWW's catch basin cleaning program.

	2011	2012	2013	2014	2015
Solids Collected (tons)	No information	No information	No information	No information	No information

Table 3.01-2 Solids Collected from Catch Basin Cleaning

4. Deicing and Snow Removal

The UWW's complete *Snow Removal Plan* can be found in Appendix H. Additional information is included in Table 3.01-3.

Item	Description
Winter Roadway Maintenance Contact	Steve Bertagnolli Buildings and Grounds Supervisor 262-472-6721 bertagns@uww.edu
Enclosed Salt Storage Building	Salt Storage Building Capacity: 25-35 tons of salt**.** UWW is planning for the construction of a new salt storage building as shown in Figure I-1 in Appendix I.
Snow Disposal Location	Not applicable
Deicing Products Used and Amount	Thawrox Treated Salt, a 95% rock salt/5% liquid solution product (organic carbohydrate-corrosion inhibitor and viscosity modifier, liquid magnesium chloride-improves lower temperature performance and promotes immediate activation of salt when spread, and a colorant-ease in seeing where applied), for road and sidewalk de-icing and is applied as appropriate to conditions and availability.(See Table 3.01-4)
Type of Deicing Equipment Used	Typical salters, both street and walk salters.
Anti-icing, equipment calibration, and salt reduction strategies considered	Deicing: Within 24 hours of a predicted snow or ice fall, UWW applies a salt brine solution on heavily used traffic areas on roads, walks, and parking lot lanes. Salt Reduction Strategies Considered: UWW staff attended the 2014 Winter Maintenance Workshop for training.
Snowfall/Rainfall Amounts	See Table 3.01-5

Table 3.01-3 Winter Roadway Maintenance Details

Table 3.01-4 shows the UWW salt usage in the period from 2011 to 2016. Table 3.01-5 shows the rainfall and snowfall amounts at the Dane County Regional Airport (MSN) as obtained from the National Oceanic and Atmospheric Administration (NOAA) website. The average rainfall amount is 36.69 inches a year and the average snowfall each winter season is 50.68 inches. Higher than average seasonal snowfall is an indicator of the potential for higher level of deicer usage and is requested to be tracked by the WDNR.

Application	Winter Season				
	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016
Thawrox (Tons)	468	486	452	319	136

Table 3.01-4 Deicer Usage by UWW (Tons)

	2012 Rainfall (in)	2012 Snowfall (in)	2013 Rainfall (in)	2013 Snowfall (in)	2014 Rainfall (in)	2014 Snowfall (in)	2015 Rainfall (in)	2015 Snowfall (in)
January	1.41	13.4	2.87	8.9	0.66	12.4	0.67	10.3
February	1.03	7.3	2.42	22.8	1.24	12.0	0.54	10.8
March	2.61	6.6	2.41	15.2	1.26	8.2	0.076	4.2
April	2.85	0	5.83	0.3	5.14	1.0	4.38	0
May	3.19	0	6.58	0	3.48	0	4.19	0
June	0.31	0	10.86	0	9.55	0	3.15	0
July	4.00	0	4.00	0	1.08	0	5.02	0
August	1.59	0	1.52	0	5.43	0	4.10	0
September	1.33	0	3.19	0	1.84	0	6.00	0
October	4.56	0	1.90	0	3.10	0.2	2.72	0
November	0.90	0.1	2.20	3.5	1.55	8.3	4.75	4.1
December	2.60	23.5	1.62	22.1	1.02	0.1	3.33	7.4
Totals	**26.38**	**50.9**	**45.40**	**72.8**	**35.35**	**42.2**	**39.61**	**36.8**

Table 3.01-5 Rainfall and Snowfall at Madison Dane County Regional Airport

5. Leaf and Grass Clipping Management

UWW mulches leaves on campus as part of mowing operations such that they remain in place on turf areas. UWW does not collect leaves or grass clippings.

6. Municipal Garage and Storage Area Management

The UWW owns and operates the General Services Building facility. A stormwater pollution prevention plan (SWPPP) for the General Services Building (see Figure 3.01-1) is included in Appendix I.

Figure 3.01-1 General Services Building (500 North Fremont Street)

7. Turf Maintenance Policies

The UWW applies fertilizer on varsity game fields, practice fields, intramural fields, and the stadium grounds. Table 3.01-6 shows information on the UWW's fertilizer usage.

Year	Property	Amount of Fertilizer (lbs)	Acreage
2013	Varsity game fields, practice fields, intramural fields, and stadium grounds	12,000	42
2014	Varsity game fields, practice fields, intramural fields, and stadium grounds	10,700	42
2015	Varsity game fields, practice fields, intramural fields, and stadium grounds	11,400	42
2016	Varsity game fields, practice fields, intramural fields, and stadium grounds	9,350	42

Table 3.01-6 UWW Fertilizer Usage

8. Inform Department Staff of Permit Requirements

The UWW internally coordinates implementation of the requirements of the NR 216 permit. Staff attended the 2014 Winter Road Maintenance Workshop and Veolia Spill Prevention Training.

9. Measures to Reduce Municipal Sources of Stormwater within Source Water Protection Areas

The UWW is served by municipal sanitary sewer and water. The municipal sanitary sewer discharges to the Whitewater Wastewater Treatment Plant that discharges treated water to Whitewater Creek. The City has a wellhead protection plan and ordinance (Ordinance 1383, adopted 1997) for Well No. 9. The wellhead protection area is subject to land use and development restrictions because of the high threat of contamination.

G. Stormwater Quality Management

The UWW adopted a stormwater management plan in 2009. A UWW Comprehensive Campus Master Plan was completed in 2014, which included some stormwater quality management components. Stormwater quality modeling of campus lands was completed in 2011 including an alternatives analysis seeking to achieve a 40 percent TSS reduction applicable at the time. The report, herein, generally updates the previous efforts required for MS4 permit compliance.

H. Storm Sewer System Map

The UWW has an existing storm sewer system map. Maps included in this document augment the existing map to meet the requirements of the stormwater permit. The maps and figures are listed in the Table of Contents.

I. Annual Report

The UWW submitted an annual report to the WDNR meeting the March 31, 2016, deadline.

J. Cooperation

The City and UWW are cooperating with the RRSG in permit compliance efforts.

3.02 RECOMMENDED STORMWATER MANAGEMENT PROGRAM

To comply with the terms of the WPDES permit, we recommend the following program.

An outside consultant may need to be retained to address some of the recommended activities outlined in this section. Costs for the recommended activities are outlined in Table 6.03-1.

A. Public Education and Outreach

We recommend continuation of the UWW's program to educate UWW employees and students regarding measures that can be taken to reduce nonpoint source discharges to surrounding water resources. The information and education program is intended to raise awareness among individuals and organizations concerning stormwater runoff and the measures that can be taken to minimize its harmful effects. The program would include the activities of measurable goals, anticipated completion dates, and responsible parties, as shown in Table 3.02-1. In addition, we recommend continuation of the UWW's participation in RRSG and partnership with the City.

B. Public Involvement and Participation

We recommend the implementation of the following public involvement and participation activities with their associated measurable goals, responsible parties, and anticipated completion dates, as described in Table 3.02-2.

Table 3.02-1 Public Education and Outreach Plan and Measurable Goals

	Activity	Measurable Goal	Responsible Party	Anticipated Completion Date
1	Complete one presentation to UWW Staff and interested students upon completion of this plan discussing the plan contents.	One meeting	UWW Staff and Strand	January 2018
2	Annually, dedicate a portion of one **UWW Staff Meeting** to the discussion of the Annual Report submitted for the previous year's permit compliance activities.	One meeting each year, starting in 2018.	UWW Staff	April or May 2018
3	The UWW will have available stormwater management-related materials at the General Services Building prepared by organizations such as WDNR and RRSG. Materials will promote detection of illicit discharges. It will also include promotion of good streambank and shoreline management, infiltration of stormwater runoff where feasible, and general stormwater pollution prevention techniques.	Have the following available starting in 2018. 1. Fertilizer/pesticide management. 2. Hazardous waste and oil management and illicit discharges. 3. Streambank and shoreline management. 4. Infiltration. Note: Brochures will be numbered to track usage.	UWW Staff	Ongoing
4	Continue the UWW's current program of providing information on recycling and garbage collection on the UWW website.	Continue current program	UWW Staff	Ongoing
5	The UWW will maintain the UWW website to promote detection of illicit discharges. It will also include promotion of good streambank and shoreline management, infiltration of stormwater runoff where feasible, and general stormwater pollution prevention techniques.	Continue current program	UWW Staff	Complete by December 31 of each year.
6	Participate in the Joint Public Education Program for the RRSG Partnership.	Participate in joint activities.	UWW Staff	As required by joint agreement.
7	Track public education and outreach activities for annual reporting to the WDNR. Track hits on UWW Stormwater webpage, if feasible.	Once each year.	UWW Staff	Once each year.

Table 3.02-2 Public Involvement and Participation Plan and Measurable Goals

	Activity	Measurable Goal	Responsible Party	Anticipated Completion Date
1	Continue to public notice all public meetings.	Ongoing.	UWW Staff	Ongoing
2	Continue to work with RRSG for planning and participating in public involvement events.	One public involvement event each year.	UWW Staff	Complete by August 30, annually
3	Continue to establish policy for receiving and addressing stormwater management issues. UWW will be investigating setting up an interactive website using the standard form in Appendix J to receive, respond to, and track reported stormwater-related issues.	Ongoing.	UWW Staff	Ongoing.

C. Illicit Discharge Detection and Elimination Plan

1. Introduction

a. Background and Definitions

As discussed in Section 2, the UWW's storm drainage system discharges to local water resources including Whitewater Creek, Galloway Creek, and other waterways at approximately 14 outfall locations throughout the UWW. In addition to stormwater runoff, the storm drainage system connected to each of these outfalls has the potential to carry other discharges introduced to the storm drainage system such as sanitary sewage, waste oil, industrial waste, and other substances that may harm downstream water quality. The term "illicit discharge" is generally used to refer to any discharge to a storm drainage system that is not composed entirely of stormwater, except those discharges allowed by an ordinance or permit. Such allowable discharges may include those from fire-fighting activities, air-conditioning condensate, and related "clean water" flows.

The Center for Watershed Protection (CWP) has published a manual titled *Illicit Discharge Detection and Elimination, A Guidance Manual for Program Development and Technical Assessments* (October 2004). This document (referred to as the "CWP Guide" in this report) uses a four-part definition for illicit discharges, including the following:

(1) Illicit discharges have a measurable flow during dry weather containing pollutants and/or pathogens. Storm drains having measurable flow, but no pollutants are simply considered a discharge.

(2) Illicit discharges have a unique frequency, composition, and mode of entry in the storm drainage system.

(3) Illicit discharges may be caused when the sewage disposal system interacts with the storm drainage system through illegal cross connections or other sources.

(4) Illicit discharges may be produced from specific source areas and operations known as "generating sites." An understanding of the interaction between these potential generating sites and the storm drainage system can be helpful in locating and preventing illicit discharges.

b. Modes of Entry

The CWP Guide describes potential direct and indirect modes of entry for illicit discharges to the storm drainage system. Direct entry means the discharge is directly connected to the storm drain through a sewage pipe, shop drain, or other kind of pipe. Indirect entry means that flows generated outside the storm drainage system enter through storm drain inlets or by infiltrating through the joints of the pipe.

Primary sources of direct entry include the following:

(1) Sewage cross connections.

(2) Straight pipe connections–Straight pipe connections refer to small diameter (typically) pipes that intentionally bypass the sanitary connection or septic drain fields, producing direct discharge to open channels, streams, lakes, or other water resources.

(3) Industrial and commercial cross connections–These occur when industrial or commercial wash water, process water, or other illicit flows enter the storm drainage system, typically through floor drains connected to systems improperly connected to the storm drainage system. These are most prevalent in older industrial areas.

Primary sources of indirect entry to the storm drainage system include the following:

(1) Groundwater seepage–Groundwater seepage usually consists of relatively clean water but can mask other illicit discharges. For example, groundwater seepage may include diluted sewage if the storm and sanitary sewer systems are close together.

(2) Spills–These may occur when a spill travels across an impervious surface and enters a storm drain inlet.

(3) Dumping liquid into a storm drain inlet–This occurs when liquid wastes such as oil, grease, paint, solvents, and various automotive fluids are dumped into the storm drain. One example of an intermittent discharge of this type is cleaning deep fryers in the parking lot of fast food operations.

(4) Outdoor washing activities–This may or may not produce illicit discharges, depending on the nature of the activity. Routine washing of fueling or outdoor storage areas, power washing of parking lots, and cleaning construction equipment outdoors are examples of activities that may produce illicit discharges.

c. Land Use and Generating Sites

Experience in other communities indicates that land use can be a good predictor of the likelihood of illicit discharges. For example, residential areas may be sources of indirect discharges from activities such as failing septic systems (unlikely in the UWW), waste oil dumping, or car washing. Commercial areas are most prominently sources of discharges from outdoor washing, disposal of food wastes, car fueling, repair, and washing, and other activities.

Table 3.02-3, which is an excerpt from the CWP Guide, provides an overview of common discharges from various land use types. It should be noted that WDNR regulations exempt some of the activities listed in Table 3.02-3 such as individual residential car washing.

d. Regulatory Requirements

In recognition of the potentially harmful impacts of illicit discharges, WDNR has identified development of an IDDE program as a condition of the UWW's Stormwater Discharge permit. Specific program requirements are included in Section 2.3 of the WPDES Municipal Separate Storm Sewer System Permit No. WI-S050075-2 (included in Appendix A). In general, the program must include the following:

(1) 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 must prohibit the discharge, spilling, or dumping of nonstormwater substances or materials into Waters of the State or the MS4, identify nonstormwater discharges or flows that are not considered illicit discharges, and establish inspection and enforcement authority.

(2) Initial field screening at all major outfalls during dry weather periods. At a minimum, field screening shall be documented and include visual observation, and field analysis if flow is observed.

(3) Ongoing dry weather field screening of outfalls during the term of the permit. Priority outfalls shall be screened annually. All major outfalls shall be screened once during each five-year permit term.

(4) Procedures for responding to known or suspected illicit discharges.

(5) Procedures to remove illicit discharges from its MS4 system as soon as possible (according to the permit, within three working days to the maximum extent practicable).

(6) Immediately notify WDNR in accordance with Ch. NR 706 Wisconsin Administrative Code. Contact shall be made with the WDNR via the WDNR 24-hour toll-free spill hotline at 1-800-943-0003.

(7) Notice to the affected municipality within one working day in the case of an illicit discharge that originates from the permittee's permitted area and that discharges directly to a municipal separate storm sewer or property under the jurisdiction of another municipality.

(8) 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 and submitted to the Department of Public Works.

Table 3.02-3 Typical Land Uses and Activities That Produce Illicit Discharges (Excerpt)*

Table 2: Land Uses, Generating Sites and Activities That Produce Indirect Discharges		
Land Use	**Generating Site**	**Activity that Produces Discharge**
Residential	• Apartments • Multi-family • Single Family Detached	• Car Washing • Driveway Cleaning • Dumping/Spills (e.g., leaf litter and RV/boat holding tank effluent) • Equipment Washdowns • Lawn/Landscape Watering • Septic System Maintenance • Swimming Pool Discharges
Commercial	• Campgrounds/RV parks • Car Dealers/Rental Car Companies • Car Washes • Commercial Laundry/Dry Cleaning • Gas Stations/Auto Repair Shops • Marinas • Nurseries and Garden Centers • Oil Change Shops • Restaurants • Swimming Pools	• Building Maintenance (power washing) • Dumping/Spills • Landscaping/Grounds Care (irrigation) • Outdoor Fluid Storage • Parking Lot Maintenance (power washing) • Vehicle Fueling • Vehicle Maintenance/Repair • Vehicle Washing • Washdown of greasy equipment and grease traps
Industrial	• Auto recyclers • Beverages and brewing • Construction vehicle washouts • Distribution centers • Food processing • Garbage truck washouts • Marinas, boat building and repair • Metal plating operations • Paper and wood products • Petroleum storage and refining • Printing	• All commercial activities • Industrial process water or rinse water • Loading and un-loading area washdowns • Outdoor material storage (fluids)
Institutional	• Cemeteries • Churches • Corporate Campuses • Hospitals • Schools and Universities	• Building Maintenance (e.g., power washing) • Dumping/Spills • Landscaping/Grounds Care (irrigation) • Parking Lot Maintenance (power washing) • Vehicle Washing
Municipal	• Airports • Landfills • Maintenance Depots • Municipal Fleet Storage Areas • Ports • Public Works Yards • Streets and Highways	• Building Maintenance (power washing) • Dumping/Spills • Landscaping/Grounds Care (irrigation) • Outdoor Fluid Storage • Parking Lot Maintenance (power washing) • Road Maintenance • Spill Prevention/Response • Vehicle Fueling • Vehicle Maintenance/Repair • Vehicle Washing

* Excerpted from Table 2 of *Illicit Discharge Detection and Elimination, A Guidance Manual*, Center for Watershed Protection, October 2004.

2. IDDE Ordinance

The UWW has legal authority to control illicit discharges in State of Wisconsin Administrative Code, University of Wisconsin System, Chapter 19: Conduct on University Lands. No modifications to this code appear to be necessary.

Initial Field Screening Procedures and Requirements: Initial field screening shall be conducted at all major outfalls during dry weather periods. In the event that now or in the future a major outfall is a ditch rather than a pipe, the nearest upstream pipe discharge point should be used as a field screening point. Table 3.02-5 identifies recommended field screening points. Field screening shall be documented on the form included in Appendix C (which includes a spreadsheet of the major outfalls) and will 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 nonstormwater illicit discharges.

(b) Field Analysis–If flow is observed, a field analysis shall be conducted to determine the presence of nonstormwater illicit discharges. The field analysis shall include sampling for pH, total chlorine, total copper, total phenol, and detergents.

(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.

(3) If field analysis indicates higher than expected range for pH, total chlorine, total copper, total phenol, and detergents, the discharge will need to be tracked upstream and eliminated.

(c) Database–The UWW will maintain a file or database of all field screening forms. Field screening results will be reported to the WDNR annually in the Annual Report.

3. Ongoing Dry Weather Screening Program and Priorities

Figure 3.02-1 has been updated to show major, minor, priority major, and priority minor outfalls based on the UWW's current storm sewer system. Section 2.3 of the UWW's stormwater permit requires ongoing dry weather field screening of outfalls during the term of the permit including field screening of selected outfalls on an annual basis (i.e., priority outfalls) and field screening of all major outfalls once during the five-year permit term. This is consistent with the WDNR's 2012 IDDE Guidance document.

Table 3.02-4 provides a listing of all the UWW's outfalls, and Table 3.02-5 shows the priority minor, priority major, and major outfalls and their future screening schedule.

Path: S:\MAD\1400-1499\1407\088\Data\GIS\Report Figures\Figure 3.02-1 UWW Outfall 11x17.mxd

User: davidk

Date: 11/6/2016

Time: 12:06:26 PM

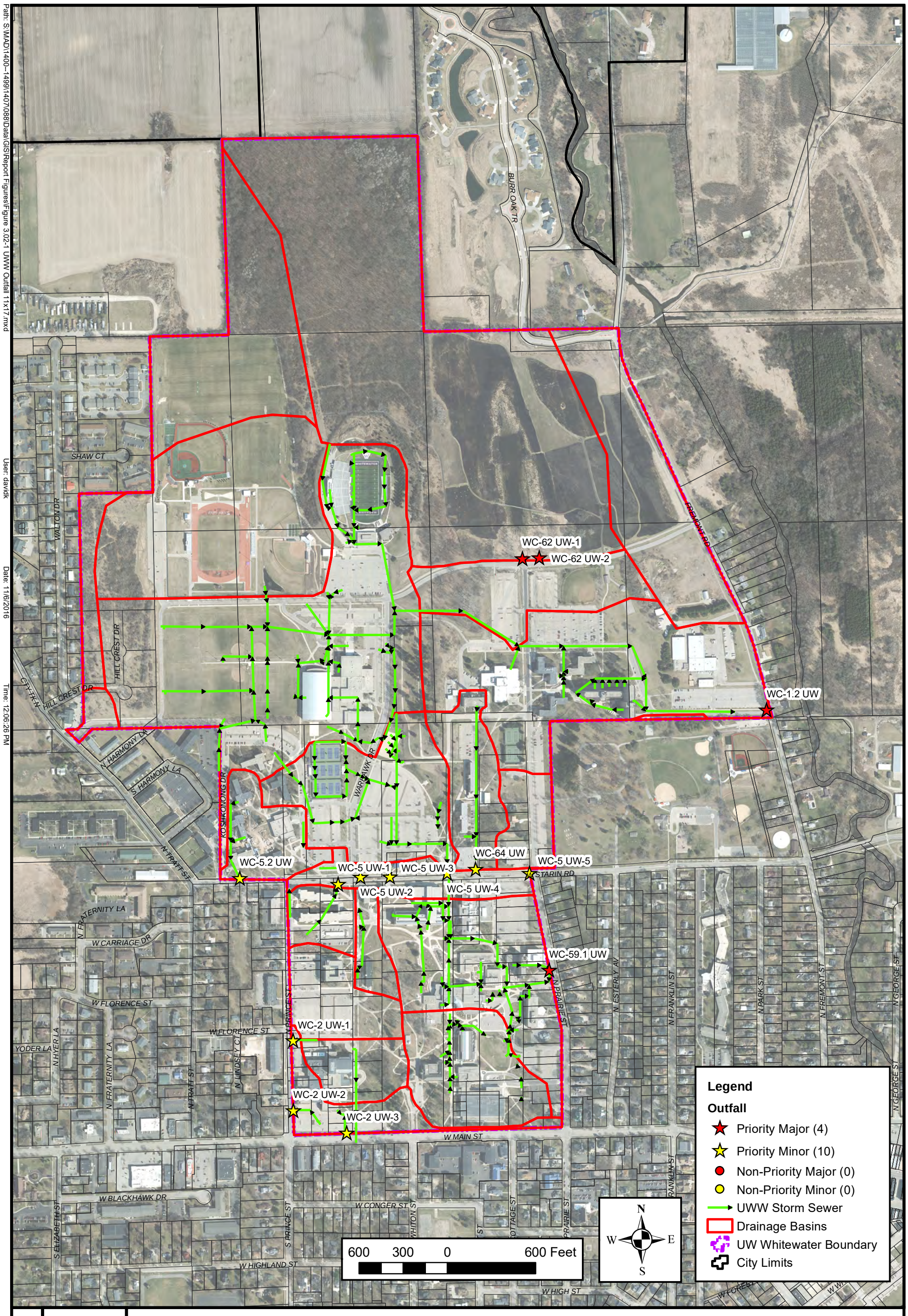


FIGURE 3.02-1
1407.088

STRAND ASSOCIATES®

OUTFALL SCREENING LOCATIONS
UNIVERSITY OF WISCONSIN-WHITEWATER

TMDL STORMWATER PLAN
CITY OF WHITEWATER
WALWORTH AND JEFFERSON COUNTIES

Table 3.02-4 UWW Outfalls

Outfall	Location	Contributing Basins	Contributing Area (ac)	Major/Minor	Priority	Watershed	Material	Size (in)
WC-1.2 UW	N. Fremont St and E Lauderdale Dr intersection	WC-1.1 UW, WC-1.2 UW, WC-58.1 UW, WC-58.2 UW	153.89	Major	Priority	Whitewater Cr.	RCP	42
WC-2 UW-1	North of S Prince St and W Main Street South of N Prince St and W Florence St	WC-57.4 UW	0.33	Minor	Priority	Whitewater Cr.	Unknown	Unknown
WC-2 UW-2	North of W Main St and N Prince St	WC-2 UW	0.98	Minor	Priority	Whitewater Cr.	Unknown	Unknown
WC-2 UW-3	North of W Main Street Between S Prince St and S. Whiton St	WC-57.4 UW, WC-2 UW	9.94	Minor	Priority	Whitewater Cr.	Unknown	Unknown
WC-5 UW-1	SE corner of N. Prince St W Starin Rd	WC-57.1 UW, WC-57.3 UW	12.61	Minor	Priority	Whitewater Cr.	Unknown	Unknown
WC-5 UW-2	W Starin Rd and Warhawk Dr	WC-57.2 UW	3.39	Minor	Priority	Whitewater Cr.	Unknown	Unknown
WC-5 UW-3	W Starin Rd east of Warhawk Dr	WC-5 UW	1.028	Minor	Priority	Whitewater Cr.	Unknown	Unknown
WC-5 UW-4	625' east of Warhawk Dr and W Starin Rd	WC-63 UW	20.322	Minor	Priority	Whitewater Cr.	Unknown	Unknown
WC-5 UW-5	N. Prairie St. and W. Starin Rd	WC-65 UW	5.37	Minor	Priority	Whitewater Cr.	RCP	24
WC-5.2 UW	East of W Starin Rd and Koshkonong Dr Intersection	WC-5.2 UW	7.73	Minor	Priority	Whitewater Cr.	Unknown	Unknown
WC-59.1 UW	N. Prairie St.	WC-59.1 UW	37.27	Minor	Priority	Whitewater Cr.	RCP	24 x 38
WC-62 UW-1	North of E Schwager Dr	WC-1.1 UW	5.69	Major	Priority	Whitewater Cr.	Unknown	Unknown
WC-62 UW-2	North of W Schwager Dr	WC-1.1 UW	6.09	Major	Priority	Whitewater Cr.	Unknown	Unknown
WC-64 UW	825' east of Warhawk Dr and W Starin Rd	WC-64 UW	9.33	Minor	Priority	Whitewater Cr.	Unknown	Unknown

Notes:

1 - Major outfalls are defined as outfalls that are 36 inches in diameter (or equivalent cross-sectional area) or larger and are associated with a drainage area of 50 acres or larger. Outfalls with an inside diameter of 12 inches or more are also classified as major outfalls if they receive stormwater runoff from land zoned for industrial activity with 2 or more acres of industrial activity.
2 - Priority outfalls can be major or minor outfalls that have a higher potential for illicit discharge. Contributing drainage area characteristics or land uses that should be considered when selecting priority outfalls include:
History of known or suspected illicit discharges reported within the last five years.
Sections of storm sewer and/or sanitary sewer infrastructure that have exceeded or are approaching their design/useful life.
Contributing drainage areas with 80 or more percent impervious.
Business or industrial parks with frequent changes in property ownership or operations.
Schools or other institutional facilities.
Commercial or industrial operations that generate wastewater or wash water including food processing, metal plating or machining shops, auto and scrap recyclers, commercial car washes and chemical manufacturers or users.

Table 3.02-5 Priority Outfall Screening Schedule-UWW

Outfall	Location	Contributing Area (ac)	Watershed	Material	Size (in)	Major/Minor	Predominant Land Use	Screening Frequency	Priority	Reason for Priority	Screening Location	Screening Frequency					
												2017	2018	2019	2020	2021	2022
WC-1.2 UW	N. Fremont St and E Lauderdale Dr intersection	153.89	Whitewater Cr.	RCP	42	Major	Institutional	Once every year	Priority	Institutional Land Use	UWW to City Manhole at N. Fremont St and E Lauderdale Dr intersection	X	X	X	X	X	X
WC-2 UW-1	North of S Prince St and W Main Street	0.33	Whitewater Cr.	Unknown	Unknown	Minor	Institutional	Once every year	Priority	Institutional Land Use	UWW to City Manhole North of S Prince St and W Main Street	X	X	X	X	X	X
WC-2 UW-2	North of W Main St and N Prince St	0.98	Whitewater Cr.	Unknown	Unknown	Minor	Institutional	Once every year	Priority	Institutional Land Use	UWW to City Manhole North of W Main St and N Prince St	X	X	X	X	X	X
WC-2 UW-3	North of W Main Street Between S Prince St and S Whiton St	9.94	Whitewater Cr.	Unknown	Unknown	Minor	Institutional	Once every year	Priority	Institutional Land Use	UWW to City Manhole North of W Main Street Between S Prince St and S Whiton St	X	X	X	X	X	X
WC-5 UW-1	SE corner of N. Prince St W Starin Rd	12.61	Whitewater Cr.	Unknown	Unknown	Minor	Institutional	Once every year	Priority	Institutional Land Use	UWW to City Manhole at SE corner of N. Prince St W Starin Rd	X	X	X	X	X	X
WC-5 UW-2	W Starin Rd and Warhawk Dr	3.39	Whitewater Cr.	Unknown	Unknown	Minor	Institutional	Once every year	Priority	Institutional Land Use	UWW to City Manhole at W Starin Rd and Warhawk Dr	X	X	X	X	X	X
WC-5 UW-3	W Starin Rd east of Warhawk Dr	1.028	Whitewater Cr.	Unknown	Unknown	Major	Institutional	Once every year	Priority	Institutional Land Use	UWW to City Manhole at W Starin Rd east of Warhawk Dr	X	X	X	X	X	X
WC-5 UW-4	625' east of Warhawk Dr and W Starin Rd	20.322	Whitewater Cr.	Unknown	Unknown	Minor	Institutional	Once every year	Priority	Institutional Land Use	UWW to City Manhole 625' east of Warhawk Dr and W Starin Rd	X	X	X	X	X	X
WC-5 UW-5	N. Prairie St. and W. Starin Rd	5.37	Whitewater Cr.	Unknown	Unknown	Minor	Institutional	Once every year	Priority	Institutional Land Use	UWW to City Manhole at N. Prairie St. and W. Starin Rd	X	X	X	X	X	X
WC-5.2 UW	East of W Starin Rd and Koshkonong Dr Intersection	7.73	Whitewater Cr.	Unknown	Unknown	Minor	Institutional	Once every year	Priority	Institutional Land Use	UWW to City Manhole at East of W Starin Rd and Koshkonong Dr Intersection	X	X	X	X	X	X
WC-59.1 UW	N. Prairie St.	12.61	Whitewater Cr.	Unknown	Unknown	Minor	Institutional	Once every year	Priority	Institutional Land Use	UWW to City Manhole at SE corner of N. Prince St W Starin Rd	X	X	X	X	X	X
WC-62 UW-1	North of E Schwager Dr	5.69	Whitewater Cr.	Unknown	Unknown	Major	Institutional	Once every year	Priority	Institutional Land Use	Culvert Outlet North of E Schwager Dr	X	X	X	X	X	X
WC-62 UW-2	North of W Schwager Dr	6.09	Whitewater Cr.	Unknown	Unknown	Major	Institutional	Once every year	Priority	Institutional Land Use	Culvert Outlet North of W Schwager Dr	X	X	X	X	X	X
WC-64 UW	825' east of Warhawk Dr and W Starin Rd	9.33	Whitewater Cr.	Unknown	Unknown	Minor	Institutional	Once every year	Priority	Institutional Land Use	UWW to City Manhole 825' east of Warhawk Dr and W Starin Rd	X	X	X	X	X	X

4. Response Procedures

a. Identification of Suspected Spill or Illicit Discharge

Where field screening indicates the possible presence of an illicit discharge or other nonstormwater discharge, the following procedure shall be implemented as soon as possible:

(1) The field analysis described in Section 3.02 C. 3. A. (2) shall be conducted.

(2) The suspected illicit discharge shall be tracked by screening manholes and other screening points upstream until the source of the spill or discharge is identified.

(3) Measures shall be taken to prevent or contain spills that have discharged or may discharge into the drainage system.

(4) The WDNR shall be notified immediately in accordance with NR 706, Wisconsin Administrative Code, in the event that a spill or release of a hazardous substance is identified that has resulted or may result in the discharge of pollutants into Waters of the State. The WDNR shall be notified via the 24-hour toll-free spill hotline at 1-800-943-0003. The UWW will cooperate with WDNR staff in efforts to investigate and prevent such discharges from polluting Waters of the State.

(5) The UWW shall take appropriate action to remove illicit discharges from its MS4 system as soon as possible. If it will take more than three days to remove an illicit connection, the UWW will contact the WDNR to discuss an appropriate action and/or timeframe for removal.

(6) If a suspected illicit discharge that originates from the UWW's permitted area is found to discharge directly to a storm sewer or property under the jurisdiction of another municipality, the UWW shall notify the affected municipality within one working day.

b. Leakage from Sanitary Conveyance System

Leakages from sanitary conveyance system into the MS4 shall be eliminated to the maximum extent practicable. Any actions taken to eliminate sanitary conveyance leakage will be recorded and reported to the WDNR in the Annual Report.

c. Dye Testing Notification

The UWW will provide the WDNR with advance notice of the time and location of dye testing within an MS4.

5. Responsible Parties

Jeff Klamik, Campus Facilities Engineer
University of Wisconsin-Whitewater
500 North Fremont Street
Whitewater, WI 53190-1790
262-472-6729 (Office)
262-903-6388 (Cell)
klamikj@uww.edu

6. Measurable Goals

We recommend implementation of the following activities with their associated measurable goal, responsible party, and anticipated completion date as described in Table 3.02-6.

	Activity	Measurable Goal	Responsible Party	Anticipated Completion Date
1	Implement the illicit discharge detection and elimination program described in Section 3.02.C.	See above	Campus Facilities Engineer	Ongoing
2	Conduct field screening for illicit discharges as described in Section 3.02.C. using the blank field screening form in Appendix F.	See above	Campus Facilities Engineer	By Nov. 15, annually
3	Track the illicit discharge detection and elimination program activities for annual reporting to WDNR.	Once each year	Campus Facilities Engineer	Once each year

Table 3.02-6 Illicit Discharge Detection and Elimination Plan and Measurable Goals

D. Construction Site Pollution Control

Section 3.01 documents existing UWW activities. It is recommended that the UWW continues those activities and supplement them with the recommendations included in Table 3.02-7.

	Activity	Measurable Goal	Responsible Party	Anticipated Completion Date
1	Continue administration and enforcement of existing Construction Site Erosion Control Requirements. Continue to update WI DOA/DFD requirements and procedures to be consistent with the most recent version of NR 151.	Ongoing	Campus Facilities Engineer	On-going
2	Document the number of construction projects administered under the Construction Site Erosion Control Requirements each year by WI DOA/DFD.	Ongoing	Campus Facilities Engineer	On-going
3	Document the number and nature of inspections and enforcement actions conducted by WI DOA/DFD to ensure compliance with the erosion control requirements.	Ongoing	Campus Facilities Engineer	On-going

Table 3.02-7 Construction Site Pollution Control Plan and Measurable Goals

E. Postconstruction Stormwater Management

Section 3.01 documents existing UWW activities. It is recommended that the UWW continue those activities and supplement them with the recommendations included in Table 3.02-8.

	Activity	Measurable Goal	Responsible Party	Anticipated Completion Date
1	Continue administration and enforcement of the Postconstruction Stormwater Management Requirements. Continue to update WI DOA/DFD requirements and procedures to be consistent with the most recent version of NR 151.	Ongoing	Campus Facilities Engineer	On-going
2	Document the number of construction projects administered under the Postconstruction Stormwater Management Requirements each year by WI DOA/DFD.	Ongoing	Campus Facilities Engineer	On-going
3	Document the number and nature of inspections and enforcement actions conducted by WI DOA/DFD to ensure compliance with the postconstruction stormwater management requirements.	Ongoing	Campus Facilities Engineer	On-going

Table 3.02-8 Postconstruction Stormwater Management Plan and Measurable Goals

F. Pollution Prevention for Municipal Operations

In Section 3.01, we documented existing UWW activities. We recommend that the UWW continue those activities and supplement them with the recommendations included in Table 3.02-9.

	Activity	Measurable Goal	Responsible Party	Anticipated Completion Date
1	Maintenance of Existing UWW Owned/Operated Stormwater BMPs–Continue to maintain stormwater facilities. Maintenance of stormwater facilities should be in accordance with the Stormwater Facility Maintenance program document provided in Appendix G. Track these maintenance operations.	Ongoing per Appendix G.	Campus Facilities Engineer	Ongoing
2	Street Sweeping–Continue existing program. In 2018, begin tracking quantities and miles of streets sweeped each year based on data requested from and provided by the City.	Ongoing	Campus Facilities Engineer	Ongoing
3	Catch Basin Cleaning on Warhawk Drive and Schwager Drive–Clean catch basins yearly. In 2018, begin tracking quantities removed from catch basins each year. Complete a map of UWW catch basins including sump depth.	Continue yearly catch basin cleaning.	Campus Facilities Engineer	Map-December 2018; Cleaning-Yearly by November 15
4	Deicing and Snow Removal–Continue current operations and look for possible ways to decrease deicer use while still maintaining public safety. References regarding deicers include: -WisDOT Highway Maintenance Manual, Chapter 6: http://wisconsindot.gov/Pages/doing-bus/local-gov/hwy-mnt/mntc-manual/chapter06.aspx -DNR Guidance for Municipalities: http://dnr.wi.gov/topic/stormwater/documents/snow.pdf Also, track the yearly quantity of salt and deicer used.	Ongoing	Campus Facilities Engineer	Ongoing
5	Leaf and Grass Management–Continue existing program consisting of mulching leaves during mowing operations.	Ongoing	Campus Facilities Engineer	Ongoing
6	Municipal Garage and Storage Area Management–Continue existing operations. Track quantity of used oil recycled each year. Implement SWPPP recommendations included in Appendix I.	Ongoing	Campus Facilities Engineer	Ongoing
7	Turf Maintenance Policies–Continue existing program. In 2018, begin tracking the type, quantity, and location of fertilizer usage each year.	Ongoing	Campus Facilities Engineer	Ongoing
8	Measures to Reduce Municipal Sources of Stormwater Within Source Water Protection Areas–The UWW should continue existing practices.	Ongoing	Campus Facilities Engineer	Ongoing
9	Track Pollution Prevention for Municipal Operations for annual report to DNR.	Once each year	Campus Facilities Engineer	Once each year

Table 3.02-9 Pollution Prevention for Municipal Operations Plan and Measurable Goals

G. Stormwater Quality Management

The UWW currently does not meet the 20 percent reduction in the annual average mass of TSS discharging from the UWW's MS4 to surface waters of the state, as described in Section 4. Section 5 provides an alternatives analysis to look at cost-effective ways to attain the 20 percent TSS reduction requirements and the Rock River Basin TMDL reduction requirements for TP (66 percent) and TSS (49 percent). Section 7 recommends stormwater planning activities to meet the 20 percent TSS reduction requirements and TMDL requirements.

We recommend the implementation of the following activities with their associated measurable goals, responsible parties, and anticipated completion dates, as described in Table 3.02-10.

	Activity	Measurable Goal	Responsible Party	Anticipated Completion Date
1	Implement recommended activities to bring the UWW into compliance with the Rock River Basin TMDL TP and TSS reduction requirement as described in Section 5 and 7 of this plan.	Achieve Rock River Basin TMDL TP and TSS reduction requirements per the implementation plan provided in Section 5 and 7 of this plan.	UWW	A short-term (current permit term) and long-term implementation plan is provided in Sections 5 and 7 of this plan.

Table 3.02-10 Stormwater Quality Management Plan and Measurable Goal

H. Storm Sewer System Map

The storm sewer system maps submitted in this plan meet the WPDES permit requirements. We recommend the storm sewer system map be updated on an annual basis as needed to be submitted with the Annual Report. We recommend implementation of the following activities with their associated measureable goals, responsible parties, and anticipated completion dates, as described in Table 3.02-11.

	Activity	Measurable Goal	Responsible Party	Anticipated Completion Date
1	Annual update of storm sewer system map.	Once each year, if needed because of development in the UWW.	Campus Facilities Engineer	Yearly by March 1, if needed.

Table 3.02-11 Storm Sewer System Map Plan and Measurable Goal

I. Annual Report

The WPDES stormwater permit requires the UWW to submit an annual report for each calendar year by March 31 of the following year. It is our understanding that UWW isn't required to pay a yearly WPDES stormwater permit fee as municipalities are required to do per NR 216.09.

We recommend implementation of the following activities with their associated measurable goal, responsible party, and anticipated completion date as described in Table 3.02-12.

	Activity	Measurable Goal	Responsible Party	Anticipated Completion Date
1	Compilation of tracked permit activities.	Once each year	Campus Facilities Engineer	Once each year, by March 1.
2	Preparation and submittal of annual report.	Once each year	Campus Facilities Engineer	Once each year, by March 31.

Table 3.02-12 Annual Report and Permit Fee Plan and Measurable Goals

J. Cooperation

Continue partnership with the City and the other RRSG municipalities on public education and outreach and public involvement and participation.

SECTION 4
STORMWATER QUALITY MODELING

4.01 INTRODUCTION

A. General

Water quality analysis for the City and the UWW was completed using the Source Loading and Management Model (WinSLAMM v10.2.1), herein referred to as SLAMM. SLAMM is a computer model approved by WDNR to address the requirements of NR 151 that analyze nonpoint source pollution abatement. SLAMM has been calibrated using extensive water quality data throughout the United States. As this model is used for regulatory purposes, the results can be compared to other past and ongoing studies. SLAMM is regularly updated to include additional water quality monitoring data to further refine its predictive capabilities.

SLAMM is a planning-level tool that enables municipalities to make decisions regarding BMPs necessary to achieve nonpoint source runoff standards described in NR 151. SLAMM specifically analyzes control practices including street sweeping, wet detention ponds, catch basin and inlet sumps, infiltration devices, porous pavements, and grass swales. SLAMM also predicts relative pollutant contributions from "source areas" including rooftops, parking lots, driveways, streets, sidewalks, and pervious space.

B. Regulatory Requirements

The City and UWW's Stormwater Permits require assessment of compliance with NR 151 pollutant reduction goals through completion of a pollutant loading analysis using the SLAMM or other equivalent pollutant loading model. At a minimum, the City and UWW must estimate average annual TSS and phosphorus loads for the cumulative discharge from all outfalls for the "no controls/baseline" and "controls/existing" conditions. For the no controls condition, the modeling must estimate the theoretical annual average mass of TSS and TP generated for the entire area served by the City's and UWW's stormwater management systems with no controls or BMPs applied. The controls condition must estimate the City's and UWW's current levels of pollutant reductions based on current City and UWW practices including wet detention basins, bioretention basins, and swale drainage. The controls condition must be judged against the no controls condition to determine the percent of TSS and TP reduction.

The pollutant loading analysis will be used by the WDNR to evaluate compliance with mandated pollutant reduction goals. As discussed in Section 1, the City and UWW must implement stormwater management practices so that the controls condition results in a minimum of 20 percent TSS reduction compared to the no controls condition and must meet the Rock River Basin TMDL requirements.

C. Analysis Methodology

City and UWW land use was divided for SLAMM modeling purposes into the categories of residential, commercial, institutional, industrial, exempt, and open space. Table 4.01-1 lists the percentage of source area for each land use category from the WDNR Standard Land Use. The WDNR Standard Land Use distributions were modified according to impervious areas within the modeled area. Table 4.01-2 lists the distribution of impervious source areas by land use class from the WDNR Standard Land use. Table 4.01-3 lists the distribution of pervious source areas by land use class from the WDNR Standard Land use. Strand delineated impervious and pervious areas within the City and UWW for commercial, industrial, and institutional land uses. Samples were taken of residential areas for total impervious versus pervious areas and applied to all comparable areas. Refer to Figure 2.01-2 and Tables 2.01-1 and 2.01-2, which shows the modeled SLAMM land use.

Table 4.01-1 Source Area by Land Use

Class	Land Use	Roof (percent)	Driveway (percent)	Sidewalk (percent)	Paved Parking/ Storage (percent)	Unpaved Parking/ Storage (percent)	Playground (percent)	Large Landscaped (percent)	Undeveloped (percent)	Small Landscaped (percent)	Other Pervious (percent)	Isolated Water Body (percent)	Directly Connected Impervious (percent)	Partially Connected Impervious (percent)	Street Area (percent)	Total (percent)
Residential	High Density Residential with Alleys (<1/4 acre lots)	24.20	0.70	6.40	0.40	0.00	0.00	0.00	0.30	41.50	6.30	0.00	0.00	0.00	20.20	100.00
	High Density Residential Without Alleys (<1/4 acre Lots)	21.40	14.10	4.0	0.00	0.00	0.00	0.00	0.00	41.00	5.90	0.10	0.00	0.00	13.50	100.00
	Medium Density Residential (1/4 to 1/2 acre lots)	15.00	7.50	2.20	0.20	0.00	0.00	0.20	0.40	57.50	4.00	0.20	0.00	0.00	12.80	100.00
	Low Density Residential (>1/2 acre lots)	8.00	4.50	0.70	0.10	0.00	0.00	0.00	4.40	74.80	0.20	0.20	0.10	0.00	7.00	100.00
	Duplex	16.54	5.31	3.96	0.00	0.00	0.00	0.00	0.00	60.88	0.00	0.00	0.00	0.00	13.31	100.00
	Multifamily	20.70	2.80	4.20	10.80	0.50	0.10	1.40	3.00	38.00	3.80	0.10	0.00	0.00	14.60	100.00
	Mobile Home	16.90	12.30	1.00	13.40	0.60	0.00	0.00	4.50	44.70	0.00	1.00	2.00	0.00	3.60	100.00
Commercial	Commercial	9.44	0.00	2.28	26.31	0.00	0.00	58.66	0.00	0.00	0.00	0.00	0.00	0.00	3.31	100.00
	Commercial DownVillage and Town	40.73	1.48	8.35	22.61	0.00	0.00	0.00	0.00	3.56	0.62	0.00	0.00	0.08	22.17	99.60
	Shopping Center	21.61	1.81	0.54	60.68	0.34	0.00	0.00	2.93	4.53	0.82	0.00	0.35	0.00	6.39	100.00
	Strip Commercial	23.40	2.00	4.30	40.90	1.40	0.00	0.00	0.20	5.80	1.90	0.00	0.00	0.00	20.10	100.00
Institutional	Institutional	14.41	3.00	2.20	27.21	0.00	3.40	5.34	1.83	26.55	2.65	0.00	0.00	1.33	12.08	100.00
	School	15.00	1.98	2.91	10.65	0.00	17.33	22.09	0.42	17.43	2.19	0.00	0.00	1.35	8.65	100.00
Industrial	Light Industrial	25.35	2.56	1.28	32.94	6.34	0.00	3.51	4.34	9.86	2.77	0.00	0.00	0.21	10.84	100.00
	Medium Industrial	23.11	2.80	0.90	34.09	14.61	0.00	2.81	5.37	4.00	4.53	0.00	0.00	0.23	7.55	100.00
Other Urban	Cemetery	1.10	7.67	0.06	2.24	0.07	0.00	86.40	0.48	0.23	0.00	0.28	0.00	0.03	1.44	100.00
	Open Space	0.55	0.00	0.58	0.00	0.00	0.00	0.59	94.54	0.00	0.00	0.00	0.00	0.00	3.74	100.00
	Park	0.46	1.21	0.49	4.19	0.22	1.80	77.95	0.00	0.85	0.00	7.08	0.00	2.48	3.27	100.00

Source: WDNR Standard Land Use Tables

Table 4.01-2 Distribution of Impervious Source Areas by Land Use Class

Class	Land Use	Pitched Roofs		Flat Roofs		Driveways		Sidewalks		Parking/Storage		Unpaved Parking/Storage		
		Connected (percent)	Unconnected (percent)	Connected (percent)	Unconnected (percent)	Connected (percent)	Unconnected (percent)	Connected (percent)	Unconnected (percent)	Connected (percent)	Unconnected (percent)	Connected (percent)	Unconnected (percent)	Total (percent)
Residential	High Density Residential with Alleys (<1/4 acre lots)	42.9	33.4	0.0	0.0	2.2	0.0	10.1	10.1	1.3	0.0	0.0	0.0	100.0
	High Density Residential Without Alleys (<1/4 acre lots)	26.0	28.1	0.0	0.0	35.7	0.0	5.1	5.1	0.0	0.0	0.0	0.0	100.0
	Medium Density Residential (1/4 to 1/2 acre lots)	18.1	42.2	0.0	0.0	22.5	7.6	4.4	4.4	0.8	0.0	0.0	0.0	100.0
	Low Density Residential (>1/2 acre lots)	14.3	45.9	0.0	0.0	24.1	9.8	2.6	2.6	0.8	0.0	0.0	0.0	100.0
	Duplex	17.4	46.7	0.0	0.0	20.6	0.0	15.3	0.0	0.0	0.0	0.0	0.0	100.0
	Multifamily	36.2	8.2	8.7	0.0	4.9	2.3	5.4	5.4	27.7	0.0	1.3	0.0	100.0
	Mobile Home	0.0	0.0	38.2	0.0	27.8	0.0	1.1	1.1	30.3	0.0	0.0	1.4	100.0
Commercial	Commercial	2.0	0.0	12.4	10.5	0.0	0.0	6.0	0.0	69.2	0.0	0.0	0.0	100.0
	Commercial DownVillage and Town	0.0	0.0	55.7	0.0	2.0	0.0	11.4	0.0	30.9	0.0	0.0	0.0	100.0
	Shopping Center	0.0	0.0	25.4	0.0	2.1	0.0	0.6	0.0	71.4	0.0	0.4	0.0	100.0
	Strip Commercial	5.1	0.0	27.4	0.0	2.8	0.0	6.0	0.0	56.8	0.0	0.0	1.9	100.0
Institutional	Institutional	18.0	1.2	11.5	0.0	6.4	0.0	4.7	0.0	58.1	0.0	0.0	0.0	100.0
	School	0.0	0.0	49.1	0.0	6.5	0.0	9.5	0.0	34.9	0.0	0.0	0.0	100.0
Industrial	Light Industrial	3.8	0.0	30.0	3.3	3.7	0.0	1.9	0.0	48.1	0.0	0.0	9.3	100.0
	Medium Industrial	2.5	0.0	22.3	5.9	2.4	1.3	0.6	0.6	45.2	0.0	0.0	19.4	100.0
Other Urban	Cemetery	0.0	4.9	4.9	0.0	68.9	0.0	0.5	0.0	20.1	0.6	0.0	0.0	100.0
	Open Space	0.0	0.0	48.7	0.0	0.0	0.0	51.3	0.0	0.0	0.0	0.0	0.0	100.0
	Park	1.7	3.8	1.5	0.0	18.4	0.0	7.5	0.0	63.8	0.0	0.0	3.4	100.0

Table 4.01-3 Distribution of Pervious Source Areas by Land Use Class

Class	Land Use	Playground		Pervious Areas							
		Connected (percent)	Unconnected (percent)	Large Landscaped Area (percent)	Undeveloped (percent)	Small Landscaped Area (percent)	Other Pervious (percent)	Isolated Water Body (percent)	Other Partially Connected (percent)	Other Directly Connected (percent)	Total (percent)
Residential	High Density Residential with Alleys (<1/4 acre lots)	0.0	0.0	0.0	0.6	86.3	13.1	0.0	0.0	0.0	100.0
	High Density Residential Without Alleys (<1/4 acre lots)	0.0	0.0	0.0	0.0	87.2	12.6	0.2	0.0	0.0	100.0
	Medium Density Residential (1/4 to 1/2 acre lots)	0.0	0.0	0.3	0.6	92.3	6.4	0.3	0.0	0.0	100.0
	Low Density Residential (>1/2 acre lots)	0.0	0.0	0.0	5.5	93.9	0.3	0.3	0.1	0.0	100.0
	Duplex	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	100.0
	Multifamily	0.0	0.2	3.0	6.5	81.9	8.2	0.2	0.0	0.0	100.0
	Mobile Home	0.0	0.0	0.0	8.6	85.6	0.0	1.9	0.0	3.8	100.0
Commercial	Commercial	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
	Commercial DownVillage and Town	0.0	0.0	0.0	0.0	83.6	14.6	0.0	1.9	0.0	100.0
	Shopping Center	0.0	0.0	0.0	34.0	52.5	9.5	0.0	0.0	4.1	100.0
	Strip Commercial	0.0	0.0	0.0	2.5	73.4	24.1	0.0	0.0	0.0	100.0
Institutional	Institutional	4.1	4.1	13.0	4.5	64.6	6.5	0.0	3.2	0.0	100.0
	School	28.5	0.0	36.3	0.7	28.7	3.6	0.0	2.2	0.0	100.0
Industrial	Light Industrial	0.0	0.0	17.0	21.0	47.7	13.4	0.0	1.0	0.0	100.0
	Medium Industrial	0.0	0.0	16.6	31.7	23.6	26.7	0.0	1.4	0.0	100.0
Other Urban	Cemetery	0.0	0.0	98.8	0.6	0.3	0.0	0.3	0.0	0.0	100.0
	Open Space	0.0	0.0	0.6	99.4	0.0	0.0	0.0	0.0	0.0	100.0
	Park	1.0	1.0	86.5	0.0	0.9	0.0	7.9	2.8	0.0	100.0

4.02 WDNR SLAMM GUIDANCE

The following WDNR guidance was referred to for the City's and UWW's MS4 modeling. Copies of each guidance document are provided in Appendix C.

1. *TMDL Guidance for MS4 Permits: Planning, Implementation, and Modeling Guidance, Addendum B (Internally Drained Areas), May 2016.*
2. *TMDL Guidance for MS4 Permits: Planning, Implementation, and Modeling Guidance, Addendum A (Percent Reduction), February 2016.*
3. Modeling Post-Construction Storm Water Management Treatment, May 2015.
4. *Developed Urban Areas and the 20% and 40% TSS Reductions Sections NR 151.13(2) and NR 216.07(6), Wis. Adm. Code,* November 24, 2010.
5. *Process to Assess and Model Grass Swales for ss. NR 151.13(2) and NR216.07(6), Wis. Adm. Code - Total Suspended Solids Reduction,* November 24, 2010.
6. *TMDL Guidance for MS4 Permits: Planning, Implementation, and Modeling Guidance,* October 20, 2014.
7. Modeling of dry detention basins for TSS removal, April 1, 2010.
8. *Errata to Guidance on Process to Assess and Model Grass Swales for ss. NR 151.13(2) and NR 216.07*6), Wis. Adm. Code - Total Suspended Solids Reduction,* January 8, 2010.
9. *Developed Urban Areas and the 20% and 40% TSS Reductions Internally Drained Areas*, April 6, 2009.
10. *Errata for Process to Assess and Model Existing Grass Swales (TSS Reduction): Modifications to Double-Ring Infiltrometer Test Procedures in Technical Standard 1002,* August 2008.

Pursuant to the guidelines provided in the memorandum, a portion of City and UWW lands can be exempted from inclusion in the lands required to be modeled in SLAMM. Figures 2.01-1 shows the watersheds modeled in SLAMM.

4.03 SWALE MODELING AND DOUBLE-RING INFILTROMETER TESTING

On July 25, 2016, double-ring infiltrometer testing was performed at four locations throughout the City and UWW. The test locations are shown in Figure 4.03-1. Test locations were based on soil type and contributing areas. The City and UWW consist of 103 different soil types with the majority of them being in the Hydrologic Soil Group B and the dominant soil is Plano Silt Loam. The soil test at the southeast area of the Schwager Drive and North Prairie Street intersection showed no measureable infiltration rate during the two-hour field test. It was therefore decided to exclude this test when calculating the geometric mean of the dynamic infiltration rates.

DOUBLE-RING INFILTROMETER TEST LOCATIONS

TMDL STORMWATER PLAN
CITY OF WHITEWATER
WALWORTH AND JEFFERSON COUNTIES, WISCONSIN

Legend

- Infiltration Test Locations

Road Drainage

- Curb and Gutter
- Curb and Gutter/Grass Swale
- Curb and Gutter/Undeveloped
- Grass Swale
- Grass Swale/Undeveloped
- Undeveloped
- City Limits
- UW Whitewater Boundary

Soil Texture

- Clayey
- Sandy
- Silty
- Water

N W E S

0 1,000 2,000 4,000 Feet

1 2 3 4

STRAND ASSOCIATES®

FIGURE 4.03-1
1407.088

Path: S:\MAD\1400--1499\1407\088\Data\GIS\Report Figures\Figure 4.03-1 Infiltrometer Testing Location 11x17.mxd User: davidk Date: 12/29/2017 Time: 8:36:23 AM

The results of the testing presented in Table 4.03-1 show a static infiltration rate geometric mean of 6.08 inches per hour (in/hr) and a geometric dynamic infiltration rate geometric mean of 3.04 in/hr. In the vicinity of the Schwager Drive and North Prairie Street intersection an infiltration rate of 0.03 was used per Page 4 of the November 24, 2010 WDNR Guidance document since there was no measurable infiltration rate during the field test. In swales adjacent to but beyond 150 feet from the Schwager Drive and North Prairie Street intersection a 0.065 in/hr dynamic infiltration rate was used. The remaining grass-lined swales use a dynamic infiltration rate of 3.04 in/hr. The use of these infiltration rates was approved by Bryan Hartsook of the WDNR on August 26, 2016.

Location	Static Infiltration Rate (in/hr)	Dynamic Infiltration Rate (in/hr)
1	--	--
2	2.29	1.15
3	10.47	5.24
4	9.38	4.69

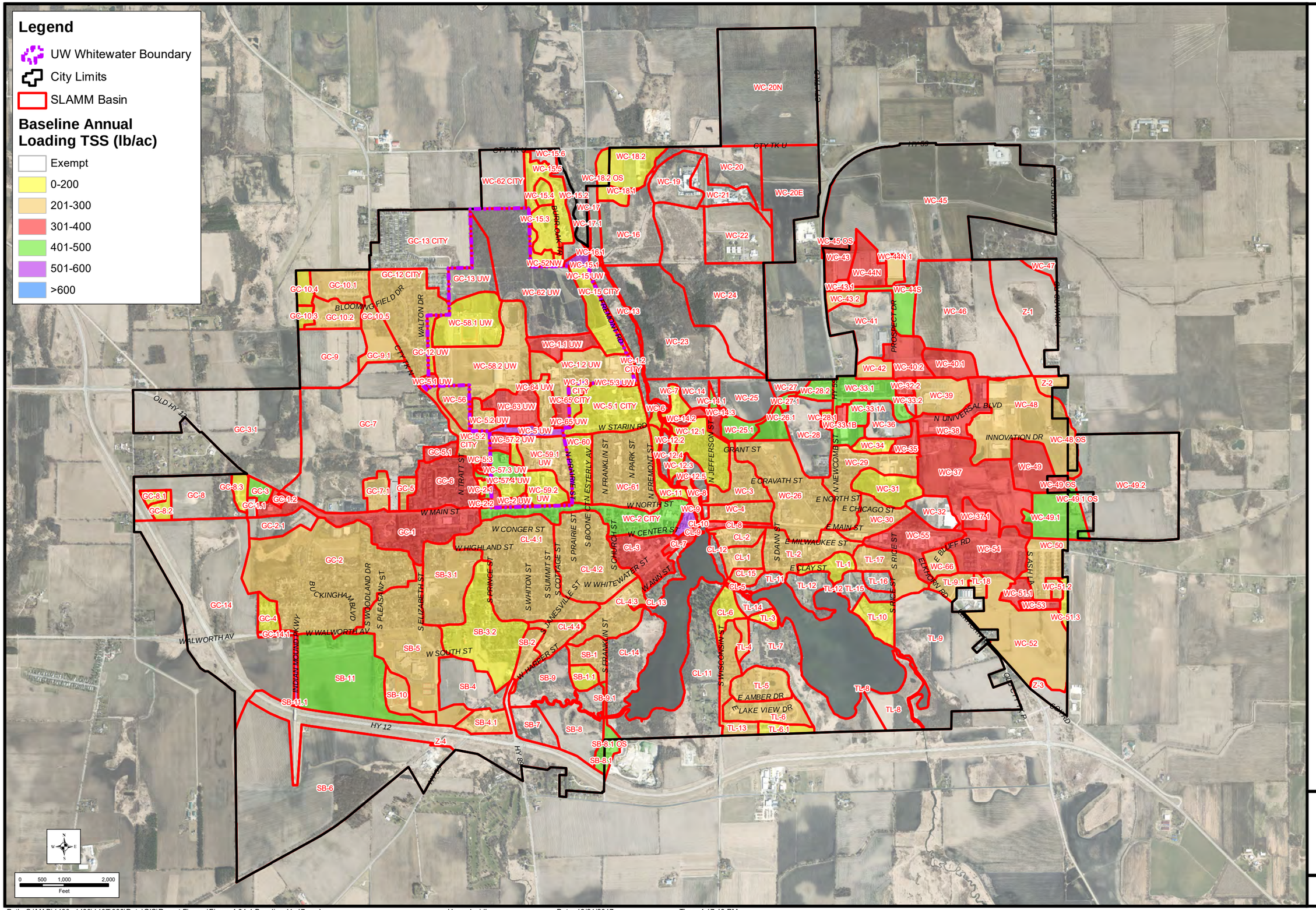
Table 4.03-1 Infiltration Testing Results Summary

4.04 BASELINE CONDITIONS ANALYSIS

To evaluate the effectiveness of the City's and UWW's existing stormwater management practices and proposed management practices, baseline conditions were modeled using SLAMM. Models were run to estimate the TSS and TP loadings for each watershed. Baseline conditions are considered to have no BMPs employed, in accordance with guidelines specified by the WDNR. For example, the City and UWW are assumed to be drained completely by a curb and gutter system. Also, no wet detention basins or infiltration practices were modeled for the baseline conditions.

Results of the City baseline condition model are shown in Figure 4.04-1. This figure helps identify potential "hot spots" that may be good locations for BMPs to help reduce TSS and TP loads to comply with future TMDLs. Table 4.04-1 and 4.04-2 list the baseline annual TSS and TP loads by subbasin for the City, respectively. As can be seen, the City total annual pounds of TSS in the baseline condition is 561,670. This loading equates to an average City TSS loading rate in the baseline conditions of 264 pounds per acre (lb/ac). The City's total annual pounds of TP loading in the baseline condition is 1,538.9. The City TP loading rates are 0.72 lb/ac. Fifty-seven basins were considered exempt under NR 151 guidelines, which are listed in Table 4.04-5.

Results of the UWW baseline condition model are shown in Figure 4.04-1. This figure helps identify potential "hot spots" that may be good locations for BMPs to help reduce TSS and TP loads to comply with future TMDLs. Table 4.04-3 and 4.04-4 list the baseline annual TSS and TP loads by subbasin for the UWW, respectively. As can be seen, the UWW total annual pounds of TSS in the baseline conditions is 70,568. These loadings equate to an average UWW TSS loading rate in the baseline conditions of 239 lbs/ac. The UWW total annual pounds of TP loading in the baseline condition is 179.8. The UWW TP loading rates are 0.61 lb/acre, respectively. Two basins were considered exempt under NR 151 guidelines. These are listed in Table 4.04-6.



BASELINE LOADING - TOTAL SUSPENDED SOLIDS

TMDL STORMWATER PLAN
CITY OF WHITEWATER
WALWORTH AND JEFFERSON COUNTIES

STRAND ASSOCIATES®

FIGURE 4.04-1
1407.088

Path: S:\MAD\1400--1499\1407\088\Data\GIS\Report Figures\Figure 4.04-1 Baseline 11x17.mxd User: davidk Date: 12/21/2017 Time: 4:17:48 PM

Table 4.04-1 Total Suspended Solids Loading Results Baseline and Existing Controls Conditions–City of Whitewater

Basin	Total MS4 Area[1] (Acres)	Off-site Drainage Area (Acres)	Exempt MS4 Area[1] (Acres)	Regulatory MS4 Area[1] (Acres)	2016 Baseline Conditions			Existing Conditions			Percent Reduction	Major Soil Type	Current Practices	Swale dynamic infiltration rate
					5-Yr TSS (lbs)	Annual TSS (lbs)	Annual TSS Loading (lbs/acre)	5-Yr TSS (lbs)	Annual TSS (lbs)	Annual TSS Loading (lbs/acre)				
CL-1	12.0	0.0	0.0	12.0	17,318	3,464	288	7,922	1,584	132	54.3%	Sandy	SS, CB	--
CL-10	0.3	0.0	0.0	0.3	1,300	260	919	756	151	534	41.8%	Silty	SS, CB	--
CL-11	79.7	0.0	79.7	NA	0	0	0	0	0	0	0.0%	Silty	Exempt	--
CL-12	4.3	0.0	4.3	NA	0	0	0	0	0	0	0.0%	Sandy	Exempt	--
CL-13	8.4	0.0	8.4	NA	0	0	0	0	0	0	0.0%	Silty	Exempt	--
CL-14	39.3	0.0	39.3	NA	0	0	0	0	0	0	0.0%	Silty	Exempt	--
CL-15	5.3	0.0	0.0	5.3	5,311	1,062	201	1,798	360	68	66.1%	Silty	WP	--
CL-2	10.8	0.0	0.7	10.1	13,607	2,721	268	10,337	2,067	204	24.0%	Sandy	SS, CB	--
CL-3	27.3	0.0	1.8	25.5	48,160	9,632	377	9,554	1,911	75	80.2%	Silty	SS, GS, WP, CB	3.04
CL-4.1, CL-4.2, CL-4.3, CL-4.4	203.2	0.0	4.2	199.0	249,753	49,951	251	124,630	24,926	125	50.1%	Silty	SS, GS, CB, WP	3.04
CL-5	0.8	0.0	0.0	0.8	881	176	229	850	170	221	3.5%	Silty	SS	--
CL-6	11.5	0.0	0.0	11.5	9,340	1,868	163	5,521	1,104	96	40.9%	Silty	SS, GS	3.04
CL-7	3.3	0.0	1.2	2.0	3,728	746	364	3,354	671	328	10.0%	Silty	SS	--
CL-8	4.1	0.0	1.4	2.6	4,826	965	367	3,590	718	273	25.6%	Sandy	SS, CB	--
CL-9	1.3	0.0	0.4	0.9	1,475	295	322	1,475	295	322	0.0%	Silty	--	--
GC-1_GC-1.2	63.3	0.0	0.9	62.4	114,907	22,981	368	77,292	15,458	248	32.7%	Sandy	SS, GS, BF	3.04
GC-1.1	2.3	0.0	1.5	0.8	3,540	708	857	208	42	50	94.1%	Sandy	SS, GS	3.60
GC-10.1, GC-12 CITY, GC-12 UW, GC-9.1, GC-10.5	102.7	4.1	11.3	87.3	94,517	18,903	217	7,420	1,484	17	92.1%	Sandy	WP, GS, SS	3.04, 0.13
GC-10.2	16.4	0.0	0.0	16.4	16,487	3,297	202	1,910	382	23	88.4%	Sandy	BF, SS	--
GC-10.3	4.0	0.0	0.0	4.0	358	72	18	358	72	18	0.0%	Sandy	SS	--
GC-10.4	6.3	0.0	0.0	6.3	4,859	972	155	963	193	31	80.2%	Sandy	SS	--
GC-13 CITY	73.3	0.0	73.3	NA	0	0	0	0	0	0	0.0%	Sandy	Exempt	--
GC-14	185.0	0.0	185.0	NA	0	0	0	0	0	0	0.0%	Sandy	Exempt	--
GC-14.1	2.2	0.0	0.1	2.2	10,435	2,087	968	0	0	0	100.0%	Silty	SS, GS	3.04
GC-2	157.3	0.0	8.0	149.3	170,328	34,066	228	157,301	31,460	211	7.6%	Silty	SS, GS	0.13
GC-2.1	15.4	0.0	15.4	NA	0	0	0	0	0	0	0.0%	Silty	Exempt	--
GC-3	5.6	0.0	2.5	3.1	7,728	1,546	498	401	80	26	94.8%	Sandy	SS, GS	3.04
GC-3.1	126.7	0.0	126.7	NA	0	0	0	0	0	0	0.0%	Sandy	Exempt	--
GC-4	8.1	0.0	0.0	8.1	7,353	1,471	181	6,857	1,371	169	6.7%	Silty	SS	--
GC-5	5.2	0.0	0.0	5.2	5,826	1,165	226	5,220	1,044	203	10.4%	Sandy	SS	--
GC-5.1	5.5	0.0	0.0	5.5	10,344	2,069	375	9,041	1,808	328	12.6%	Sandy	SS	--
GC-6	36.6	0.0	0.0	36.6	58,640	11,728	320	52,678	10,536	288	10.2%	Sandy	SS	--
GC-7	190.1	0.0	190.1	NA	0	0	0	0	0	0	0.0%	Silty	Exempt	--
GC-7.1	10.0	0.0	0.0	10.0	12,806	2,561	255	3,258	652	65	74.6%	Silty	WP	--
GC-8	44.0	0.0	44.0	NA	0	0	0	0	0	0	0.0%	Sandy	Exempt	--
GC-8.1	3.5	0.0	0.0	3.5	3,303	661	190	176	35	10	94.7%	Sandy	WP	--
GC-8.2	5.1	0.0	0.0	5.1	3,589	718	142	296	59	12	91.8%	Sandy	WP	--

GC-8.3	6.1	0.0	0.1	6.0	3,791	758	126	0	0	0	100.0%	Sandy	SS, BF	--
GC-9	42.2	0.0	42.2	NA	0	0	0	0	0	0	0.0%	Sandy	Exempt	--
SB-1	12.9	0.0	0.2	12.8	16,816	3,363	263	13,225	2,645	207	21.4%	Silty	SS, CB	--
SB-1.1	7.3	0.0	2.4	4.9	4,202	840	173	1,594	319	66	62.1%	Silty	WP, SC	--
SB-11	83.5	0.0	66.6	17.0	41,429	8,286	489	40,548	8,110	478	2.1%	Silty	SS	--
SB-11.1	3.4	0.0	0.5	3.0	8,289	1,658	560	7,283	1,457	492	12.1%	Silty	SS	--
SB-2	10.1	0.0	1.1	9.0	11,962	2,392	267	11,035	2,207	246	7.7%	Silty	SS	--
SB-3.1	44.7	0.0	0.0	44.7	46,481	9,296	208	41,045	8,209	184	11.7%	Silty	SS, GS	0.13
SB-3.2	61.5	0.0	6.3	55.2	54,816	10,963	199	51,308	10,262	186	6.4%	Silty	SS	
SB-4	31.3	0.0	31.3	NA	0	0	0	0	0	0	0.0%	Silty	Exempt	--
SB-4.1	12.5	0.0	0.6	11.9	13,370	2,674	225	3,789	758	64	71.7%	Silty	SS, GS	3.04
SB-5,SB-10	97.3	0.0	8.4	89.0	122,826	24,565	276	15,291	3,058	34	87.6%	Silty	WP, BF, SS, GS	3.04
SB-6	222.7	0.0	222.7	NA	0	0	0	0	0	0	0.0%	Silty	Exempt	--
SB-7	15.1	0.0	15.1	NA	0	0	0	0	0	0	0.0%	Silty	Exempt	--
SB-8	29.1	0.0	29.1	NA	0	0	0	0	0	0	0.0%	Silty	Exempt	--
SB-8.1, SB-8.1 OS	9.6	4.3	3.4	1.9	3,997	799	421	22	4	2	99.5%	Silty	SS, GS	3.04
SB-9	36.7	0.0	36.7	NA	0	0	0	0	0	0	0.0%	Silty	Exempt	--
SB-9.1	1.3	0.0	0.4	1.0	2,345	469	477	10	2	2	99.6%	Sandy	SS, GS	3.04
TL-1	10.7	0.0	0.0	10.7	10,284	2,057	192	5,373	1,075	100	47.8%	Sandy	SS, GS	3.04
TL-10	15.4	0.0	0.0	15.4	6,909	1,382	90	6,909	1,382	90	0.0%	Sandy	--	--
TL-11	5.9	0.0	5.9	NA	0	0	0	0	0	0	0.0%	Sandy	Exempt	--
TL-12	15.0	0.0	15.0	NA	0	0	0	0	0	0	0.0%	Sandy	Exempt	--
TL-13	21.1	0.0	0.0	21.1	22,150	4,430	210	2,425	485	23	89.1%	Silty	WP, SS, GS	3.04
TL-14	6.0	0.0	6.0	NA	0	0	0	0	0	0	0.0%	Sandy	Exempt	--
TL-15	12.6	0.0	12.6	NA	0	0	0	0	0	0	0.0%	Sandy	Exempt	--
TL-16	6.4	0.0	6.4	NA	0	0	0	0	0	0	0.0%	Silty	Exempt	--
TL-17	23.7	0.0	6.5	17.2	19,290	3,858	224	4,318	864	50	77.6%	Sandy	GS, SS, CB	3.04
TL-18	3.8	0.0	0.0	3.8	4,652	930	244	2,719	544	143	41.6%	Silty	SS, GS	0.13
TL-2	31.6	0.0	0.3	31.3	41,842	8,368	268	11,382	2,276	73	72.8%	Sandy	SS, GS, WP, CB	3.04
TL-3	4.1	0.0	0.0	4.1	1,912	382	94	1,722	344	84	9.9%	Silty	SS	--
TL-4	5.2	0.0	0.0	5.2	5,653	1,131	218	820	164	32	85.5%	Silty	GS	3.04
TL-5	20.8	0.0	0.0	20.8	22,182	4,436	213	5,538	1,108	53	75.0%	Silty	WP, SS	--
TL-6	21.8	0.0	0.0	21.8	21,977	4,395	201	6,669	1,334	61	69.7%	Silty	WP, SS	--
TL-6.1	6.5	0.0	0.0	6.5	4,540	908	140	3,597	719	111	20.8%	Silty	SC, GS	0.13
TL-7	58.0	0.0	58.0	NA	0	0	0	0	0	0	0.0%	Silty	Exempt	--
TL-8	23.3	0.0	23.3	NA	0	0	0	0	0	0	0.0%	Silty	Exempt	--
TL-9	118.2	0.0	118.2	NA	0	0	0	0	0	0	0.0%	Silty	Exempt	--
TL-9.1	8.6	0.0	0.3	8.3	10,541	2,108	253	7,854	1,571	189	25.5%	Silty	SS, OCD	--
WC-1.2 CITY, WC-1.3 CITY, WC- 1.2 UW	43.6	38.4	0.0	5.2	3,663	733	141	2,228	446	86	39.2%	Sandy	SS, GS	3.04
WC-10	1.0	0.0	1.0	NA	0	0	0	0	0	0	0.0%	Sandy	Exempt	--
WC-11	10.6	0.0	0.0	10.6	5,594	1,119	106	5,476	1,095	104	2.1%	Sandy	SS	--
WC-12.1	28.9	0.0	0.0	28.9	12,889	2,578	89	11,923	2,385	83	7.5%	Sandy	SS	--
WC-12.2	1.8	0.0	0.0	1.8	1,679	336	190	1,331	266	151	20.7%	Sandy	SS, CB	--
WC-12.3	3.8	0.0	0.0	3.8	3,398	680	177	2,706	541	141	20.4%	Sandy	SS, CB	--
WC-12.4	4.6	0.0	4.6	NA	0	0	0	0	0	0	0.0%	Sandy	Exempt	--
WC-12.5	7.4	0.0	7.4	NA	0	0	0	0	0	0	0.0%	Sandy	Exempt	--

WC-13	23.4	0.0	23.4	NA	0	0	0	0	0	0	0.0%	Silty	Exempt	--
WC-14	18.0	0.0	18.0	NA	0	0	0	0	0	0	0.0%	Sandy	Exempt	--
WC-14.1	1.6	0.0	0.0	1.6	3,874	775	471	6	1	1	99.8%	Sandy	SS, GS	3.04
WC-14.2, WC-14.3	9.6	0.0	0.8	8.7	13,706	2,741	313	2,204	441	50	83.9%	Sandy	WP, SS, CB	--
WC-15 CITY, WC-15 UW	24.5	21.8	0.0	2.7	1,546	309	113	8	2	1	99.5%	Silty	SS, GS	3.04
WC-15.1	3.5	0.0	3.1	0.5	1,138	228	501	987	197	435	13.3%	Silty	SS	--
WC-15.2	9.8	0.0	9.8	NA	0	0	0	0	0	0	0.0%	Sandy	Exempt	--
WC-15.5, WC-15.4, WC-15.3, WC-52NW	47.6	0.0	2.0	45.6	39,248	7,850	172	4,021	804	18	89.8%	Silty, Sandy	WP, SS, CB	--
WC-15.6	4.2	0.0	4.2	NA	0	0	0	0	0	0	0.0%	Sandy	Exempt	--
WC-16	46.7	0.0	46.7	NA	0	0	0	0	0	0	0.0%	Silty	Exempt	--
WC-16.1	1.4	0.0	1.4	NA	0	0	0	0	0	0	0.0%	Silty	Exempt	--
WC-17	8.3	0.0	8.3	NA	0	0	0	0	0	0	0.0%	Sandy	Exempt	--
WC-17.1	1.4	0.0	0.0	1.4	6,160	1,232	901	0	0	0	100.0%	Silty	GS	3.04
WC-18.1	6.0	0.0	2.1	3.9	3,578	716	184	3,578	716	184	0.0%	Silty	--	--
WC-18.2, WC-18.2 OS	26.2	5.2	0.2	20.9	15,726	3,145	151	952	190	9	93.9%	Silty, Sandy	WP	--
WC-19	25.6	0.0	25.6	NA	0	0	0	0	0	0	0.0%	Silty	Exempt	--
WC-2 CITY, WC-2 UW	50.8	6.6	0.0	44.1	93,427	18,685	423	49,735	9,947	225	46.8%	Sandy	SS, CB	--
WC-2.1	1.8	0.0	0.0	1.8	746	149	82	352	70	39	52.9%	Sandy	BF	--
WC-2.2	0.8	0.0	0.0	0.8	826	165	196	272	54	64	67.1%	Sandy	BF	--
WC-20	34.5	0.0	34.5	NA	0	0	0	0	0	0	0.0%	Silty	Exempt	--
WC-20E	59.8	0.0	59.8	NA	0	0	0	0	0	0	0.0%	Silty	Exempt	--
WC-20N	134.6	0.0	134.6	NA	0	0	0	0	0	0	0.0%	Silty	Exempt	--
WC-21	16.1	0.0	16.1	NA	0	0	0	0	0	0	0.0%	Sandy	Exempt	--
WC-22	43.9	0.0	43.9	NA	0	0	0	0	0	0	0.0%	Silty	Exempt	--
WC-23	100.9	0.0	100.9	NA	0	0	0	0	0	0	0.0%	Silty	Exempt	--
WC-24	113.0	0.0	113.0	NA	0	0	0	0	0	0	0.0%	Silty	Exempt	--
WC-25	24.3	0.0	24.3	NA	0	0	0	0	0	0	0.0%	Silty	Exempt	--
WC-25.1	10.2	0.0	8.0	2.2	5,449	1,090	485	439	88	39	91.9%	Sandy	WP, SS, CB	--
WC-26	65.4	0.0	17.6	47.8	49,937	9,987	209	21,089	4,218	88	57.8%	Sandy	SS, GS, CB	3.04
WC-26.1	9.0	0.0	8.5	0.5	1,073	215	468	923	185	402	14.0%	Sandy	SS	--
WC-27	5.8	0.0	5.8	NA	0	0	0	0	0	0	0.0%	Silty	Exempt	--
WC-27.1, WC-28.2	9.3	0.0	6.8	2.4	5,841	1,168	478	773	155	63	86.8%	Sandy	WP, SS, CB	--
WC-28	33.9	0.0	33.9	NA	0	0	0	0	0	0	0.0%	Silty	Exempt	--
WC-28.1	2.5	0.0	0.0	2.5	1,697	339	137	0	0	0	100.0%	Silty	BF	--
WC-29	41.6	0.0	0.8	40.8	58,153	11,631	285	48,690	9,738	238	16.3%	Sandy	SS, GS	3.04
WC-3	21.0	0.0	0.0	21.0	22,452	4,490	214	17,388	3,478	166	22.6%	Sandy	SS, GS	3.04
WC-30	19.0	0.0	1.4	17.6	24,737	4,947	281	15,462	3,092	176	37.5%	Sandy	SS, GS	3.04
WC-31	21.0	0.0	0.0	21.0	16,197	3,239	154	14,928	2,986	142	7.8%	Sandy	SS	--
WC-32	14.1	0.0	14.1	NA	0	0	0	0	0	0	0.0%	Silty	Exempt	--
WC-32.2	3.6	0.0	0.0	3.6	6,781	1,356	382	3,036	607	171	55.2%	Clayey	SS, BF, GS	3.04
WC-33.1	30.0	0.0	0.5	29.6	60,805	12,161	412	54,538	10,908	369	10.3%	Sandy	SS	--
WC-33.1A	6.2	0.0	0.0	6.2	12,656	2,531	409	4,760	952	154	62.4%	Silty	GS	3.04, 3.6
WC-33.1B	2.6	0.0	0.0	2.6	4,905	981	376	466	93	36	90.5%	Sandy	GS, SS, CB	3.60

WC-33.2	2.2	0.0	2.2	NA	0	0	0	0	0	0	0.0%	Clayey	Exempt	--
WC-34	6.3	0.0	0.0	6.3	3,342	668	106	3,342	668	106	0.0%	Sandy	--	--
WC-35	6.1	0.0	0.0	6.1	11,673	2,335	384	10,177	2,035	335	12.8%	Silty	SS	--
WC-36	14.9	0.0	14.9	NA	0	0	0	0	0	0	0.0%	Sandy	Exempt	--
WC-37	77.1	0.0	0.1	77.0	140,995	28,199	366	113,095	22,619	294	19.8%	Clayey	SS	--
WC-37.1	6.9	0.0	0.0	6.9	13,416	2,683	391	791	158	23	94.1%	Sandy	WP	--
WC-38	22.7	0.0	0.0	22.7	35,140	7,028	309	31,700	6,340	279	9.8%	Silty	SS	--
WC-39	22.9	0.0	0.0	22.9	30,588	6,118	267	17,787	3,557	156	41.8%	Clayey	GS, SS	--
WC-4	15.1	0.0	0.0	15.1	17,178	3,436	228	14,835	2,967	197	13.6%	Sandy	SS	--
WC-40.1	15.6	0.0	10.1	5.5	9,352	1,870	340	1,869	374	68	80.0%	Silty	SS	--
WC-40.2	18.4	0.0	0.0	18.4	30,327	6,065	329	12,615	2,523	137	58.4%	Silty	SS	--
WC-41	35.4	0.0	35.4	NA	0	0	0	0	0	0	0.0%	Silty	Exempt	--
WC-42	8.2	0.0	0.0	8.2	9,653	1,931	234	2,578	516	63	73.3%	Silty	SS	--
WC-43, WC-45 OS	14.3	3.3	0.0	11.0	19,374	3,875	351	4,255	851	77	78.0%	Silty	WP	--
WC-43.1	2.5	0.0	0.0	2.5	8,646	1,729	692	7,565	1,513	606	12.5%	Silty	SS	--
WC-43.2	7.1	0.0	0.0	7.1	8,421	1,684	239	1,668	334	47	80.2%	Silty	SS	--
WC-44N	16.3	0.0	0.9	15.4	27,205	5,441	352	3,783	757	49	86.1%	Sandy	WP	--
WC-44N.1	6.3	0.0	0.0	6.3	7,198	1,440	230	0	0	0	100.0%	Silty	BF	--
WC-44S	14.5	0.0	0.0	14.5	31,934	6,387	441	6,545	1,309	90	79.5%	Silty	SS	--
WC-45	248.1	0.0	248.1	NA	0	0	0	0	0	0	0.0%	Silty	Exempt	--
WC-46	105.4	0.0	105.4	NA	0	0	0	0	0	0	0.0%	Sandy	Exempt	--
WC-47	5.3	0.0	5.3	NA	0	0	0	0	0	0	0.0%	Sandy	Exempt	--
WC-48, WC-48 OS, Z-2	85.3	8.8	0.0	76.6	95,889	19,178	250	24,644	4,929	64	74.3%	Sandy	WP, SS, CB	--
WC-49, WC-49 OS	25.4	4.0	0.0	21.4	42,366	8,473	395	1,945	389	18	95.4%	Sandy	WP, SS	--
WC-49.2	118.3	0.0	118.3	NA	0	0	0	0	0	0	0.0%	Silty	Exempt	
WC-49.1, WC-49.1 OS	30.8	10.1	0.6	20.1	43,931	8,786	437	6,056	1,211	60	86.2%	Sandy	WP, SS, CB	--
WC-5.1 CITY, WC-5 UW, WC-5.3 UW	45.1	7.8	0.0	37.3	30,742	6,148	165	20,597	4,119	111	33.0%	Sandy	BF, SS	--
WC-5.2 CITY, WC-5.1 UW	19.2	1.5	0.0	17.7	20,286	4,057	229	16,031	3,206	181	21.0%	Sandy	SS, CB	--
WC-5.3	1.3	0.0	0.0	1.3	2,294	459	341	1,626	325	242	29.1%	Sandy	WP, CB	--
WC-50	22.8	0.0	0.7	22.2	25,203	5,041	227	22,731	4,546	205	9.8%	Sandy	SS	--
WC-51.2	3.1	0.0	0.0	3.1	3,204	641	204	261	52	17	91.9%	Silty	GS, SS	3.60
WC-51.3	3.9	0.0	1.5	2.4	2,147	429	179	171	34	14	92.1%	Silty	GS, SS	3.60
WC-52	72.0	0.0	60.2	11.8	15,270	3,054	259	5,488	1,098	93	64.1%	Silty	SS, OCD	--
WC-54, WC-51.1, WC-53	50.5	0.0	2.1	48.4	84,765	16,953	350	8,848	1,770	37	89.6%	Silty, Sandy	WP, SS, CB, OCD	--
WC-55	29.8	0.0	3.1	26.8	47,681	9,536	356	17,022	3,404	127	64.3%	Sandy	SS, GS, CB, OCD	3.04
WC-56	12.2	0.0	0.0	12.2	18,127	3,625	297	16,249	3,250	267	10.4%	Sandy	SS	--
WC-6	2.2	0.0	0.0	2.2	1,196	239	111	1,099	220	102	8.1%	Sandy	SS	--
WC-60	18.3	0.0	0.0	18.3	17,841	3,568	195	16,053	3,211	176	10.0%	Sandy	SS	--
WC-61	56.3	0.0	0.0	56.3	58,237	11,647	207	48,197	9,639	171	17.2%	Sandy	SS, CB	--

WC-62 CITY	31.1	0.0	31.1	NA	0	0	0	0	0	0	0.0%	Silty	Exempt	--
WC-65 CITY	2.6	0.0	0.0	2.6	1,041	208	79	1,034	207	78	0.7%	Sandy	SS	--
WC-66	9.0	0.0	0.0	9.0	10,431	2,086	231	2,074	415	46	80.1%	Silty	OCD	--
WC-7	5.9	0.0	0.0	5.9	5,274	1,055	178	5,265	1,053	178	0.2%	Sandy	SS	--
WC-8	4.2	0.0	0.0	4.2	4,668	934	221	4,076	815	193	12.7%	Sandy	SS	--
WC-9	4.7	0.0	0.0	4.7	12,457	2,491	536	10,782	2,156	464	13.4%	Silty	SS	--
Z-1	63.1	0.0	63.1	NA	0	0	0	0	0	0	0.0%	Sandy	Exempt	--
Z-3	7.7	0.0	7.7	NA	0	0	0	0	0	0	0.0%	Silty	Exempt	--
Z-4	99.6	0.0	99.6	NA	0	0	0	0	0	0	0.0%	Silty	Exempt	--
Total	**5357.4**	**115.9**	**3112.9**	**2128.6**	**2,808,348**	**561,670**	**264**	**1,467,605**	**293,521**	**138**	**47.7%**			

[1]"Total MS4 Area" is all the area within the municipality.

"Off-site Drainage Area" is the area outside the municipal jurisdiction.

"Exempt MS4 Area" is the area draining to the MS4, but the municipality is not responsible for the loading (e.g. Agricultural, WisDOT Right-of-way, and County Right-of-way land use).

"Regulatory MS4 Area" is the area which loading is assessed for the municipality.

Abbreviation	Name
SC	Street Cleaning
GS	Grass Swale
BF	Biofiltration Basin
WP	Wet Pond
CB	Catch Basin

Table 4.04-2 Total Phosphorus Loading Results Baseline and Existing Controls Conditions–City of Whitewater

Basin ID	Total MS4 Area (Acres)	Off-site Drainage Area (Acres)	Exempt MS4 Area (Acres)	Regulatory MS4 Area (Acres)	Annual Dissolved Phosphorus					Annual Particulate Phosphorus			Total Annual Phosphorus					Current Practices	
					Baseline Dissolved Phosphorus (lbs)	Adjusted Baseline Dissolved Phosphorus[1] (lbs)	Existing Dissolved Phosphorus (lbs)	Adjusted Existing Dissolved Phosphorus[2] (lbs)	Reduction in Dissolved Phosphorus (%)	Baseline Particulate Phosphorus (lbs)	Existing Particulate Phosphorus (lbs)	Reduction in Particulate Phosphorus (%)	Baseline Total Phosphorus (lbs)	Adjusted Baseline Total Phosphorus[3] (lbs)	Existing Total Phosphorus (lbs)	Adjusted Existing Total Phosphorus[4] (lbs)	Reduction in Total Phosphorus (%)		
CL-1	12.0	0.0	0.0	12.0	2.1	2.1	2.1	2.1	0.0%	7.6	3.6	53.5%	9.8	9.8	5.7	5.7	41.7%	SS, CB	
CL-10	0.3	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0%	0.4	0.3	41.1%	0.5	0.5	0.3	0.3	37.0%	SS, CB	
CL-11	79.7	0.0	79.7	NA	0.0	0.0	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	0.0	0.0	0.0%	Exempt	
CL-12	4.3	0.0	4.3	NA	0.0	0.0	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	0.0	0.0	0.0%	Exempt	
CL-13	8.4	0.0	8.4	NA	0.0	0.0	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	0.0	0.0	0.0%	Exempt	
CL-14	39.3	0.0	39.3	NA	0.0	0.0	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	0.0	0.0	0.0%	Exempt	
CL-15	5.3	0.0	0.0	5.3	1.1	1.1	1.1	1.1	-0.1%	2.8	1.0	65.4%	3.9	3.9	2.1	2.1	46.4%	WP	
CL-2	10.8	0.0	0.7	10.1	1.6	1.4	1.6	1.4	0.0%	5.9	4.6	24.0%	7.5	7.0	6.2	5.7	19.2%	SS, CB	
CL-3	27.3	0.0	1.8	25.5	6.9	6.5	5.3	5.0	23.1%	21.6	4.4	80.2%	28.4	27.2	9.6	9.1	66.5%	SS, GS, WP, CB	
CL-4.1, CL-4.2, CL-4.3, CL-4.4	203.2	0.0	4.2	199.0	53.9	53.1	52.0	51.2	3.5%	129.7	67.7	50.1%	183.6	180.6	119.7	114.9	36.4%	SS, GS, CB, WP	
CL-5	0.8	0.0	0.0	0.8	0.2	0.2	0.2	0.2	0.0%	0.5	0.4	3.2%	0.7	0.7	0.6	0.6	2.2%	SS	
CL-6	11.5	0.0	0.0	11.5	3.1	3.1	2.4	2.4	22.4%	5.2	3.3	37.6%	8.4	8.4	5.7	5.7	31.9%	SS, GS	
CL-7	3.3	0.0	1.2	2.0	0.7	0.5	0.7	0.5	0.0%	1.6	1.5	10.0%	2.3	1.5	2.2	1.4	6.9%	SS	
CL-8	4.1	0.0	1.4	2.6	0.5	0.2	0.5	0.2	0.0%	2.2	1.7	25.6%	2.7	1.6	2.2	1.3	22.7%	SS, CB	
CL-9	1.3	0.0	0.4	0.9	0.3	0.2	0.3	0.2	0.0%	0.7	0.7	0.0%	1.0	0.7	1.0	0.7	0.0%	--	
GC-1_GC-1.2	63.3	0.0	0.9	62.4	7.7	7.6	6.2	6.1	19.8%	40.9	28.3	32.7%	48.6	48.0	34.5	33.2	30.7%	SS, GS, BF	
GC-1.1	2.3	0.0	1.5	0.8	0.2	0.0	0.0	0.0	0.0%	1.2	0.1	94.1%	1.4	0.4	0.1	0.0	94.1%	SS, GS	
GC-10.1, GC-12 CITY, GC-12 UW, GC-9.1, GC-10.5	102.7	4.1	11.3	87.3	17.6	14.6	5.0	4.1	71.8%	46.7	4.0	92.1%	64.3	53.3	9.0	7.2	86.6%	WP, GS, SS	
GC-10.2	16.4	0.0	0.0	16.4	3.2	3.2	0.4	0.4	87.0%	8.5	1.0	88.2%	11.7	11.7	1.4	1.4	87.9%	BF, SS	
GC-10.3	4.0	0.0	0.0	4.0	0.2	0.0	0.2	0.0	0.0%	0.4	0.2	0.0%	0.6	0.0	0.4	0.0	0.0%	SS	
GC-10.4	6.3	0.0	0.0	6.3	1.1	1.1	1.1	1.1	0.0%	2.5	0.5	80.2%	3.5	3.5	1.6	1.6	56.0%	SS	
GC-13 CITY	73.3	0.0	73.3	NA	0.0	0.0	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	0.0	0.0	0.0%	Exempt	
GC-14	185.0	0.0	185.0	NA	0.0	0.0	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	0.0	0.0	0.0%	Exempt	
GC-14.1	2.2	0.0	0.1	2.2	1.0	1.0	0.0	0.0	100.0%	4.9	0.0	100.0%	5.9	5.9	0.0	0.0	100.0%	SS, GS	
GC-2	157.3	0.0	8.0	149.3	38.9	37.3	38.8	37.3	0.1%	93.3	85.3	7.6%	132.2	126.5	124.1	119.6	5.4%	SS, GS	
GC-2.1	15.4	0.0	15.4	NA	0.0	0.0	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	0.0	0.0	0.0%	Exempt	
GC-3	5.6	0.0	2.5	3.1	0.8	0.3	0.1	0.0	91.2%	3.5	0.2	94.8%	4.3	2.6	0.2	0.1	94.3%	SS, GS	
GC-3.1	126.7	0.0	126.7	NA	0.0	0.0	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	0.0	0.0	0.0%	Exempt	
GC-4	8.1	0.0	0.0	8.1	2.1	2.1	2.1	2.1	0.0%	4.5	4.3	4.8%	6.6	6.6	6.4	6.4	3.3%	SS	
GC-5	5.2	0.0	0.0	5.2	0.7	0.7	0.7	0.7	0.0%	2.4	2.2	9.6%	3.1	3.1	2.9	2.9	7.5%	SS	
GC-5.1	5.5	0.0	0.0	5.5	0.6	0.6	0.6	0.6	0.0%	3.6	3.2	11.9%	4.2	4.2	3.8	3.8	10.1%	SS	
GC-6	36.6	0.0	0.0	36.6	4.6	4.6	4.6	4.6	0.0%	21.4	19.4	9.5%	26.0	26.0	24.0	24.0	7.8%	SS	
GC-7	190.1	0.0	190.1	NA	0.0	0.0	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	0.0	0.0	0.0%	Exempt	

GC-7.1	10.0	0.0	0.0	10.0	1.9	1.9	1.9	1.9	-0.1%	5.6	1.5	73.6%	7.6	7.6	3.4	3.4	54.8%	WP	
GC-8	44.0	0.0	44.0	NA	0.0	0.0	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	0.0	0.0	0.0%	Exempt	
GC-8.1	3.5	0.0	0.0	3.5	0.8	0.8	0.7	0.7	10.4%	1.8	0.1	94.3%	2.6	2.6	0.8	0.8	69.9%	WP	
GC-8.2	5.1	0.0	0.0	5.1	0.4	0.4	0.4	0.4	3.5%	1.6	0.1	91.7%	2.1	2.1	0.6	0.6	72.6%	WP	
GC-8.3	6.1	0.0	0.1	6.0	0.6	0.6	0.0	0.0	100.0%	2.0	0.0	100.0%	2.6	2.5	0.0	0.0	100.0%	SS, BF	
GC-9	42.2	0.0	42.2	NA	0.0	0.0	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	0.0	0.0	0.0%	Exempt	
SB-1	12.9	0.0	0.2	12.8	3.3	3.3	3.3	3.3	0.0%	8.3	6.6	21.4%	11.6	11.5	10.0	9.8	15.3%	SS, CB	
SB-1.1	7.3	0.0	2.4	4.9	1.8	1.3	1.8	1.3	0.0%	3.1	0.8	62.1%	4.8	3.1	2.6	2.0	36.7%	WP, SC	
SB-11	83.5	0.0	66.6	17.0	18.7	5.6	18.7	5.6	0.0%	33.2	32.9	0.0%	51.9	5.6	51.9	5.6	0.0%	SS	
SB-11.1	3.4	0.0	0.5	3.0	1.5	1.4	1.5	1.4	0.0%	4.1	3.4	12.1%	5.6	5.3	5.0	4.8	8.8%	SS	
SB-2	10.1	0.0	1.1	9.0	2.6	2.4	2.6	2.4	0.0%	5.8	5.4	7.7%	8.4	7.6	8.0	7.2	5.3%	SS	
SB-3.1	44.7	0.0	0.0	44.7	9.7	9.7	9.1	9.1	6.7%	25.0	22.5	9.9%	34.7	34.7	31.6	31.6	9.0%	SS, GS	
SB-3.2	61.5	0.0	6.3	55.2	15.1	13.9	15.1	13.9	0.0%	33.6	29.9	6.4%	48.7	44.2	45.0	42.3	4.4%	SS	
SB-4	31.3	0.0	31.3	NA	0.0	0.0	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	0.0	0.0	0.0%	Exempt	
SB-4.1	12.5	0.0	0.6	11.9	2.7	2.6	1.1	1.1	58.6%	6.6	2.1	71.7%	9.3	8.9	3.2	2.9	67.8%	SS, GS	
SB-5,SB-10	97.3	0.0	8.4	89.0	22.2	20.5	8.9	8.3	59.8%	62.1	8.4	87.6%	84.2	78.3	17.3	15.4	80.3%	WP, BF, SS, GS	
SB-6	222.7	0.0	222.7	NA	0.0	0.0	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	0.0	0.0	0.0%	Exempt	
SB-7	15.1	0.0	15.1	NA	0.0	0.0	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	0.0	0.0	0.0%	Exempt	
SB-8	29.1	0.0	29.1	NA	0.0	0.0	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	0.0	0.0	0.0%	Exempt	
SB-8.1, SB-8.1 OS	9.6	4.3	3.4	1.9	2.1	0.6	0.0	0.0	98.3%	4.3	0.0	99.5%	6.4	0.9	0.0	0.0	98.7%	SS, GS	
SB-9	36.7	0.0	36.7	NA	0.0	0.0	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	0.0	0.0	0.0%	Exempt	
SB-9.1	1.3	0.0	0.4	1.0	0.4	0.3	0.0	0.0	99.6%	1.1	0.0	99.6%	1.5	1.3	0.0	0.0	99.6%	SS, GS	
TL-1	10.7	0.0	0.0	10.7	1.8	1.8	1.0	1.0	42.0%	4.9	2.6	47.3%	6.7	6.7	3.6	3.6	45.9%	SS, GS	
TL-10	15.4	0.0	0.0	15.4	1.4	1.4	1.4	1.4	0.0%	3.6	3.6	0.0%	5.0	5.0	5.0	5.0	0.0%	--	
TL-11	5.9	0.0	5.9	NA	0.0	0.0	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	0.0	0.0	0.0%	Exempt	
TL-12	15.0	0.0	15.0	NA	0.0	0.0	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	0.0	0.0	0.0%	Exempt	
TL-13	21.1	0.0	0.0	21.1	5.3	5.3	2.7	2.7	49.8%	12.3	1.5	88.0%	17.6	17.6	4.1	4.1	76.5%	WP, SS, GS	
TL-14	6.0	0.0	6.0	NA	0.0	0.0	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	0.0	0.0	0.0%	Exempt	
TL-15	12.6	0.0	12.6	NA	0.0	0.0	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	0.0	0.0	0.0%	Exempt	
TL-16	6.4	0.0	6.4	NA	0.0	0.0	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	0.0	0.0	0.0%	Exempt	
TL-17	23.7	0.0	6.5	17.2	2.2	0.9	1.6	0.7	26.0%	8.0	1.7	77.6%	10.2	5.6	3.3	1.7	69.0%	GS, SS, CB	
TL-18	3.8	0.0	0.0	3.8	0.8	0.8	0.6	0.6	26.0%	2.2	1.3	38.5%	3.0	3.0	2.0	2.0	35.1%	SS, GS	
TL-2	31.6	0.0	0.3	31.3	4.7	4.7	3.9	3.9	16.8%	18.1	5.1	72.8%	22.8	22.6	9.0	8.8	61.3%	SS, GS, WP, CB	
TL-3	4.1	0.0	0.0	4.1	1.1	1.1	1.1	1.1	0.0%	1.0	1.0	8.4%	2.1	2.1	2.0	2.0	4.2%	SS	
TL-4	5.2	0.0	0.0	5.2	1.5	1.5	0.3	0.3	78.6%	3.3	0.5	84.0%	4.9	4.9	0.9	0.9	82.3%	GS	
TL-5	20.8	0.0	0.0	20.8	6.0	6.0	6.0	6.0	-0.5%	13.0	3.4	74.1%	19.0	19.0	9.4	9.4	50.6%	WP, SS	
TL-6	21.8	0.0	0.0	21.8	5.9	5.9	5.9	5.9	-0.2%	12.7	4.0	68.4%	18.7	18.7	10.0	10.0	46.6%	WP, SS	
TL-6.1	6.5	0.0	0.0	6.5	1.6	1.6	1.5	1.5	5.0%	2.4	1.9	19.9%	4.0	4.0	3.4	3.4	14.0%	SC, GS	
TL-7	58.0	0.0	58.0	NA	0.0	0.0	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	0.0	0.0	0.0%	Exempt	
TL-8	23.3	0.0	23.3	NA	0.0	0.0	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	0.0	0.0	0.0%	Exempt	

TL-9	118.2	0.0	118.2	NA	0.0	0.0	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	0.0	0.0	0.0%	Exempt	
TL-9.1	8.6	0.0	0.3	8.3	1.9	1.9	1.9	1.9	0.0%	5.5	4.1	25.5%	7.4	7.2	6.0	5.9	18.9%	SS, OCD	
WC-1.2 CITY, WC-1.3 CITY, WC- 1.2 UW	43.6	38.4	0.0	5.2	4.8	0.0	3.0	0.0	0.0%	23.0	1.0	39.2%	27.8	3.1	4.0	1.9	39.2%	SS, GS	
WC-10	1.0	0.0	1.0	NA	0.0	0.0	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	0.0	0.0	0.0%	Exempt	
WC-11	10.6	0.0	0.0	10.6	1.0	1.0	1.0	1.0	0.0%	2.9	2.9	0.0%	3.9	3.9	3.9	3.9	0.0%	SS	
WC-12.1	28.9	0.0	0.0	28.9	2.7	2.7	2.7	2.7	0.0%	6.7	6.2	6.5%	9.4	9.4	9.0	9.0	4.6%	SS	
WC-12.2	1.8	0.0	0.0	1.8	0.3	0.3	0.3	0.3	0.0%	0.8	0.7	20.1%	1.2	1.2	1.0	1.0	14.4%	SS, CB	
WC-12.3	3.8	0.0	0.0	3.8	1.0	1.0	1.0	1.0	0.0%	2.1	1.7	18.6%	3.2	3.2	2.8	2.8	12.5%	SS, CB	
WC-12.4	4.6	0.0	4.6	NA	0.0	0.0	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	0.0	0.0	0.0%	Exempt	
WC-12.5	7.4	0.0	7.4	NA	0.0	0.0	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	0.0	0.0	0.0%	Exempt	
WC-13	23.4	0.0	23.4	NA	0.0	0.0	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	0.0	0.0	0.0%	Exempt	
WC-14	18.0	0.0	18.0	NA	0.0	0.0	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	0.0	0.0	0.0%	Exempt	
WC-14.1	1.6	0.0	0.0	1.6	0.1	0.1	0.0	0.0	99.7%	1.3	0.0	99.8%	1.4	1.4	0.0	0.0	99.8%	SS, GS	
WC-14.2, WC-14.3	9.6	0.0	0.8	8.7	1.2	1.1	1.2	1.1	0.0%	5.2	0.9	83.9%	6.4	5.8	2.1	1.8	68.5%	WP, SS, CB	
WC-15 CITY, WC-15 UW	24.5	21.8	0.0	2.7	5.7	1.4	0.0	0.0	99.2%	4.6	0.0	0.0%	10.3	1.4	0.1	0.0	99.2%	SS, GS	
WC-15.1	3.5	0.0	3.1	0.5	0.9	0.3	0.9	0.3	0.0%	1.7	0.5	13.3%	2.6	0.4	1.4	0.4	3.8%	SS	
WC-15.2	9.8	0.0	9.8	NA	0.0	0.0	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	0.0	0.0	0.0%	Exempt	
WC-15.5, WC-15.4, WC-15.3, WC-52NW	47.6	0.0	2.0	45.6	9.1	8.7	8.5	8.1	7.0%	19.6	2.0	89.8%	28.7	27.3	10.5	10.0	63.3%	WP, SS, CB	
WC-15.6	4.2	0.0	4.2	NA	0.0	0.0	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	0.0	0.0	0.0%	Exempt	
WC-16	46.7	0.0	46.7	NA	0.0	0.0	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	0.0	0.0	0.0%	Exempt	
WC-16.1	1.4	0.0	1.4	NA	0.0	0.0	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	0.0	0.0	0.0%	Exempt	
WC-17	8.3	0.0	8.3	NA	0.0	0.0	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	0.0	0.0	0.0%	Exempt	
WC-17.1	1.4	0.0	0.0	1.4	1.5	1.5	0.0	0.0	100.0%	1.8	0.0	100.0%	3.3	3.3	0.0	0.0	100.0%	GS	
WC-18.1	6.0	0.0	2.1	3.9	1.3	0.9	1.3	0.9	0.0%	2.7	1.9	0.0%	4.0	2.5	3.2	2.5	0.0%	--	
WC-18.2, WC-18.2 OS	26.2	5.2	0.2	20.9	4.4	3.3	3.7	2.8	15.1%	9.3	0.5	93.9%	13.7	9.8	4.3	3.2	67.2%	WP	
WC-19	25.6	0.0	25.6	NA	0.0	0.0	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	0.0	0.0	0.0%	Exempt	
WC-2 CITY, WC-2 UW	50.8	6.6	0.0	44.1	8.1	6.8	8.1	6.8	0.0%	39.9	18.7	46.8%	48.0	43.3	26.9	26.2	39.4%	SS, CB	
WC-2.1	1.8	0.0	0.0	1.8	0.2	0.2	0.1	0.1	52.8%	0.4	0.2	52.8%	0.6	0.6	0.3	0.3	52.8%	BF	
WC-2.2	0.8	0.0	0.0	0.8	0.1	0.1	0.0	0.0	64.9%	0.3	0.1	66.5%	0.4	0.4	0.1	0.1	66.2%	BF	
WC-20	34.5	0.0	34.5	NA	0.0	0.0	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	0.0	0.0	0.0%	Exempt	
WC-20E	59.8	0.0	59.8	NA	0.0	0.0	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	0.0	0.0	0.0%	Exempt	
WC-20N	134.6	0.0	134.6	NA	0.0	0.0	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	0.0	0.0	0.0%	Exempt	
WC-21	16.1	0.0	16.1	NA	0.0	0.0	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	0.0	0.0	0.0%	Exempt	
WC-22	43.9	0.0	43.9	NA	0.0	0.0	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	0.0	0.0	0.0%	Exempt	
WC-23	100.9	0.0	100.9	NA	0.0	0.0	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	0.0	0.0	0.0%	Exempt	
WC-24	113.0	0.0	113.0	NA	0.0	0.0	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	0.0	0.0	0.0%	Exempt	
WC-25	24.3	0.0	24.3	NA	0.0	0.0	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	0.0	0.0	0.0%	Exempt	
WC-25.1	10.2	0.0	8.0	2.2	1.2	0.0	1.2	0.0	0.0%	3.0	0.2	0.0%	4.3	0.0	1.4	0.0	0.0%	WP, SS, CB	

WC-26	65.4	0.0	17.6	47.8	6.5	3.1	4.5	2.1	30.5%	22.6	9.1	57.8%	29.1	16.5	10.7	7.8	52.7%	SS, GS, CB	
WC-26.1	9.0	0.0	8.5	0.5	0.5	0.0	0.5	0.0	0.0%	1.0	0.4	0.0%	1.5	0.0	0.9	0.0	0.0%	SS	
WC-27	5.8	0.0	5.8	NA	0.0	0.0	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	0.0	0.0	0.0%	Exempt	
WC-27.1, WC-28.2	9.3	0.0	6.8	2.4	1.3	0.0	1.3	0.0	0.0%	3.1	0.4	0.0%	4.4	0.0	1.6	0.0	0.0%	WP, SS, CB	
WC-28	33.9	0.0	33.9	NA	0.0	0.0	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	0.0	0.0	0.0%	Exempt	
WC-28.1	2.5	0.0	0.0	2.5	0.6	0.6	0.0	0.0	100.0%	1.1	0.0	100.0%	1.7	1.7	0.0	0.0	100.0%	BF	
WC-29	41.6	0.0	0.8	40.8	6.9	6.7	6.6	6.5	3.8%	22.3	18.8	16.3%	29.2	28.6	25.4	24.8	13.3%	SS, GS	
WC-3	21.0	0.0	0.0	21.0	4.0	4.0	3.5	3.5	13.8%	10.9	8.5	22.1%	14.9	14.9	12.0	12.0	19.8%	SS, GS	
WC-30	19.0	0.0	1.4	17.6	3.6	3.3	2.5	2.3	32.0%	9.1	5.7	37.5%	12.7	11.7	8.1	7.5	35.9%	SS, GS	
WC-31	21.0	0.0	0.0	21.0	2.1	2.1	2.1	2.1	0.0%	6.6	6.2	6.6%	8.7	8.7	8.3	8.3	5.0%	SS	
WC-32	14.1	0.0	14.1	NA	0.0	0.0	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	0.0	0.0	0.0%	Exempt	
WC-32.2	3.6	0.0	0.0	3.6	0.7	0.7	0.4	0.4	45.0%	2.5	1.2	50.3%	3.2	3.2	1.6	1.6	49.1%	SS, BF, GS	
WC-33.1	30.0	0.0	0.5	29.6	7.2	7.1	7.2	7.1	0.0%	17.0	15.3	10.3%	24.2	23.9	22.5	22.2	7.2%	SS	
WC-33.1A	6.2	0.0	0.0	6.2	1.0	1.0	0.3	0.3	67.0%	4.5	1.6	63.7%	5.5	5.5	2.0	2.0	64.3%	GS	
WC-33.1B	2.6	0.0	0.0	2.6	0.3	0.3	0.0	0.0	87.7%	1.7	0.2	90.4%	2.0	2.0	0.2	0.2	90.0%	GS, SS, CB	
WC-33.2	2.2	0.0	2.2	NA	0.0	0.0	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	0.0	0.0	0.0%	Exempt	
WC-34	6.3	0.0	0.0	6.3	0.3	0.3	0.3	0.3	0.0%	1.1	1.1	0.0%	1.4	1.4	1.4	1.4	0.0%	--	
WC-35	6.1	0.0	0.0	6.1	2.6	2.6	2.6	2.6	0.0%	3.6	3.2	10.2%	6.2	6.2	5.8	5.8	5.9%	SS	
WC-36	14.9	0.0	14.9	NA	0.0	0.0	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	0.0	0.0	0.0%	Exempt	
WC-37	77.1	0.0	0.1	77.0	18.7	18.7	18.7	18.7	0.0%	47.2	39.2	19.8%	65.8	65.8	57.8	56.4	14.2%	SS	
WC-37.1	6.9	0.0	0.0	6.9	0.7	0.7	0.6	0.6	0.4%	3.3	0.0	99.4%	3.9	3.9	0.8	0.7	83.1%	WP	
WC-38	22.7	0.0	0.0	22.7	4.3	4.3	4.3	4.3	0.0%	9.3	8.4	9.8%	13.6	13.6	12.7	12.7	6.7%	SS	
WC-39	22.9	0.0	0.0	22.9	5.8	5.8	5.4	5.4	7.5%	13.9	8.8	41.8%	19.7	19.7	14.2	13.4	31.7%	GS, SS	
WC-4	15.1	0.0	0.0	15.1	2.4	2.4	2.4	2.4	0.0%	7.8	6.9	11.7%	10.2	10.2	9.3	9.3	9.0%	SS	
WC-40.1	15.6	0.0	10.1	5.5	4.5	2.5	4.5	2.5	0.0%	7.1	7.1	80.0%	11.6	4.4	5.2	2.9	33.5%	SS	
WC-40.2	18.4	0.0	0.0	18.4	6.9	6.9	6.9	6.9	0.0%	9.9	4.4	55.8%	16.8	16.8	11.3	11.3	33.0%	SS	
WC-41	35.4	0.0	35.4	NA	0.0	0.0	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	0.0	0.0	0.0%	Exempt	
WC-42	8.2	0.0	0.0	8.2	1.6	1.6	1.6	1.6	0.0%	3.3	0.9	73.0%	4.9	4.9	2.5	2.5	49.5%	SS	
WC-43, WC-45 OS	14.3	3.3	0.0	11.0	2.7	2.1	2.7	2.1	-0.1%	7.6	1.2	78.0%	10.3	7.9	4.0	3.4	57.7%	WP	
WC-43.1	2.5	0.0	0.0	2.5	1.7	1.7	1.7	1.7	0.0%	2.3	2.0	10.9%	4.0	4.0	3.8	3.8	6.2%	SS	
WC-43.2	7.1	0.0	0.0	7.1	1.4	1.4	1.4	1.4	0.0%	2.9	0.6	80.1%	4.3	4.3	2.0	2.0	53.7%	SS	
WC-44N	16.3	0.0	0.9	15.4	1.2	1.1	1.2	1.1	0.6%	6.5	0.9	86.1%	7.7	7.1	2.1	1.9	73.2%	WP	
WC-44N.1	6.3	0.0	0.0	6.3	1.2	1.2	0.0	0.0	100.0%	2.5	0.0	100.0%	3.6	3.6	0.0	0.0	100.0%	BF	
WC-44S	14.5	0.0	0.0	14.5	7.4	7.4	7.4	7.4	0.0%	9.4	2.0	78.9%	16.9	16.9	9.4	9.4	44.1%	SS	
WC-45	248.1	0.0	248.1	NA	0.0	0.0	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	0.0	0.0	0.0%	Exempt	
WC-46	105.4	0.0	105.4	NA	0.0	0.0	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	0.0	0.0	0.0%	Exempt	
WC-47	5.3	0.0	5.3	NA	0.0	0.0	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	0.0	0.0	0.0%	Exempt	
WC-48, WC-48 OS, Z-2	85.3	8.8	0.0	76.6	13.6	11.8	13.6	11.9	-0.2%	30.1	7.5	74.3%	43.7	37.4	21.0	18.4	50.7%	WP, SS, CB	
WC-49, WC-49 OS	25.4	4.0	0.0	21.4	2.4	1.6	2.4	1.6	0.6%	11.6	0.5	95.4%	14.0	11.2	2.9	2.1	81.5%	WP, SS	
WC-49.2	118.3	0.0	118.3	NA	0.0	0.0	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	0.0	0.0	0.0%	Exempt	

WC-49.1, WC-49.1 OS	30.8	10.1	0.6	20.1	4.4	2.3	4.4	2.3	1.4%	11.6	1.5	86.2%	16.0	8.3	5.9	3.1	62.6%	WP, SS, CB	
WC-5.1 CITY, WC-5 UW, WC-5.3 UW	45.1	7.8	0.0	37.3	5.0	3.5	3.9	2.7	22.5%	20.2	8.6	33.0%	25.3	19.7	12.6	13.6	31.1%	BF, SS	
WC-5.2 CITY, WC-5.1 UW	19.2	1.5	0.0	17.7	2.5	2.2	2.5	2.2	0.0%	9.5	7.1	21.0%	12.0	10.9	9.6	9.1	16.7%	SS, CB	
WC-5.3	1.3	0.0	0.0	1.3	0.1	0.1	0.1	0.1	-0.1%	0.7	0.5	27.4%	0.8	0.8	0.6	0.6	23.0%	WP, CB	
WC-50	22.8	0.0	0.7	22.2	3.6	3.5	3.6	3.5	0.0%	11.2	10.2	9.8%	14.8	14.3	13.8	13.3	7.4%	SS	
WC-51.2	3.1	0.0	0.0	3.1	0.5	0.5	0.1	0.1	89.4%	1.5	0.1	91.6%	2.1	2.1	0.2	0.2	91.1%	GS, SS	
WC-51.3	3.9	0.0	1.5	2.4	0.9	0.6	0.1	0.1	87.6%	1.9	0.1	92.1%	2.8	1.7	0.2	0.2	90.4%	GS, SS	
WC-52	72.0	0.0	60.2	11.8	16.5	4.6	16.5	4.6	0.0%	30.2	2.6	0.0%	46.7	4.6	19.0	4.6	0.0%	SS, OCD	
WC-54, WC-51.1, WC-53	50.5	0.0	2.1	48.4	11.3	10.9	11.1	10.7	1.1%	33.5	3.6	89.6%	44.8	43.3	14.7	14.1	67.4%	WP, SS, CB, OCD	
WC-55	29.8	0.0	3.1	26.8	6.3	5.7	3.2	2.9	49.0%	14.9	5.3	64.3%	21.3	19.1	8.5	7.7	59.7%	SS, GS, CB, OCD	
WC-56	12.2	0.0	0.0	12.2	1.5	1.5	1.5	1.5	0.0%	8.1	7.5	7.3%	9.6	9.6	9.0	9.0	6.1%	SS	
WC-6	2.2	0.0	0.0	2.2	0.3	0.3	0.3	0.3	0.0%	0.6	0.6	7.1%	0.9	0.9	0.9	0.9	5.0%	SS	
WC-60	18.3	0.0	0.0	18.3	3.1	3.1	3.1	3.1	0.0%	8.5	7.7	9.3%	11.6	11.6	10.8	10.8	6.8%	SS	
WC-61	56.3	0.0	0.0	56.3	8.1	8.1	8.1	8.1	0.0%	26.5	22.3	15.9%	34.6	34.6	30.4	30.4	12.2%	SS, CB	
WC-62 CITY	31.1	0.0	31.1	NA	0.0	0.0	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	0.0	0.0	0.0%	Exempt	
WC-65 CITY	2.6	0.0	0.0	2.6	0.2	0.2	0.2	0.2	0.0%	0.5	0.5	0.5%	0.7	0.7	0.7	0.7	0.3%	SS	
WC-66	9.0	0.0	0.0	9.0	1.8	1.8	1.8	1.8	0.0%	4.9	1.0	80.1%	6.7	6.7	2.8	2.8	58.5%	OCD	
WC-7	5.9	0.0	0.0	5.9	0.6	0.6	0.6	0.6	0.0%	2.2	2.2	0.1%	2.8	2.8	2.8	2.8	0.1%	SS	
WC-8	4.2	0.0	0.0	4.2	0.4	0.4	0.4	0.4	0.0%	1.8	1.6	10.8%	2.3	2.3	2.1	2.1	8.8%	SS	
WC-9	4.7	0.0	0.0	4.7	1.1	1.1	1.1	1.1	0.0%	4.8	4.3	10.5%	5.9	5.9	5.4	5.4	8.6%	SS	
Z-1	63.1	0.0	63.1	NA	0.0	0.0	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	0.0	0.0	0.0%	Exempt	
Z-3	7.7	0.0	7.7	NA	0.0	0.0	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	0.0	0.0	0.0%	Exempt	
Z-4	99.6	0.0	99.6	NA	0.0	0.0	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	0.0	0.0	0.0%	Exempt	
Total	**5357.4**	**115.9**	**3112.9**	**2128.6**	**494.1**	**424.0**	**422.4**	**366.5**	**13.6%**	**1299.1**	**669.8**	**46.0%**	**1791.2**	**1538.9**	**1081.2**	**967.8**	**37.1%**		

[1]Adjusted Baseline Dissolved P= [0.25lb/ac of dissolved P*(Off-site area + Exempt area)]+Baseline Dissolved Phosphorus

[2]Adjusted Existing Dissolved P=Existing Dissolved P-[0.25lb/ac*(Off-site area + Exempt area)*(1-Infiltration Rate)]. It is assumed the percent reduction for Dissolved P from WinSLAMM is equal to the percent reduction for infiltration.

[3]Adjusted Baseline Total Phosphorus=Adjusted Baseline Dissolved Phosphorus + Baseline Particulate Phosphorus

[4]Adjusted Existing Total Phosphorus=Adjusted Existing Dissolved Phosphorus + Existing Particulate Phosphorus

Abbreviation	Name
SC	Street Cleaning
GS	Grass Swale
BF	Biofiltration Basin
WP	Wet Pond
CB	Catch Basin

Table 4.04-3 Total Suspended Solids Loading Results Baseline and Existing Controls Conditions–University of Wisconsin Whitewater

Basin	Total MS4 Area[1] (Acres)	Off-site Drainage Area (Acres)	Exempt MS4 Area[1] (Acres)	Regulatory MS4 Area[1] (Acres)	2016 Baseline Conditions			Existing Conditions			Percent Reduction	Major Soil Type	Current Practices	Swale dynamic infiltration rate
					5-Yr TSS (lbs)	Annual TSS (lbs)	Annual TSS (lbs/acre)	5-Yr TSS (lbs)	Annual TSS (lbs)	Annual TSS Concentration (lbs/acre)				
GC-12 UW	4.1	0.0	0.0	4.1	20	4	1	3	1	0	84.1%	Sandy	CITY BMP	--
GC-13 UW	24.8	0.0	24.8	NA	--	--	--	--	--	--	0.0%	--	Exempt	--
WC-1.1 UW	13.6	0.0	0.0	13.6	26,850	5,370	394	20,002	4,000	293	25.5%	Silty	SS, GS	0.03, 0.065
WC-1.2 UW, WC-1.3 CITY	41.5	3.1	0.0	38.4	56,752	11,350	295	49,863	9,973	259	12.1%	Sandy	SS, GS	3.04
WC-15 UW	21.8	0.0	0.0	21.8	9,011	1,802	83	318	64	3	96.5%	Sandy	SS, GS	3.04
WC-2 UW	6.6	0.0	0.0	6.6	11,417	2,283	345	11,213	2,243	339	1.8%	Sandy	SS	--
WC-5 UW	7.5	0.0	0.0	7.5	19,450	3,890	521	16,104	3,221	431	17.2%	Sandy	SS, BF	--
WC-5.1 UW	1.5	0.0	0.0	1.5	2,434	487	319	2,062	412	270	15.3%	Sandy	SS	--
WC-5.2 UW	7.6	0.0	0.0	7.6	7,765	1,553	205	6,336	1,267	167	18.4%	Sandy	SS, BF	--
WC-5.3 UW	0.3	0.0	0.0	0.3	609	122	393	48	10	31	92.2%	Sandy	SS	--
WC-57.1 UW	4.4	0.0	0.0	4.4	7,001	1,400	320	6,471	1,294	295	7.6%	Sandy	SS	--
WC-57.2 UW	3.4	0.0	0.0	3.4	2,149	430	127	2,149	430	127	0.0%	Sandy	--	--
WC-57.3 UW	8.5	0.0	0.0	8.5	16,932	3,386	400	8,816	1,763	208	47.9%	Sandy	SS, BF	--
WC-57.4 UW	6.1	0.0	0.0	6.1	5,134	1,027	168	5,134	1,027	168	0.0%	Sandy	--	--
WC-58.1 UW	36.8	0.0	0.0	36.8	15,415	3,083	84	5,428	1,086	29	64.8%	Sandy	WP	--
WC-58.2 UW	62.8	0.0	0.0	62.8	78,618	15,724	250	71,265	14,253	227	9.4%	Sandy	None	--
WC-59.1 UW	22.9	0.0	0.0	22.9	26,939	5,388	236	26,940	5,388	236	0.0%	Sandy	--	--
WC-59.2 UW	14.4	0.0	0.0	14.4	13,737	2,747	190	13,737	2,747	190	0.0%	Sandy	--	--
WC-62 UW	88.5	0.0	88.5	NA	--	--	--	--	--	--	0.0%	--	Exempt	--
WC-63 UW	20.3	0.0	0.0	20.3	32,429	6,486	319	31,402	6,280	309	3.2%	Sandy	SS	--
WC-64 UW	9.3	0.0	0.0	9.3	9,653	1,931	207	9,404	1,881	201	2.6%	Sandy	SS	--
WC-65 UW, WC-65 CITY	8.0	2.6	0.0	5.4	10,523	2,105	392	8,790	1,758	328	16.5%	Sandy	SS	--
Total	**414.6**	**5.7**	**113.2**	**295.7**	**352,838**	**70,568**	**239**	**295,485**	**59,097**	**200**	**16.3%**			

[1]"Total MS4 Area" is all the area within the municipality.

"Off-site Drainage Area" is the area outside the municipal jurisdiction.

"Exempt MS4 Area" is the area draining to the MS4 but the municipality is not responsible for the loading (e.g. Agricultural, WisDOT Right-of-way, and County Right-of-way land use).

"Regulatory MS4 Area" is the area which loading is assessed for the municipality.

Abbreviation	Name
SC	Street Cleaning
GS	Grass Swale
BF	Biofiltration Basin
WP	Wet Pond
CB	Catch Basin

Table 4.04-4 Total Phosphorus Loading Results Baseline and Existing Controls Conditions–University of Wisconsin Whitewater

Basin ID	Total Drainage Area (AC)	Off-Site Drainage Area (Acres)	Exempt Area (Acres)	Modeled Area (AC)	Annual Dissolved Phosphorus					Annual Particulate Phosphorus			Total Annual Phosphorus					Current Practices
					Baseline Dissolved Phosphorus (lbs)	Adjusted Baseline Dissolved Phosphorus[1] (lbs)	Existing Dissolved Phosphorus (lbs)	Adjusted Existing Dissolved Phosphorus[2] (lbs)	Reduction in Dissolved Phosphorus (%)	Baseline Particulate Phosphorus (lbs)	Existing Particulate Phosphorus (lbs)	Reduction in Particulate Phosphorus (%)	Baseline Total Phosphorus (lbs)	Adjusted Baseline Total Phosphorus[3] (lbs)	Existing Total Phosphorus (lbs)	Adjusted Existing Total Phosphorus[4] (lbs)	Reduction in Total Phosphorus (%)	
GC-12 UW	4.1	0.0	0.0	4.1	0.2	0.2	0.2	0.2	0.0%	0.0	0.0	85.7%	0.2	0.2	0.2	0.2	0.8%	CITY BMP
GC-13 UW	24.8	0.0	24.8	NA	0.0	0.0	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	--	0.0	0.0%	Exempt
WC-1.1 UW	13.6	0.0	0.0	13.6	2.8	2.8	2.6	2.6	6.0%	9.3	7.1	24.1%	12.1	12.1	9.7	9.7	19.9%	SS, GS
WC-1.2 UW, WC-1.3 CITY	41.5	3.1	0.0	38.4	4.8	4.4	4.5	4.1	6.1%	22.3	19.4	13.0%	27.0	25.2	23.8	22.4	11.1%	SS, GS
WC-15 UW	21.8	0.0	0.0	21.8	1.4	1.4	0.1	0.1	96.0%	3.1	0.1	96.4%	4.5	4.5	0.2	0.2	96.3%	SS, GS
WC-2 UW	6.6	0.0	0.0	6.6	1.0	1.0	1.0	1.0	0.0%	4.3	4.2	1.5%	5.4	5.4	5.3	5.3	1.2%	SS
WC-5 UW	7.5	0.0	0.0	7.5	1.5	1.5	1.4	1.4	1.7%	7.1	6.0	14.6%	8.5	8.5	7.5	7.5	12.4%	SS, BF
WC-5.1 UW	1.5	0.0	0.0	1.5	0.1	0.1	0.1	0.1	0.0%	0.8	0.8	0.0%	0.9	0.9	0.9	0.9	0.0%	SS
WC-5.2 UW	7.6	0.0	0.0	7.6	1.5	1.5	1.4	1.4	3.8%	4.2	3.8	9.8%	5.7	5.7	5.2	5.2	8.3%	SS, BF
WC-5.3 UW	0.3	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0%	0.2	0.0	92.1%	0.2	0.2	0.0	0.0	81.7%	SS
WC-57.1 UW	4.4	0.0	0.0	4.4	0.8	0.8	0.8	0.8	0.0%	3.2	3.0	5.2%	4.0	4.0	3.8	3.8	4.2%	SS
WC-57.2 UW	3.4	0.0	0.0	3.4	0.6	0.6	0.6	0.6	0.0%	1.3	1.3	0.0%	1.9	1.9	1.9	1.9	0.0%	--
WC-57.3 UW	8.4	0.0	0.0	8.5	1.4	1.4	0.8	0.8	40.7%	5.9	3.1	47.1%	7.3	7.3	3.9	3.9	45.9%	SS, BF
WC-57.4 UW	6.1	0.0	0.0	6.1	1.0	1.0	1.0	1.0	0.0%	3.2	3.2	0.0%	4.1	4.1	4.1	4.1	0.0%	--

Basin ID	Total Drainage Area (AC)	Off-Site Drainage Area (Acres)	Exempt Area (Acres)	Modeled Area (AC)	Annual Dissolved Phosphorus					Annual Particulate Phosphorus			Total Annual Phosphorus					Current Practices
					Baseline Dissolved Phosphorus (lbs)	Adjusted Baseline Dissolved Phosphorus[1] (lbs)	Existing Dissolved Phosphorus (lbs)	Adjusted Existing Dissolved Phosphorus[2] (lbs)	Reduction in Dissolved Phosphorus (%)	Baseline Particulate Phosphorus (lbs)	Existing Particulate Phosphorus (lbs)	Reduction in Particulate Phosphorus (%)	Baseline Total Phosphorus (lbs)	Adjusted Baseline Total Phosphorus[3] (lbs)	Existing Total Phosphorus (lbs)	Adjusted Existing Total Phosphorus[4] (lbs)	Reduction in Total Phosphorus (%)	
WC-58.1 UW	36.8	0.0	0.0	36.8	3.1	3.1	3.1	3.1	-0.2%	7.2	2.6	64.6%	10.3	10.3	5.6	5.6	45.3%	WP
WC-58.2 UW	62.8	0.0	0.0	62.8	7.1	7.1	7.1	7.1	0.0%	31.1	28.8	7.4%	38.2	38.2	35.9	35.9	6.0%	None
WC-59.1 UW	22.9	0.0	0.0	22.9	4.6	4.6	4.6	4.6	0.0%	14.1	14.1	0.0%	18.7	18.7	18.7	18.7	0.0%	--
WC-59.2 UW	14.4	0.0	0.0	14.4	2.7	2.7	2.7	2.7	0.0%	7.9	7.9	0.0%	10.6	10.6	10.6	10.6	0.0%	--
WC-62 UW	88.5	0.0	88.5	NA	0.0	0.0	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	--	0.0	0.0%	Exempt
WC-63 UW	20.3	0.0	0.0	20.3	2.6	2.6	2.6	2.6	0.0%	10.8	10.4	3.0%	13.3	13.3	13.0	13.0	2.4%	SS
WC-64 UW	9.3	0.0	0.0	9.3	1.3	1.3	1.3	1.3	0.0%	4.5	4.5	1.7%	5.8	5.8	5.8	5.8	1.3%	SS
WC-65 UW, WC-65 CITY	8.0	2.6	0.0	5.4	0.8	0.4	0.8	0.4	0.0%	3.9	3.2	18.9%	4.7	3.1	3.9	2.6	14.1%	SS
Total	**414.6**	**5.7**	**113.2**	**295.7**	**39.0**	**38.3**	**36.6**	**35.9**	**6.3%**	**144.2**	**123.3**	**14.5%**	**183.3**	**179.8**	**159.9**	**157.2**	**12.6%**	

[1]Adjusted Baseline Dissolved P= [0.25lb/ac of dissolved P*(Off-site area + Exempt area)]+Baseline Dissolved Phosphorus

[2]Adjusted Existing Dissolved P=Existing Dissolved P-[0.25lb/ac*(Off-site area + Exempt area)*(1-Infiltration Rate)]. It is assumed the percent reduction for Dissolved P from WinSLAMM is equal to the percent reduction for infiltration.

[3]Adjusted Baseline Total Phosphorus=Adjusted Baseline Dissolved Phosphorus + Baseline Particulate Phosphorus

[4]Adjusted Existing Total Phosphorus=Adjusted Existing Dissolved Phosphorus + Existing Particulate Phosphorus

Abbreviation	Name
SC	Street Cleaning
GS	Grass Swale
BF	Biofiltration Basin
WP	Wet Pond
CB	Catch Basin

Table 4.04-5 City of Whitewater Exempt Basins

Subbasin	Area (acres)	Exempt Reason	Subbasin	Area (acres)	Exempt Reason	Subbasin	Area (acres)	Exempt Reason
CL-11	79.66	Riparian	TL-15	12.55	Riparian	WC-21	16.08	Riparian
CL-12	4.25	Riparian	TL-16	6.38	Isolated Drainage Area	WC-22	43.88	Riparian
CL-13	8.37	Riparian	TL-7	58.00	Riparian	WC-23	100.94	Riparian
CL-14	39.35	Riparian	TL-8	23.34	Riparian	WC-24	112.96	Riparian
GC-13 CITY	73.34	Does not drain through MS4	TL-9	118.23	Riparian	WC-25	24.27	Riparian
GC-14	185.04	Does not drain through MS4	WC-10	1.02	Riparian	WC-27	5.76	Does not drain through MS4
GC-2.1	15.43	Riparian	WC-12.4	4.62	Riparian	WC-28	33.89	Isolated Drainage Area
GC-3.1	126.66	Riparian	WC-12.5	7.39	Riparian	WC-32	14.09	Riparian
GC-7	190.11	Riparian	WC-13	23.37	Riparian	WC-33.2	2.25	Riparian
GC-8	44.04	Riparian	WC-14	18.00	Riparian	WC-36	14.93	Isolated Drainage Area
GC-9	42.21	Riparian	WC-15.2	9.75	Riparian	WC-41	35.37	Riparian
SB-4	31.32	Does not drain through MS4	WC-15.6	4.21	Riparian	WC-45	248.07	Riparian
SB-6	222.68	Does not drain through MS4	WC-16	46.71	Riparian	WC-46	105.38	Riparian
SB-7	15.06	Riparian	WC-16.1	1.39	Riparian	WC-47	5.34	Does not drain through MS4
SB-8	29.06	Riparian	WC-17	8.34	Riparian	WC-49.2	118.26	Does not drain through MS4
SB-9	36.73	Riparian	WC-19	25.55	Riparian	WC-62 CITY	31.08	Riparian
TL-11	5.92	Riparian	WC-20	34.49	Riparian	Z-1	63.10	Does not drain through MS4
TL-12	14.98	Riparian	WC-20E	59.85	Riparian	Z-3	7.72	Does not drain through MS4
TL-14	5.99	Riparian	WC-20N	134.59	Riparian	Z-4	99.62	STH ROW

Table 4.04-6 UWW Exempt Basins

Subbasin	Area (acres)	Exempt Reason
GC-13 UW	24.75	Does not drain through MS4
WC-62 UW	88.45	Does not drain through MS4

4.05 EXISTING CONDITIONS ANALYSIS

Water quality modeling was completed for existing conditions to assess the effectiveness of current stormwater management practices in removing TSS from stormwater. BMPs evaluated typically include street sweeping, grassed swales, wet detention basins, dry detention basins, infiltration basins, rain gardens/bioretention basins, and inlet and catch basin sumps. Descriptions of current practices and modeling results are summarized in this section.

A. Street Sweeping

As described in Section 2.04, the City performs street sweeping on every public street within the City boundary approximately once every two weeks. Major arterial and downtown streets are swept 30 times per year and all other streets 24 times per year (2 times in winter, 8 times in spring, 6 times in summer, and 8 times in fall). The City also sweeps every street within the UWW boundary twice every year, in the spring and fall. Table 4.05-1 and 4.05-2 shows the street sweeping schedules for each basin within the City and the UWW, respectively.

B. Inlet and Catch Basin Sumps

Inlet and catch basin sumps were included in this study because of their prevalence in the storm sewer system. Sumps constructed post-2007 were assumed to all have 2 feet of depth between the outlet invert and the bottom invert, meeting WDNR standards for inclusion in this study; 35 basins had road reconstruction projects for a total of 249 catch basin sumps. The BMP at 534 Walworth and Advanced Autoparts also drained through a sump. Per guidance from the City, catch basins were cleaned in a quarter grid system, with one-fourth of the city cleaned two times per year. This averaged to once every two years. The main arterial streets are cleaned once per year. The only main arterial street with new sumps installed was Milwaukee Street. No sumps in the UWW were included. Table 4.05-3 shows the inputs for catch basins sumps.

Table 4.05-1 Street Sweeping Schedule for the City of Whitewater

Basin	Street Cleaning Frequency	Type of Street Cleaner	Parking Density	Parking Controls Imposed
CL-1 Commercial	One Pass Every Two Weeks	Mechanical	Light	Yes
CL-1 Institutional	One Pass Every Two Weeks	Mechanical	Light	Yes
CL-1 Residential	One Pass Every Two Weeks	Mechanical	Light	No
CL-10	One Pass Every Two Weeks	Mechanical	Light	No
CL-2	One Pass Every Two Weeks	Mechanical	Light	No
CL-3	One Pass Every Two Weeks	Mechanical	Light	Yes
CL-4.1	One Pass Every Two Weeks	Mechanical	Light	No
CL-4.2	One Pass Every Two Weeks	Mechanical	Light	Yes
CL-4.3	One Pass Every Two Weeks	Mechanical	Light	No
CL-4.4	One Pass Every Two Weeks	Mechanical	Light	No
CL-5	One Pass Every Two Weeks	Mechanical	Light	No
CL-6	One Pass Every Two Weeks	Mechanical	Light	No
CL-7	One Pass Every Two Weeks	Mechanical	Light	Yes
CL-8	One Pass Every Two Weeks	Mechanical	Light	No
GC-1	One Pass Every Two Weeks	Mechanical	None	Yes
GC-1.1	One Pass Every Two Weeks	Mechanical	Light	No
GC-1.2	One Pass Every Two Weeks	Mechanical	None	No
GC-10.1	One Pass Every Two Weeks	Mechanical	Light	No
GC-10.2	One Pass Every Two Weeks	Mechanical	Light	No
GC-10.3	One Pass Every Two Weeks	Mechanical	Light	No
GC-10.4	One Pass Every Two Weeks	Mechanical	Light	No
GC-10.5	One Pass Every Two Weeks	Mechanical	Light	No
GC-12 CITY	One Pass Every Two Weeks	Mechanical	Light	Yes
GC-14.1	One Pass Every Two Weeks	Mechanical	Light	No
GC-2	One Pass Every Two Weeks	Mechanical	Light	No
GC-3	One Pass Every Two Weeks	Mechanical	Light	No
GC-4	One Pass Every Two Weeks	Mechanical	Light	No
GC-5	One Pass Every Two Weeks	Mechanical	Light	No
GC-5.1	One Pass Every Two Weeks	Mechanical	Light	No
GC-6	One Pass Every Two Weeks	Mechanical	Light	Yes
GC-7	One Pass Every Two Weeks	Mechanical	Light	No
GC-8.3	One Pass Every Two Weeks	Mechanical	Light	No
GC-9.1	One Pass Every Two Weeks	Mechanical	Light	No
SB-1	One Pass Every Two Weeks	Mechanical	Light	No
SB-1.1	One Pass Every Two Weeks	Mechanical	Light	No
SB-11	One Pass Every Two Weeks	Mechanical	Light	No
SB-11.1	One Pass Every Two Weeks	Mechanical	Light	No
SB-2	One Pass Every Two Weeks	Mechanical	Light	No
SB-3.1	One Pass Every Two Weeks	Mechanical	Light	No
SB-3.2	One Pass Every Two Weeks	Mechanical	Light	No
SB-4.1	One Pass Every Two Weeks	Mechanical	None	Yes
SB-5	One Pass Every Two Weeks	Mechanical	Light	No
SB-8.1	One Pass Every Two Weeks	Mechanical	Light	No
SB-9.1	One Pass Every Two Weeks	Mechanical	Light	No
TL-1	One Pass Every Two Weeks	Mechanical	Light	No
TL-13	One Pass Every Two Weeks	Mechanical	Light	No
TL-17	One Pass Every Two Weeks	Mechanical	Light	No
TL-18	One Pass Every Two Weeks	Mechanical	None	Yes
TL-2	One Pass Every Two Weeks	Mechanical	Light	No

Basin	Street Cleaning Frequency	Type of Street Cleaner	Parking Density	Parking Controls Imposed
TL-3	One Pass Every Two Weeks	Mechanical	Light	No
TL-5	One Pass Every Two Weeks	Mechanical	Light	No
TL-6	One Pass Every Two Weeks	Mechanical	Light	No
TL-6.1	One Pass Every Two Weeks	Mechanical	Light	No
TL-9.1	One Pass Every Two Weeks	Mechanical	None	Yes
WC-1.2 CITY	One Pass Every Two Weeks	Mechanical	Light	No
WC-11	One Pass Every Two Weeks	Mechanical	Light	No
WC-12.1	One Pass Every Two Weeks	Mechanical	Light	No
WC-12.2	One Pass Every Two Weeks	Mechanical	Light	No
WC-12.3	One Pass Every Two Weeks	Mechanical	Light	No
WC-14.1	One Pass Every Two Weeks	Mechanical	Light	No
WC-14.2	One Pass Every Two Weeks	Mechanical	Light	No
WC-14.3	One Pass Every Two Weeks	Mechanical	Light	No
WC-15 CITY	One Pass Every Two Weeks	Mechanical	Light	No
WC-15.1	One Pass Every Two Weeks	Mechanical	Light	No
WC-15.3	One Pass Every Two Weeks	Mechanical	Light	No
WC-15.4	One Pass Every Two Weeks	Mechanical	Light	No
WC-15.5	One Pass Every Two Weeks	Mechanical	Light	No
WC-2 CITY	One Pass Every Two Weeks	Mechanical	Light	Yes
WC-25.1	One Pass Every Two Weeks	Mechanical	Light	No
WC-26	One Pass Every Two Weeks	Mechanical	Light	Yes
WC-26.1	One Pass Every Two Weeks	Mechanical	Light	No
WC-27.1	One Pass Every Two Weeks	Mechanical	Light	No
WC-28.2	One Pass Every Two Weeks	Mechanical	Light	No
WC-29 Commercial	One Pass Every Two Weeks	Mechanical	None	Yes
WC-29 Industrial	One Pass Every Two Weeks	Mechanical	None	Yes
WC-29 Institutional	One Pass Every Two Weeks	Mechanical	Light	Yes
WC-29 Residential	One Pass Every Two Weeks	Mechanical	Light	Yes
WC-3	One Pass Every Two Weeks	Mechanical	Light	No
WC-30	One Pass Every Two Weeks	Mechanical	Light	No
WC-31	One Pass Every Two Weeks	Mechanical	Light	No
WC-32.2	One Pass Every Two Weeks	Mechanical	Light	No
WC-33.1	One Pass Every Two Weeks	Mechanical	Light	Yes
WC-33.1B	One Pass Every Two Weeks	Mechanical	Light	Yes
WC-35	One Pass Every Two Weeks	Mechanical	None	Yes
WC-37	One Pass Every Two Weeks	Mechanical	Light	No
WC-37.1	One Pass Every Two Weeks	Mechanical	Light	No
WC-38	One Pass Every Two Weeks	Mechanical	None	Yes
WC-39	One Pass Every Two Weeks	Mechanical	Light	Yes
WC-4	One Pass Every Two Weeks	Mechanical	Light	No
WC-40.1	One Pass Every Two Weeks	Mechanical	Light	No
WC-40.2	One Pass Every Two Weeks	Mechanical	Light	No
WC-42	One Pass Every Two Weeks	Mechanical	Light	No
WC-43.1	One Pass Every Two Weeks	Mechanical	None	Yes
WC-43.2	One Pass Every Two Weeks	Mechanical	None	Yes
WC-44S	One Pass Every Two Weeks	Mechanical	Light	Yes
WC-48	One Pass Every Two Weeks	Mechanical	Light	Yes
WC-49	One Pass Every Two Weeks	Mechanical	Light	No
WC-49.1	One Pass Every Two Weeks	Mechanical	Light	No
WC-5.1 CITY	One Pass Every Two Weeks	Mechanical	Light	No
WC-5.2 CITY	One Pass Every Two Weeks	Mechanical	Light	No

Basin	Street Cleaning Frequency	Type of Street Cleaner	Parking Density	Parking Controls Imposed
WC-50	One Pass Every Two Weeks	Mechanical	Light	No
WC-51.1	One Pass Every Two Weeks	Mechanical	Light	No
WC-51.2	One Pass Every Two Weeks	Mechanical	Light	No
WC-51.3	One Pass Every Two Weeks	Mechanical	Light	No
WC-52	One Pass Every Two Weeks	Mechanical	Light	No
WC-52NW	One Pass Every Two Weeks	Mechanical	Light	No
WC-53	One Pass Every Two Weeks	Mechanical	Light	No
WC-54	One Pass Every Two Weeks	Mechanical	Light	No
WC-55	One Pass Every Two Weeks	Mechanical	Light	Yes
WC-56	One Pass Every Two Weeks	Mechanical	Light	No
WC-6	One Pass Every Two Weeks	Mechanical	Light	No
WC-60	One Pass Every Two Weeks	Mechanical	Light	No
WC-61	One Pass Every Two Weeks	Mechanical	Light	Yes
WC-65 CITY	One Pass Every Two Weeks	Mechanical	Light	No
WC-7	One Pass Every Two Weeks	Mechanical	Light	No
WC-8	One Pass Every Two Weeks	Mechanical	Light	No
WC-9	One Pass Every Two Weeks	Mechanical	Light	Yes

Table 4.05-2 Street Sweeping Schedule for the University of Wisconsin-Whitewater

Basin	Street Cleaning Frequency	Type of Street Cleaner	Parking Density	Parking Controls Imposed
WC-1.1 UW	Two Passes per Year (Spring and Fall)	Mechanical	None	Yes
WC-1.2 UW	Two Passes per Year (Spring and Fall)	Mechanical	Light	No
WC-15 UW	Two Passes per Year (Spring and Fall)	Mechanical	Light	No
WC-2 UW	One Pass Every Two Weeks	Mechanical	Light	Yes
WC-5 UW	One Pass Every Two Weeks	Mechanical	Light	Yes
WC-5.1 UW	Two Passes per Year (Spring and Fall)	Mechanical	Light	No
WC-5.2 UW	Two Passes per Year (Spring and Fall)	Mechanical	Light	Yes
WC-5.3 UW	Two Passes per Year (Spring and Fall)	Mechanical	Light	No
WC-57.1 UW	One Pass Every Two Weeks	Mechanical	Light	No
WC-57.3 UW	One Pass Every Two Weeks	Mechanical	Light	Yes
WC-63 UW	Two Passes per Year (Spring and Fall)	Mechanical	Light	Yes
WC-64 UW	Two Passes per Year (Spring and Fall)	Mechanical	Light	No
WC-65 UW	Two Passes per Year (Spring and Fall)	Mechanical	Light	No

Table 4.05-3 Inlets and Catch Basin Sumps Schedule for the City of Whitewater

Basin	Fraction of Drainage Area	Number of Catch Basins	Average Sump Depth (ft)	Depth of Sediment in Catch Basin (ft)	Typical Outlet Pipe Diameter (ft)	Typical Manning's n	Typical outlet pipe slope (ft/ft)	Typical Sump Surface Area (sq ft)	Catch Basin Depth from Sump Bottom to Street Level (ft)	Inflow Hydrograph Peak to Average Flow Ratio	Leakage Rate through Sump Bottom (in/hr)	Cleaning Frequency
CL-1	0.05	4	2	0	1	0.013	0.02	6	5	3.8	0	Every Two Years
CL-10	1.00	4	2	0	1	0.013	0.02	6	5	3.8	0	Annually
CL-2	0.82	13	2	0	1	0.013	0.02	6	5	3.8	0	Annually
CL-3	0.09	7	2	0	1	0.013	0.02	6	5	3.8	0	Every Two Years
CL-4.2	0.27	6	2	0	1	0.013	0.02	6	5	3.8	0	Every Two Years
CL-8	1.00	9	2	0	1	0.013	0.02	6	5	3.8	0	Annually
SB-1	1.00	15	2	0	1	0.013	0.02	6	5	3.8	0	Every Two Years
TL-17	0.12	8	2	0	1	0.013	0.02	6	5	3.8	0	Every Two Years
TL-2	0.28	22	2	0	1	0.013	0.02	6	5	3.8	0	Annually
WC-12.2	0.69	2	2	0	1	0.013	0.02	6	5	3.8	0	Every Two Years
WC-12.3	0.85	4	2	0	1	0.013	0.02	6	5	3.8	0	Every Two Years
WC-14.2, WC-14.3	1.00	12	2	0	1	0.013	0.02	6	5	3.8	0	Every Two Years
WC-2 CITY	0.16	19	2	0	1	0.013	0.02	6	5	3.8	0	Every Two Years
WC-25.1	1.00	8	2	0	1	0.013	0.02	6	5	3.8	0	Every Two Years
WC-26	0.16	7	2	0	1	0.013	0.02	6	5	3.8	0	Every Two Years
WC-27.1, WC-28.2	0.81	10	2	0	1	0.013	0.02	6	5	3.8	0	Every Two Years
WC-48	0.20	24	2	0	1	0.013	0.02	6	5	3.8	0	Every Two Years
WC-49.1	1.00	17	2	0	1	0.013	0.02	6	5	3.8	0	Every Two Years
WC-5.2 CITY	0.30	12	2	0	1	0.013	0.02	6	5	3.8	0	Every Two Years
WC-54, WC-51.1, WC-53	0.06	10	2	0	1	0.013	0.02	6	5	3.8	0	Every Two Years
WC-55	0.12	5	2	0	1	0.013	0.02	6	5	3.8	0	Every Two Years
WC-61	0.02	3	2	0	1	0.013	0.02	6	5	3.8	0	Every Two Years
WC-66	1.00	2	2	0	1	0.013	0.02	6	5	3.8	0	Every Two Years
WC-15.5, WC-15.4, WC-15.3, WC-52NW	1.00	26	2	0	1	0.013	0.02	6	5	3.8	0	Every Two Years
534 Walworth	1.00	1	2	0	1	0.013	0.02	6	5	3.8	0	Every Two Years

C. Grass-Lined Ditches/Swales

Areas drained by grass-lined ditches/swales were modeled as such in SLAMM. Ditch properties used in the modeling were conservatively assumed and supplemented with GIS topographic data for cross-section geometry and horizontal slope. Swale cross-sections were sampled in four general locations throughout the City and in UWW's MS4 area. When contours conformed to a swale, then a desktop analysis was conducted to determine the shape. When contours did not conform to a swale, then the average of the measured cross sections was used. Tables 4.05-4 and 4.05-5 show the swale parameters used in modeling the City and UWW, respectively. There are 43,709 linear feet of roadside swales and drainage in the SLAMM model. The SLAMM model includes 1,183 linear feet of non-roadside swales. Table 4.05-6 shows the input parameters for dry detention basins modeled as grass swales. Tables 4.05-7 and 4.05-8 show the desktop analysis used to calculate the swale geometries of for the City and UWW, respectively.

The WDNR does not allow infiltration credit for grass-lined ditches/swales that have less than a 1 percent longitudinal slope where visual evidence indicates the infiltration rate has been reduced (i.e., significant duration of ponded water or evidence of wetland vegetation). If there is evidence of a reduced infiltration rate, infiltration rates appropriate for clay soils should be used. Based on the review of the City's and UWW's swales, several sections appear to have less than a 1 percent longitudinal slope. Strand performed an investigation of all ditches in the watersheds that had a weighted average of less than a 1 percent longitudinal slope. This investigation revealed no locations that had evidence of ponded water or wetland vegetation. Therefore, the approved infiltration rate was used in these areas.

D. Dry Detention Basins

There are 11 dry detention basins in the City and none in the UWW, as shown in Figure 2.01-1 and listed in Table 4.05-9 for the City and Table 4.05-11 for the UWW. Table 4.05-10 shows the additional BMPs not modeled. These tables also show which basins have stormwater maintenance agreements between the City and UWW and private owners. Table 4.05-6 shows the input parameters for dry detention basins modeled as grass swales.

E. Wet Detention Basins

There are 30 wet detention basins in the City and 1 in the UWW, as shown in Figure 2.01-1 and listed in Table 4.05-9 for the City and Table 4.05-11 for the UWW. Table 4.05-10 shows the additional BMPs not modeled. These tables also show which basins have stormwater maintenance agreements between the City and UWW and private owners. The site at 534 Walworth also has a wet detention basin.

F. Infiltration Basins

There are no infiltration basins in the City or UWW.

Table 4.05-4 Swale Schedule for the City

Basin	Total Length (ft)	Average Swale Length (ft)	Fraction of Drainage Area	Typical Bottom Width (ft)	Typical Swale Side Slope m:V (ft)	Typical Slope (ft/ft)	Swale Retardance Factor	Typical Grass Height	Dynamic Infiltration Rate (ft)	If slope < 1%, evidence of wetlands?
CL-3	1435.39	717.69	0.24	10.00	10.00	0.03	C	3.00	3.04	--
CL-4.2	1042.99	521.49	0.10	10.00	10.00	0.01	C	3.00	3.04	No
CL-4.3	475.92	237.96	0.07	10.00	10.00	0.07	C	3.00	3.04	--
CL-6	965.00	483.00	0.39	0.83	5.85	0.03	C	3.00	3.04	--
CL-6	811.00	405.00	1.00	10.00	10.00	0.05	C	3.00	3.04	--
GC-1	165.00	165.00	0.23	10.00	10.00	0.02	C	3.00	3.04	--
GC-1	1146.00	655.58	0.26	7.30	11.50	0.02	C	3.00	3.04	--
GC-10.1	971.00	971.00	1.00	8.00	6.80	0.02	C	3.00	3.04	--
GC-10.5	486.00	243.00	0.90	2.69	6.42	0.01	C	3.00	3.04	--
GC-12 CITY	2977.00	595.40	0.18	2.69	6.42	0.02	C	3.00	3.04	--
GC-14.1	1712.21	856.11	1.00	21.70	7.25	0.01	C	3.00	3.04	--
GC-3	278.97	278.97	1.00	10.00	10.00	0.01	C	3.00	3.04	No
GC-9.1	1085.00	542.50	1.00	2.69	6.42	0.02	C	3.00	3.04	--
SB-4.1	1.00	450.00	450.00	6.00	6.40	0.02	C	3.00	3.04	--
SB-5	600.00	600.00	0.92	6.00	6.40	0.00	C	3.00	3.04	No
SB-5	583.00	583.00	1.00	6.00	6.40	0.01	C	3.00	3.04	No
SB-8.1	1872.67	936.34	1.00	3.13	6.42	0.01	C	3.00	3.04	--
SB-9.1	1215.68	607.84	1.00	5.24	6.27	0.03	C	3.00	3.04	--
TL-1	2975.58	330.62	0.42	10.00	10.00	0.01	C	3.00	3.04	No
TL-13	1171.00	1171.00	0.55	0.83	5.85	0.01	C	3.00	3.04	--
TL-17	1763.52	587.84	0.26	10.00	10.00	0.01	C	3.00	3.04	--
TL-2	1572.71	393.18	0.17	10.00	10.00	0.01	C	3.00	3.04	No
TL-4	270.00	270.00	1.00	10.00	10.00	0.08	C	3.00	3.04	--
WC-1.2 CITY	400.72	400.72	0.37	10.00	10.00	0.04	C	3.00	3.04	--
WC-14.1	946.50	473.25	1.00	4.00	1.81	0.02	C	3.00	3.04	--
WC-15 CITY	2170.00	2170.00	1.00	10.00	10.00	0.01	C	3.00	3.04	--
WC-17.1	1431.00	1431.00	1.00	10.00	10.00	0.01	C	3.00	3.04	--
WC-26	5373.12	413.32	0.34	10.00	10.00	0.04	C	3.00	3.04	--
WC-29	1253.82	313.45	0.06	10.00	10.00	0.01	C	3.00	3.04	--
WC-3	1133.11	283.28	0.14	10.00	10.00	0.06	C	3.00	3.04	No
WC-30	2049.55	409.91	0.32	10.00	10.00	0.01	C	3.00	3.04	--
WC-55	4185.35	597.91	0.49	1.25	7.00	0.01	C	3.00	3.04	No

Table 4.05-5 Swale Schedule for the UWW

Basin	Total Length (ft)	Average Swale Length (ft)	Fraction of Drainage Area	Typical Bottom Width (ft)	Typical Swale Side Slope m:V (ft)	Typical Slope (ft/ft)	Swale Retardance Factor	Typical Grass Height	Dynamic Infiltration Rate (ft)	If slope < 1%, evidence of wetlands?
WC-1.1 UW	150.00	37.50	0.52	5.10	6.21	0.03	C	3.00	0.03	--
WC-1.1 UW	1840.76	460.19	0.52	5.10	6.21	0.03	C	3.00	0.07	--
WC-1.2 UW	400.72	400.72	0.07	6.00	6.40	0.02	C	3.00	3.04	--
WC-15 UW	2170.00	2170.00	0.96	6.00	6.40	0.00	C	3.00	3.04	No

Table 4.05-6 Dry Detention Basins Modeled as Swales Parameters

Basin	Total Length (ft)	Average Swale Length (ft)	Fraction of Drainage Area	Typical Bottom Width (ft)	Typical Swale Side Slope m:V (ft)	Typical Slope (ft/ft)	Swale Retardance Factor	Typical Grass Height	Dynamic Infiltration Rate (ft)
TL-18	514.0	514.0	1.00	8	4	0.005	C	3	0.13
TL-18	100.0	100.0	1.00	10	4	0.01	C	3	0.13
WC-51.2	74.0	74.0	1.00	20	4	0.01	C	3	3.6
WC-51.3	99.0	99.0	1.00	15	4	0.01	C	3	3.6
GC-10.1	341.0	341.0	1.00	20	5	0.035	C	3	0.13
GC-1.1	75.0	75.0	1.00	10	4	0.01	C	3	3.6
GC-2	31.0	31.0	1.00	10	5	0.02	C	3	0.13
SB-3.1	592.6	296.3	1.00	15	4	0.007	C	3	0.13
WC-32.2	344.0	344.0	1.00	10	4	0.0125	C	3	3.04
WC-33.1A	100.0	100.0	1.00	20	4	0.01	C	3	3.6
WC-33.1B	187.7	187.7	1.00	20	4	0.03	C	3	3.6
TL-6.1	100.0	100.0	0.82	10	4	0.01	C	3	0.13
WC-39	660.5	660.5	1.00	15	4	0.005	C	3	0.07
SB-10	153.2	153.2	1.00	10	4	0.022	C	3	0.13

Table 4.05-7 Swale Desktop Analysis for the City of Whitewater and University of Wisconsin-Whitewater

Basin	CL-6	GC-1	GC-10.1	GC-10.5	GC-12 CITY	GC-14.1	GC-9.1	SB-3.1	SB-4.1	SB-8.1	SB-9.1	TL-17	WC-1.1 UWW	WC-14.1
Left Distance (ft)	--	36.00	12.00	--	--	16.00	--	8.00	--	5.55	5.06	--	14.22	3.51
Right Distance (ft)	--	10.00	15.00	--	--	13.00	--	8.00	--	12.30	20.00	--	10.63	3.71
Bottom Width (ft)	0.833	7.30	8.00	2.69	2.69	21.70	2.69	4.00	2.69	3.13	5.24	2.69	5.10	4.00
Side Slope Left (_ft H: 1 ft V)	8	18.00	6.00	6.93	6.93	8.00	6.93	4.00	6.93	2.78	2.53	6.93	7.11	1.76
Side Slope Right (_ft H: 1 ft V)	3.69	5.00	7.50	5.90	5.90	6.50	5.90	4.00	5.90	6.15	10.00	5.90	5.32	1.86
Average Side Slope (_ft H: 1 ft V)	5.845	11.50	6.75	6.42	6.42	7.25	6.42	4.00	6.42	4.46	6.27	6.42	6.21	1.81
Source	Test 3	Contours	Contours	Average of field tests	Tests	Contours	Tests	Contours	Tests	Contours	Contours	Tests	Contours	Contours

Table 4.05-8 Swale Measured Dimensions for the City and UWW

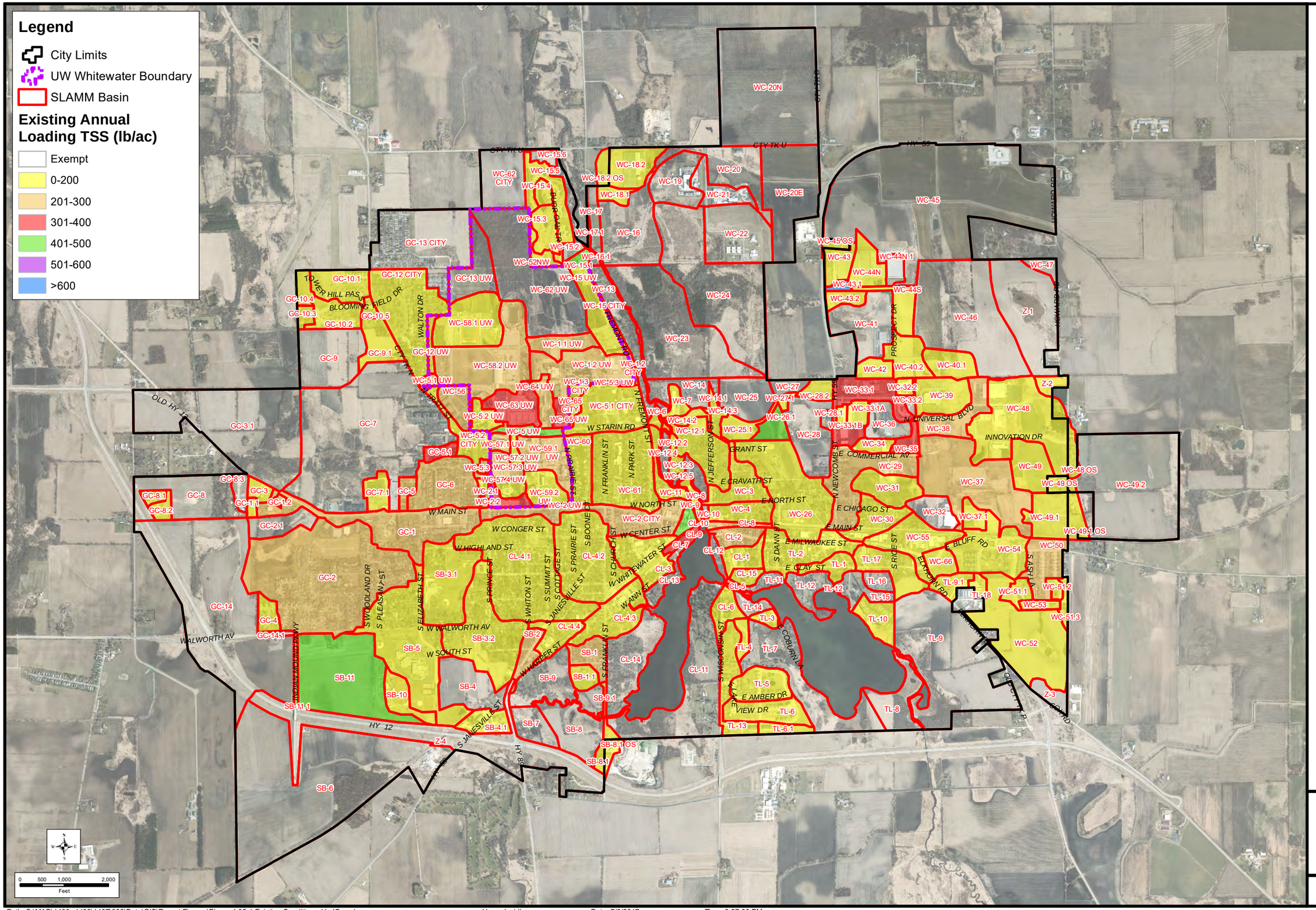
Test	2	3	4	Average
Basin	WC-15 UW	WC-55	TL-13	
Bottom Width (ft)	6	1.25	0.833	2.69
Side Slope Left (_ft H: 1 ft V)	4.8	8	8	6.93
Side Slope Right (_ft H: 1 ft V)	8	6	3.69	5.90
Average Side Slope (_ft H: 1 ft V)	6.4	7	5.845	6.42

G. Bioretention Basins

There are 10 bioretention basins in the City and 3 in the UWW, as shown in Figure 2.01-1 and as listed in Table 4.05-9 for the City and 4.05-11 for the UWW. Table 4.05-10 shows the additional BMPs not modeled.

Tables 4.04-1 and 4.04-2 list the existing conditions annual TSS and phosphorus loads by subbasin within the City, respectively. Tables 4.04-3 and 4.04-4 list the existing conditions annual TSS and phosphorus loads by subbasin within the UWW, respectively. The existing TSS loading rates are shown graphically in Figure 4.05-1.

The above practices were evaluated in the SLAMM model based on contour mapping, field review, and information supplied by the City and UWW.



EXISTING CONDITIONS LOADING - TOTAL SUSPENDED SOLIDS

TMDL STORMWATER PLAN
CITY OF WHITEWATER
WALWORTH AND JEFFERSON COUNTIES

STRAND ASSOCIATES®

FIGURE 4.05-1
1407.088

Path: S:\MAD\1400--1499\1407\088\Data\GIS\Report Figures\Figure 4.05-1 Existing Conditions 11x17.mxd User: davidk Date: 7/9/2017 Time: 3:27:00 PM

Table 4.05-9 City of Whitewater Best Management Practices

BMP Name	Basin ID	Approximate Year Constructed	Owner	Type	Modeled in Existing Conditions?	Comments
1014 Main Street Bioretention Basin	WC-2.2	2014	Private	Biofiltration	Yes	BMP & Maintenance Condition Of Approval
Ann Street Wet Pond	CL-4.3	2016	Public	Wet Pond	Yes	
Baysaver Hydrodynamic Device	GC-6	2008	Private	Hydrodynamic Device	Yes	BMP & Maintenance Condition Of Approval
Bloomingfield Acres Wet Pond	GC-12 CITY	2015	Public	Wet Pond	Yes	
Clay Street Wet Pond	TL-2	2015	Public	Wet Pond	Yes	
East Town Market Bioretention Basins	WC-66, TL-9.1, WC-54	2008	Public	OCD	Yes	Assumed 80% Reduction
Galloway Ridge Bioretention Basin 1	GC-8.3	Pre-2005	Private	Biofiltration	Yes	BMP & Maintenance Condition Of Approval
Galloway Ridge Dry Pond 2	GC-1.1	Pre-2005	Private	Swale	Yes	BMP & Maintenance Condition Of Approval
Generac Bioretention Basin 3	WC-44N.1	2008	Private	Biofiltration	Yes	BMP & Maintenance Condition Of Approval
Generac Wet Pond 1	WC-43	Pre-2005	Private	Wet Pond	Yes	BMP & Maintenance Condition Of Approval
Generac Wet Pond 2	WC-44N	Pre-2005	Private	Wet Pond	Yes	BMP & Maintenance Condition Of Approval
Golden State Foods Dry Pond 1	WC-33.1A	2012	Private	Swale	Yes	BMP & Maintenance Condition Of Approval
Golden State Foods Dry Pond 2	WC-33.1B	2012	Private	Swale	Yes	BMP & Maintenance Condition Of Approval
HUSCO Dry Pond	WC-39	Pre-2005	Private	Swale	Yes	BMP & Maintenance Condition Of Approval
James Street Wet Pond	CL-3	2014	Public	Wet Pond	Yes	
Mound Meadows	GC-2	2007	--	--	No	
National Guard Armory Dry Pond	WC-32.2	2010	Private	Swale, Biofiltration	Yes	BMP & Maintenance Condition Of Approval
Nitardy Funeral Home Bioretention Basin	WC-28.1	2006	Private	Biofiltration	Yes	BMP & Maintenance Condition Of Approval
Park Crest Bioretention Basin 2	GC-10.2	2008	Private	Biofiltration	Yes	BMP & Maintenance Condition Of Approval
Park Crest Dry Pond 1	GC-10.1	2006	Public	Swale	Yes	
Park Crest Bioretention Basin 2	GC-10.2	2008	Private	Biofiltration	Yes	BMP & Maintenance Condition Of Approval
Park Crest Dry Pond 1	GC-10.1	2006	Public	Swale	Yes	
Park Crest Dry Pond 3	GC-10.4	Not yet built	Not yet built	OCD	Yes	Not Yet Built, Assumed 80% Reduction
Pine Bluff Dry Pond 3	WC-51.2	2005	Private	Swale	Yes	BMP & Maintenance Condition Of Approval
Pine Bluff Dry Pond 4	WC-51.3	2005	Private	Swale	Yes	BMP & Maintenance Condition Of Approval
Pine Bluff Wet Pond 1	WC-51.1	2005	Private	Wet Pond	Yes	BMP & Maintenance Condition Of Approval
Pine Bluff Wet Pond 2	WC-53	2005	Private	Wet Pond	Yes	BMP & Maintenance Condition Of Approval
Prairie Village Wet Pond 1	WC-15.5	2006	Private	Wet Pond	Yes	BMP & Maintenance Condition Of Approval
Prairie Village Wet Pond 2	WC-15.4	2006	Private	Wet Pond	Yes	BMP & Maintenance Condition Of Approval
Prairie Village Wet Pond 3	WC-15.3	2006	Private	Wet Pond	Yes	BMP & Maintenance Condition Of Approval
Prince Street Bioretention Basin	WC-2.1	2014	Private	Biofiltration	Yes	BMP & Maintenance Condition Of Approval
Skyway Park Swale	GC-10.1	2005	Public	Swale	Yes	
Spring Brooks Wet Pond	SB-1.1	2004	Private	WP	Yes	BMP & Maintenance Condition Of Approval
Starin Road Wet Pond 1	WC-14.2	2011	Public	Wet Pond	Yes	
Starin Road Wet Pond 2	WC-25.1	2011	Public	Wet Pond	Yes	
Starin Road Wet Pond 3	WC-27.1	2011	Public	Wet Pond	Yes	
Summit Dental Bioretention Basin	GC-1.2	2015	Private	Biofiltration	Yes	BMP & Maintenance Condition Of Approval
Technology Park Wet Pond 1	WC-37.1	2010	Public	Wet Pond	Yes	
Technology Park Wet Pond 2	WC-49.1	2010	Public	Wet Pond	Yes	
Technology Park Wet Pond 3	WC-54	2010	Public	Wet Pond	Yes	
Technology Park Wet Detention Pond 4	WC-49	2010	Public	Wet Pond	Yes	
The Element Bioretention Basin	WC-5.3	2010	Private	Wet Pond	Yes	BMP & Maintenance Condition Of Approval
Treyton's Field of Dreams Bioretention Basin 1	WC-5.1 CITY	2013	Public	Biofiltration	Yes	
Treyton's Field of Dreams Bioretention Basin 2	WC-5.1 CITY	2013	Public	Biofiltration	Yes	
Walmart Wet Pond	GC-7.1	2010	Private	Wet Pond	Yes	BMP & Maintenance Condition Of Approval

BMP Name	Basin ID	Approximate Year Constructed	Owner	Type	Modeled in Existing Conditions?	Comments
Walton Crest Wet Pond	SB-5	2006	Private	Wet Pond	Yes	BMP & Maintenance Condition Of Approval
Waters Edge South Dry Pond 4	TL-6.1	2006	Private	Swale	Yes	BMP & Maintenance Condition Of Approval
Waters Edge South Wet Pond 1	TL-13	2006	Private	Wet Pond	Yes	BMP & Maintenance Condition Of Approval
Waters Edge South Wet Pond 2	TL-5	2005	Private	Wet Pond	Yes	BMP & Maintenance Condition Of Approval
Waters Edge South Wet Pond 3	TL-6	2005	Private	Wet Pond	Yes	BMP & Maintenance Condition Of Approval
Waters Edge South Wet Pond 5	TL-5	2005	Private	Wet Pond	Yes	BMP & Maintenance Condition Of Approval
Waters Edge Wet Pond	CL-15	Pre-2005	Private	Wet Pond	Yes	BMP & Maintenance Condition Of Approval
Whitewater Community Church Wet Pond 1	GC-8.2	2006	Private	Wet Pond	Yes	BMP & Maintenance Condition Of Approval
Whitewater Community Church Wet Pond 2	GC-8.1	2006	Private	Wet Pond	Yes	BMP & Maintenance Condition Of Approval
Whitewater Greenhouse Wet Pond	WC-18.2	Pre-2005	Private	Wet Pond	Yes	BMP & Maintenance Condition Of Approval
Whitewater High School Bioretention Basin	SB-10	Pre-1998	Public	Swale	Yes	
Whitewater High School Swale	SB-5, SB-10	Pre-2005	Public	Swale	Yes	
Whitewater Innovation Center Wet Pond	WC-48	2008	Public	Wet Pond	Yes	
Whitewater Middle School Dry Pond	SB-3.1	Pre-1998	Public	Swale	Yes	
Whitewater Self Storage Dry Pond	TL-18	2007	Private	Swale	Yes	

Table 4.05-10 Additional Stormwater Facilities within the City of Whitewater

BMP Name	Basin ID	Approximate Year Constructed	Owner	Type	Modeled in Existing Conditions?	Comments
Advanced Autoparts Catch Basin	GC-6	2016	Private	Catch Basins	Yes	BMP & Maintenance Condition Of Approval
534 Walworth Dry Pond	CL-4.3	2012	Private	Swale, Wet Pond	Yes	BMP & Maintenance Condition Of Approval

Table 4.05-11 University of Wisconsin-Whitewater Stormwater Facilities

BMP	Basin No.	Approximate year of construction	Owner	Modeled in Existing Conditions	Type of BMP	Comments
Schwager Drive Wet Pond	WC-58.1 UW	2008	Private-UWW	Yes	Wet Pond	BMP & Maintenance Condition Of Approval
UWW Parking Lot 2 Bioretention Basin	WC-57.3 UW	2010	Private-UWW	Yes	Biofiltration	BMP & Maintenance Condition Of Approval
UWW Parking Lot 8 Bioretention Basin 1	WC-5 UW	2010	Private-UWW	Yes	Biofiltration	BMP & Maintenance Condition Of Approval
UWW Parking Lot 8 Bioretention Basin 2	WC-5.2 UW	2010	Private-UWW	Yes	Biofiltration	BMP & Maintenance Condition Of Approval
UWW Parking Lot 8 Bioretention Basin 3	WC-5.2 UW	2010	Private-UWW	Yes	Biofiltration	BMP & Maintenance Condition Of Approval

4.06 WATER QUALITY MODELING CONCLUSIONS

A. Baseline Conditions

City of Whitewater

Baseline or "no controls" water quality modeling estimates the City-wide TSS load to be approximately 561,670 pounds as modeled. This translates to an average unit load of 264 lb/ac for the 2,128.6 acres of City land modeled. The City-wide total annual TP load was modeled to be 1,538.9 pounds, which translates to 0.72 lb/ac.

Of the 163 subbasins modeled, the unit loads ranged from approximately 17.8 lb/ac in the southwest section of the Park Crest neighborhood to 968 lb/ac along Walworth Avenue. As shown in Table 4.04-1, higher unit loads of TSS are found in areas of commercial and industrial land use. Baseline and existing conditions modeling output is provided in Appendix K.

University of Wisconsin-Whitewater

Baseline or "no controls" water quality modeling estimates the UWW-wide TSS load to be approximately 70,568 pounds as modeled. This translates to an average unit load of 239 lb/ac for the 295.70 acres of UWW land modeled. The UWW-wide total annual TP load was modeled to be 179.8 pounds, which translates to 0.61 lb/ac.

Of the 22 subbasins modeled, the unit loads ranged from approximately 0.97 lb/ac in the open area along the northwest side of campus to 521 lb/ac along West Starin Road. As shown in Table 4.04-3, higher unit loads of TSS are found in the areas of with larger amounts of parking, such as in WC-63 UW. Baseline and existing conditions modeling output is provided in Appendix L.

B. Existing Conditions

City of Whitewater

Water quality modeling of current conditions shows that the City's current BMPs have been effective in controlling nonpoint source pollution in stormwater runoff. Based on modeling, the estimate for the existing TSS load for the City's MS4 area is approximately 293,521 pounds. This translates to an average City-wide unit load of 138. The estimate for the existing TP load is approximately 967.8 pounds. This translates to an average unit load of 0.45 lb/ac. Specifically, modeling estimates that the existing conditions TSS reduction from baseline conditions is approximately 47.7 percent and the TP reduction is 37.1 percent, as shown in Table 4.06-1.

University of Wisconsin-Whitewater

Water quality modeling of current conditions shows that the UWW's current BMPs have been effective in controlling nonpoint source pollution in stormwater runoff. Based on modeling, the estimate for the existing TSS load for the UWW's MS4 area is approximately 59,097. pounds. This translates to an average UWW-wide unit load of 200 lbs/ac. The estimate for the existing TP load is approximately 157.2 pounds as modeled for the UWW. This translates to an average unit load of

0.53 lbs/ac. Specifically, modeling estimates that the existing conditions TSS reduction from baseline conditions is approximately 16.3 percent and the TP reduction 12.6 percent, as shown in Table 4.06-1.

Examples of new BMPs include the Bloomingfield Acres wet detention pond and the University Technology Park wet detention ponds. Street sweeping has also been applied to each basin, along with additional catch basins and assumed reduction for areas to be developed according to NR 151 standards.

The current City and UWW-wide TSS and TP reduction requirements do not meet the Rock River TMDL (Reach 59) requirements of 49 percent and 66 percent, respectively. Therefore, additional BMPs will need to be installed to meet these reduction targets. Table 4.06-1 shows the reductions required.

Pollutant	MS4 Permit Required Reductions	Rock River TMDL Required Reductions (Reach 59)	MS4 Modeled Existing Conditions Reduction (%)	TMDL Pollutant Reduction Gap (%)
City of Whitewater (WinSLAMM Version 10.2.1				
TSS	20%	49%	47.7%	1.3%
TP	NA	66%	37.1%	28.9%
University of Wisconsin-Whitewater (WinSLAMM Version 10.2.1				
TSS	20%	49%	16.3%	32.7%
TP	NA	66%	12.6%	53.4%

Table 4.06-1 TMDL Modeling Results for the City and the UWW

C. TMDL Issues

Section 1.5.2 of the MS4 permit requires that the permittee “shall include a written section in its stormwater 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.”

As described in Table 2.01-2, the City and UWW discharge to Cravath Lake, Galloway Creek, Spring Brook, Tripp Lake (an impaired water), and Whitewater Creek (pending impaired water). To further reduce pollutant loads that enter the impaired waters, we recommend the City and UWW investigate ways, if possible, to reduce discharge of phosphorus from City and UWW lands that come from farmland and lawn fertilizers, yard waste, and leaves. One way to do this could be to encourage residents to keep leaves and yard waste out of the curb and gutter line and ditches. TSS can be reduced by minimizing erosion, directing downspouts onto lawns rather than hard surfaces, and reducing hard surfaces on property. The City and UWW currently promote these and other practices in their respective brochures and news articles available to the public. For these impaired waters, this stormwater quality management plan addresses both TSS and phosphorus. At this time, the City and UWW appear to be in compliance with this permit condition. Section 5 of this plan includes an alternatives analysis for the City and UWW to meet the wasteload allocations included in the Rock River Basin TMDL.

SECTION 5
ALTERNATIVES ANALYSIS

5.01 INTRODUCTION

The City and UWW are required to meet both the MS4 permit TSS reduction requirements and the Rock River TMDL TSS and TP reduction requirements. To meet these requirements, there are generally three ways to do so, including stormwater BMPs within the municipality, watershed adaptive management (WAM), and water quality trading (WQT).

As shown in Table 5.01-1 and described in Section 4, the City has attained the MS4 permit required TSS reductions, while UWW has not. Neither the City nor UWW have attained the Rock River TMDL required reductions for Reach 59. The remaining TMDL pollutant reduction gap will need to be closed by achieving a higher pollutant loading reduction through implementation of stormwater BMPs within the Village, WAM, WQT, the multidischarger variance for the City's wastewater treatment facility (WWTF), or a combination of these options. Stormwater BMPs might include conversion of dry detention basins to wet detention basins, construction of new wet detention basins, bioretention basins, modified street sweeping program, and modified ordinance requirements for redevelopment as further described in this section. As shown in Table 5.01-1, TP is the controlling pollutant meaning that meeting the TP reduction requirement should also meet the TSS reduction requirements, but not vice versa.

Pollutant	MS4 Permit Required Reductions	Rock River TMDL Required Reductions (Reach 59)	MS4 Modeled Existing Conditions Reduction (%)	TMDL Pollutant Reduction Gap (% and lbs)
City of Whitewater (WinSLAMM Version 10.2.1)				
TSS	20%	49%	47.7%	1.3% 7,067 lbs
TP	NA	66%	37.1%	28.8% 444.6 lbs
University of Wisconsin-Whitewater (WinSLAMM Version 10.2.1)				
TSS	20%	49%	16.3%	32.7% 23,108 lbs
TP	NA	66%	12.6%	53.4% 96.1 lbs

Table 5.01-1 TMDL Modeling Results for the City and UWW MS4s

The remainder of this section is devoted to alternatives analysis to determine the most cost-effective way for the City and UWW to achieve MS4 TMDL compliance.

Section 5.02 discusses alternatives considered for the City. Section 5.04 discusses components that make up the alternatives for the City and UWW. Sections 5.05 provides an evaluation of alternatives for the City.

Section 5.03 discusses alternatives considered for UWW. Section 5.04 discusses components that make up the alternatives for the City and UWW. Section 5.06 provides an evaluation of alternatives for UWW.

Section 5.07 provides an evaluation of WQT and WAM; Section 5.08 includes a discussion of potential trading partners; Section 5.09 discusses the potential for WQT with the City WWTF; Section 5.10

discusses the potential for WQT with agricultural lands; Section 5.11 discusses the potential for WAM led by the City WWTF; and Section 5.12 includes recommendations.

Each alternative includes a description, the effects on stormwater quality, and the planning-level opinion of probable cost. Costs presented were estimated using historical bid costs, where available, and supplemented by other reference sources. All referenced project costs include allowances for engineering, contingencies, and soils investigations, where necessary. The purpose of this report is to provide the City and UWW with the information required to initiate the budgeting and planning phase for facilities improvements. All costs are presented in 4th quarter 2017 dollars. All costs presented in this section include a contingency and technical services allowance of 25 percent. Costs do not include utility conflict resolution, if any, unless noted. Appendix N (City) and Appendix P (UWW) includes detailed opinion of probable construction cost breakouts for each alternative component. Future engineering and construction costs should be adjusted for inflation when final project schedules are determined. Opinions of probable construction cost should be updated during the design phase.

5.02 ALTERNATIVES CONSIDERED (CITY)

The City's 2011 Water Quality Modeling Updates report identified six non-structural (various street sweeping types and frequencies) and 16 structural stormwater BMPs (wet detention basins, dry to wet pond conversions, and hydrodynamic separators) aimed at helping the City meet the required City-wide 40 percent TSS reduction at the time. Based on the alternatives analysis in that report, the City implemented a refined street sweeping program and embarked on a program to pursue grant funding to construct wet detention basins in the City. Since 2012, the City has applied for and received five construction grants worth $565,500 for six wet detention basins (James Street, Bloomingfield Acres, East Clay Street, Ann Street, South Janesville Street, and Business Park Armory). All of the wet detention basins have been constructed except for South Janesville Street and the Business Park Armory, which received grants in 2017 and are tentatively planned for design in 2017 or 2018 and construction in 2018 or 2019.

Many of the alternative components identified, but not constructed, in the 2011 report were retained in this report. Because of the more stringent TMDL-required 66 percent TP reduction, additional BMPs have been identified to close the 444.6-lb TP reduction gap shown in Table 5.01-1 including vacuum street sweeping, wet detention basins, underground wet detention basins, dry to wet detention basin conversion, permeable pavement retrofits, hydrodynamic separators, traffic-calming bioretention basin bumpouts and 80 percent TSS reduction for redevelopment. There are three projects that would involve a BMP that serves both UWW and City lands. For these BMPs, the cost and stormwater quality performance are prorated based on UWW and City area draining to the BMP. Table 5.02-1 provides a listing of these alternative components packaged into Alternatives 1, 2, and 3, including cost, performance, cost effectiveness, potential soil contamination on-site (per WDNR RR Sites Map), property acquisition need, and wetland delineation need. Appendix N (City) includes the detailed opinion of probable construction cost for each alternative component. Appendix M (City) includes a figure showing the layout of each alternative component (Figures M-1 through M-20).

5.03 ALTERNATIVES CONSIDERED (UWW)

UWW's 2011 Stormwater Management Plan Updates report identified five non-structural (various street sweeping types and frequencies) and ten structural stormwater BMPs (wet detention basins,

underground wet detention basins, and bioretention basins) aimed at helping UWW meet the required UWW-wide 40 percent TSS reduction at the time. Based on the alternatives analysis in that report, UWW implemented a refined street sweeping program changing from mechanical sweeping once per year in the spring to mechanical sweeping twice per year (once in spring and once in fall). UWW did not construct any of the identified structural stormwater BMPs.

Many of the alternative components identified, but not constructed, in the 2011 report were retained in this report. Because of the more stringent TMDL-required 66 percent TP reduction, additional BMPs have been identified to close the 96.1-lb TP reduction gap shown in Table 5.01-1, including vacuum street sweeping, wet detention basins, underground wet detention basins, bioretention basins, permeable pavement retrofits, traffic-calming bioretention basin bumpouts and 80 percent TSS reduction for redevelopment. There are three projects that would involve a BMP that serves both UWW and City lands. For these BMPs, the cost and stormwater quality performance are prorated based on UWW and City area draining to the BMP. Table 5.03-1 provides a listing of these alternative components packaged into Alternatives 1, 2, and 3 including cost, performance, cost effectiveness, potential soil contamination on-site (per WDNR RR Sites Map), property acquisition need, and wetland delineation need. Appendix P (UWW) includes the detailed opinion of probable construction cost for each alternative component. Appendix O (UWW) includes a figure showing the layout of each alternative component (Figures O-1 through O-3).

5.04 ALTERNATIVE COMPONENTS

Alternatives considered for both the City and UWW involve many different components. Assumptions for these components are described in this section.

1. Vacuum Street Sweeping

As described in Section 4.05, the City currently sweeps every City street approximately every two weeks with a mechanical sweeper. The every two-week frequency is considered a reasonable frequency, but the City can realize a substantial increase in TP reduction by switching to a vacuum sweeper (32.9 lbs per year).

Likewise, the City currently sweeps every street within the UWW boundary twice per year. This frequency is less than that being employed by other MS4s including the City. By switching to an every two-week frequency with a mechanical sweeper and a vacuum sweeper, UWW can realize a substantial increase in TP reduction of 17.1 lbs TP and 19.6 lbs TP per year, respectively.

2. Redevelopment

The WDNR allows TMDL pollutant reduction credit to be taken for redevelopment. The City's current post-construction stormwater ordinance requires redevelopments to meet a 40 percent TSS reduction. Many communities are considering requiring redevelopment to meet an 80 percent TSS reduction to assist in meeting TMDL requirements. Assuming that 1 acre of commercial redevelopment occurs yearly within the City, the City can realize reductions of 8.1 lbs and 16.2 lbs TP due to redevelopment meeting 40 percent and 80 percent TSS reduction, respectively, over a 20-year planning period. It is anticipated that private development will use an array of stormwater BMPs for compliance including

green infrastructure such as wet detention ponds, underground wet detention basins, bioretention basins, infiltration basins, permeable pavement, and green roofs.

3. Construction of Stormwater BMPs

Appendices M and O include figures for each of the proposed structural stormwater BMPs. These figures show existing wetlands, floodplains, storm sewer, sanitary sewer, and water main. Inclusion of this information allows preliminary siting of proposed stormwater BMPs outside of wetlands and floodplains and to avoid or reroute existing public utilities.

a. Dry Detention Basin to Wet Detention Basin Conversion

In the City, there is only one dry detention basin that appears to warrant conversion to a wet detention basin. The HUSCO International dry detention basin currently only achieves a 41.8 percent TSS and a 31.7 percent TP reduction. By converting this basin to a wet detention basin achieving an 80 percent TSS reduction and 67 percent TP reduction, an additional 13.4 lbs of TP per year can be achieved.

There are no dry detention basins on the UWW campus.

b. Wet Detention Basins

Wet detention basins have been layed out at 11 locations within the City and one location on the UWW campus. For each proposed wet detention basin, we have sought to attain a minimum of an 80 percent TSS reduction (with equivalent 67 percent TP reduction) if allowed by available land. Our analysis includes WinSLAMM modeling of a proposed stage-storage-discharge information at each wet detention basin. For all wet detention basins, the cost for a clay liner is included. It is recommended that geotechnical investigation be completed during design of wet detention basins to determine the need for and cost of a clay liner.

During design, the City and UWW may want to consider the idea of using a bioretention basin in lieu of a wet detention basin if conditions allow. The WDNR Bioretention For Infiltration Technical Standard 1004 recommends a maximum drainage area of 2 acres. However, Strand has had success in implementing enhanced bioretention basins for drainage areas up to 60 acres when the following are incorporated into the design: diversion of large storm events around the bioretention basin, pretreatment of low flows upstream of bioretention basin with a hydrodynamic separator, level spreading/energy dissipation of lows flows entering the bioretention basin, sufficient drawdown time, and confirmation of adequate vertical grade to incorporate an underdrain. Possible benefits of bioretention in lieu of a wet detention basin include potentially less opposition in residential/institutional areas, potential to be more aesthetically pleasing, and potential to couple with park-like amenities (outdoor classrooms, overlooks, etc.) Figure 5.04-1 shows two examples of enhanced bioretention basins incorporating these features on Strand-designed projects in Cleveland, Ohio.

If wet detention ponds proceed in Parking Lot 20 on the UWW campus (see Figures M-4 and M-5 in Appendix M) or at the Commercial Avenue site (Figure M-11 in Appendix M), implications (if any) of WDNR's 400-foot setback from wells to stormwater ponds per NR 811.12 (5) (d) 6.

should be investigated. At the Husco site shown on Figure M-9 in Appendix M, a WDNR wetland exemption request per NR 103 would need to be pursued to establish that the wetland shown within the Husco International detention pond is artificial and can thus be excavated. This artificial wetland would then be allowed to be removed because it is associated with a stormwater detention facility operated and maintained only for sediment detention and flood storage purposes. The West South Street Pond (Figure M-19 in Appendix M) is sized to match the size of the pond applied for in the grant for a project closer to South Janesville Street. Should the City desire to expand this pond to get additional pollutant reduction, a larger pond as shown in Figure M-19A would be pursued. The East Main Street Wet Detention Pond shown in Figure M-14 in Appendix M could be an expansion area for the adjacent industry (Provisur Technologies, Inc.) and appears to currently be established as a native prairie.

Source: Stormbloc, Stormtech, ADS N-12, Contech CMP Storage, Stormtrap (clockwise from top left)

Figure 5.04-1 Enhanced Bioretention Basins in Cleveland, Ohio Serving 19-Acre and 59-Acre Drainage Areas, Respectively

c. Underground Wet Detention Basins

Underground wet detention basins have been laid out at two locations within the City and one location on the UWW campus. For each proposed wet detention basin, we have sought to attain a minimum of an 80 percent TSS reduction (with equivalent 67 percent TP reduction) if sufficient available land. Our analysis includes WinSLAMM modeling of a proposed stage-storage-discharge information at each underground wet detention basin assuming that a pre-cast concrete vault product (Stormtrap) was used. Typical options for underground wet detention as shown in Figure 5.04-2 include corrugated metal pipe (CMP) underground detention system (Contech), a high-density polyethylene (HDPE) pipe detention system (ADS) with maximum 60-inch pipe size, polypropylene arched vaults (Stormtech), pre-cast concrete stormwater vaults (StormTrap), and polypropylene cellular blocks (Stormbloc). We recommend that during design, an alternatives analysis be completed to determine the most cost-effective way to provide underground wet detention at the proposed locations while considering ability for system to provide a 3-foot depth wet pool, ease of maintenance, and longevity of system. Underground wet detention basins would include measures to maintain a 3-foot depth permanent pool.

Source: Stormbloc, Stormtech, ADS N-12, Contech CMP Storage, Stormtrap (clockwise from top left)

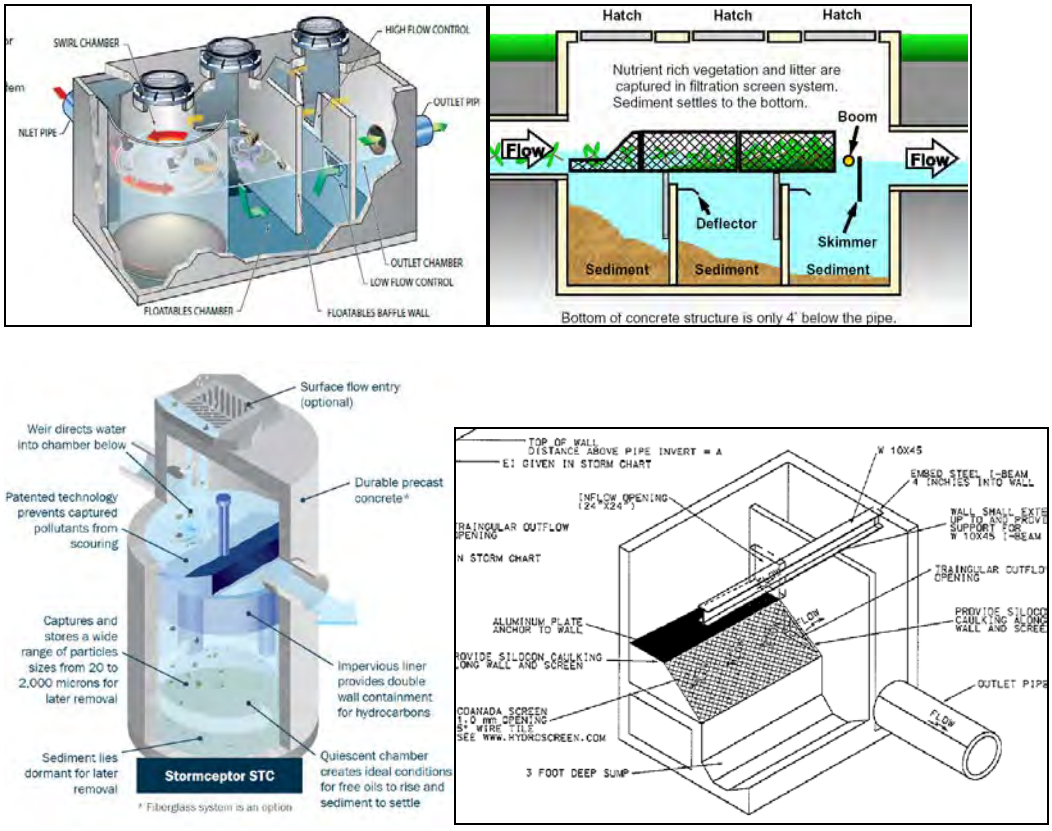
Figure 5.04-2 Underground Detention Options

d. Hydrodynamic Separators

Hydrodynamic separators have been laid out at nine locations within the City and no locations on the UWW campus. Hydrodynamic separators are generally less effective than wet detention basins, but are considered when there is little open land available to site a more traditional stormwater BMP such as a wet detention basin. Hydrodynamic separators typically will treat only low flows (1- to 2-year storm events) while bypassing high flows around or through the unit. Hydrodynamic separators generally can expect to achieve a 15 percent TSS reduction and a 12 percent TP reduction. Hydrodynamic separators are proven to be effective in reducing urban stormwater pollutants (nutrients, TSS, TP, oil/grease, trash, and other debris) when adequately maintained. Typical maintenance would be provided via Vac truck two to three times per year.

Typical options for hydrodynamic separators as shown in Figure 5.04-3 include Vortechs (Contech) units, Nutrient Separating Baffle Box (Suntree Technologies, Inc.), Stormceptor (Rinker), and non-proprietary Coanda screen pretreatment units. We recommend that during design, an alternatives analysis be completed to determine the most cost-effective hydrodynamic separator at a given location while considering performance, need for bypass, ease of maintenance and cost. Given WDNR's expected leaf collection credit, the Nutrient Separating Baffle Box (Suntree Technologies, Inc.) may merit further consideration because it has a dedicated feature to remove leaves.

Figure M-15 in Appendix M shows the locations of numerous hydrodynamic separators in the downtown area. It is acknowledged that the West Main Street and East Main Street hydrodynamic separators would be difficult to construct due to utility conflicts in their general vicinity.



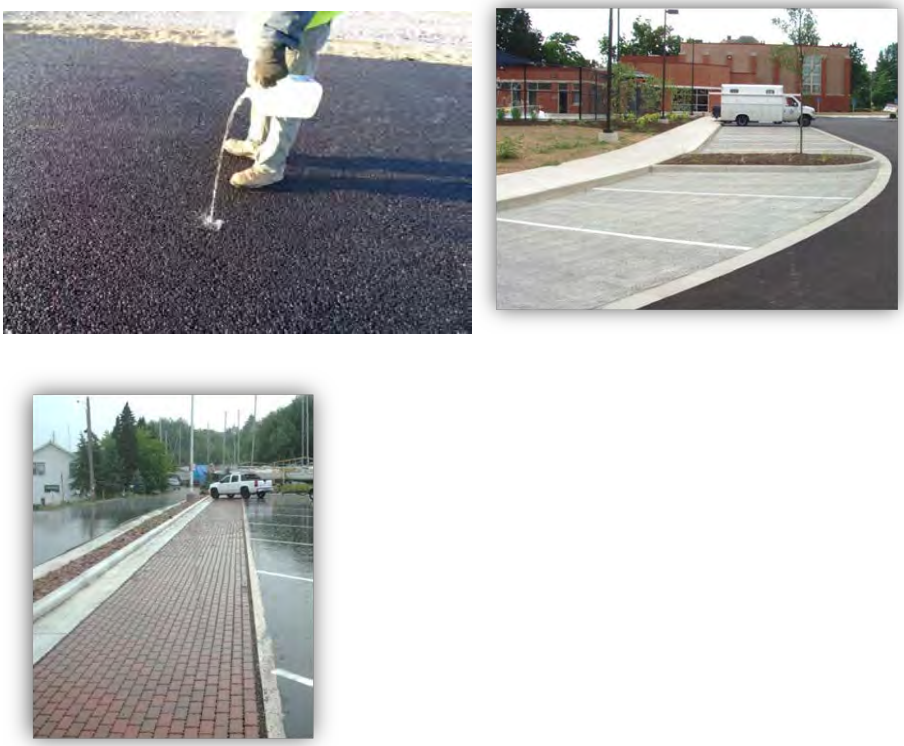
Source: Vortech, Nutrient Separating Baffle Box, Stormceptor, Coanda Screen (clockwise from top left)

Figure 5.04-3 Hydrodynamic Separator Options

e. Permeable Pavement

Permeable pavement can be considered to retrofit existing public and private parking lots on City and UWW campus lands. Analysis of impervious area GIS layers shows that there is 475 acres of parking lot in the City and 45 acres of parking lot on the UWW campus that would be candidates for retrofit. While no specific projects have been identified in the City, permeable pavement has been identified as a stormwater BMP serving untreated Parking Lots 18 and 19 on the UWW campus. For the City, porous pavement retrofits would likely be best implemented through the City's stormwater utility credit process or as City projects. Because the UWW pays stormwater utility fees to the City, a UWW retrofit project would be eligible for a stormwater utility credit which would reduce the UWW's annual payment to the City.

Analysis of permeable pavement assumes a 5 to 1 traditional to permeable run-on ratio as allowed by WDNR Permeable Pavement Technical Standard 1008. For analysis purposes, silty soils are assumed. Technical Standard 1008 allows for 100 percent TSS and TP reduction for the portion of incoming flows infiltrating into the ground beneath the pavement and 65 percent TSS and 35 percent TP removal for incoming flows flowing out of an underdrain in a permeable pavement system. Typical options for permeable pavement as shown in Figure 5.04-4 include permeable asphalt, permeable concrete, and paver blocks.



Source: Permeable Asphalt, Permeable Concrete, Permeable Paver Blocks(clockwise from top left)

Figure 5.04-4 Permeable Pavement Options

f. Traffic Calming Bioretention Basin Bumpout System

Where the City or UWW has a need to provide traffic-calming and pedestrian refuge at certain intersections, a traffic-calming bioretention basin bumpout system should be considered. On a recent Strand project in Aurora, Illinois, 17 intersections were provided with this system. Watersheds draining to each intersection ranged from 0.3 acres to 5.4 acres with an average of 3.2 acres per intersection. Underdrains would be connected to existing storm sewer infrastructure in or nearby the intersection.

This system would look much like Figures 5.04-5 and 5.04-6. From an analysis standpoint, we have assumed an average of 3.2 acres of medium density residential landuse (institutional landuse for the UWW) draining to a given intersection. WinSLAMM modeling shows that a

single intersection serving 3.2 acres with this system would provide 50 to 60 percent TSS reduction (464 to 672 lbs) and 40 to 46 percent TP reduction (1.4-1.6 lbs). This system should be considered alongside the City's annual street reconstruction program.

Bioretention basins should be designed using the WDNR *Technical Standard 1004: Bioretention for Infiltration*. Bioretention basins were analyzed to have 2 feet of above-ground storage, a 2-foot engineered soil layer, and a 15-inch aggregate storage layer with a 6-inch underdrain pipe.

An engineered soil mix that minimizes leaching of phosphorus should be considered. As stated in the WDNR guidance document *Modeling Post-Construction Storm Water Management Treatment, May 2015,* the "DNR allows […] 80% TSS and 0% TP removal credit for the volume of runoff that is filtered through an engineered soil filtering layer that meets the requirements of Technical Standard 1004 (Bioretention for Infiltration), and that is discharged via an underdrain."

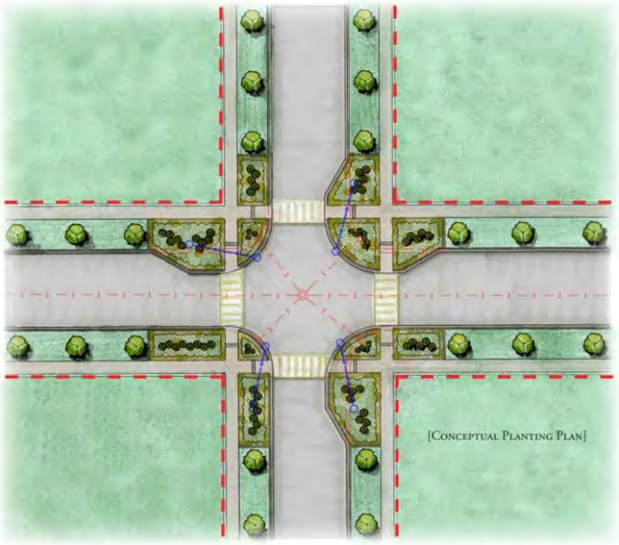


Figure 5.04-5 Traffic-Calming Bioretention Basin Bumpout System

Figure 5.04-6 Traffic-Calming Bioretention Basin Bumpout System

g. Chemical Treatment of Existing Wet Detention Basins

Chemical treatment at existing wet detention basins was considered in the City. Typical candidates for chemical treatment would be regional wet detention basins with large drainage areas and underperforming wet detention basins (that get considerably less than 80 percent TSS reduction). The premise behind a chemical treatment system is that wet detention basins will settle out particulate phosphorus, but without chemical treatment, will allow dissolved phosphorus to pass through. We have investigated chemical treatment of the Ann Street wet detention basin by virtue of its 203-acre watershed size and underperforming 50 percent TSS reduction performance. With the addition of a chemical feed system, an 80 percent TSS and 80 percent TP reduction would be considered feasible.

h. Chemical Treatment of Whitewater Creek Storm Flows

To assist in meeting TMDL limits, the City may want to consider construction of a wet detention basin along Whitewater Creek. This detention basin would pull off storm flows from the creek while allowing baseflows to continue down the creek unabated. A properly sized chemical treatment system would likely provide an 80 percent TP reduction in the storm flows compared to a 67 percent TP reduction without chemical treatment. This detention would likely be located downstream of the City and rather than treating closer to the source, would consist of treating after the pollutants have already reached Whitewater Creek. The City of Madison is embarking on a similar system for a 5,500-acre watershed draining through Starkweather Creek and has gained initial buy-in from the WDNR that they would get credit for a system of this type. This

type of analysis is beyond the scope of this project but could be considered in the future if desired by the City for the approximate 38,000-acre Whitewater Creek drainage area (measured at the north City limits). However, with a TMDL-required 66 percent TP reduction, a wet pond achieving 80 percent TSS reduction and equivalent 67 percent TP reduction could potentially satisfy the City's TMDL requirements. We recommend that the City collect Whitewater Creek water quality data during storm events to see if a system of this nature is feasible. Many times waterways immediately downstream of impoundments and lakes may not exhibit the water quality characteristics that would make a system of this nature feasible because of pollutant removal occurring in the impoundment/lake. For this reason, consideration could be given to a treatment system upstream of the lakes which would also help the lakes from accumulating sediment.

i. Streambank Restoration

Figure 1.01-1 shows the general location of streambank erosion along Whitewater Creek. According to the WDNR's TMDL Guidance for MS4 Permits: Planning, Implementation, and Modeling Guidance # 3800-2014-04, October 20, 2014, streambank restoration might not be given credit toward TMDL compliance because the TMDL baseline modeling already assumes that drainage systems are stable. However, recognizing the benefit that streambank restoration provides, the WDNR allows and encourages streambank restoration as a compliance benchmark toward meeting TMDL goals.

4. Pollutant Reduction Credit for Improved Leaf Collection

While not analyzed as part of this alternatives analysis, the City should track the WDNR's development of a pollutant reduction credit for improved leaf collection. This could have a significant effect on pollutant reduction in the City. Upon release of the WDNR's credit, the City should reevaluate TMDL compliance efforts.

On October 30, 2017, the WDNR posted draft Interim Municipal Phosphorus Reduction Credit for Leaf Management Programs for public comment. The draft guidance states that a 17 percent TP reduction credit would be given for leaf collection in medium density residential areas without alleys (unless alleys get same leaf pickup and alley cleaning as streets) under the following conditions:

- The TP reduction shall be adjusted for the amount of medium density residential in a watershed.
- Must be in a curb and gutter drainage system.
- Tree cover of one or more trees between sidewalk and curb for every 80 feet of curb. In areas without sidewalk, trees within 10 feet of the curb count as tree cover.
- Municipality must have an ordinance prohibiting placement of leaves in the street and a policy stating leaves shall be placed on the terrace in bags or piles.
- Municipal leaf collection must occur at least four times in the months of October and November by pushing, vacuuming, or manually loading the leaves into a garbage vehicle.
- Municipality must clean the street of remaining leaf litter within 24 hours of each leaf collection occurrence by mechanical broom or vacuum-assisted street cleaner.
- The credit may not be taken in addition to phosphorus reductions from other BMPs in a given drainage area at this time.
- The credit is currently not available for any other than medium density residential landuse areas.

Currently, the City has approximately 16 percent of its land area in a medium density residential landuse so this credit could potentially have a meaningful impact on the overall pollutant reduction levels in the City. Some of these areas are currently served by one or more BMPs which may lessen the impact. Additionally, the City would need to modify its leaf collection program to meet the conditions described above to claim the credit. It is expected that additional research will be completed that will expand the applicability of this credit to other landuses and other leaf collection methods/programs. We recommend that the City provide financial support for research efforts that will expand this credit.

5.05 EVALUATION OF ALTERNATIVES–CITY

Table 5.05-1 summarizes the alternatives, the incremental TSS reduction, and the opinions of probable costs.

Table 5.05-1 Summary of Alternatives (City)–Capital Cost

Component	BMP	Figure Number	Proposed BMP Type	Basin	Serves UWW and City Lands	Property Acquisition	Wetland Delineation	Soil Contamination On-Site	2017 BMP Cost	BMP Cost (20-Year NPW)	20-Year NPW Cost-Effectiveness ($/lb TP)	Alternative #1	Alternative #2	Alternative #3	Alternative #4-12 BMPs, Then WQT	Alternative #5- 6 BMPs, Then WQT	Alternative #6-4 BMPs, Then WQT	Alternative #7-All WQT
	Mechanical Street Sweeping (Existing Performance) with full bmps	N/A	N/A															
	Mechanical Street Sweeping (Existing Performance) with SC only	N/A	N/A															
	Vacuum Street Sweeping (Using Existing Frequencies) with full bmps	N/A	Vacuum Street Sweeping						$284,299	$240,267	$336	30.9	30.9	30.9	30.9	30.9		
1	Vacuum Street Sweeping (Using Existing Frequencies) with SC only	N/A	Vacuum Street Sweeping															
2	Redevelopment-40% (20 years of redevelopment)	N/A	TBD									8.1						
3	Redevelopment-80% (20 years of redevelopment)	N/A	TBD										16.2	16.2	16.2	16.2	16.2	
4	Mound Meadows	M-1	Wet Detention Basin	GC-2		**Yes**	**Yes**		$354,875	$420,832	$683	30.7	30.7	30.7	30.7			
5	DLK / Main St.	M-2	Wet Detention Basin	GC-1		**Yes**			$328,000	$366,215	$1,077	17.0	17.0	17.0	17.0			
6	Carriage Drive	M-3	Wet Detention Basin	GC-6					$548,500	$730,477	$2,029	18.0	18.0	18.0	18.0			
7	Parking Lot 20–Underground Detention (2.8 ac-ft)	M-4	Underground Wet Detention Basin	WC-1.2 UW	**Yes**				$11,688	$12,052	$2,954	0.2						
8	Parking Lot 20–Underground Detention (6.3 ac-ft)	M-5	Underground Wet Detention Basin	WC-1.2 UW	**Yes**				$20,939	$21,993	$3,766		0.3	0.3				
9	Starin Road-Starin Park	M-6	Underground Wet Detention Basin	--	**Yes**				$622,924	$669,641	$2,075	16.7	16.7	16.7	16.7	16.7		
10	Public Works Yard	M-7	Hydrodynamic Separator	WC-7					$44,875	$89,552	$11,194	0.4	0.4	0.4	0.4	0.4	0.4	
11	Armory Site–Business Park	M-8	Wet Detention Basin	--			**Yes**		$493,125	$657,215	$1,911	17.2	17.2	17.2	17.2	17.2	17.2	
12	Husco International	M-9	Dry to Wet Pond Conversion	WC-39					$443,250	$586,336	$5,235	5.6	5.6	5.6				
13	N. Universal Blvd. (Husco)	M-10	Wet Detention Basin	WC-38		**Yes**			$462,250	$509,272	$4,316	5.9	5.9	5.9				
14	Commercial Avenue	M-11	Wet Detention Basin	WC-29		**Yes**			$528,000	$615,569	$2,332	13.2	13.2	13.2				

Component	BMP	Figure Number	Proposed BMP Type	Basin	Serves UWW and City Lands	Property Acquisition	Wetland Delineation	Soil Contamination On-Site	2017 BMP Cost	BMP Cost (20-Year NPW)	20-Year NPW Cost-Effectiveness ($/lb TP)	Alternative #1	Alternative #2	Alternative #3	Alternative #4-12 BMPs, Then WQT	Alternative #5- 6 BMPs, Then WQT	Alternative #6-4 BMPs, Then WQT	Alternative #7-All WQT
14	Commercial Avenue	M-11	Wet Detention Basin	WC-29		**Yes**			$528,000	$615,569	$2,332	13.2	13.2	13.2				
15	East Cravath St.	M-12	Wet Detention Basin	WC-26		**Yes**	**Yes**		$496,625	$660,568	$4,129	8.0	8.0	8.0				
16	Chicago/East St.	M-13	Wet Detention Basin	WC-30, WC-31		**Yes**			$218,625	$255,651	$2,283	5.6	5.6	5.6	5.6			
17	E. Main St.	M-14	Wet Detention Basin	WC-55, TL-17, and WC-66		**Yes**			$538,750	$680,719	$6,303	5.3	5.3	5.3				
18	S. Wisconsin Street	M-15	Hydrodynamic Separator	CL-1					$50,875	$95,300	$23,825	0.2	0.2					
19	E. Milwaukee Street	M-15	Hydrodynamic Separator	CL-2, CL-8					$80,125	$123,324	$61,662	0.1	0.1					
20	E. Main street	M-15	Hydrodynamic Separator	WC-4, CL-8					$141,500	$182,127	$10,118	0.9	0.9					
21	E. North Street	M-15	Hydrodynamic Separator	WC-3					$63,125	$107,037	$6,690	0.8	0.8					
23	W. North Street (Pond)	M-16	Underground Wet Detention Basin	WC-2 CITY	**Yes**				$1,677,190	$1,741,492	$5,466	16.8	16.8	16.8				
24	W. Main Street	M-15	Hydrodynamic Separator	WC-9					$82,875	$125,959	$8,997	0.7	0.7					
25	Cravath Park	M-15	Hydrodynamic Separator	CL-7					$48,375	$92,905	$23,226	0.2	0.2	0.2				
26	W. Caine Street Wet Pond	M-18	Wet Detention Basin	SB-1		**Yes**			$501,750	$575,985	$4,114	7.0	7.0	7.0				
27	S. Janesville Street Hydrodynamic Separator	M-17	Hydrodynamic Separator	SB-2					$83,000	$126,079	$7,880	0.8	0.8					
29	W. South Street Small Pond	M-19	Wet Detention Basin	--		**Yes**	**Yes**		$271,750	$354,017	$741				23.9	23.9	23.9	
28	W. South Street Large Pond	M-19a	Wet Detention Basin	--		**Yes**	**Yes**		$890,375	$1,246,158	$1,644	37.9	37.9	37.9				
30	E. Bluff Road	M-20	Wet Detention Pond	WC-50, WC-51.2, and WC-51.3		**Yes**			$294,125	$353,968	$2,837	6.2	6.2	6.2				
31	1 Acre of Permeable Pavement Serving 5 Acres of Existing Pavement (5:1 Run-On Ratio)	N/A	N/A	Various		N/A												
32	Alternative #1 Porous Pavement 24.13 Acres Serving 144.8 Acres of Existing Pavement	N/A	N/A	Various		N/A			$23,145,874	$21,097,735	$10,936	109.8						

Component	BMP	Figure Number	Proposed BMP Type	Basin	Serves UWW and City Lands	Property Acquisition	Wetland Delineation	Soil Contamination On-Site	2017 BMP Cost	BMP Cost (20-Year NPW)	20-Year NPW Cost-Effectiveness ($/lb TP)	Alternative #1	Alternative #2	Alternative #3	Alternative #4-12 BMPs, Then WQT	Alternative #5- 6 BMPs, Then WQT	Alternative #6-4 BMPs, Then WQT	Alternative #7-All WQT
33	Alternative #2 Porous Pavement 22.33 Acres Serving 133.99 Acres of Existing Pavement	N/A	N/A	Various		N/A			$21,418,532	$19,339,591	$10,936		101.6					
34	Alternative #3 Porous Pavement 20.73 Acres Serving 124.38 Acres of Existing Pavement	N/A	N/A	Various		N/A			$19,881,696	$17,581,446	$10,936			94.3				
35	79.1 Acres of Permeable Pavement Serving 474.73 Acres of Existing Pavement	N/A	N/A	Various		N/A												
36	Traffic-Calming Bioretention Basin Bumpouts (Per Intersection)								$207,100	$221,698	$7,918	1.4	1.4	1.4				
37	Ann Street Wet Pond Chemical Treatment								$359,384	$931,056	$591	79.0	79.0	79.0	79.0			
38	Innovation Center Wet Pond Chemical Treatment								$49,359	$127,875	$591			10.8	10.8			
39	Agricultural WQT (Interim Credits)-178.2 lbs									$379,520	$110				178.2			
40	Agricultural WQT (Interim Credits)-339.3 lbs									$722,980	$110					339.3		
41	Agricultural WQT (Interim Credits)-386.9 lbs									$824,120	$110						386.9	
42	Agricultural WQT (Interim Credits)-444.6 lbs									$947,840	$110							444.6
											Total TP Removed	444.6	444.6	444.6	444.6	444.6	444.6	444.6
											Total 2017 Cost	$33,001,459	$31,283,368	$29,294,391	$3,575,716	$1,716,973	$809,750	$ -
											Total 20-Year NPW Cost	$33,515,192	$31,766,988	$29,376,892	$5,222,318	$2,733,672	$1,924,904	$947,840
											20-Year NPW Cost Per Pound TP Captured	$3,802	$3,636	$3,362	$598	$313	$ 220	$110