# Lakes Advisory Committee Meeting

Cravath Lakefront room 2nd floor 312 West Whitewater Str, Whitewater, WI, 53190 *In Person and Virtual

**Monday, March 04, 2024 - 4:00 PM**

**Citizens are welcome (and encouraged) to join our webinar via computer, smart phone, or telephone. Citizen participation is welcome during topic discussion periods.**

**Please note that although every effort will be made to provide for virtual participation, unforeseen technical difficulties may prevent this, in which case the meeting may still proceed as long as there is a quorum.**

1. Topic: Lake Advisory Committee Meeting
   Time: Mar 4, 2024 04:00 PM Central Time (US and Canada)

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## AGENDA

**CALL TO ORDER**

**ROLL CALL**

**APPROVAL OF AGENDA**
*A committee member can choose to remove an item from the agenda or rearrange its order; however, introducing new items to the agenda is not allowed. Any proposed changes require a motion, a second, and approval from the council to be implemented. the agenda shall be approved at reach meeting even if no changes are being made at that meeting.*

**OLD BUSINESS**

2. Minutes From January 25, 2024
3. Minutes From February 9, 2024

**HEARING OF CITIZEN COMMENTS**

*No formal Committee action will be taken during this meeting although issues raised may become a part of a future agenda. Participants are allotted a three minute speaking period. Specific items listed on the agenda may not be discussed at this time; however, citizens are invited to speak to those specific issues at the time the Committee discusses that particular item.*

***To make a comment during this period, or during any agenda item: On a computer or handheld device, locate the controls on your computer to raise your hand. You may need to move your mouse to see these controls. On a traditional telephone, dial *6 to unmute your phone and dial *9 to raise your hand.***

**CONSIDERATIONS / DISCUSSIONS / REPORTS**

4. Presentation from Southeastern Wisconsin Regional Planning Commission
5. Discussion and possible action regarding storm quality management plan
6. Discussion and possible action regarding creating a resolution

**FUTURE AGENDA ITEMS**

**ADJOURNMENT**

A quorum of the Common Council may be present. This notice is given to inform the public that no formal action will be taken at this meeting.

**Anyone requiring special arrangements is asked to call the Office of the City Manager / City Clerk (262-473-0102) at least 72 hours prior to the meeting.**

**Lakes Advisory Committee Meeting Minutes**
**Thursday, January 25, 2024 – 5:00 pm**
**Cravath Lakefront Room**
**312 W. Whitewater Street**
**Whitewater, WI 53190**
Hybrid Meeting

1. **Call to Order and Roll Call**

   Present: Carol McCormick, Elvira Kau, Gayle Stettler, and Kurt Zipp. Absent: Geoff Hale and Ginny Coburn
   Staff: Michelle Dujardin, and Kevin Boehm
   Guest: Ryan Tevis and Don Huntington

2. **Approval of Agenda**

   Motioned by Carol McCormick. Seconded by Kurt Zipp. Ayes: Carol McCormick, Elvira Kau, Gayle Stettler, and Kurt Zipp Absent: Geoff Hale and Ginny Coburn

   (Geoff Hale Joined by phone)

3. **Hearing of Citizen Comments**

   No Comments

4. **Staff Reports**
   a. **Assistant Director's Report**
      i. Michelle Dujardin
         1. Dujardin presented Ordinance No. 2072 Creating Chapter 2.73 Lake Advisory Committee.

5. **Considerations/Discussions/Reports**
   a. **Discussion and possible action regarding appointment of Committee Chair**
      i. Motioned by Carol McCormick to nominate Kurt Zipp for Chair. Seconded by Geoff Hale. Ayes: Carol McCormick, Elvira Kau, Gayle Stettler, Geoff Hale and Kurt Zipp Absent: Ginny Coburn.
      Kurt Zipp accepted position

6. **Considerations/Discussions/Reports**
    a. **Discussion and possible action regarding appointment of Committee Vice Chair**
        i. Carol McCormick volunteered for Vice Chair. Ayes:. Carol McCormick, Elvira Kau, Gayle Stettler, Geoff Hale and Kurt Zipp Absent: Ginny Coburn.
        Carol McCormick accepted position.

7. **Considerations/Discussions/Reports**
    a. **Discussion and possible action regarding committee goals and objectives**
        i. Board discussion took place to create goals and objectives.

8. **Future Agenda Items**
    a. Presentation from Whitewater-Rice Lakes Management District
    b. Whitewater Stormwater Plan

9. **Adjournment**
    a. Motioned by Kurt Zipp at 6:04pm, followed by a unanimous Aye from all board members: Carol McCormick, Elvira Kau, Gayle Stettler, Geoff Hale and Kurt Zipp Absent: Ginny Coburn

Respectfully Submitted,

*Michelle Dujardin*
Michelle Dujardin

**Lakes Advisory Committee Meeting Goals & Objectives Establish 1/25/24**

| Goals & Objectives | Extra Discussion/Ideas |
|---|---|
| Creation of Lakes District | Asking Whitewater/Rice Lake District for help |
| Education/Promotion of Lake District & Overall Value of our Lakes to our community | Social Media, City Manager Newsletter |
| Cattail mangement and removal | Dredge, Swamp Devil, Drone Spray, Truxor |
| Update Lakes Management Plan with Southeastern Wisconsin Reginal Planning Commission | |
| Balanced ecosystem | |
| Purchase of equipment to manage lakes moving forward | Truxor w/attachments |
| Create navigational waters for no wake actvities | |
| Plant management plant, to include all plants, not just cattail | Evaluate submerged weeds in Spring |
| Water quality improvement & ability to maintain | |
| Identify water locations being fed into the lake, to include quality, & plan to catch nutrients before entering main lake | |
| Identify and work with agricutlure land owners to improve water quality and soure of runoff feeding the lake | |
| Colaboration with UW-Whitewater for future capstone studies, funding, educational speakers | |
| Increase Recreational Activities: Kayak, Canoe, Fishing, Bird Watching, | Rental options at Cravath Lakefront Building |
| Improve Pier & ADA Access in multiple locations, first targeting Clay Street Nature Park location | ADA Kayak Launch |
| Dredge & Bring Back Swimming Hole at Trippe Lake | What is the appropriate depth |
| Explore Political Avenues for Back-up | Baldwin on Water Quality |
| Shoreline Restoration | |
| Fish Stocking for 2024 and future years | |
| Enhance Landscaping on City owned areas around the lakes | Exercise Equipment on the pathways |
| Storm water management plan that spells out water entering the lake | |
| Explore Grants that could help Lake District & Individual Land Owners | |
| Connect with Wisconsin Wetlands for Public Education & Resources | |

**Lakes Advisory Committee Special Meeting Minutes**
**Friday, February 09, 2024 – 8:30 pm**
**Cravath Lakefront Room**
**312 W. Whitewater Street**
**Whitewater, WI 53190**
Hybrid Meeting

1. **Call to Order and Roll Call**
   Present: Carol McCormick, Elvira Kau, Ginny Coburn and Kurt Zipp. Absent: Gayle Stettler and Geoff Hale
   Staff: Michelle Dujardin, and Kevin Boehm
   Guest: Don Huntington, Jon Tanis, Carol Ducommon, and Chuck Chambers

2. **Approval of Agenda**
   Motioned by Carol McCormick. Seconded by Ginny Coburn. Ayes: Carol McCormick, Elvira Kau, Ginny Coburn and Kurt Zipp Absent: Geoff Hale and Gayle Stettler

3. **Hearing of Citizen Comments**
   No Comments

4. **Considerations/Discussions/Reports**
   a. **Presentation on creating a Lakes District by the Whitewater-Rice Lakes Management District**
      i. Presentation given by Whitewater-Rice Lakes Management District on best practices and possible obstacles. Board questions and answers took place.

5. **Future Agenda Items**
   a. Presentation from Southeastern Wisconsin Regional Planning Commission
   b. Whitewater Stormwater Plan
   c. Discussion of Resolution
6. **Adjournment**
   a. Motioned by Elvira Kau at 9:53am, seconded by Carol McCormick Ayes: Carol McCormick, Elvira Kau, Ginny Coburn and Kurt Zipp Absent: Geoff Hale and Gayle Stettler

Respectfully Submitted,

*Michelle Dujardin*

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**


Page No.
or Following

SECTION 1–INTRODUCTION

1.01 Background ..... 1-1
1.02 Plan Objectives and Criteria ..... 1-2
1.03 Scope of Study ..... 1-5
1.04 Definitions ..... 1-7

SECTION 2–CONTRIBUTING WATERSHED CHARACTERISTICS

2.01 Watershed Description ..... 2-1
2.02 Local Source Areas and Outfalls ..... 2-11
2.03 Topography, Soils, and Precipitation ..... 2-13
2.04 Current Stormwater Practices Affecting Stormwater Quality ..... 2-18

SECTION 3–EVALUATION OF CURRENT CITY PRACTICES

3.01 Current Stormwater Policies and Practices ..... 3-1
3.02 Recommended Stormwater Management Program ..... 3-11

SECTION 3–EVALUATION OF CURRENT UNIVERSITY OF WISCONSIN-WHITEWATER PRACTICES

3.01 Current Stormwater Policies and Practices ..... 3-1
3.02 Recommended Stormwater Management Program ..... 3-9

SECTION 4–STORMWATER QUALITY MODELING

4.01 Introduction ..... 4-1
4.02 WDNR SLAMM Guidance ..... 4-4
4.03 Swale Modeling and Double-Ring Infiltrometer Testing ..... 4-4
4.04 Baseline Conditions Analysis ..... 4-5
4.05 Existing Conditions Analysis ..... 4-20
4.06 Water Quality Modeling Conclusions ..... 4-31

SECTION 5–ALTERNATIVES ANALYSIS

5.01 Introduction ..... 5-1
5.02 Alternatives Considered (City) ..... 5-2
5.03 Alternatives Considered (UWW) ..... 5-2
5.04 Alternative Components ..... 5-3
5.05 Evaluation of Alternatives–City ..... 5-12
5.06 Evaluation of Alternatives–UWW ..... 5-16
5.07 Evaluation of WQT and WAM ..... 5-16
5.08 Identify WQT Partners ..... 5-23
5.09 City WWTF WQT Potential ..... 5-23
5.10 Agricultural Lands WQT Potential ..... 5-24
5.11 WAM ..... 5-29

## **TABLE OF CONTENTS** Continued

Page No.
or Following

5.12 Recommendations–City ..... 5-29
5.13 Recommendations–UWW ..... 5-31

SECTION 6–STORMWATER UTILITY RATE REVIEW AND UPDATE

6.01 Introduction ..... 6-1
6.02 SWU Rate Structure and Rates ..... 6-1
6.03 Statewide SWU Rate Trends ..... 6-2
6.04 SWU Budget Summary ..... 6-2
6.05 Potential Future SWU Rates ..... 6-3

SECTION 7–CONCLUSIONS AND RECOMMENDATIONS

7.01 General ..... 7-1
7.02 Recommendations for Achieving Stormwater Management Goals ..... 7-1
7.03 Implementation Plan ..... 7-2
7.04 Program Funding Options ..... 7-3
7.05 Policies and Practices ..... 7-5
7.06 Conclusion ..... 7-6

# TABLE OF CONTENTS Continued

Page No.
or Following

***TABLES***

2.01-1 SLAMM Land Use By Subbasin (Acres) To City Boundary (Including Exempt Areas) ..... 2-5
2.01-2 SLAMM Land Use By Subbasin (Acres) Within UWW Boundary (Including Exempt Areas) ..... 2-10
2.01-3 Impaired Waters ..... 2-10
2.01-4 Rock River Basin TMDL Wasteload Allocations per Reach ..... 2-10
2.03-1 Soils Summary-City of Whitewater ..... 2-14
2.03-2 Soils Summary-UW-Whitewater ..... 2-17
2.03-3 Expected Rainfall Depths from NOAA Atlas 14 ..... 2-18
2.04-1 Approximate Street Sweeping Schedule ..... 2-18
2.04-2 City Inspection and Maintenance Activities ..... 2-20
2.04-3 UWW Inspection and Maintenance Activities ..... 2-20

*Section 3–Evaluation of Current City Practices Tables*
3.01-1 Street Sweeping Quantity Summary ..... 3-6
3.01-2 Solids Collected from Catch Basin Cleaning ..... 3-6
3.01-3 Winter Roadway Maintenance Details ..... 3-7
3.01-4 Deicer Usage by City (Tons) ..... 3-7
3.01-5 Rainfall and Snowfall at Madison Dane County Regional Airport ..... 3-8
3.01-6 Leaf Collection ..... 3-8
3.01-7 City Fertilizer Usage ..... 3-10
3.02-1 Public Education and Outreach Plan and Measurable Goals ..... 3-12
3.02-2 Public Involvement and Participation Plan and Measurable Goals ..... 3-12
3.02-3 City Outfalls ..... 3-13
3.02-4 City Priority Outfall Screening Schedule ..... 3-15
3.02-5 Illicit Discharge Detection and Elimination Plan and Measurable Goals .... 3-17
3.02-6 Construction Site Pollution Control Ordinance Revisions ..... 3-17
3.02-7 Construction Site Pollution Control Plan and Measurable Goals ..... 3-18
3.02-8 Postconstruction Stormwater Management Ordinance Revisions ..... 3-19
3.02-9 Postconstruction Stormwater Management Plan and Measurable Goals . 3-20
3.02-10 Pollution Prevention for Municipal Operations Plan and Measurable Goals 3-21
3.02-11 Stormwater Quality Management Plan and Measurable Goal ..... 3-22
3.02-12 Storm Sewer System Map Plan and Measurable Goal ..... 3-22
3.02-13 Annual Report and Permit Fee Plan and Measurable Goals ..... 3-23

*Section 3–Evaluation of Current UWW Practices Tables*
3.01-1 Street Sweeping Quantity Summary ..... 3-5
3.01-2 Solids Collected from Catch Basin Cleaning ..... 3-6
3.01-3 Winter Roadway Maintenance Details ..... 3-6
3.01-4 Deicer Usage by UWW (Tons) ..... 3-7
3.01-5 Rainfall and Snowfall at Madison Dane County Regional Airport ..... 3-7
3.01-6 UWW Fertilizer Usage ..... 3-8
3.02-1 Public Education and Outreach Plan and Measurable Goals ..... 3-11
3.02-2 Public Involvement and Participation Plan and Measurable Goals ..... 3-11
3.02-3 Typical Land Uses and Activities That Produce Illicit Discharges (Excerpt) 3-15
3.02-4 UWW Outfalls ..... 3-17
3.02-5 UWW Outfall Screening Schedule ..... 3-18
3.02-6 Illicit Discharge Detection and Elimination Plan and Measurable Goals .... 3-20
3.02-7 Construction Site Pollution Control Plan and Measurable Goals ..... 3-20

# **TABLE OF CONTENTS** Continued

Page No.
or Following

***TABLES (Continued)***

*Section 3–Evaluation of Current UWW Practices Tables (Continued)*

| | | |
|---|---|---|
| 3.02-8 | Postconstruction Stormwater Management Plan and Measurable Goals.. | 3-21 |
| 3.02-9 | Pollution Prevention for Municipal Operations Plan and Measurable Goals | 3-22 |
| 3.02-10 | Stormwater Quality Management Plan and Measurable Goal..... | 3-23 |
| 3.02-11 | Storm Sewer System Map Plan and Measurable Goal ..... | 3-23 |
| 3.02-12 | Annual Report and Permit Fee Plan and Measurable Goals..... | 3-23 |
| 4.01-1 | Source Area by Land Use ..... | 4-2 |
| 4.01-2 | Distribution of Impervious Source Areas by Land Use Class ..... | 4-2 |
| 4.01-3 | Distribution of Pervious Source Areas by Land Use Class..... | 4-3 |
| 4.03-1 | Infiltration Testing Results Summary ..... | 4-5 |
| 4.04-1 | Total Suspended Solids Loading Results Baseline and Existing Controls Conditions–City of Whitewater ..... | 4-6 |
| 4.04-2 | Total Phosphorus Loading Results Baseline and Existing Controls Conditions–City of Whitewater ..... | 4-11 |
| 4.04-3 | Total Suspended Solids Loading Results Baseline and Existing Controls Conditions–University of Wisconsin Whitewater..... | 4-16 |
| 4.04-4 | Total Phosphorus Loading Results Baseline and Existing Controls Conditions–University of Wisconsin Whitewater..... | 4-17 |
| 4.04-5 | City of Whitewater Exempt Basins..... | 4-19 |
| 4.04-6 | UWW Exempt Basins ..... | 4-19 |
| 4.05-1 | Street Sweeping Schedule for the City of Whitewater..... | 4-21 |
| 4.05-2 | Street Sweeping Schedule for the University of Wisconsin-Whitewater .... | 4-23 |
| 4.05-3 | Inlets and Catch Basin Sumps Schedule for the City of Whitewater ..... | 4-24 |
| 4.05-4 | Swale Schedule for the City ..... | 4-26 |
| 4.05-5 | Swale Schedule for the UWW ..... | 4-26 |
| 4.05-6 | Dry Detention Basins Modeled as Swales Parameters..... | 4-27 |
| 4.05-7 | Swale Desktop Analysis for the City of Whitewater and University of Wisconsin-Whitewater..... | 4-27 |
| 4.05-8 | Swale Measured Dimensions for the City and UWW ..... | 4-27 |
| 4.05-9 | City of Whitewater Best Management Practices ..... | 4-29 |
| 4.05-10 | Additional Stormwater Facilities within the City of Whitewater ..... | 4-30 |
| 4.05-11 | University of Wisconsin-Whitewater Stormwater Facilities..... | 4-30 |
| 4.06-1 | TMDL Modeling Results for the City and the UWW ..... | 4-32 |
| 5.01-1 | TMDL Modeling Results for the City and UWW MS4s ..... | 5-1 |
| 5.05-1 | Summary of Alternatives–Capital Cost ..... | 5-13 |
| 5.06-1 | Summary of Alternatives–Capital Cost ..... | 5-17 |
| 5.08-1 | Potential Trading Partners..... | 5-23 |
| 5.09-1 | TP Available for Trading (IBs)..... | 5-24 |
| 5.10-1 | Trade Ratios for Evaluated BMPs ..... | 5-25 |
| 5.10-2 | PRESTO Stream Length and Agricultural Land Results ..... | 5-25 |
| 5.10-3 | Present Worth Cost of WQT BMPs to Meet the City and UWW MS4s TP Reduction Gap ..... | 5-26 |
| 5.10-4 | Present Worth Costs for WQT BMPs to Meet the City TP Reduction Gap (as analyzed by Alternative No. 4) ..... | 5-26 |
| 5.10-5 | Present Worth Costs for WQT BMPs to Meet the City TP Reduction Gap (as analyzed by Alternative No. 5)..... | 5-27 |

# TABLE OF CONTENTS Continued

Page No.
or Following

***TABLES (Continued)***

5.10-6 Present Worth Costs for WQT BMPs to Meet the City TP Reduction Gap (as analyzed by Alternative No. 6) ..... 5-27
5.10-7 Present Worth Costs for WQT BMPs to Meet the City TP Reduction Gap (as analyzed by Alternative No. 7) ..... 5-28
5.10-8 Present Worth Costs for WQT BMPs to Meet the UWW TP Reduction Gap (as analyzed by Alternative No. 5) ..... 5-28
5.10-9 Present Worth Costs for WQT BMPs to Meet the UWW TP Reduction Gap (as analyzed by Alternative No. 6) ..... 5-29

6.02-1 City of Whitewater SWU Rate History ..... 6-2
6.03-1 SWU Rates for Wisconsin Communities With State Universities ..... 6-2
6.04-1 Alterative 4–Potential Future Stormwater Management Costs ..... 6-4
6.04-2 Alternative 5–Potential Future Stromwater Management Costs ..... 6-5
6.04-3 Alterative 6–Potential Future Stormwater Management Costs ..... 6-6
6.04-4 Alternative 7–Potential Future Stormwater Management Costs ..... 6-7
6.05-1 Potential Future SWU Rates ..... 6-8

***FIGURES***

1.01-1 Location Map ..... 1-1

2.01-1 Drainage Basins ..... Pocket Folder
2.01-2 SLAMM Land Use ..... Pocket Folder
2.01-3 General Land Use Classification–City of Whitewater ..... 2-1
2.01-4 General Land Use Classification-UWW ..... 2-2
2.03-1 Soils Map ..... 2-13
2.04-1 Street Cleaning Program ..... 2-19
2.04-2 Street Drainage ..... 2-19

*Section 3–Evaluation of Current City Practices Figures*
3.01-1 2015 Whitewater Creek Streambank Restoration ..... 3-2
3.01-2 Public Works Garage (150 East Starin Road) ..... 3-9
3.02-1 Outfall Screening Locations City of Whitewater ..... 3-11

*Section 3–Evaluation of Current UWW Practices Figures*
3.01-1 General Services Building (500 North Fremont Street) ..... 3-8
3.02-1 Outfall Screening Locations University of Wisconsin Whitewater…Pocket Folder

4.03-1 Double-Ring Infiltrometer Test Locations ..... 4-4
4.04-1 Baseline Loading–Total Suspended Solids ..... 4-5
4.05-1 Existing Conditions Loading–Total Suspended Solids ..... 4-28

5.04-1 Enhanced Bioretention Basins in Cleveland, Ohio Serving 19-Acre and 59-Acre Drainage Areas, Respectively ..... 5-5
5.04-2 Underground Detention Options ..... 5-6
5.04-3 Hydrodynamic Separator Options ..... 5-7
5.04-4 Permeable Pavement Options ..... 5-8
5.04-5 Traffic-Calming Bioretention Basin Bumpout System ..... 5-9

# **TABLE OF CONTENTS** Continued

Page No.
or Following

***FIGURES (Continued)***

5.04-6 Traffic-Calming Bioretention Basin Bumpout System ..... 5-10
5.07-1 Timeline and Process to Begin Using WQT to Demonstrate Compliances with WBQELS ..... 5-22
5.10-1 Upstream Watershed ..... 5-25

6..05-1 Potential Future SWU Rates Analysis ..... 6-9

***APPENDICES***

APPENDIX A–GENERAL STORMWATER PERMIT WPDES PERMIT NO. WI-S050075-2
APPENDIX B–NR 151
APPENDIX C–WDNR GUIDANCE DOCUMENTS
- APPENDIX C1–WDNR TMDL SLAMM MODELING GUIDANCE
- APPENDIX C2A–WDNR GRASS SWALE MODELING GUIDANCE
- APPENDIX C2B–ERRATA GUIDANCE SWALES
- APPENDIX C3–WDNR SLAMM MODELING GUIDANCE
- APPENDIX C4–WDNR INTERNALLY DRAINING MODELING GUIDANCE
- APPENDIX C5–DRY DETENTION BASIN MODELING

APPENDIX D–WHITEWATER STORMWATER POLLUTION PREVENTION PLAN
APPENDIX E–WHITEWATER DRAINAGE EVALUATION FORM
APPENDIX F–FIELD SCREENING FORM
APPENDIX G–STORMWATER FACILITY MAINTENANCE PROGRAM
APPENDIX H–UWW 2015-2016 SNOW PLAN
APPENDIX I–UWW STORMWATER POLLUTION PREVENTION PLAN
APPENDIX J–UWW DRAINAGE EVALUATION FORM
APPENDIX K–CITY MODELING OUTPUT (ON CD)
APPENDIX L–UWW MODELING OUTPUT (ON CD)
APPENDIX M–CITY ALTERNATIVE BMP FIGURES
APPENDIX N–CITY OPCCS
APPENDIX O–UWW ALTERNATIVE BMP FIGURES
APPENDIX P–UWW OPCCS
APPENDIX Q–ORDINANCE CHANGES AND SWU RATE ADJUSTMENTS
APPENDIX R–APWA STORMWATER UTILITY CHART 2016

# 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).

**Legend**

- City Limits
- UW Whitewater Boundary
- Public Works Facility
- Approximate Location of Streambank Erosion
- General Flooding Problem Area
- Park/Recreation Area

WWTP
Whitewater Creek Nature Area
Park Crest Park
Walton Oaks Conservancy Area
Meadowsweet Park
General Services Building
City Compost Site
Starin Park
City Garage
Brewery Hill Park/Armory
Periodic Snow Disposal Site
Ward Park
Birge Fountain Park
Main Street Shoppes Courtyard
Washington Elementary School
Moraine View Park
Indian Mounds Park
Lincoln Elementary School
Mill Race Park
Trailhead Park
Big Brick Park
Cravath Lake Waterfront Park
Clay Street Nature Park
Trippe Park
Jake's Way Park
Optimist Turtle Mound Park
Whitewaer Middle School
Whitewater High School/Steward Park
Minnieska Park

CTY TK U
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BURR OAK TR
HOWARD DR
ENTERPRISE BLVD
PROSPECT DR
ENDEAVOR DR
N UNIVERSITY BLVD
INNOVATION DR
FREMONT RD
SHAW CT
BONNIE WALTON TR
CTY TK N
OLD HY 14
WARHAWK DR
W STARIN RD
W CARRIAGE DR
W MAIN ST
W CONGER ST
W HIGHLAND ST
W NORTH ST
E NORTH ST
E CHICAGO ST
E COMMERCIAL AV
E CRAVATH ST
E MAIN ST
E MILWAUKEE ST
E CLAY ST
E CLIFF RD
S WOODLAND DR
S ELIZABETH ST
S PLEASANT ST
W WALWORTH AV
WALWORTH AV
W SOUTH ST
INDIAN MOUND PKWY
HY 12
S JAMES HILL ST
HY 89
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S WISCONSIN ST
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PARKSIDE DR
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LOCATION MAP

TMDL STORMWATER PLAN
CITY OF WHITEWATER
WALWORTH AND JEFFERSON COUNTIES

STRAND ASSOCIATES®

FIGURE 1.01-1
1407.088

## 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).

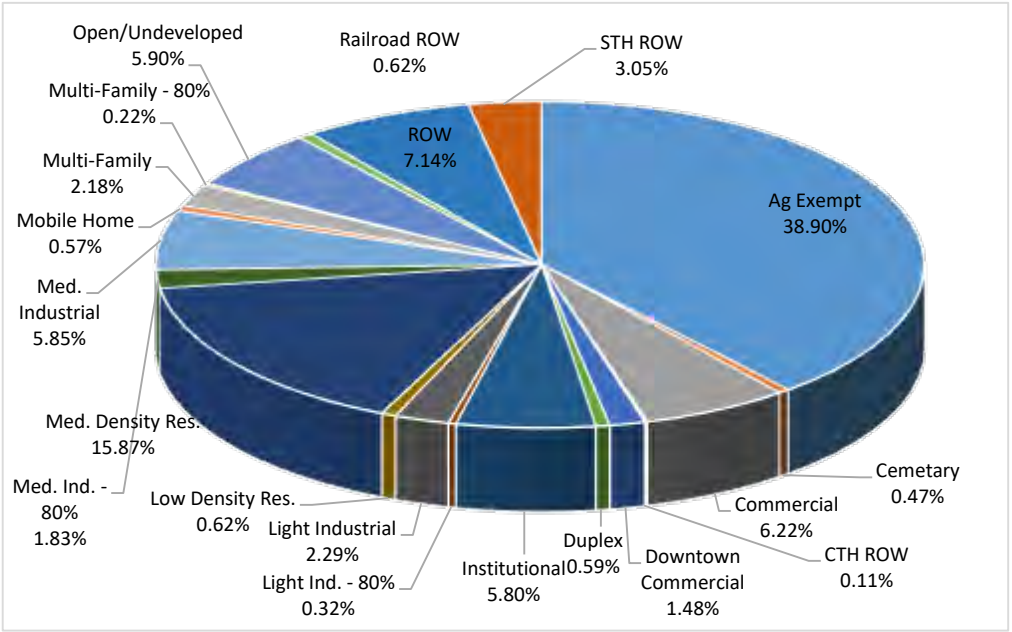
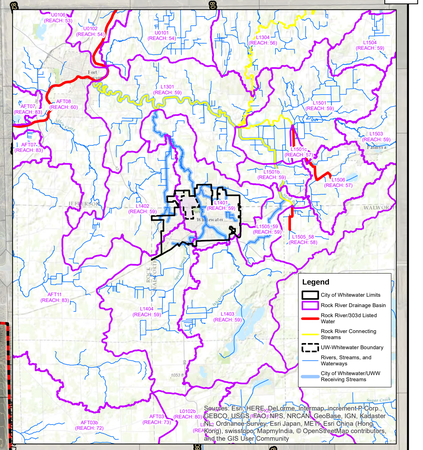



**Figure 2.01-3 General Land Use Classification-City of Whitewater**

| 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.






DRAINAGE BASINS

N W E S

610 305 0 610 Feet

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

STRAND ASSOCIATES®

FIGURE 2.01-1
1407.088

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## 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

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**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.

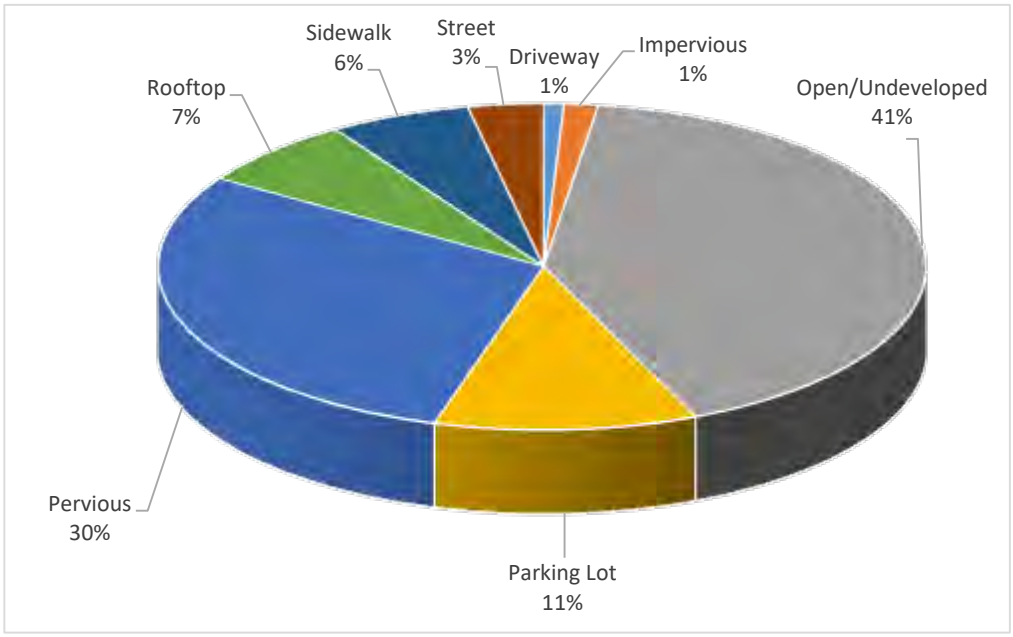



**Figure 2.01-4 General Land Use Classification-UWW**

## 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<br>-PS/NPS<br>-Excess Algal Growth<br>-Total Phosphorus<br>-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
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BURR OAK TR
HOWARD RD
ENTERPRISE BLVD
PROSPECT DR
LOWER HILL PASS
BLOOMING FIELD DR
BLACK RIVER CT
WALTON DR
CTY TK N
HILL CREST DR
FREMONT RD
E EXECUTIVE DR
N UNIVERSAL BLVD
INNOVATION DR
E COMMERCIAL AV
OLD HY 12
W STARIN RD
N PRAIRIE ST
N FRANKLIN ST
N PARK ST
N FREMONT ST
N GEORGE ST
N JEFFERSON ST
GRANT ST
N NEWCOMB ST
E CRAVATH ST
E NORTH ST
E CHICAGO ST
E MAIN ST
E MILWAUKEE ST
E BLUFF RD
S PEARSON LA
N TRATT ST
N PRINCE 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 GREEN ST
E CLAY ST
S RICE ST
ELKHORN RD
SASH LA
E COBURN LA
E AMBER DR
E LAKE VIEW DR
E PARKSIDE DR
S WISCONSIN ST
OLD CTY TK P
COX RD
TURTLE MOUND LA
S WOODLAND DR
S ELIZABETH ST
S PRINCE ST
S WHITON ST
S FRANKLIN ST
W WALWORTH AV
WALWORTH AV
W SOUTH ST
W HARPER ST
W CAINE ST
INDIAN MOUND PKWY
S JANESVILLE ST
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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

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

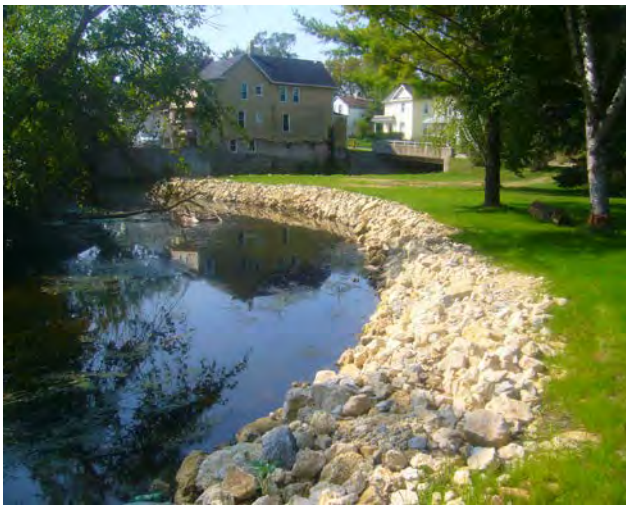


**Figure 3.01-1 2015 Whitewater Creek Streambank Restoration**

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<br>Superintendent of Streets/Parks<br>262-473-0542 (office)<br>262-903-9511 (cell)<br>cnass@whitewater-wi.gov |
| Enclosed Salt Storage Building | Public Works Garage<br>150 East Starin Road<br>Salt Storage Building Capacity: 2,000 tons of salt<br>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.<br>Salting (Major arterials only): 100 percent road salt pre-wetted with salt brine (water with 23% salt content)<br>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).<br><br>Equipment Calibration: Spreaders are calibrated at start of winter season and at half-way point of winter season.<br><br>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<br>Superintendent of Streets/Parks<br>262-473-0542 (office)<br>262-903-9511 (cell)<br>cnass@whitewater-wi.gov |
| Enclosed Salt Storage Building | Public Works Garage<br>150 East Starin Road<br>Salt Storage Building Capacity: 2,000 tons of salt<br>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.<br>Salting (Major arterials only): 100 percent road salt pre-wetted with salt brine (water with 23% salt content)<br>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).<br><br>Equipment Calibration: Spreaders are calibrated at start of winter season and at half-way point of winter season.<br><br>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

WC-13-2 WC-14 WC-27-1 WC-7 WC-5-1 CITY WC-6 WC-14-2 WC-12-1-1 WC-12-2 WC-25-1 WC-26 WC-12-1-2 WC-12-4 WC-2 CITY WC-3 WC-9 WC-4 CL-8 CL-9 CL-2 CL-7 CL-13 CL-12 CL-6 CL-5 CL-4-3 TL-2 TL-12 TL-5 TL-7-1 TL-7-2 TL-6 TL-6-1 TL-13-1 TL-13-2 WC-15.5-1 WC-15.5-2 WC-21 WC-13-1 WC-46 WC-45 WC-43-2 WC-40-2-1 WC-32-2 WC-38 WC-35 WC-48-1 WC-29 WC-48-2 WC-48-3 WC-37 WC-31 WC-37-1 WC-30 WC-55 WC-49-1-1 WC-49-1-2 WC-54-1 WC-54-2 WC-50 TL-17 GC-10 GC-10-1-2 GC-10-1-3 GC-10-2 GC-8-3 GC-3 GC-1-1 GC-1-2 GC-2-1 GC-7 GC-6 GC-4 SB-11-2 SB-11-1 SB-11-3 SB-4 SB-3-2-1 SB-3-2-2 SB-5 SB-9 SB-6



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

Path: S:\MAD\1400--1499\1407\088\Data\GIS\Report Figures\Figure 3.02-1 Whitewater Outfall 22x34.mxd User: davidk Date: 11/7/2016 Time: 8:50:55 AM

## 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.<br>1. Lawn, pet, and household waste.<br>2. Fertilizer/Pesticide Management.<br>3. Hazardous waste and oil management and illicit discharges.<br>4. Streambank and Shoreline Management.<br>5. Infiltration.<br><br>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.<br><br>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:<br><br>"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.<br><br>"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:<br><br>"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:<br><br>"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:<br><br>"C. Runoff Volume<br><br>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:<br><br>-WisDOT Highway Maintenance Manual, Chapter 35<br>-http://www.dot.wisconsin.gov/business/extranet<br><br>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<br>Buildings and Grounds Supervisor<br>262-472-6721<br>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.<br>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.<br>1. Fertilizer/pesticide management.<br>2. Hazardous waste and oil management and illicit discharges.<br>3. Streambank and shoreline management.<br>4. Infiltration.<br><br>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<br>• Multi-family<br>• Single Family Detached | • Car Washing<br>• Driveway Cleaning<br>• Dumping/Spills (e.g., leaf litter and RV/boat holding tank effluent)<br>• Equipment Washdowns<br>• Lawn/Landscape Watering<br>• Septic System Maintenance<br>• Swimming Pool Discharges |
| Commercial | • Campgrounds/RV parks<br>• Car Dealers/Rental Car Companies<br>• Car Washes<br>• Commercial Laundry/Dry Cleaning<br>• Gas Stations/Auto Repair Shops<br>• Marinas<br>• Nurseries and Garden Centers<br>• Oil Change Shops<br>• Restaurants<br>• Swimming Pools | • Building Maintenance (power washing)<br>• Dumping/Spills<br>• Landscaping/Grounds Care (irrigation)<br>• Outdoor Fluid Storage<br>• Parking Lot Maintenance (power washing)<br>• Vehicle Fueling<br>• Vehicle Maintenance/Repair<br>• Vehicle Washing<br>• Washdown of greasy equipment and grease traps |
| Industrial | • Auto recyclers<br>• Beverages and brewing<br>• Construction vehicle washouts<br>• Distribution centers<br>• Food processing<br>• Garbage truck washouts<br>• Marinas, boat building and repair<br>• Metal plating operations<br>• Paper and wood products<br>• Petroleum storage and refining<br>• Printing | • All commercial activities<br>• Industrial process water or rinse water<br>• Loading and un-loading area washdowns<br>• Outdoor material storage (fluids) |
| Institutional | • Cemeteries<br>• Churches<br>• Corporate Campuses<br>• Hospitals<br>• Schools and Universities | • Building Maintenance (e.g., power washing)<br>• Dumping/Spills<br>• Landscaping/Grounds Care (irrigation)<br>• Parking Lot Maintenance (power washing)<br>• Vehicle Washing |
| Municipal | • Airports<br>• Landfills<br>• Maintenance Depots<br>• Municipal Fleet Storage Areas<br>• Ports<br>• Public Works Yards<br>• Streets and Highways | • Building Maintenance (power washing)<br>• Dumping/Spills<br>• Landscaping/Grounds Care (irrigation)<br>• Outdoor Fluid Storage<br>• Parking Lot Maintenance (power washing)<br>• Road Maintenance<br>• Spill Prevention/Response<br>• Vehicle Fueling<br>• Vehicle Maintenance/Repair<br>• 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

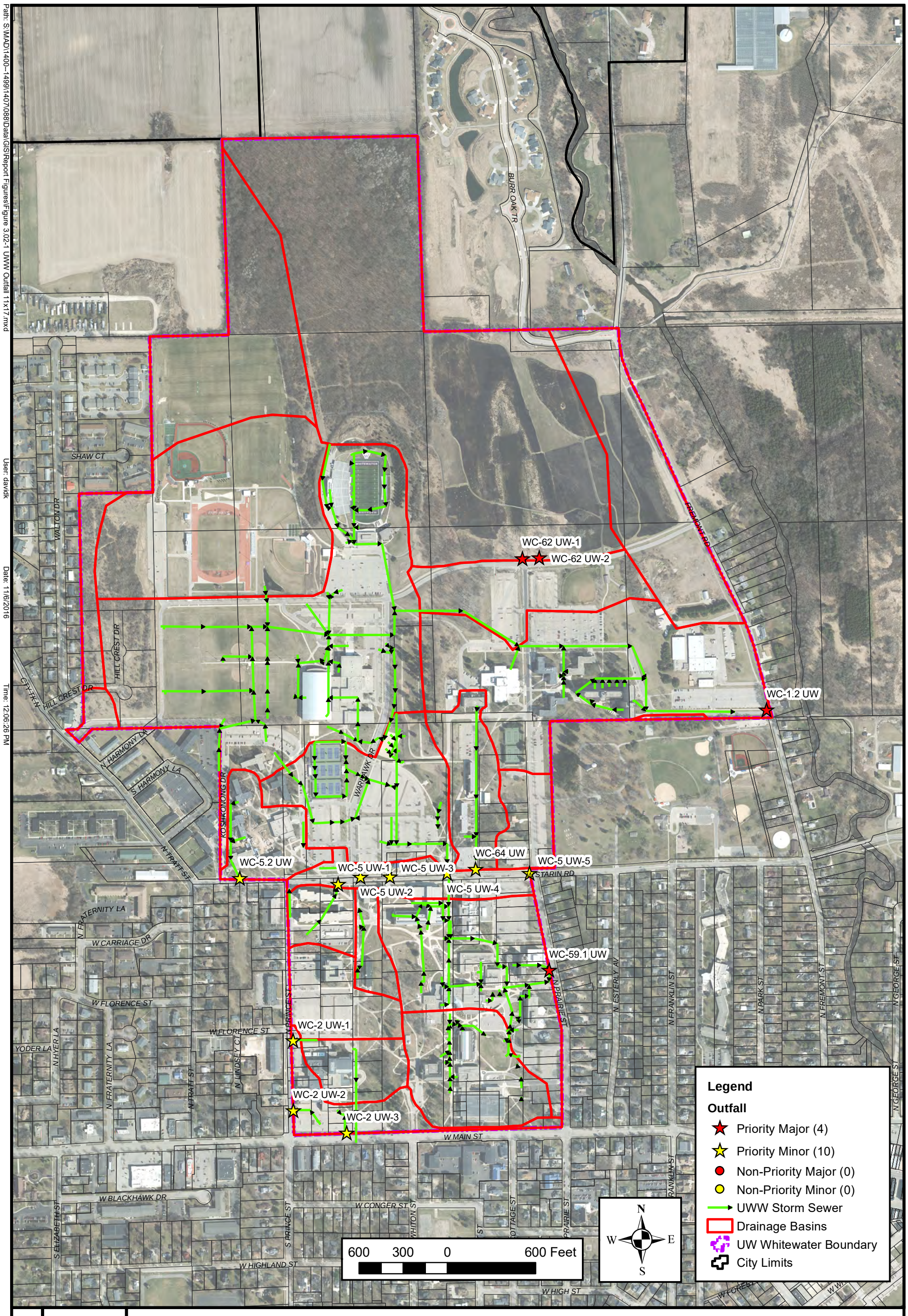



FIGURE 3.02-1
1407.088

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:<br><br>-WisDOT Highway Maintenance Manual, Chapter 6: http://wisconsindot.gov/Pages/doing-bus/local-gov/hwy-mnt/mntc-manual/chapter06.aspx<br><br>-DNR Guidance for Municipalities: http://dnr.wi.gov/topic/stormwater/documents/snow.pdf<br><br>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.

**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

# DOUBLE-RING INFILTROMETER TEST LOCATIONS

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

STRAND ASSOCIATES®

FIGURE 4.03
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 |

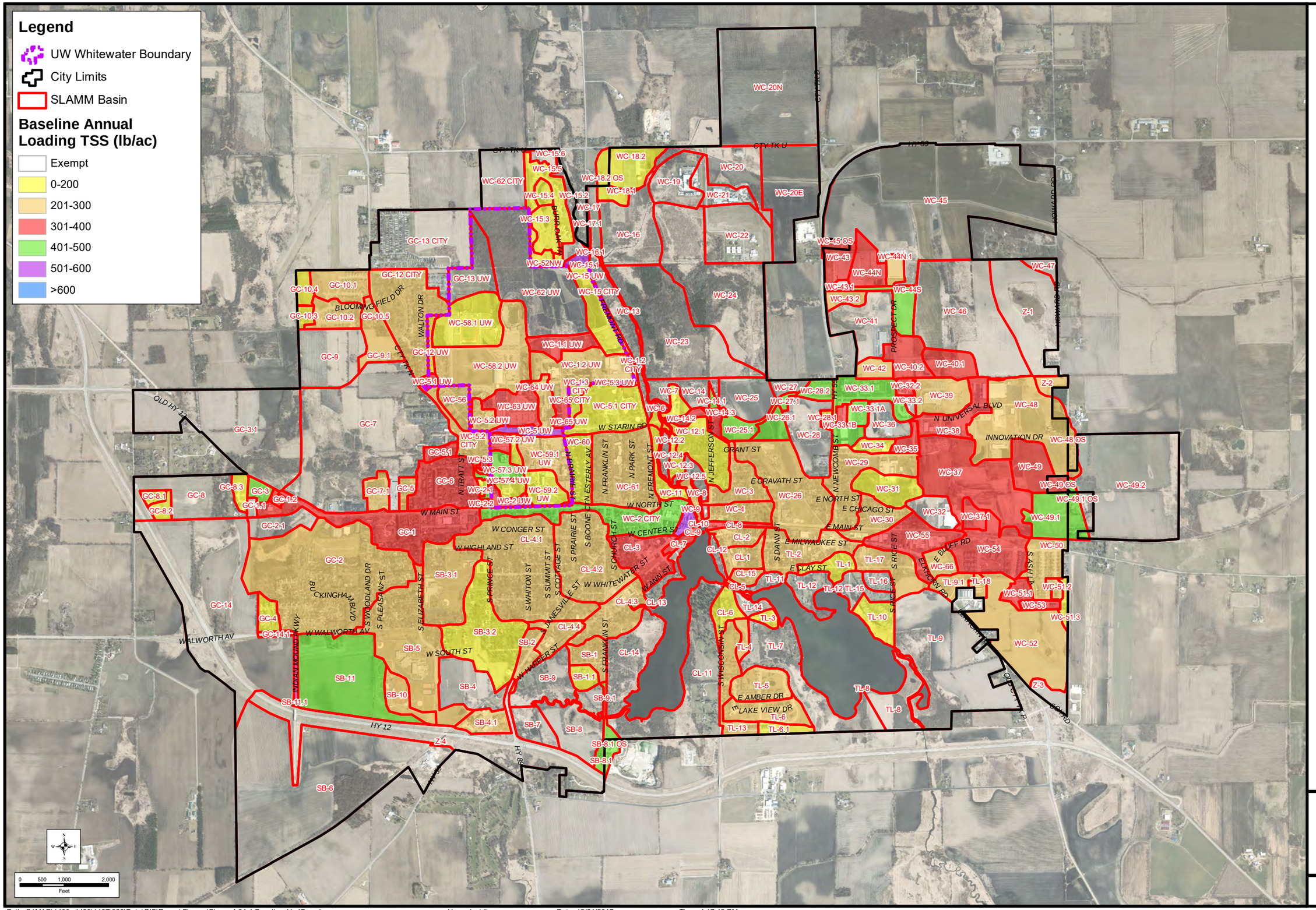
**Table 4.03-1 Infiltration Testing Results Summary**

## 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
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 | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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

**Legend**

- City Limits
- UW Whitewater Boundary
- SLAMM Basin

**Existing Annual Loading TSS (lb/ac)**

- Exempt
- 0-200
- 201-300
- 301-400
- 401-500
- 501-600
- >600

0 500 1,000 2,000 Feet

STRAND ASSOCIATES®

FIGURE 4.05
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%<br>7,067 lbs |
| TP | NA | 66% | 37.1% | 28.8%<br>444.6 lbs |
| **University of Wisconsin-Whitewater (WinSLAMM Version 10.2.1)** | | | | |
| TSS | 20% | 49% | 16.3% | 32.7%<br>23,108 lbs |
| TP | NA | 66% | 12.6% | 53.4%<br>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)

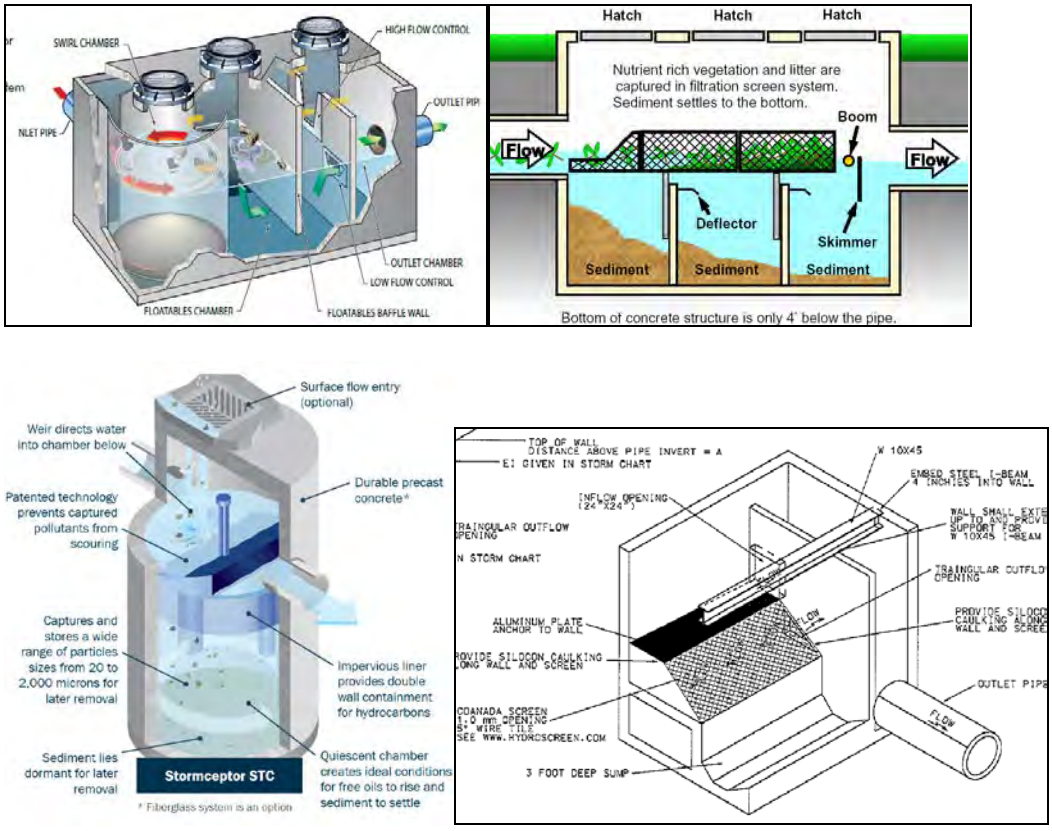
**Figure 5.04-2 Underground Detention Options**

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.



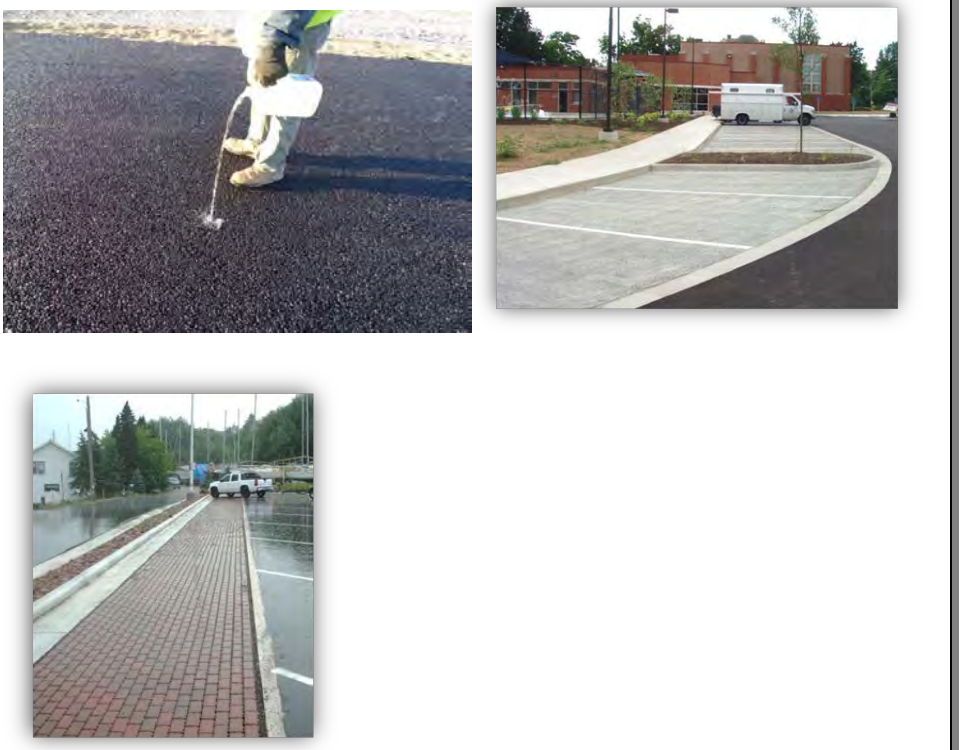

Source: Vortech, Nutrient Separating Baffle Box, Stormceptor, Coanda Screen (clockwise from top left)

**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."

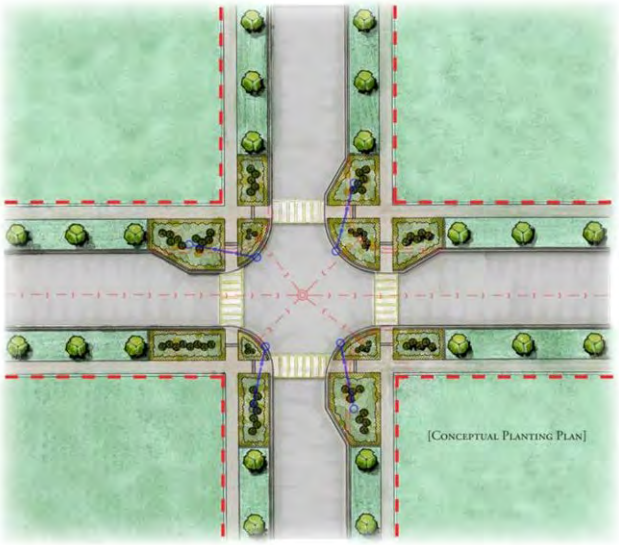



**Figure 5.04-5 Traffic-Calming Bioretention Basin Bumpout System**




**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 |

## 5.06 EVALUATION OF ALTERNATIVES-UWW

Table 5.06-1 summarizes the alternatives, the incremental TSS reduction, and the opinions of probable costs.

## 5.07 EVALUATION OF WQT AND WAM

A. WQT

WQT or pollutant trading is a method for municipalities and industrial WPDES permit holders (point sources) to establish compliance with water quality-based effluent limitations (WBQELs) and TMDLs. WQT typically involves a point source facing relatively high pollutant reduction costs compensating another party to achieve less costly pollutant reduction with the same or greater water quality benefit. Water quality modeling is generally required and a trade ratio is applied to help assure the water quality benefit. WQT thresholds may also apply. For example, in a TMDL watershed, credit generators need to meet their own load or wasteload allocation before generating long-term credits. However, interim credits may be generated if the credit threshold is not yet met. The duration of interim credits equals the lifespan of the management practice employed to reduce pollutant loads, or 5 years, whichever is less. Once interim credits have expired, new interim credits or long-term credits need to be used. Overall, WQT provides point sources with the flexibility to acquire pollutant reductions from other sources in the watershed to offset their point source load so that they will comply with their own permit requirements. WQT is not a mandatory program or a regulatory requirement, but instead is a market-based option that may enable some industrial and municipal facilities to meet regulatory requirements more cost-effectively. A WPDES Permit holder can be a WQT credit generator or user.

As stated in the WDNR's *A Water Quality Trading How To Manual*, a few benefits to WQT include:

1. Permit compliance through trading may be economically preferable to other compliance options.

2. New and expanding point source discharges can use trading to develop new economic opportunities in a region, while still meeting water quality goals.

3. Permittees, and the point and nonpoint sources that work cooperatively with them, can demonstrate their commitment to the community and to the environment by working together to protect and restore local water resources.

In the City's case, trading with upstream partners could have multiple benefits such as improving lake and stream water quality while meeting WPDES permit requirements at a lower overall cost. Trading can be used for phosphorus, TSS, or other permitted parameters.

## Table 5.06-1 Summary of Alternatives (UWW)–Capital Cost

| Component | BMP | Figure Number | Proposed BMP Type | Basin | Serves City and UWW 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-BMPs to get 20% TSS, then WQT | Alternative #5-BMPs to get 40% TSS, then WQT | Alternative #6-All WQT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mechanical Street Sweeping (Existing Performance–2x per Year) with full bmps | NA | NA | Campus | | | | | | | | | | | | | |
| | Mechanical Street Sweeping (Existing Performance–2x per Year)) with SC only | NA | NA | Campus | | | | | | | | | | | | | |
| 1 | Mechanical Street Sweeping (Once Every 2 Weeks) with full bmps | NA | Mechanical Street Sweeping | Campus | | | | | $927 | $24,261 | $402 | | | 0.5 | | | |
| 2 | Mechanical Street Sweeping (Once Every 2 Weeks) with SC only | NA | Mechanical Street Sweeping | Campus | | | | | | | | | | | | | |
| 3 | Vacuum Street Sweeping (Once Every 2 Weeks) with full bmps | NA | Vacuum Street Sweeping | Campus | | | | | $10,738 | $32,860 | $336 | 3.5 | 3.5 | | | 3.5 | |
| 4 | Vacuum Street Sweeping (Once Every 2 Weeks) with SC only | NA | Vacuum Street Sweeping | Campus | | | | | | | | | | | | | |
| 5 | Redevelopment (see Campus Master Plan) | NA | TBD | Campus | | | | | $0 | $0 | $0 | 10.1 | 10.1 | 10.1 | 10.1 | 10.1 | |
| 6 | Parking Lot 20–Underground Detention (2.8 ac-ft) | M-4 | Underground Wet Detention Basin | WC-1.2 UW | Yes-Minor | | | | $1,157,063 | $1,193,142 | $2,954 | | 20.2 | 20.2 | | | |
| 7 | Parking Lot 20–Underground Detention (6.3 ac-ft) | M-5 | Underground Wet Detention Basin | WC-1.2 UW | Yes-Minor | | | | $2,072,936 | $2,177,270 | $3,766 | 28.9 | | | | | |
| 8 | Parking Lot 18 and 19 Porous Pavement (5:1 Run-On Ratio) | O-1 | Permeable Pavement | WC-1.1 UW | | | | | $431,125 | $441,557 | $10,035 | 2.2 | 2.2 | 2.2 | | | |
| 9 | McGraw Hall Bioretention Basin w/Level Spreader | O-2 | Bioretention Basin | WC-59.2 | | | | | $554,750 | $563,770 | $1,807 | | | | | | |

| Component | BMP | Figure Number | Proposed BMP Type | Basin | Serves City and UWW 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-BMPs to get 20% TSS, then WQT | Alternative #5-BMPs to get 40% TSS, then WQT | Alternative #6-All WQT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | McGraw Hall Wet Pond | O-3 | Wet Detention Basin | WC-59.2 | | | | | $343,000 | $429,663 | $3,465 | | | | | | |
| 11 | Starin Road Underground Wet Basin–Starin Park | M-6 | Underground Wet Detention Basin | -- | Yes | | | | $1,188,076 | $1,277,176 | $2,075 | 30.2 | 30.2 | 30.2 | | 30.2 | |
| 12 | W. North Street | M-16 | Underground Wet Detention Basin | WC-11 | Yes | | | | $544,435 | $565,308 | $5,466 | 4.3 | 4.3 | 4.3 | | | |
| 13 | 1 Acre of Permeable Pavement Serving 5 Acres of Existing Pavement (5:1 Run-On Ratio) | N/A | Permeable Pavement | Campus | | N/A | | | | | | | | | | | |
| 14 | Alternative #1 Permeable Pavement 3.47 Acres serving 20.83 Acres of Existing Pavement (5:1) Run-on Ratio | N/A | Permeable Pavement | Campus | | N/A | | | $3,328,046 | $3,389,312 | $10,936 | 15.2 | | | | | |
| 15 | Alternative #2 Permeable Pavement 5.85 Acres serving 35.11 Acres of Existing Pavement (5:1) Run-on Ratio | N/A | Permeable Pavement | Campus | | N/A | | | $5,610,682 | $5,713,970 | $10,936 | | 25.5 | | | | |
| 16 | Alternative #1 Permeable Pavement 6.53 Acres serving 39.18 Acres of Existing Pavement (5:1) Run-on Ratio | N/A | Permeable Pavement | Campus | | N/A | | | $6,262,864 | $6,378,158 | $10,936 | | | 28.4 | | | |
| 17 | Traffic-Calming Bioretention Basin Bumpouts (Per Intersection) | N/A | Bioretention Basin | | | | | | $207,100 | $221,698 | $6,928 | 1.6 | | | | | |
| 18 | Agricultural WQT (Interim)-85.8 lbs TP | | | | | | | | | $183,020 | $110 | | | | 85.8 | | |
| 19 | Agricultural WQT (Interim)-52.1 lbs TP | | | | | | | | | $110,920 | $110 | | | | | 52.1 | |
| 20 | WQT (Interim)-95.9 lbs TP | | | | | | | | | $204,480 | $110 | | | | | | 95.9 |

| Component | BMP | Figure Number | Proposed BMP Type | Basin | Serves City and UWW 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-BMPs to get 20% TSS, then WQT | Alternative #5-BMPs to get 40% TSS, then WQT | Alternative #6-All WQT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | Total TP Removed | 96.1 | 96.1 | 96.1 | 95.9 | 95.9 | 95.9 |
| | | | | | | | | | | | Total 2017 Cost | $7,782,456 | $8,942,119 | $9,584,489 | | | |
| | | | | | | | | | | | Total 20-Year NPW Cost | $8,105,181 | $9,224,014 | $9,879,603 | $183,020 | $1,420,956 | $204,480 |
| | - | - | - | | | | | | | | 20-Year NPW Cost Per Pound TP Captured | $ 4,442 | $5,055 | $5,415 | $100 | $780 | $110 |

B. WAM

WAM focuses on phosphorus compliance and/or TSS compliance. It may be used to meet an approved TMDL in accordance with Wis. Stat 283.17(7). Improved water quality (according to s. 283.84 (1m)(a), Wis. Stats.) must result from WAM. This may be achieved by requiring a greater pollutant load reduction than would otherwise be achieved without WAM. Overall, WAM focuses on compliance with phosphorus water quality criteria (meeting an acceptable in-stream phosphorus concentration) and TSS goals. WAM initiatives must be initiated by a WWTF, in accordance with NR 217.18, otherwise it is not a compliance option for MS4s.

As stated in the WDNR's *Adaptive Management Technical Handbook*, benefits to WAM include:

1. Permit compliance through WAM may be economically preferable to other compliance options.

2. Point sources, and the nonpoint sources that work cooperatively with them, can demonstrate their commitment to the community and to the environment by protecting and restoring local water resources.

3. WWTFs are given less restrictive interim phosphorus limits while they work to improve water quality under WAM; these less restrictive phosphorus limits can be permanent, if WAM is successful (water quality criteria is met and maintained).

4. WAM provides flexibility for permittees and their partners to learn from each other, and adapt as experience is gained. The WAM option can extend over a 15-year timeframe (up to three 5-year permit terms). This time is given so the permittee can install phosphorus reduction practices, create new partnerships, and measure success.

In the City's case, WAM could have multiple benefits such as improving lake and stream water quality while meeting WPDES permit requirements at a lower overall cost, and significantly delaying or eliminating the effective date of the stringent (0.075 mg/L 6-month average) effluent phosphorus limit at the City's WWTF.

C. Multi-Discharger Variance

While not a compliance option for the City and UWW, the Multi-Discharger Variance (MDV) is a compliance option for the City WWTF. The WWTF is subject to TMDL and NR 217.13 limits. The MDV allows the WWTF to extend its compliance timeline (currently for up to approximately two 5-year permit terms, but potentially for up to three permit terms) by paying $50/lb of TP annually to the nearby counties for agricultural BMPs upstream of the WWTF, by pursuing their own BMPs , or by buying into WDNR sponsored BMPs. It should be noted that if the first option is selected, MDV dollars would be distributed to all participating counties in the HUC-8 watershed, which could include Walworth, Jefferson, Washington, Waukesha, Columbia, Dane, and Rock Counties. The MDV does not require trade ratios and at the end of the MDV, the WWTF must meet its TMDL and/or NR 217.13 limits using treatment technologies at the WWTF or other option like WQT. At that point, it is possible that the MDV projects (unless they are permanent practices such as

conversion of farmland to prairie) would have no incentive to remain in place unless they can be converted to water quality trades.

It is our understanding that the City WWTF has at least preliminarily chosen the MDV as its compliance option. If the MDV is used, WAM is by default removed as a City and UWW MS4 compliance option. A final decision is required of the WWTF by March 2021.

D. WQT Versus WAM

WQT and WAM are similar, but are not the same thing. WQT is used to comply with WQBELs for a range of pollutants and focuses on offsetting phosphorus and TSS from a discharge to comply with a permit limit. WAM focuses on achieving water quality criterion for phosphorus (and potentially a goal for TSS) in the surface water. In-stream monitoring and annual reports are required with WAM. WQT requires the practices used to generate reductions to be established before the phosphorus limit takes effect. WAM allows permittees to reduce phosphorus pollutants during the time of the permit. WQT and WAM both take credit for phosphorus and TSS reductions within the watershed. Both also allow point source dischargers (including WWTFs and MS4s) to work with nonpoint source dischargers (i.e., agricultural community). WQT can be difficult in TMDL watersheds because the credit threshold for agricultural nonpoint sources can be low, making it difficult to find long-term credits.

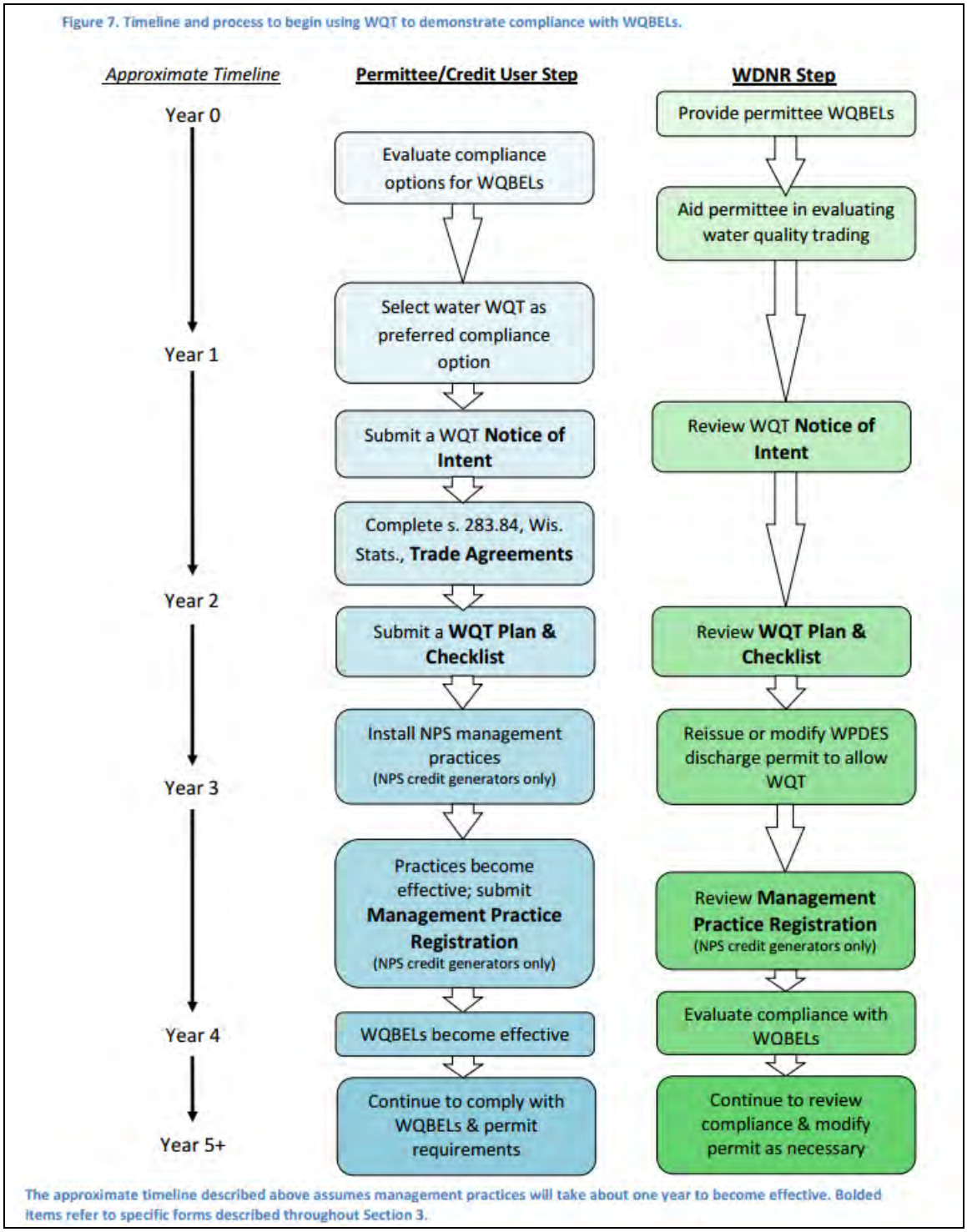
E. WPDES Permit Requirements and General Conditions for WQT

Before WQT can occur, the trade must be formalized through a written agreement (trade agreement) between trading partners per s.283.84(1) Wis. Stats. As stated in ss.283.84 (3r) and (4), Wis. Stats., the credit user's WPDES discharge permit and, if one is required, the credit generator's WPDES discharge permit must be issued, reissued, or modified to enable trading to be implemented (see Figure 5.07-1). The permit must include terms and conditions related to the trade agreement before trading of credits may occur. Every trade will have a trade ratio, which is based on the uncertainties associated with WQT due to several factors relating to site-specific conditions and the trade location. It is ideal for trade ratios to be as small as possible in order to make WQT economically efficient. The approach on how to calculate and reduce trade ratios is provided in the WDNR guidance documents.

- *A Water Quality Trading How To Manual,* September 9, 2013
- *Guidance for Implementing Water Quality Trading in WPDEs Permits, WDNR, August 21, 2013*

Guidance documents also require submittal of a WQT notice of intent (NOI) and management practice registration. The credit threshold for long-term agricultural trades will need to be determined from the TMDL, and input from the WDNR may be needed for that determination.

## Figure 5.07-1 Timeline and Process to Begin Using WQT to Demonstrate Compliances with WBQELS




Source: Figure 7, *Guidance for Implementing Water Quality Trading in WPDES Permits*

## 5.08 IDENTIFY WQT PARTNERS

Because the City WWTF has preliminarily chosen the MDV compliance option, WQT may be the only watershed-type compliance option for the City and UWW MS4s. Therefore, WQT is explored in more detail in the following sections.

WQT may occur with MS4s or point dischargers downstream or upstream if they are in the City and UWW's HUC 12 (070900020201, 202, and 203) area or the same TMDL reachshed (59). Potential nearby, downstream point source trading partners that may be able to generate credits are listed in Table 5.11-1.

| Facility | HUC-12 | Reachshed |
|---|---|---|
| City WWTF | 070900020203 | 59 |
| LS Power | 070900020203 | 59 |
| City of Fort Atkinson | 070900011104 | 59 |

**Table 5.08-1 Potential Trading Partners**

Trading may also occur with agricultural producers in the HUC 12 or TMDL reach 59.

## 5.09 CITY WWTF WQT POTENTIAL

The City and the UWW have pollutant reduction gaps for TSS and TP as shown in Table 5.01-1. Specifically, the TP reduction gaps for the City and UWW are 444.6 lbs and 96.1 lbs, respectively, for a total of 540.7 lbs TP. Using a relatively low trade ratio range of 1.2 to 1.5, a minimum of approximately 648 lbs to 811 lbs TP would need to be purchased. There may be an opportunity for the City MS4 to trade directly with the City WWTF for TP, and this type of trade would be at a low trade ratio of 1.1 to 1.2 because it can be verified by WWTF effluent monitoring. It is our understanding that the City WWTF would be able to trade excess TMDL allocation pounds upon achieving the NR 217.13 limits at the WWTF (0.075 mg/l TP six-month average and 0.225 mg/l monthly average, which must be met by April 1, 2026 if tertiary treatment is selected). Excess allocation pounds would be defined as the difference between the TMDL wasteload allocations and the NR 217.13 limits. By using the MDV, however, the City WWTF would not have excess pounds to trade until a minimum of two 5-year permit terms (10 years) when the MDV expires, and after tertiary treatment is added at the WWTF. Table 5.09-1 shows the potential excess pounds that could be traded to the City MS4 at the end of the MDV timeframe assuming that the City WWTF achieves both the NR 217.13 six-month average 0.075 mg/l TP limit (which will likely be the controlling limit) and the monthly 0.225 mg/l TP limit by then. As can be seen, as the City grows and the WWTF flow increases over time, the potentially available TP for trade decreases significantly. However, it appears that the WWTF will have sufficient excess to trade to the City and UWW MS4s to close the total 648 lb TP reduction gap using a 1.2 trade ratio.

| WWTF Flow | Potentially Available TP at 0.225 mg/l monthly average effluent (lb) | Potentially Available TP at 0.075 mg/l six month average effluent (lb) |
|---|---|---|
| 1.6 MGD (2015 to 2017) | 2,367 | 3,097 |
| 2.5 MGD | 1,750 | 2,892 |
| 3.65 MGD (Design Capacity) | 963 | 2,629 |

**Table 5.09-1 TP Available for Trading (lbs)**

It is our understanding that the City intends to optimize their operations under current flows from approximately 0.75 mg/l to 0.4 mg/l, decreasing the TP reduction they will seek through the MDV. It is unclear if this operational improvement would free up TP for trading prior to fully meeting the NR 217.13 limits, but it appears unlikely since the 0.4 mg/L would be viewed as a voluntary technology-based limit and not a WQBEL.

From the City and UWW MS4 perspective, there is uncertainty in the feasibility of the City's WWTF meeting the NR 217.13 limits even in 10 to 15 years. For this reason, it is recommended that the City and UWW MS4s seek compliance over the next 10 to 15 years via BMPs in the City and UWW campus and, as needed, WQT with upstream agricultural lands. Interim agricultural credits (above the credit threshold set by the TMDL) may be relatively easy to find in the upstream watershed, while long-term credits may be a challenge. The WDNR should be consulted to determine the credit threshold before pursuing this option. Any excess agricultural trading credits not required by the MS4s could potentially be used for trades with the WWTF, even if the MDV is pursued at the WWTF. Upstream agricultural trades would likely have positive effects upon sedimentation and water quality in Cravath and Tripp Lakes.

## 5.10 AGRICULTURAL LANDS WQT POTENTIAL

The TP reduction gaps for the City and UWW are 444.6 lbs and 96.1 lbs, respectively, for a total of 540.7 lbs TP.

For purposes of our investigation into agricultural WQT, trade ratios were determined for three BMPs (buffer strips, cover crops, and whole-farm management with cropping tillage, and infield conservation practices) as shown in Table 5.10-1. It is assumed that buffer strips would be installed in areas without drain tile, as drain tiles generally create a bypass of the buffer strip. It should be noted that the minimum trade ratio for credits generated by a point source is 1.1:1 and the minimum trade ratio for credits generated by a nonpoint source is 1.2:1. The WDNR defines the trade ratio as the following.

Trade Ratio=Delivery+Downstream+Equivalency+Uncertainty-Habitat Adustment:1

| BMP | Delivery Factor[1] | Downstream Factor | Equivalency Factor | Uncertainty Factor | Habitat Adjustment | Trade Ratio |
|---|---|---|---|---|---|---|
| Buffer Strips | 0 | 0 | 0 | 2 | 0 | 2:1 |
| Cover Crops | 0 | 0 | 0 | 2 | 0 | 2:1 |
| Cropping, Tillage, and In-Field Conservation Practices | 0 | 0 | 0 | 1 | 0 | 1.2:1 |

[1]The minimum trade ratio for nonpoint source-generated credits is 1.2:1.

**Table 5.10-1 Trade Ratios for Evaluated BMPs**

We ran WDNR's PRESTO program to determine the total stream length and total agricultural land in the HUC-12s shown in Figure 5.10-1 surrounding the City and UWW. The results are shown in Table 5.10-2. This table shows the considerable capacity for WQT or other watershed-based compliance approaches in the landscape.

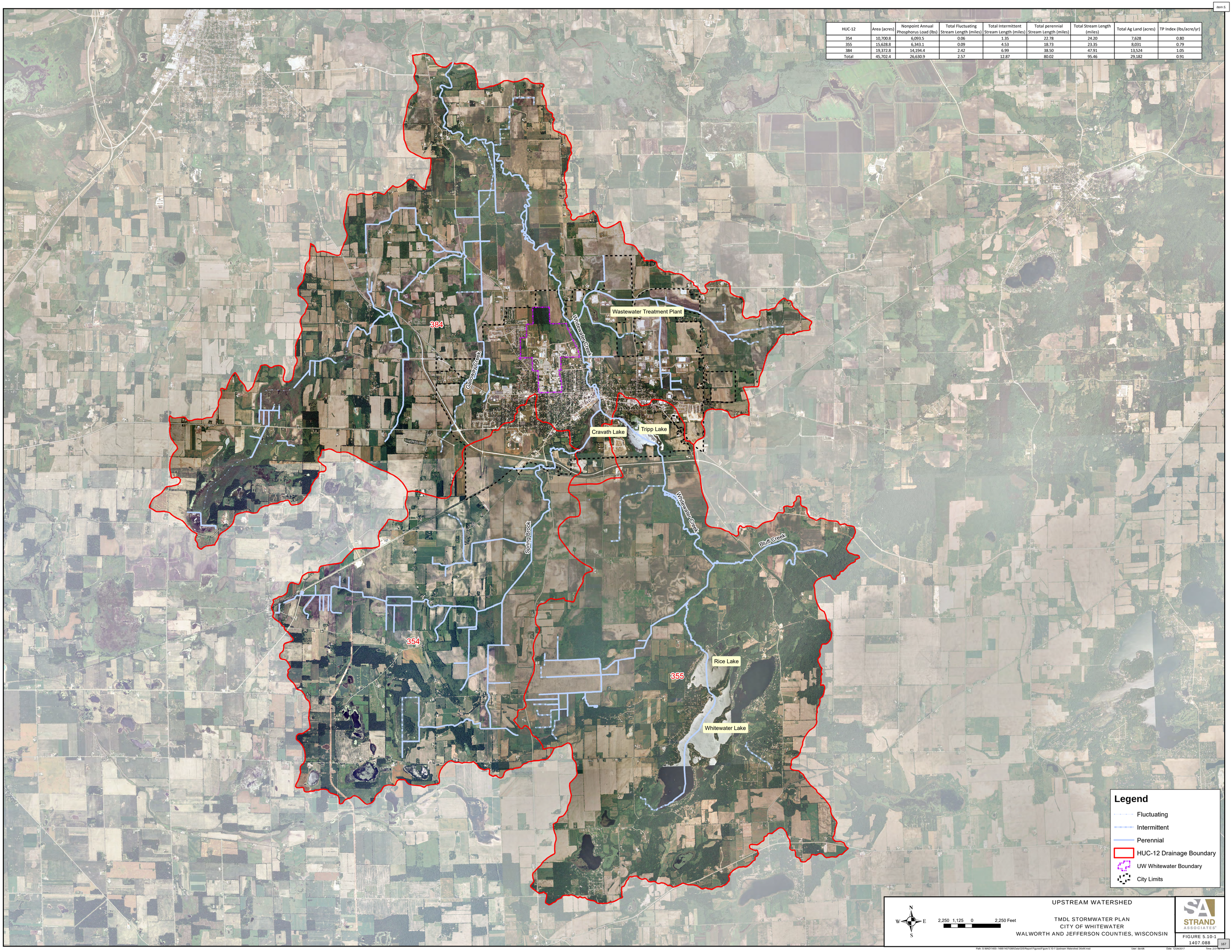
| HUC-12 | Fluctuating Stream Length (Miles) | Intermittent Stream Length (Miles) | Perennial Stream Length (Miles) | Total Stream Length (Miles) | Total Agricultural Land (Acres) |
|---|---|---|---|---|---|
| 354 | 0.06 | 1.35 | 22.78 | 24.20 | 7,628 |
| 355 | 0.09 | 4.53 | 18.73 | 23.35 | 8,031 |
| 384 | 2.42 | 6.99 | 38.50 | 47.91 | 13,524 |
| Total | 2.57 | 12.87 | 80.02 | 95.46 | 29,182 |

**Table 5.10-2 PRESTO Stream Length and Agricultural Land Results**

The trade ratios provided in Table 5.10-1 were applied to the total present worth costs for buffer strips (20-foot width assumed), cover crops, and cropping, tillage, and in-field conservation practices. These costs were calculated using data from Fond du Lac County LWCD, a 2013 study completed by Strand, the Yahara WINs AM project in the Madison area, and other sources. Present worth costs were developed based on a 20-year lifecycle (including reestablishment or replacement of BMPs that have less than a 20-year life) and WDNR's recommended facility planning discount rate of 3.875 percent for comparison with other compliance methods. The resulting potential costs for 539 pounds/year of WQT are shown in Table 5.10-3.

While there appear to be ample opportunities for WQT, WQT thresholds must also be considered. In a TMDL watershed, credit generators need to meet their own load or wasteload allocation before generating long-term credits. However, interim credits may be generated if the credit threshold is not yet met. The duration of interim credits equals the lifespan of the management practice employed to reduce pollutant loads, or 5 years, whichever is less. Once interim credits have expired, new interim credits or long-term credits need to be used. In TMDL Reach 59, the Rock River TMDL document appears to show a load allocation that would require an approximate 96 percent reduction in agricultural loads prior to a long-term credit becoming available. Agricultural producers are regulated by NR 151.04(2)(a) that mandates an average PI of 6 (6 lbs/acre-year TP runoff) and a maximum PI of 12 (12 lbs/acre-year) within the accounting period. According to Brian Smetana from Walworth County on June 13, 2017, most agricultural producers are at around a PI of 4 and are in compliance with NR 151. Therefore, there is little impetus for agricultural producers to do more conservation practices on their own and certainly not to meet the load allocation in the

| HUC-12 | Area (acres) | Nonpoint Annual Phosphorus Load (lbs) | Total Fluctuating Stream Length (miles) | Total Intermittent Stream Length (miles) | Total perennial Stream Length (miles) | Total Stream Length (miles) | Total Ag Land (acres) | TP Index (lbs/acre/yr) |
|---|---|---|---|---|---|---|---|---|
| 354 | 10,700.8 | 6,093.5 | 0.06 | 1.35 | 22.78 | 24.20 | 7,628 | 0.80 |
| 355 | 15,628.8 | 6,343.1 | 0.09 | 4.53 | 18.73 | 23.35 | 8,031 | 0.79 |
| 384 | 19,372.8 | 14,194.4 | 2.42 | 6.99 | 38.50 | 47.91 | 13,524 | 1.05 |
| Total | 45,702.4 | 26,630.9 | 2.57 | 12.87 | 80.02 | 95.46 | 29,182 | 0.91 |




UPSTREAM WATERSHED

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

STRAND ASSOCIATES®

FIGURE 5.10-1
1407.088



Path: S:\MAD\1400--1499\1407\088\Data\GIS\Report Figures\Figure 5.10-1 Upstream Watershed 34x44.mxd User: dandk Date: 12/28/2017 Time: 2:01 PM

TMDL that appears to require a 96 percent reduction. In this regard, agricultural lands in this TMDL reach may never meet their threshold, meaning that WQT would be in the format of interim credits only. A more detailed analysis could be conducted on specific fields using SnapPlus and guidance documents from the WDNR before coming to a final decision. Because of these uncertainties and to account for administrative costs, it may be advisable to approximately double the costs shown in Tables 5.10-3 to 5.10-9 for budgeting purposes.

| BMP[2] | Acres To Achieve Reduction | Average Phosphorus Credit (lbs/acre/yr) | Total Phosphorus Credit (lbs/yr) | 20-Year Present Worth Cost[1] | Present Worth Cost per Pound Phosphorus Credit |
|---|---|---|---|---|---|
| Buffer Strips | 18.4 | 2.0 | 37 | $ 37,710 | $ 53 |
| Cover Crops | 376.8 | 0.5 | 188 | $ 326,660 | $ 91 |
| Cropping, Tillage, and In-Field Conservation Practices | 376.7 | 0.83 | 314 | $ 209,790 | $ 34 |
| Total | | | 539 | $ 574,160 | $ 55 |

[1]Costs are 4th Quarter 2017 dollars and do not include modeling or administration costs, cost-sharing, or other grants. Costs do include maintenance and renewal at the end of the BMP life.

[2]Values in this table have been adjusted based on trade ratios.

**Table 5.10-3 Present Worth Costs for WQT BMPs to Meet the City and UWW MS4s TP Reduction Gap**

| BMP[2] | Acres To Achieve Reduction | Average Phosphorus Credit (lbs/acre/yr) | Total Phosphorus Credit (lbs/yr) | 20-Year Present Worth Cost[1] | Present Worth Cost per Pound Phosphorus Credit |
|---|---|---|---|---|---|
| Buffer Strips | 6.1 | 2.0 | 12 | $ 12,380 | $ 53 |
| Cover Crops | 124.6 | 0.5 | 62 | $ 108,000 | $ 91 |
| Cropping, Tillage, and In-Field Conservation Practices | 124.6 | 0.83 | 104 | $ 69,380 | $ 34 |
| Total | | | 178 | $ 189,760 | $ 55 |

[1]Costs are 4th Quarter 2017 dollars and do not include modeling or administration costs, cost-sharing, or other grants. Costs do include maintenance and renewal at the end of the BMP life.

[2]Values in this table have been adjusted based on trade ratios.

**Table 5.10-4 Present Worth Costs for WQT BMPs to Meet the City TP Reduction Gap (as analyzed as Alternative No. 4)**

| BMP[2] | Acres To Achieve Reduction | Average Phosphorus Credit (lbs/acre/yr) | Total Phosphorus Credit (lbs/yr) | 20-Year Present Worth Cost[1] | Present Worth Cost per Pound Phosphorus Credit |
|---|---|---|---|---|---|
| Buffer Strips | 11.6 | 2.0 | 23 | $ 23,790 | $ 53 |
| Cover Crops | 237.2 | 0.5 | 119 | $ 205,630 | $ 91 |
| Cropping, Tillage, and In-Field Conservation Practices | 237.1 | 0.83 | 198 | $ 132,070 | $ 34 |
| Total | | | 339 | $ 361,490 | $ 55 |

[1]Costs are 4th Quarter 2017 dollars and do not include modeling or administration costs, cost-sharing, or other grants. Costs do include maintenance and renewal at the end of the BMP life.

[2]Values in this table have been adjusted based on trade ratios.

**Table 5.10-5 Present Worth Costs for WQT BMPs to Meet the City TP Reduction Gap (as analyzed as Alternative No. 5)**

| BMP[2] | Acres To Achieve Reduction | Average Phosphorus Credit (lbs/acre/yr) | Total Phosphorus Credit (lbs/yr) | 20-Year Present Worth Cost[1] | Present Worth Cost per Pound Phosphorus Credit |
|---|---|---|---|---|---|
| Buffer Strips | 13.2 | 2.0 | 26 | $ 27,040 | $ 53 |
| Cover Crops | 270.4 | 0.5 | 135 | $ 234,450 | $ 91 |
| Cropping, Tillage, and In-Field Conservation Practices | 270.4 | 0.83 | 225 | $ 150,570 | $ 34 |
| Total | | | 387 | $ 412,060 | $ 55 |

[1]Costs are 4th Quarter 2017 dollars and do not include modeling or administration costs, cost-sharing, or other grants. Costs do include maintenance and renewal at the end of the BMP life.

[2]Values in this table have been adjusted based on trade ratios.

**Table 5.10-6 Present Worth Costs for WQT BMPs to Meet the City TP Reduction Gap (as analyzed in Alternative No. 6)**

| BMP[2] | Acres To Achieve Reduction | Average Phosphorus Credit (lbs/acre/yr) | Total Phosphorus Credit (lbs/yr) | 20-Year Present Worth Cost[1] | Present Worth Cost per Pound Phosphorus Credit |
|---|---|---|---|---|---|
| Buffer Strips | 15.3 | 2.0 | 31 | $ 31,420 | $ 53 |
| Cover Crops | 310.8 | 0.5 | 155 | $ 269,470 | $ 91 |
| Cropping, Tillage, and In-Field Conservation Practices | 310.7 | 0.83 | 259 | $ 173,030 | $ 34 |
| Total | | | 445 | $ 479,920 | $ 55 |

[1]Costs are 4th Quarter 2017 dollars and do not include modeling or administration costs, cost-sharing, or other grants. Costs do include maintenance and renewal at the end of the BMP life.

[2]Values in this table have been adjusted based on trade ratios.

**Table 5.10-7 Present Worth Costs for WQT BMPs to Meet the City TP Reduction Gap (as analyzed in Alternative No. 7)**

| BMP[2] | Acres To Achieve Reduction | Average Phosphorus Credit (lbs/acre/yr) | Total Phosphorus Credit (lbs/yr) | 20-Year Present Worth Cost[1] | Present Worth Cost per Pound Phosphorus Credit |
|---|---|---|---|---|---|
| Buffer Strips | 1.8 | 2.0 | 4 | $ 3,700 | $ 54 |
| Cover Crops | 36.4 | 0.5 | 18 | $ 31,510 | $ 91 |
| Cropping, Tillage, and In-Field Conservation Practices | 36.4 | 0.83 | 30 | $ 20,250 | $ 34 |
| Total | | | 52 | $ 55,460 | $ 55 |

[1]Costs are 4th Quarter 2017 dollars and do not include modeling or administration costs, cost-sharing, or other grants. Costs do include maintenance and renewal at the end of the BMP life.

[2]Values in this table have been adjusted based on trade ratios.

**Table 5.10-8 Present Worth Costs for WQT BMPs to Meet the UWW TP Reduction Gap (as analyzed as Alternative No. 5)**

| BMP[2] | Acres To Achieve Reduction | Average Phosphorus Credit (lbs/acre/yr) | Total Phosphorus Credit (lbs/yr) | 20-Year Present Worth Cost[1] | Present Worth Cost per Pound Phosphorus Credit |
|---|---|---|---|---|---|
| Buffer Strips | 3.3 | 2.0 | 7 | $ 6,780 | $ 54 |
| Cover Crops | 67.0 | 0.5 | 33 | $ 58,100 | $ 91 |
| Cropping, Tillage, and In-Field Conservation Practices | 67.1 | 0.83 | 56 | $ 37,360 | $ 34 |
| Total | | | 96 | $ 102,240 | $ 55 |

[1]Costs are 4th Quarter 2017 dollars and do not include modeling or administration costs, cost-sharing, or other grants. Costs do include maintenance and renewal at the end of the BMP life.

[2]Values in this table have been adjusted based on trade ratios.

**Table 5.10-9 Present Worth Costs for WQT BMPs to Meet the UWW TP Reduction Gap (as analyzed as Alternative No. 6)**

## 5.11 WAM

WAM does not require a trade ratio, and TMDL credit thresholds do not apply. The goal is to meet water quality standards at the outlet of the HUC 12, so surface water monitoring for TP (and TSS) would be required near the confluence of Whitewater Creek with Bark River at a minimum. The cost for WAM can be budgeted at approximately $50 to $100 per annual pound TP reduced, based on the previous studies and sources mentioned under WQT. This assumes some cost-share (grant) dollars would be available from USDA-NRCS and other programs and that Walworth and Jefferson counties will provide some technical and outreach assistance; it also assumes administration of the program would be by City and UWW staff. A consultant or nonprofit organization could potentially be retained to administer the program at additional cost. Again, an AM program would need to be done under the WWTF's WPDES permit. If the WWTF is able to cost-effectively maintain an effluent concentration of 0.4 mg/L TP, the WWTF would need 2,473 lbs/year of additional TP addressed by WAM assuming a WWTF flow of 2.5 mgd. With the MS4s included, at least 3,011 lbs/year would need to be addressed in total, and about a third of this would need to be addressed in the WWTF's next permit term. WAM could be used for up to three WWTF permit terms (i.e., 2022 through 2037). This option could be investigated in more detail and compared to the cost of the MDV program plus MS4 BMPs/WQT if the WWTF and City as a whole believe it is worthwhile. It does appear that this could be the lowest-cost option for the City and UWW MS4s.

WAM could have multiple benefits such as improving lake and stream water quality while meeting WPDES permit requirements at a lower overall cost.

## 5.12 RECOMMENDATIONS–CITY

As can be seen in Sections 5.05 and 5.06, the 20-year net present worth (NPW) cost to solely implement/construct BMPs treating MS4 lands to achieve TMDL compliance ranges from

$29.4 million to $33.5 million for the City. At a 20-year NPW cost per pound in the range of $3,300 to $3,800/lb of TP, consideration must be given to agricultural WQT that might be in the range of $110 per pound using interim credits. We have the following recommendations.

For the City, see Table 5.05-1 for the alternatives evaluation.

1. Prior to performing WQT, the City is required to meet a 40 percent TSS reduction baseline. Because the City is already at an existing conditions 47.7 percent TSS reduction, the City could freely pursue TMDL compliance solely through agricultural WQT as shown as Alternative No. 7 in Table 5.05-1. However, the City may want to consider implementing/constructing Alternative No. 4-12 Priority BMPs plus necessary agricultural WQT, Alternative No. 5-6 Priority BMPs (wet detention basins with existing grants, Public Works Yard hydrodynamic separator, Starin Road underground wet detention basin, and vacuum street sweeping) plus necessary agricultural WQT, or Alternative No. 6-4 Priority BMPs (wet detention basins with existing grants and the Public Works Yard hydrodynamic separator) plus necessary agricultural WQT. The Priority BMPs would be constructed over a 20-year period while pursuing WDNR Urban Nonpoint Source and Stormwater grants to partially fund the design and construction. Alternative No. 5 aligns the necessary UWW projects (as described in UWW's Alternative No. 5) with City projects.

2. WDNR is considering an improved leaf collection operations credit that might be likely in the next few years. It is expected that this credit may considerably improve the City's existing conditions TSS and TP reduction performance. For this reason, upon release of the credit from the WDNR we recommend that the City reanalyze the City's existing conditions TSS and TP reduction performance and most-cost-effective method to achieve TMDL compliance.

3. There is potential in the future for WQT with the City WWTF for TP, but not TSS, as described in Section 5.09, but only if the WWTF chooses to meet the NR 217.13 WQBEL of 0.075 mg/L. The City's existing conditions 47.7 percent TSS reduction is almost in conformance with the TMDL TSS limit of 49 percent and could be achieved through a modest number of constructed BMPs. We recommend that the City's MS4 coordinate with the City's WWTF on the potential for and timing of future TP credits.

4. Given the potentially cost-effective nature of WQT and WAM, we recommend that the City further study the most cost-effective method for collective (MS4 and WWTF) TMDL compliance. WAM appears to have some merit in cost-effective collective compliance. Likewise, WQT and WAM would have positive effects on the quality of the water entering Cravath and Tripp Lakes. UWW students could potentially participate in a watershed-based approach for additional cost savings and benefits.

5. The City should discretionarily pursue design and construction of streambank restoration projects in the problem areas identified in Figure 1.01. The WDNR will give credit for streambank restoration projects as benchmarks towards TMDL compliance.

## 5.13 RECOMMENDATIONS–UWW

As can be seen in Sections 5.05 and 5.06, the 20-year NPW cost to solely implement/construct BMPs treating MS4 lands to achieve TMDL compliance ranges from $8.1 million to $9.9 million for UWW. At a 20-year NPW cost per pound in the range of $4,400 to $5,400/lb of TP, consideration must be given to WQT that might be in the range of $110 per pound using interim credits. We have the following recommendations.

For the UWW, see Table 5.06-1 for the alternatives evaluation.

1. Prior to performing WQT, UWW is required to meet a 40 percent TSS reduction baseline. Because UWW is only at an existing conditions 16.3 percent TSS reduction, UWW must first close the 23.7 percent TSS reduction gap prior to pursuing WQT (or WAM) as shown as Alternative No. 5 in Table 5.06-1. Alternative No. 5 includes going to a twice per month frequency of vacuum sweeping, relying on campus redevelopment, and construction of the Starin Road Underground Wet Detention Basin. The remaining TP can be achieved through agricultural WQT. A WDNR Urban Nonpoint Source and Stormwater grant to partially fund the design and construction of the Starin Road Underground Wet Detention Basin should be pursued.

2. WDNR is considering an improved leaf collection operations credit that might be likely in the next few years. It is expected that this credit may considerably improve the City's existing condition's TSS and TP reduction performance. However, it is our understanding that the UWW does not collect leaves, but rather mulches leaves on lawn areas as part of mowing operations. It is unclear if the UWW's practices would qualify for a credit. Upon release of the credit from the WDNR we recommend that the UWW determine if the credit would apply to UWW leaf management operations. If so, we recommend reanalyzing the UWW's existing conditions TSS and TP reduction performance and most-cost-effective method to achieve TMDL compliance.

3. There is potential in the future for WQT with the City WWTF for TP, but not TSS, as described in Section 5.09, but only if the WWTF chooses to meet the NR 217.13 WQBEL of 0.075 mg/L. The UWW's existing conditions 16.3 percent TSS reduction requires conformance with the TMDL TSS limit of 49 percent. To close this gap, the City would implement BMPs and/or trade with the City MS4 because they may have excess TSS after implementation of a number of BMPs. We recommend that the City and UWW MS4s coordinate with the City's WWTF on the potential for and timing of future TP credits.

4. Given the potentially cost-effective nature of WQT and WAM, we recommend that the City and UWW further study the most cost-effective method for collective (MS4 and WWTF) TMDL compliance. WAM appears to have some merit in cost-effective collective compliance. Likewise, WQT and WAM would have positive effects on the quality of the water entering Cravath and Tripp Lakes. UWW students could potentially participate in a watershed-based approach for additional cost savings and benefits.

# SECTION 6
# STORMWATER UTILITY RATE REVIEW AND UPDATE

## 6.01 INTRODUCTION

Included in this plan is a stormwater utility (SWU) rate review and update for the City. The City's utility was established in the 4th quarter of 2007 (with billing starting in 2008) and it appears that there have been four rate increases since then. A letter contemplating the 2016 increase is included as Appendix Q. The SWU rate review and update provides the City with an estimate of the range of rates necessary to fund the City's stormwater program including the costs related to Rock River Basin TMDL compliance. Section 5 provides an alternatives analysis for TMDL compliance related to TSS and TP reductions. The SWU rate review and update uses the City's current stormwater program budget to create a future stormwater program budget by adding the cost to implement recommendations from this plan.

## 6.02 SWU RATE STRUCTURE AND RATES

SWU service charges in the City are based on Equivalent Runoff Units (ERUs). One ERU equals the average impervious area on a typical single-family residential property. In the City, one ERU is equivalent to 3,850 square feet of impervious area. The City has implemented a tiered SWU rate structure for single-family residential properties as follows:

Residential lot size <5,445 SF = 0.7 ERU.
Residential lot size >5,445 SF and < 21,781 SF = 1.0 ERU.
Residential lot size >21,781 SF = 1.2 ERU.

The fee for nonresidential parcels is based on the number of ERUs. The number of ERUs is determined by dividing the total estimated impervious area on the parcel by the typical residential impervious area. For instance, the measured impervious area at a fast food restaurant in the City is 46,200 SF, so it has 12 ERUs (46,200 SF ÷ 3,850 SF).

In 2008, the City began billing at a $3.58 per ERU per month rate. Since then, there have been four rate increases as shown in Table 6.02-1.

| Year | SWU Rates $/ERU/Month | SWU Rates $/ERU/Yr | % Rate Increase | No. of Base ERUs | No of O&M and C&D ERUs | No. of Credit and Adjustment ERUs | Annual Revenue |
|---|---|---|---|---|---|---|---|
| 2008 | $3.58 | $43.00 | 0% | | | | |
| 2009 | $3.58 | $43.00 | 0% | | | | |
| 2010 | $4.08 | $49.00 | 14.0% | | | | |
| 2011 | $4.08 | $49.00 | 0% | | | | |
| 2012 | $4.08 | $49.00 | 0% | | | | |
| 2013 | $4.75 | $57.00 | 16.3% | | | | $378,000 |
| 2014 | $5.58 | $66.96 | 17.5% | | | | |
| 2015 | $5.58 | $66.96 | 0% | | | | |
| 2016 | $6.17 | 74.04 | 10.6% | 7,754.1 | 6,563.4 | 1,190.7 | $508,107 |
| 2017 | $6.17 | $74.04 | 0% | 7,814.4 | 6,623.7 | 1,190.7 | $512,572 |

Note: SWU Rates are divided into a 25 percent Base rate, 31 percent O&M rate, and 43 percent C&D rate.

**Table 6.02-1 City of Whitewater SWU Rate History**

## 6.03 STATEWIDE SWU RATE TRENDS

Based on review of the American Public Works Association's (APWA) March 4, 2016, WI Stormwater User Charge System Information document included in Appendix R, the average monthly SWU rate is $5.13/ERU for 118 stormwater utilities currently in place in the State of Wisconsin. Of these stormwater utilities, 95 communities are covered by WPDES permits. The average monthly SWU rate for these communities is $5.45/ERU. For comparison purposes, we have also compiled the SWU rates for other cities in Wisconsin with state university as shown in Table 6.03-1. It is expected that these rates will be increasing for communities statewide that are in TMDL watersheds. Currently, only the Rock River Basin and Lower Fox River Basin have EPA-approved TMDLs. TMDLs are currently in development or are awaiting EPA approval for the Milwaukee River Basin, Upper Fox and Wolf River Basin, and the Wisconsin River Basin.

| Community | SWU Rate ($/ERU/Month) |
|---|---|
| Eau Claire | $7.17 |
| La Crosse | $4.49 |
| Menomonie | $3.00 |
| Oshkosh | $10.24 |
| River Falls | $3.14 |
| Stevens Point | $4.92 |
| Superior | $5.90 |
| Average | $5.55 |

**Table 6.03-1 SWU Rates for Wisconsin Communities With State Universities**

## 6.04 SWU BUDGET SUMMARY

On November 15, 2017, Strand received the City's SWU budget documents that show an existing base SWU budget of approximately $512,572 in 2018 matching the revenue projected to be generated by

the SWU in 2018. For purposes of our SWU rate review and update, we have developed four future SWU budgets that add in the costs to implement recommendations from this plan in addition to TMDL compliance via Alternative 4, Alternative 5, Alternative 6, and Alternative 7 described in Section 5. Each of these budgets was created with the following assumptions.

1. Capital projects are financed at a 3.875 percent interest rate for 20 years.

2. Capital projects related to stormwater quality improvements are assumed to be funded by WDNR Urban Nonpoint Source and Stormwater Construction grants that will reduce their overall cost during the year of construction.

3. The City's existing SWU budget of $512,572 is increased by 3 percent per year to account for inflation.

4. The total number of ERUs increases by 0.5 percent per year.

5. Capital projects and water quality trading are timed in a staggered fashion to achieve TMDL compliance by the year 2040. It is acknowledged that WDNR has not set forth a specific timeline for compliance with the Rock River Basin TMDL requirements, though compliance timelines on the order of 20 to 30 years have been mentioned. Rather, it is understood that WDNR will require the City to show continual progress by meeting benchmarks of performance within each 5-year permit term.

Tables 6.04-1, 6.04-2, 6.04-3, and 6.04-4 show the Alternative No. 4, Alternative No. 5, Alternative No. 6, and Alternative No. 7 SWU future budgets.

## 6.05 POTENTIAL FUTURE SWU RATES

Table 6.05-1 and Figure 6.05-1 show five potential SWU rate increases aimed at funding the Alternative No. 4, Alternative No. 5, Alternative No. 6, and Alternative No. 7 SWU budgets. As can be seen, substantial increases are necessary regardless of alternative chosen for TMDL compliance. It is envisioned that this information will be used by the City to help choose a TMDL compliance option and ultimately to revise SWU rates. Alternative No. 5 includes implementation of vacuum street sweeping and the Starin Road underground wet detention basin to assist UWW in achieving a 40 percent TSS reduction that will allow UWW to pursue water quality trading. Vacuum street sweeping and the Starin Road underground wet detention basin are considered joint projects with financial contributions from both UWW and City.

## Table 6.04-1 Alternative 4–Potential Future Stormwater Management Costs

| Expenses | | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 | 2036 | 2037 | 2038 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Assumed Expenses Funded by Stormwater Utility in 2018 (then 3% Inflation) | | $ 512,572 | $ 527,949 | $ 543,787 | $ 560,101 | $ 576,904 | $ 594,211 | $ 612,037 | $ 630,398 | $ 649,310 | $ 668,790 | $ 688,853 | $ 709,519 | $ 730,805 | $ 752,729 | $ 775,311 | $ 798,570 | $ 822,527 | $ 847,203 | $ 872,619 | $ 898,797 | $ 925,761 |
| **Additional Expenses** | | | | | | | | | | | | | | | | | | | | | | |
| Initiate Program to Gather All Maintenance Agreements for All Privately-Owned Storwmater BMPs | | $ 15,000 | | | | | | | | | | | | | | | | | | | | |
| Develop Private BMP Maintenance Program | | $ 20,000 | | | | | | | | | | | | | | | | | | | | |
| Initiate Private BMP Maintenance Program | | | $ 45,000 | $ 46,350 | $ 47,741 | $ 49,173 | $ 50,648 | $ 52,167 | $ 53,732 | $ 55,344 | $ 57,005 | $ 58,715 | $ 60,476 | $ 62,291 | $ 64,159 | $ 66,084 | $ 68,067 | $ 70,109 | $ 72,212 | $ 74,378 | $ 76,609 | $ 78,908 |
| Assessment of 12 City-Owned Wet Ponds for Dredging Need | | | $ 12,000 | | | | | $ 16,059 | | | | | $ 21,490 | | | | | $ 28,759 | | | | | |
| Design of City Owned Wet Pond Dredging | **2017 Cost** | | | $ 65,000 | | | | | $ 86,985 | | | | | $ 116,405 | | | | | $ 155,776 | | | | |
| City-Owned Wet Pond Periodic Dredging (Project #1-2021) | $ 150,000 | | | | $ 12,285 | $ 12,285 | $ 12,285 | $ 12,285 | $ 12,285 | $ 12,285 | $ 12,285 | $ 12,285 | $ 12,285 | $ 12,285 | $ 12,285 | $ 12,285 | $ 12,285 | $ 12,285 | $ 12,285 | $ 12,285 | $ 12,285 | $ 12,285 | $ 12,285 |
| City-Owned Wet Pond Periodic Dredging (Project #2-2026) | $ 157,652 | | | | | | | | | $ 14,969 | $ 14,969 | $ 14,969 | $ 14,969 | $ 14,969 | $ 14,969 | $ 14,969 | $ 14,969 | $ 14,969 | $ 14,969 | $ 14,969 | $ 14,969 | $ 14,969 |
| City-Owned Wet Pond Periodic Dredging (Project #3-2031) | $ 165,693 | | | | | | | | | | | | | | $ 18,238 | $ 18,238 | $ 18,238 | $ 18,238 | $ 18,238 | $ 18,238 | $ 18,238 | $ 18,238 |
| City-Owned Wet Pond Periodic Dredging (Project #4-2036) | $ 174,145 | | | | | | | | | | | | | | | | | | | $ 22,221 | $ 22,221 | $ 22,221 |
| City-Owned Wet Pond Periodic Dredging (Project #5-2041) | $ 183,029 | | | | | | | | | | | | | | | | | | | | | |
| City-Owned Wet Pond Periodic Dredging (Project #6-2046) | $ 192,365 | | | | | | | | | | | | | | | | | | | | | |
| Create map of existing sumps and depths in City | | | $ 10,000 | | | | | | | | | | | | | | | | | | | |
| City SWPPP-Install Perimeter Sediment Control Devices at Public Works Garage | | $ 1,000 | | | | | | | | | | | | | | | | | | | | |
| Apply for WDNR UNPS Grant for Hydrodynamic Separator at Public Works Garage | **2017 Cost** | $ 4,500 | | | | | | | | | | | | | | | | | | | | |
| Design (2019) and Construct (2020) HDS at Public Works Garage | $ 44,875 | | $ 15,000 | $ 3,568 | $3,568 | $3,568 | $3,568 | $3,568 | $3,568 | $3,568 | $3,568 | $3,568 | $3,568 | $3,568 | $3,568 | $3,568 | $3,568 | $3,568 | $3,568 | $3,568 | $3,568 | $3,568 |
| UNPS Grant for HDS | | | | $ (54,637) | | | | | | | | | | | | | | | | | | |
| Review spill prevention and response procedures at Public Works Garage for improvements in 2018 and implement in 2019 | | $ 500 | | | | | | | | | | | | | | | | | | | | |
| Review Public Works Department staff training for stormwater pollution prevention at the Public Works Garage for improvements in 2018 and implement in 2019 | | $ 500 | $ 1,000 | $ 1,030 | $ 1,061 | $ 1,093 | $ 1,126 | $ 1,159 | $ 1,194 | $ 1,230 | $ 1,267 | $ 1,305 | $ 1,344 | $ 1,384 | $ 1,426 | $ 1,469 | $ 1,513 | $ 1,558 | $ 1,605 | $ 1,653 | $ 1,702 | $ 1,754 |
| Joint City MS4, City WWTP, and UWW Water Quality Trading and Watershed Adaptive Management TMDL Compliance Study | | | $ 40,000 | | | | | | | | | | | | | | | | | | | |
| WDNR UNPS Grant Application for WinSLAMM Modeling Update | | | | | $ 5,369 | | | | | | $ 7,616 | | | | | | $ 10,803 | | | | | |
| WDNR UNPS Grant for WinSLAMM Modeling Update | | | | | | $ (30,000) | | | | | | $ (42,556) | | | | | | $ (60,366) | | | | |
| WinSLAMM Modeling Update | | | | | | $ 60,000 | | | | | | $ 85,111 | | | | | | $ 120,732 | | | | |
| WDNR UNPS Grant Application for Stormwater BMPs | | $ 4,500 | | $ 5,056 | | $ 5,681 | | $ 6,383 | | $ 7,172 | | $ 8,059 | | $ 9,055 | | $ 10,174 | | | | | | |
| WDNR UNPS Grant for Stormater BMP | **2017 Cost** | $ (150,000) | $ (150,000) | $ (61,866) | $ (150,000) | | $ (150,000) | | $ (150,000) | | $ (150,000) | | $ (150,000) | | $ (150,000) | | $ (39,603) | | | | | |
| Design/Construct Armory Detention Basin | $ 493,125 | $ 36,961 | $ 36,961 | $ 36,961 | $ 36,961 | $ 36,961 | $ 36,961 | $ 36,961 | $ 36,961 | $ 36,961 | $ 36,961 | $ 36,961 | $ 36,961 | $ 36,961 | $ 36,961 | $ 36,961 | $ 36,961 | $ 36,961 | $ 36,961 | $ 36,961 | $ 36,961 | |
| Design/Construct South Street Detention Basin (Small) | $ 271,750 | | $ 20,979 | $ 20,979 | $ 20,979 | $ 20,979 | $ 20,979 | $ 20,979 | $ 20,979 | $ 20,979 | $ 20,979 | $ 20,979 | $ 20,979 | $ 20,979 | $ 20,979 | $ 20,979 | $ 20,979 | $ 20,979 | $ 20,979 | $ 20,979 | $ 20,979 | $ 20,979 |
| Purchase Vacuum Street Sweeper | $ 292,624 | | | $ 23,269 | $ 23,269 | $ 23,269 | $ 23,269 | $ 23,269 | $ 23,269 | $ 23,269 | $ 23,269 | $ 23,269 | $ 23,269 | $ 23,269 | $ 23,269 | $ 23,269 | $ 23,269 | $ 23,269 | $ 23,269 | $ 23,269 | $ 23,269 | $ 23,269 |
| Implement Vacuum Street Sweeping (Additional Cost Only) | | | | $ 2,637 | $ 2,716 | $ 2,798 | $ 2,882 | $ 2,968 | $ 3,057 | $ 3,149 | $ 3,243 | $ 3,340 | $ 3,441 | $ 3,544 | $ 3,650 | $ 3,760 | $ 3,873 | $ 3,989 | $ 4,108 | $ 4,232 | $ 4,359 | $ 4,489 |
| Design/Construct Mound Meadows Wet Detention Basin | $ 354,875 | | | | $ 29,065 | $ 29,065 | $ 29,065 | $ 29,065 | $ 29,065 | $ 29,065 | $ 29,065 | $ 29,065 | $ 29,065 | $ 29,065 | $ 29,065 | $ 29,065 | $ 29,065 | $ 29,065 | $ 29,065 | $ 29,065 | $ 29,065 | $ 29,065 |
| Design/Construct DLK/Main Street Wet Detention Basin | $ 328,000 | | | | | | $ 28,500 | $ 28,500 | $ 28,500 | $ 28,500 | $ 28,500 | $ 28,500 | $ 28,500 | $ 28,500 | $ 28,500 | $ 28,500 | $ 28,500 | $ 28,500 | $ 28,500 | $ 28,500 | $ 28,500 | $ 28,500 |
| Design/Construct Starin Road Underground Wet Detention Basin | $ 622,924 | | | | | | | | $ 57,423 | $ 57,423 | $ 57,423 | $ 57,423 | $ 57,423 | $ 57,423 | $ 57,423 | $ 57,423 | $ 57,423 | $ 57,423 | $ 57,423 | $ 57,423 | $ 57,423 | $ 57,423 |
| Design/Construct Carriage Drive Wet Detention Basin | $ 548,500 | | | | | | | | | | $ 53,641 | $ 53,641 | $ 53,641 | $ 53,641 | $ 53,641 | $ 53,641 | $ 53,641 | $ 53,641 | $ 53,641 | $ 53,641 | $ 53,641 | $ 53,641 |
| Design/Construct Chicago/East Street Wet Detention Basin | $ 218,625 | | | | | | | | | | | | $ 22,683 | $ 22,683 | $ 22,683 | $ 22,683 | $ 22,683 | $ 22,683 | $ 22,683 | $ 22,683 | $ 22,683 | $ 22,683 |
| Ann Street Wet Pond Chemical Treatment (Construction) | $ 359,384 | | | | | | | | | | | | | | $ 39,558 | $ 39,558 | $ 39,558 | $ 39,558 | $ 39,558 | $ 39,558 | $ 39,558 | $ 39,558 |
| Ann Street Wet Pond Chemical Treatment (On-Going O&M) | | | | | | | | | | | | | | | | $ 25,000 | $ 25,750 | $ 26,523 | $ 27,318 | $ 28,138 | $ 28,982 | $ 29,851 |
| Innovation Center Wet Pond Chemical Treatment (Construction) | $ 49,359 | | | | | | | | | | | | | | | | $ 5,764 | $ 5,764 | $ 5,764 | $ 5,764 | $ 5,764 | $ 5,764 |
| Innovation Center Wet Pond Chemical Treatment (On-Going O&M) | | | | | | | | | | | | | | | | | | $ 3,865 | $ 3,980 | $ 4,100 | $ 4,223 | $ 4,350 |
| Agricultural Water Quality Trading for TP (178.2 lbs at $110/lb TP; 1/7 per year starting in 2034 with full implementation in 2040) | $ 110.00 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ 4,628 | $ 9,535 | $ 14,731 | $ 20,231 | $ 26,047 |
| **Total Expenses** | | **$ 445,500** | **$ 558,900** | **$ 632,100** | **$ 593,100** | **$ 791,800** | **$ 653,500** | **$ 845,400** | **$ 837,400** | **$ 943,200** | **$ 868,600** | **$ 1,083,500** | **$ 949,600** | **$ 1,226,800** | **$ 1,033,100** | **$ 1,242,900** | **$ 1,235,900** | **$ 1,389,200** | **$1,488,600** | **$ 1,389,000** | **$ 1,424,000** | **$ 1,423,300** |

## Table 6.04-2 Alternative 5–Potential Future Stormwater Management Costs

| Expenses | | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 | 2036 | 2037 | 2038 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Assumed Expenses Funded by Stormwater Utility in 2018 (then 3% Inflation) | | $ 512,572 | $ 527,949 | $ 543,787 | $ 560,101 | $ 576,904 | $ 594,211 | $ 612,037 | $ 630,398 | $ 649,310 | $ 668,790 | $ 688,853 | $ 709,519 | $ 730,805 | $ 752,729 | $ 775,311 | $ 798,570 | $ 822,527 | $ 847,203 | $ 872,619 | $ 898,797 | $ 925,761 |
| **Additional Expenses** | | | | | | | | | | | | | | | | | | | | | | |
| Initiate Program to Gather All Maintenance Agreements for All Privately-Owned Storwmater BMPs | | $ 15,000 | | | | | | | | | | | | | | | | | | | | |
| Develop Private BMP Maintenance Program | | $ 20,000 | | | | | | | | | | | | | | | | | | | | |
| Initiate Private BMP Maintenance Program | | | $ 45,000 | $ 46,350 | $ 47,741 | $ 49,173 | $ 50,648 | $ 52,167 | $ 53,732 | $ 55,344 | $ 57,005 | $ 58,715 | $ 60,476 | $ 62,291 | $ 64,159 | $ 66,084 | $ 68,067 | $ 70,109 | $ 72,212 | $ 74,378 | $ 76,609 | $ 78,908 |
| Assessment of 12 City-Owned Wet Ponds for Dredging Need | | | $ 12,000 | | | | | $ 16,059 | | | | | $ 21,490 | | | | | $ 28,759 | | | | | |
| Design of City Owned Wet Pond Dredging | **2017 Cost** | | | $ 65,000 | | | | | $ 86,985 | | | | | $ 116,405 | | | | | $ 155,776 | | | |
| City-Owned Wet Pond Periodic Dredging (Project #1-2021) | $ 150,000 | | | | $ 12,285 | $ 12,285 | $ 12,285 | $ 12,285 | $ 12,285 | $ 12,285 | $ 12,285 | $ 12,285 | $ 12,285 | $ 12,285 | $ 12,285 | $ 12,285 | $ 12,285 | $ 12,285 | $ 12,285 | $ 12,285 | $ 12,285 | $ 12,285 |
| City-Owned Wet Pond Periodic Dredging (Project #2-2026) | $ 157,652 | | | | | | | | | $ 14,969 | $ 14,969 | $ 14,969 | $ 14,969 | $ 14,969 | $ 14,969 | $ 14,969 | $ 14,969 | $ 14,969 | $ 14,969 | $ 14,969 | $ 14,969 | $ 14,969 |
| City-Owned Wet Pond Periodic Dredging (Project #3-2031) | $ 165,693 | | | | | | | | | | | | | | $ 18,238 | $ 18,238 | $ 18,238 | $ 18,238 | $ 18,238 | $ 18,238 | $ 18,238 | $ 18,238 |
| City-Owned Wet Pond Periodic Dredging (Project #4-2036) | $ 174,145 | | | | | | | | | | | | | | | | | | | $ 22,221 | $ 22,221 | $ 22,221 |
| City-Owned Wet Pond Periodic Dredging (Project #5-2041) | $ 183,029 | | | | | | | | | | | | | | | | | | | | | |
| City-Owned Wet Pond Periodic Dredging (Project #6-2046) | $ 192,365 | | | | | | | | | | | | | | | | | | | | | |
| Create map of existing sumps and depths in City | | | $ 10,000 | | | | | | | | | | | | | | | | | | | |
| City SWPPP-Install Perimeter Sediment Control Devices at Public Works Garage | | $ 1,000 | | | | | | | | | | | | | | | | | | | | |
| Apply for WDNR UNPS Grant for Hydrodynamic Separator at Public Works Garage | **2017 Cost** | $ 4,500 | | | | | | | | | | | | | | | | | | | | |
| Design (2019) and Construct (2020) HDS at Public Works Garage | $ 44,875 | | $ 15,000 | $ 3,568 | $3,568 | $3,568 | $3,568 | $3,568 | $3,568 | $3,568 | $3,568 | $3,568 | $3,568 | $3,568 | $3,568 | $3,568 | $3,568 | $3,568 | $3,568 | $3,568 | $3,568 | $3,568 |
| UNPS Grant for HDS | | | | $ (54,637) | | | | | | | | | | | | | | | | | | |
| Review spill prevention and response procedures at Public Works Garage for improvements in 2018 and implement in 2019 | | $ 500 | | | | | | | | | | | | | | | | | | | | |
| Review Public Works Department staff training for stormwater pollution prevention at the Public Works Garage for improvements in 2018 and implement in 2019 | | $ 500 | $ 1,000 | $ 1,030 | $ 1,061 | $ 1,093 | $ 1,126 | $ 1,159 | $ 1,194 | $ 1,230 | $ 1,267 | $ 1,305 | $ 1,344 | $ 1,384 | $ 1,426 | $ 1,469 | $ 1,513 | $ 1,558 | $ 1,605 | $ 1,653 | $ 1,702 | $ 1,754 |
| Joint City MS4, City WWTP, and UWW Water Quality Trading and Watershed Adaptive Management TMDL Compliance Study | | | $ 40,000 | | | | | | | | | | | | | | | | | | | |
| WDNR UNPS Grant Application for WinSLAMM Modeling Update | | | | | $ 5,369 | | | | | | $ 7,616 | | | | | | $ 10,803 | | | | | |
| WDNR UNPS Grant for WinSLAMM Modeling Update | | | | | | $ (30,000) | | | | | | $ (42,556) | | | | | | $ (60,366) | | | | |
| WinSLAMM Modeling Update | | | | | | $ 60,000 | | | | | | $ 85,111 | | | | | | $ 120,732 | | | | |
| WDNR UNPS Grant Application for Stormwater BMPs | | $ 4,500 | | $ 5,056 | | | | | | | | | | | | | | | | | | |
| WDNR UNPS Grant for Stormater BMP | | $ (150,000) | $ (150,000) | $ (61,866) | $ (150,000) | | | | | | | | | | | | | | | | | |
| | **2017 Cost** | | | | | | | | | | | | | | | | | | | | | |
| Design/Construct Armory Detention Basin | $ 493,125 | $ 36,961 | $ 36,961 | $ 36,961 | $ 36,961 | $ 36,961 | $ 36,961 | $ 36,961 | $ 36,961 | $ 36,961 | $ 36,961 | $ 36,961 | $ 36,961 | $ 36,961 | $ 36,961 | $ 36,961 | $ 36,961 | $ 36,961 | $ 36,961 | $ 36,961 | $ 36,961 | |
| Design/Construct South Street Detention Basin | $ 271,750 | | $ 20,979 | $20,979 | $20,979 | $20,979 | $20,979 | $20,979 | $20,979 | $20,979 | $20,979 | $20,979 | $20,979 | $20,979 | $20,979 | $20,979 | $20,979 | $20,979 | $20,979 | $20,979 | $20,979 | $20,979 |
| Purchase Vacuum Street Sweeper | $ 292,624 | | | $ 23,269 | $ 23,269 | $ 23,269 | $ 23,269 | $ 23,269 | $ 23,269 | $ 23,269 | $ 23,269 | $ 23,269 | $ 23,269 | $ 23,269 | $ 23,269 | $ 23,269 | $ 23,269 | $ 23,269 | $ 23,269 | $ 23,269 | $ 23,269 | $ 23,269 |
| Implement Vacuum Street Sweeping (Additional Cost Only) | | | | $ 2,637 | $ 2,716 | $ 2,798 | $ 2,882 | $ 2,968 | $ 3,057 | $ 3,149 | $ 3,243 | $ 3,340 | $ 3,441 | $ 3,544 | $ 3,650 | $ 3,760 | $ 3,873 | $ 3,989 | $ 4,108 | $ 4,232 | $ 4,359 | $ 4,489 |
| Design/Construct Starin Road Underground Wet Detention Basin | $ 622,924 | | | | $ 51,019 | $ 51,019 | $ 51,019 | $ 51,019 | $ 51,019 | $ 51,019 | $ 51,019 | $ 51,019 | $ 51,019 | $ 51,019 | $ 51,019 | $ 51,019 | $ 51,019 | $ 51,019 | $ 51,019 | $ 51,019 | $ 51,019 | $ 51,019 |
| Agricultural Water Quality Trading for TP (339.3 lbs at $110/lb TP; 1/20 per year starting in 2021 with full implementation in 2040) | $ 110.00 | $ - | $ - | $ - | $ 2,100 | $ 4,327 | $ 6,685 | $ 9,181 | $ 11,820 | $ 14,609 | $ 17,556 | $ 20,666 | $ 23,946 | $ 27,405 | $ 31,050 | $ 34,889 | $ 38,930 | $ 43,182 | $ 47,655 | $ 52,357 | $ 57,298 | $ 62,489 |
| **Total Expenses** | | **$ 445,500** | **$ 558,900** | **$ 632,100** | **$ 617,200** | **$ 812,400** | **$ 803,600** | **$ 841,700** | **$ 935,300** | **$ 886,700** | **$ 918,500** | **$ 978,500** | **$ 983,300** | **$1,104,900** | **$ 1,034,300** | **$ 1,062,800** | **$1,103,000** | **$ 1,211,800** | **$ 1,309,800** | **$ 1,208,700** | **$ 1,242,300** | **$ 1,239,900** |

## Table 6.04-3 Alternative 6–Potential Future Stormwater Management Costs

| Expenses | | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 | 2036 | 2037 | 2038 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Assumed Expenses Funded by Stormwater Utility in 2018 (then 3% Inflation) | | $ 512,572 | $ 527,949 | $ 543,787 | $ 560,101 | $ 576,904 | $ 594,211 | $ 612,037 | $ 630,398 | $ 649,310 | $ 668,790 | $ 688,853 | $ 709,519 | $ 730,805 | $ 752,729 | $ 775,311 | $ 798,570 | $ 822,527 | $ 847,203 | $ 872,619 | $ 898,797 | $ 925,761 |
| **Additional Expenses** | | | | | | | | | | | | | | | | | | | | | | |
| Initiate Program to Gather All Maintenance Agreements for All Privately-Owned Storwmater BMPs | | $ 15,000 | | | | | | | | | | | | | | | | | | | | |
| Develop Private BMP Maintenance Program | | $ 20,000 | | | | | | | | | | | | | | | | | | | | |
| Initiate Private BMP Maintenance Program | | | $ 45,000 | $ 46,350 | $ 47,741 | $ 49,173 | $ 50,648 | $ 52,167 | $ 53,732 | $ 55,344 | $ 57,005 | $ 58,715 | $ 60,476 | $ 62,291 | $ 64,159 | $ 66,084 | $ 68,067 | $ 70,109 | $ 72,212 | $ 74,378 | $ 76,609 | $ 78,908 |
| Assessment of 12 City-Owned Wet Ponds for Dredging Need | | | $ 12,000 | | | | | $ 16,059 | | | | | $ 21,490 | | | | | $ 28,759 | | | | | |
| Design of City Owned Wet Pond Dredging | **2017 Cost** | | | $ 65,000 | | | | | $ 86,985 | | | | | $ 116,405 | | | | | $ 155,776 | | | | |
| City-Owned Wet Pond Periodic Dredging (Project #1-2021) | $ 150,000 | | | | $ 12,285 | $ 12,285 | $ 12,285 | $ 12,285 | $ 12,285 | $ 12,285 | $ 12,285 | $ 12,285 | $ 12,285 | $ 12,285 | $ 12,285 | $ 12,285 | $ 12,285 | $ 12,285 | $ 12,285 | $ 12,285 | $ 12,285 | $ 12,285 |
| City-Owned Wet Pond Periodic Dredging (Project #2-2026) | $ 157,652 | | | | | | | | | $ 14,969 | $ 14,969 | $ 14,969 | $ 14,969 | $ 14,969 | $ 14,969 | $ 14,969 | $ 14,969 | $ 14,969 | $ 14,969 | $ 14,969 | $ 14,969 | $ 14,969 |
| City-Owned Wet Pond Periodic Dredging (Project #3-2031) | $ 165,693 | | | | | | | | | | | | | | $ 18,238 | $ 18,238 | $ 18,238 | $ 18,238 | $ 18,238 | $ 18,238 | $ 18,238 | $ 18,238 |
| City-Owned Wet Pond Periodic Dredging (Project #4-2036) | $ 174,145 | | | | | | | | | | | | | | | | | | | $ 22,221 | $ 22,221 | $ 22,221 |
| City-Owned Wet Pond Periodic Dredging (Project #5-2041) | $ 183,029 | | | | | | | | | | | | | | | | | | | | | |
| City-Owned Wet Pond Periodic Dredging (Project #6-2046) | $ 192,365 | | | | | | | | | | | | | | | | | | | | | |
| Create map of existing sumps and depths in City | | | $ 10,000 | | | | | | | | | | | | | | | | | | | |
| City SWPPP-Install Perimeter Sediment Control Devices at Public Works Garage | | $ 1,000 | | | | | | | | | | | | | | | | | | | | |
| Apply for WDNR UNPS Grant for Hydrodynamic Separator at Public Works Garage | **2017 Cost** | $ 4,500 | | | | | | | | | | | | | | | | | | | | |
| Design (2019) and Construct (2020) HDS at Public Works Garage | $ 44,875 | | $ 15,000 | $ 3,568 | $3,568 | $3,568 | $3,568 | $3,568 | $3,568 | $3,568 | $3,568 | $3,568 | $3,568 | $3,568 | $3,568 | $3,568 | $3,568 | $3,568 | $3,568 | $3,568 | $3,568 | $3,568 |
| UNPS Grant for HDS | | | | $ (54,637) | | | | | | | | | | | | | | | | | | |
| Review spill prevention and response procedures at Public Works Garage for improvements in 2018 and implement in 2019 | | $ 500 | | | | | | | | | | | | | | | | | | | | |
| Review Public Works Department staff training for stormwater pollution prevention at the Public Works Garage for improvements in 2018 and implement in 2019 | | $ 500 | $ 1,000 | $ 1,030 | $ 1,061 | $ 1,093 | $ 1,126 | $ 1,159 | $ 1,194 | $ 1,230 | $ 1,267 | $ 1,305 | $ 1,344 | $ 1,384 | $ 1,426 | $ 1,469 | $ 1,513 | $ 1,558 | $ 1,605 | $ 1,653 | $ 1,702 | $ 1,754 |
| Joint City MS4, City WWTP, and UWW Water Quality Trading and Watershed Adaptive Management TMDL Compliance Study | | | $ 40,000 | | | | | | | | | | | | | | | | | | | |
| WDNR UNPS Grant Application for WinSLAMM Modeling Update | | | | | $ 5,369 | | | | | | $ 7,616 | | | | | | $ 10,803 | | | | | |
| WDNR UNPS Grant for WinSLAMM Modeling Update | | | | | | $ (30,000) | | | | | | $ (42,556) | | | | | | $ (60,366) | | | | |
| WinSLAMM Modeling Update | | | | | | $ 60,000 | | | | | | $ 85,111 | | | | | | $ 120,732 | | | | |
| WDNR UNPS Grant Application for Stormwater BMPs | | $ - | | $ - | | $ - | | $ - | | $ - | | $ - | | $ - | | $ - | | $ - | | $ - | | $ - |
| WDNR UNPS Grant for Stormater BMP | | $ (150,000) | $ (150,000) | | | | | | | | | | | | | | | | | | | |
| | **2017 Cost** | | | | | | | | | | | | | | | | | | | | | |
| Design/Construct Armory Detention Basin | $ 493,125 | $ 36,961 | $ 36,961 | $ 36,961 | $ 36,961 | $ 36,961 | $ 36,961 | $ 36,961 | $ 36,961 | $ 36,961 | $ 36,961 | $ 36,961 | $ 36,961 | $ 36,961 | $ 36,961 | $ 36,961 | $ 36,961 | $ 36,961 | $ 36,961 | $ 36,961 | $ 36,961 | |
| Design/Construct South Street Detention Basin | $ 271,750 | | $ 20,979 | $20,979 | $20,979 | $20,979 | $20,979 | $20,979 | $20,979 | $20,979 | $20,979 | $20,979 | $20,979 | $20,979 | $20,979 | $20,979 | $20,979 | $20,979 | $20,979 | $20,979 | $20,979 | $20,979 |
| Agricultural Water Quality Trading for TP (386.9 lbs at $110/lb TP; 1/20 per year starting in 2021 with full implementation in 2040) | $ 110.00 | $ - | $ - | $ - | $ 2,395 | $ 4,934 | $ 7,623 | $ 10,468 | $ 13,478 | $ 16,659 | $ 20,019 | $ 23,565 | $ 27,306 | $ 31,250 | $ 35,406 | $ 39,783 | $ 44,392 | $ 49,240 | $ 54,340 | $ 59,702 | $ 65,336 | $ 71,255 |
| **Total Expenses** | | **$ 441,000** | **$ 558,900** | **$ 663,000** | **$ 690,500** | **$ 735,900** | **$ 727,400** | **$ 765,700** | **$ 859,600** | **$ 811,300** | **$ 843,500** | **$ 903,800** | **$ 908,900** | **$1,030,900** | **$ 960,700** | **$ 989,600** | **$1,030,300** | **$ 1,139,600** | **$ 1,238,100** | **$ 1,137,600** | **$1,171,700** | **$ 1,169,900** |

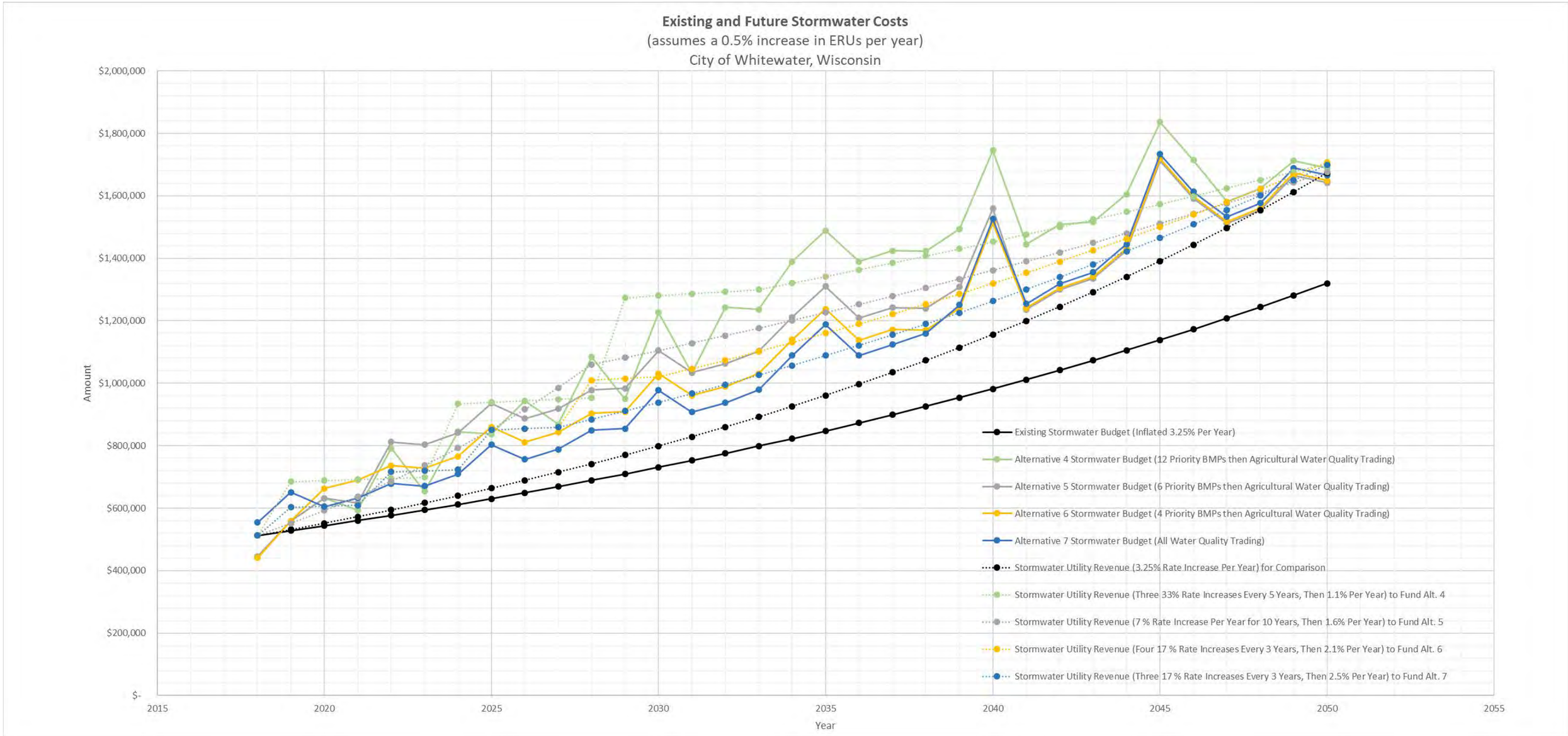
## Table 6.04-4 Alternative 7–Potential Future Stormwater Management Costs

| Expenses | | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 | 2036 | 2037 | 2038 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Assumed Expenses Funded by Stormwater Utility in 2018 (then 3% Inflation) | | $ 512,572 | $ 527,949 | $ 543,787 | $ 560,101 | $ 576,904 | $ 594,211 | $ 612,037 | $ 630,398 | $ 649,310 | $ 668,790 | $ 688,853 | $ 709,519 | $ 730,805 | $ 752,729 | $ 775,311 | $ 798,570 | $ 822,527 | $ 847,203 | $ 872,619 | $ 898,797 | $ 925,761 |
| **Additional Expenses** | | | | | | | | | | | | | | | | | | | | | | |
| Initiate Program to Gather All Maintenance Agreements for All Privately-Owned Storwmater BMPs | | $ 15,000 | | | | | | | | | | | | | | | | | | | | |
| Develop Private BMP Maintenance Program | | $ 20,000 | | | | | | | | | | | | | | | | | | | | |
| Initiate Private BMP Maintenance Program | | | $ 45,000 | $ 46,350 | $ 47,741 | $ 49,173 | $ 50,648 | $ 52,167 | $ 53,732 | $ 55,344 | $ 57,005 | $ 58,715 | $ 60,476 | $ 62,291 | $ 64,159 | $ 66,084 | $ 68,067 | $ 70,109 | $ 72,212 | $ 74,378 | $ 76,609 | $ 78,908 |
| Assessment of 12 City-Owned Wet Ponds for Dredging Need | | | $ 12,000 | | | | | $ 16,059 | | | | | $ 21,490 | | | | | $ 28,759 | | | | | |
| Design of City Owned Wet Pond Dredging | **2017 Cost** | | | $ 65,000 | | | | | $ 86,985 | | | | | $ 116,405 | | | | | $ 155,776 | | | | |
| City-Owned Wet Pond Periodic Dredging (Project #1-2021) | $ 150,000 | | | | $ 12,285 | $ 12,285 | $ 12,285 | $ 12,285 | $ 12,285 | $ 12,285 | $ 12,285 | $ 12,285 | $ 12,285 | $ 12,285 | $ 12,285 | $ 12,285 | $ 12,285 | $ 12,285 | $ 12,285 | $ 12,285 | $ 12,285 | $ 12,285 |
| City-Owned Wet Pond Periodic Dredging (Project #2-2026) | $ 157,652 | | | | | | | | | $ 14,969 | $ 14,969 | $ 14,969 | $ 14,969 | $ 14,969 | $ 14,969 | $ 14,969 | $ 14,969 | $ 14,969 | $ 14,969 | $ 14,969 | $ 14,969 | $ 14,969 |
| City-Owned Wet Pond Periodic Dredging (Project #3-2031) | $ 165,693 | | | | | | | | | | | | | | $ 18,238 | $ 18,238 | $ 18,238 | $ 18,238 | $ 18,238 | $ 18,238 | $ 18,238 | $ 18,238 |
| City-Owned Wet Pond Periodic Dredging (Project #4-2036) | $ 174,145 | | | | | | | | | | | | | | | | | | | $ 22,221 | $ 22,221 | $ 22,221 |
| City-Owned Wet Pond Periodic Dredging (Project #5-2041) | $ 183,029 | | | | | | | | | | | | | | | | | | | | | |
| City-Owned Wet Pond Periodic Dredging (Project #6-2046) | $ 192,365 | | | | | | | | | | | | | | | | | | | | | |
| Create map of existing sumps and depths in City | | | $ 10,000 | | | | | | | | | | | | | | | | | | | |
| City SWPPP-Install Perimeter Sediment Control Devices at Public Works Garage | | $ 1,000 | | | | | | | | | | | | | | | | | | | | |
| Apply for WDNR UNPS Grant for Hydrodynamic Separator at Public Works Garage | **2017 Cost** | $ 4,500 | | | | | | | | | | | | | | | | | | | | |
| Design (2019) and Construct (2020) HDS at Public Works Garage | $ 44,875 | | $ 15,000 | $ 3,568 | $3,568 | $3,568 | $3,568 | $3,568 | $3,568 | $3,568 | $3,568 | $3,568 | $3,568 | $3,568 | $3,568 | $3,568 | $3,568 | $3,568 | $3,568 | $3,568 | $3,568 | $3,568 |
| UNPS Grant for HDS | | | | $ (54,637) | | | | | | | | | | | | | | | | | | |
| Review spill prevention and response procedures at Public Works Garage for improvements in 2018 and implement in 2019 | | $ 500 | | | | | | | | | | | | | | | | | | | | |
| Review Public Works Department staff training for stormwater pollution prevention at the Public Works Garage for improvements in 2018 and implement in 2019 | | $ 500 | $ 1,000 | $ 1,030 | $ 1,061 | $ 1,093 | $ 1,126 | $ 1,159 | $ 1,194 | $ 1,230 | $ 1,267 | $ 1,305 | $ 1,344 | $ 1,384 | $ 1,426 | $ 1,469 | $ 1,513 | $ 1,558 | $ 1,605 | $ 1,653 | $ 1,702 | $ 1,754 |
| Joint City MS4, City WWTP, and UWW Water Quality Trading and Watershed Adaptive Management TMDL Compliance Study | | | $ 40,000 | | | | | | | | | | | | | | | | | | | |
| WDNR UNPS Grant Application for WinSLAMM Modeling Update | | | | | $ 5,369 | | | | | | $ 7,616 | | | | | | $ 10,803 | | | | | |
| WDNR UNPS Grant for WinSLAMM Modeling Update | | | | | | $ (30,000) | | | | | | $ (42,556) | | | | | | $ (60,366) | | | | |
| WinSLAMM Modeling Update | | | | | | $ 60,000 | | | | | | $ 85,111 | | | | | | $ 120,732 | | | | |
| WDNR UNPS Grant Application for Stormwater BMPs | | $ - | | $ - | | $ - | | $ - | | $ - | | $ - | | $ - | | $ - | | $ - | | $ - | | $ - |
| WDNR UNPS Grant for Stormater BMP | | $ - | $ - | | | | | | | | | | | | | | | | | | | |
| | **2017 Cost** | | | | | | | | | | | | | | | | | | | | | |
| Agricultural Water Quality Trading for TP (444.6 lbs at $110/lb TP; 1/20 per year starting in 2021 with full implementation in 2040) | $ 110.00 | $ - | $ - | $ - | $ 2,752 | $ 5,670 | $ 8,759 | $ 12,030 | $ 15,488 | $ 19,143 | $ 23,004 | $ 27,079 | $ 31,378 | $ 35,910 | $ 40,686 | $ 45,716 | $ 51,012 | $ 56,584 | $ 62,444 | $ 68,606 | $ 75,080 | $ 81,882 |
| **Total Expenses** | | **$ 554,100** | **$ 650,900** | **$ 605,100** | **$ 632,900** | **$ 678,700** | **$ 670,600** | **$ 709,300** | **$ 803,700** | **$ 755,900** | **$ 788,500** | **$ 849,300** | **$ 855,000** | **$ 977,600** | **$ 908,100** | **$ 937,600** | **$ 979,000** | **$ 1,089,000** | **$ 1,188,300** | **$ 1,088,500** | **$ 1,123,500** | **$ 1,159,600** |

## Table 6.05-1 Potential Future SWU Rates

| | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 | 2036 | 2037 | 2038 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # Base ERUs | 7814.4 | 7853.5 | 7892.7 | 7932.2 | 7971.9 | 8011.7 | 8051.8 | 8092.0 | 8132.5 | 8173.2 | 8214.0 | 8255.1 | 8296.4 | 8337.9 | 8379.5 | 8421.4 | 8463.6 | 8505.9 | 8548.4 | 8591.1 | 8634.1 |
| # ERUS for O&M and C&D | 6623.7 | 6656.8 | 6690.1 | 6723.6 | 6757.2 | 6791.0 | 6824.9 | 6859.0 | 6893.3 | 6927.8 | 6962.4 | 6997.2 | 7032.2 | 7067.4 | 7102.7 | 7138.2 | 7173.9 | 7209.8 | 7245.9 | 7282.1 | 7318.5 |
| | | | | | | | | | | | | | | | | | | | | | |
| *Future ERU Rate Per Year (3.25% Increase Per Year) for Comparison* | $ 74.04 | $ 76.45 | $ 78.93 | $ 81.50 | $ 84.14 | $ 86.88 | $ 89.70 | $ 92.62 | $ 95.63 | $ 98.74 | $ 101.95 | $ 105.26 | $ 108.68 | $ 112.21 | $ 115.86 | $ 119.62 | $ 123.51 | $ 127.53 | $ 131.67 | $ 135.95 | $ 140.37 |
| *Future Revenue (3.25% Increase Per Year) for Comparison* | $ 512,572 | $ 531,870 | $ 551,902 | $ 572,688 | $ 594,257 | $ 616,638 | $ 639,862 | $ 663,961 | $ 688,967 | $ 714,915 | $ 741,841 | $ 769,781 | $ 798,772 | $ 828,856 | $ 860,073 | $ 892,465 | $ 926,078 | $ 960,956 | $ 997,148 | $ 1,034,703 | $ 1,073,673 |
| *Future ERU Rate Per Year (Three 33% Increases Every 5 Years, Then 1.1% Per Year) to fund Alt.* | $ 74.04 | $ 98.47 | $ 98.47 | $ 98.47 | $ 98.47 | $ 98.47 | $ 130.97 | $ 130.97 | $ 130.97 | $ 130.97 | $ 130.97 | $ 174.19 | $ 174.19 | $ 174.19 | $ 174.19 | $ 174.19 | $ 176.11 | $ 178.04 | $ 180.00 | $ 181.98 | $ 183.98 |
| *Future Revenue (Three 33% Increases Every 5 Years, Then 1.1% Per Year) to fund Alt. 4* | $ 512,572 | $ 685,121 | $ 688,547 | $ 691,989 | $ 695,449 | $ 698,927 | $ 934,220 | $ 938,891 | $ 943,586 | $ 948,304 | $ 953,045 | $ 1,273,888 | $ 1,280,257 | $ 1,286,659 | $ 1,293,092 | $ 1,299,557 | $ 1,320,422 | $1,341,621 | $ 1,363,161 | $ 1,385,046 | $ 1,407,283 |
| *Future ERU Rate Per Year (7% Increase Per Year for 10 Years, Then 1.6% Per Year) to fund Alt. 5* | $ 74.04 | $ 79.22 | $ 84.77 | $ 90.70 | $ 97.05 | $ 103.84 | $ 111.11 | $ 118.89 | $ 127.21 | $ 136.12 | $ 145.65 | $ 147.98 | $ 150.35 | $ 152.75 | $ 155.20 | $ 157.68 | $ 160.20 | $ 162.76 | $ 165.37 | $ 168.01 | $ 170.70 |
| *Future Revenue (7% Increase Per Year for 10 Years, Then 1.6% Per Year) to fund Alt. 5* | $ 512,572 | $ 551,188 | $ 592,720 | $ 637,381 | $ 685,408 | $ 737,053 | $ 792,590 | $ 852,312 | $ 916,533 | $ 985,594 | $ 1,059,859 | $ 1,082,201 | $ 1,105,013 | $ 1,128,307 | $ 1,152,092 | $ 1,176,378 | $ 1,201,176 | $1,226,497 | $ 1,252,351 | $ 1,278,751 | $ 1,305,707 |
| *Future ERU Rate Per Year (Four 17% Increases Every 3 Years, Then 2.1% Per Year) to fund Alt. 6* | $ 74.04 | $ 86.63 | $ 86.63 | $ 86.63 | $ 101.35 | $ 101.35 | $ 101.35 | $ 118.58 | $ 118.58 | $ 118.58 | $ 138.74 | $ 138.74 | $ 138.74 | $ 141.66 | $ 144.63 | $ 147.67 | $ 150.77 | $ 153.94 | $ 157.17 | $ 160.47 | $ 163.84 |
| *Future Revenue (Four 17% Increases Every 3 Years, Then 2.1% Per Year) to fund Alt. 6* | $ 512,572 | $ 602,700 | $ 605,714 | $ 608,743 | $ 715,790 | $ 719,369 | $ 722,966 | $ 850,099 | $ 854,350 | $ 858,621 | $ 1,009,610 | $ 1,014,658 | $ 1,019,731 | $ 1,046,351 | $ 1,073,666 | $ 1,101,695 | $ 1,130,454 | $1,159,965 | $ 1,190,246 | $ 1,221,317 | $ 1,253,200 |
| *Future ERU Rate Per Year (Three 17% Increases Every 3 Years, Then 2.5% Per Year) to fund Alt.* | $ 74.04 | $ 86.63 | $ 86.63 | $ 86.63 | $ 101.35 | $ 101.35 | $ 101.35 | $ 118.58 | $ 118.58 | $ 118.58 | $ 121.55 | $ 124.59 | $ 127.70 | $ 130.89 | $ 134.17 | $ 137.52 | $ 140.96 | $ 144.48 | $ 148.09 | $ 151.80 | $ 155.59 |
| *Future Revenue (Three 17% Increases Every 3 Years, Then 2.5% Per Year) to fund Alt. 7* | $ 512,572 | $ 602,700 | $ 605,714 | $ 608,743 | $ 715,790 | $ 719,369 | $ 722,966 | $ 850,099 | $ 854,350 | $ 858,621 | $ 884,487 | $ 911,133 | $ 938,580 | $ 966,855 | $ 995,982 | $ 1,025,986 | $ 1,056,894 | $1,088,732 | $ 1,121,530 | $ 1,155,317 | $ 1,190,121 |

**Figure 6.05-1 Potential Future SWU Rates Analysis**



# SECTION 7
# CONCLUSIONS AND RECOMMENDATIONS

## 7.01 GENERAL

This section presents specific recommendations for achieving the goals of the Stormwater Quality Management Plan. These recommendations are based on the evaluations and information presented in Sections 3, 4, 5, and 6 and on analyses performed as part of this Plan.

## 7.02 RECOMMENDATIONS FOR ACHIEVING STORMWATER MANAGEMENT GOALS

Implementation of the following recommendations will aid the City and UWW in achieving the Plan goals and objectives contained in this Plan.

1. Implement the recommended Public Education/Outreach and Involvement/Participation Program identified in Section 3. Meet the measurable goals for the program.

2. Perform illicit discharge inspections at outfalls identified in Table 3.02-4 (City) and Table 3.02-5 (UWW) once each year or once every five years as defined in the tables. Locate and eliminate any illicit discharges discovered according to the procedure described in Section 4 of the City's 2008 Stormwater Management Plan and Section 3.02.C. (UWW) and on the form provided in Appendix F. Meet the measurable goals for the program.

3. Continue to administer and enforce the existing construction site erosion control (erosion control) ordinance under existing procedures. Adopt the Erosion Control and Stormwater Management Requirements document revisions included in Table 3.02-6 for the City. Meet the measurable goals for the program.

4. Continue to administer and enforce the existing postconstruction site stormwater management ordinance for all new development. Adopt the Erosion Control and Stormwater Management Requirements document revisions included in Table 3.02-8 for the City. For the City, initiate a program to gather all maintenance agreements for all privately-owned stormwater BMPs, develop and initiate a private stormwater BMP maintenance program, and provide periodic assessment and dredging of the 12 City-owned wet detention basins. Meet the measurable goals for the program.

5. Implement modifications to the City's and UWW's municipal operations as described in Table 3.02-10 (City) and Table 3.02-9 (UWW) including stormwater pollution prevention plan (SWPP) recommendations in Appendices D (City) and I (UWW).

6. Proceed with recommendations in Section 5.12 and 5.13 to achieve TMDL compliance related to TSS and TP reduction.

7. Update the City and UWW storm sewer system maps on an annual basis.

8. Submit an annual report to the WDNR documenting and tracking permit-related activities by March 31, annually.

9. Maintain stormwater BMPs according to the Maintenance and Inspection of Stormwater Management Facilities document provided in Appendix G.

10. Leverage funds from the SWU and WDNR grants for design and construction of the improvements necessary.

## 7.03 IMPLEMENTATION PLAN

### A. City Near-Term Considerations

To the extent funding is available (local and WDNR grant dollars) for the City's selected Alternative (see Tables 5.06-1, 6.04-1, and 6.04-2) for TMDL compliance, the City will begin to implement the most cost-effective and environmentally beneficial (BMPs upstream of the lakes, as applicable) stormwater BMPs in the City. These BMPs will be pursued on an every other year basis corresponding to the WDNR's every other year cycle for the WDNR Urban Nonpoint Source and Stormwater Construction grant program, as applicable. The next grant application deadline is April 15, 2018, with funding available if successful, starting January 1, 2019. Because the UWW is only eligible for the WDNR Urban Nonpoint Source and Stormwater Construction Grant Program funding if applying jointly with the City, projects that jointly impact the UWW and City (i.e., Starin Park Underground Wet Detention Basin and vacuum street sweeping) are also considered priorities. Alternatives 4, 5, and 6 consider pursuing agricultural WQT for remaining TP and TSS reductions. It should be noted that alternatives with agricultural water quality trading would require annual payments in perpetuity.

Assuming the City WWTF chooses the MDV compliance option in which the WWTF may have TP credits to trade to the City MS4 by April 1, 2026, or possibly later if the MDV is extended, the City MS4's remaining TP reduction might also be achieved through WQT between the WWTF and City MS4 at that time.

### B. UWW Near-Term Considerations

To the extent funding is available (state and WDNR grant dollars) to implement one of the alternatives for TMDL compliance (see Table 5.06-2), the UWW will begin to implement the most cost-effective and palatable (those fitting into other planned reconstruction projects such as Parking Lot 18 and 19 porous pavement or not impacting existing facilities or uses) stormwater BMPs on campus. These BMPs will be pursued seeking to achieve a 40 percent TSS reduction which will allow the UWW to then participate in WQT. Because the UWW is only eligible for WDNR Urban Nonpoint Source and Stormwater Construction Grant Program funding if applying jointly with the City, projects that jointly impact the UWW and City (i.e., Starin Park Underground Wet Detention Basin and vacuum street sweeping) are also considered priorities. Implementation of BMPs will be pursued on an every other year basis corresponding to the WDNR's every other year cycle for the WDNR Urban Nonpoint Source and Stormwater Construction Grant Program, as applicable. The next grant application deadline is April 15, 2018, with funding available if successful, starting January 1, 2019. Alternative 5 considers pursuing agricultural WQT for remaining TP reductions. It should be noted that alternatives with agricultural water quality trading would require annual payments in perpetuity.

Assuming the City WWTF chooses the MDV compliance option in which the WWTF may have TP credits to trade to the UWW MS4 by April 1, 2026, or possibly later if the MDV is extended, the UWW MS4's remaining TP reduction might also be achieved through WQT between the WWTF and UWW MS4 at that time.

C. Future Considerations

As described in Sections 5.12 and 5.13, both the City and UWW should track the WDNR's development of a pollutant reduction credit for improved leaf collection. Upon release of the WDNR's credit, the City and UWW should reanalyze existing conditions TSS and TP reduction performance and the most cost-effective method to achieve TMDL compliance.

As described in Sections 5.12 and 5.13, the City MS4, UWW MS4, and City WWTF should conduct a joint study to determine the most cost-effective collective compliance option considering the WWTF upgrades (and subsequent WQT of excess TP), MS4 BMPs, WQT with agriculture, and WAM. The results of this study may alter the City and UWW implementation plans in the future.

It is acknowledged that WDNR has not set forth a specific timeline for compliance with the Rock River Basin TMDL requirements, though compliance timelines on the order of 20 to 30 years have been mentioned. Rather, it is understood that WDNR will require the City and UWW to show continual progress by meeting benchmarks of performance within each 5-year permit term. Per the City and UWW MS4 permits, both are currently required to achieve the 20 percent TSS reduction requirement.

## 7.04 PROGRAM FUNDING OPTIONS

Possible funding sources for implementation of activities required for compliance with the stormwater permit are described herein.

A. Grants

Some of the more popular WDNR grant programs include the Urban Nonpoint Source and Stormwater Grant, Coastal Management Grant, Local Water Quality Management Planning Aids, Lake Planning Grant, Lake Protection and Classification Grant, River Protection Grant, and Municipal Flood Control Grant. The WDNR UNPS Grant is the most appropriate for implementing stormwater quality BMPs recommended in this plan. Up to 50 percent of the design and construction of a stormwater quality BMP could be covered by the grant program should the City and UWW be successful in obtaining a grant. Land acquisition is also funded through this grant program. The remaining percentage would be covered by City and UWW funds. Scoring criteria dictates that if the City and UWW were to pay a higher percentage, then the score of the grant application would increase, potentially increasing the odds of grant award.

The Clean Water Fund administered through the WDNR is also a funding option with current funding providing a 30 percent principal forgiveness loan and 70 percent of a low interest loan. The principal forgiveness loan is received through a competitive process. An Intent to Apply (ITA) and Priority Evaluation Review Form (PERF) form would need to be submitted to the WDNR.

B. Fees

Fees are another common means of funding stormwater management improvements. Fees are charges for services rendered. Many municipalities, including the City, recover costs of constructing, designing, reviewing, and/or inspecting new developments through fees assessed to developers. Impact fees and special assessments transfer the cost of infrastructure improvements needed for private development directly to developers or property owners. User fees recover costs over the life of a project. An increasingly common type of user fee related to stormwater management is a SWU. Formation of SWUs enables municipalities to recover costs of stormwater management improvements based on the amount of stormwater "generated" by a land use. As part of this plan, a SWU rate review and update was created as Section 6.

E. Bonds

Large capital improvement projects such as major storm sewers or detention facilities may be funded through bonds or grants. Bonds are a mechanism to borrow capital for a project and distribute repayment over the life span of the project. A popular local bonding program is the Clean Water Fund Program (CWFP). This is one of the subsidized loan programs included in the WDNR Environmental Improvement Fund (EIF). The CWFP provides loans to municipalities for wastewater treatment and urban stormwater projects. This program has historically been used extensively for wastewater treatment plant construction. Recent program modifications allow funds to be used for stormwater management improvements.

Most CWFP projects receive a subsidized interest rate of 55 percent, 65 percent, or 70 percent of the EIF market interest rate. CWFP wastewater projects that meet certain criteria may be eligible to receive Hardship Financial Assistance, which may be in the form of a lower interest rate loan or include a grant.

F. WQT

As part of this plan, WQT was analyzed as a potential funding source for the City and UWW. The City and UWW may want to entertain funding a portion of this plan through WQT. The City and UWW may want to investigate further the trading opportunities available for them.

G. SWUs

As part of this plan, a SWU rate review and update was prepared for the City to review and potentially adopt and implement. It is likely that the SWU would fund much of the implementation plan. The City may want to evaluate and assess the annual increase in cost per ERU needed to implement the necessary programs, goals, and objectives in order to achieve the mandated requirements.

## 7.05 POLICIES AND PRACTICES

A. General

As in any typical community, localized drainage issues commonly arise that may affect a limited number of areas. These issues may be caused by a deficiency in a drainage facility, a maintenance issue, or alterations of property during maintenance or construction projects.

It is recommended that the City and UWW develop a uniform policy for addressing localized drainage issues and maintain a record of where these issues have occurred. This policy should establish the procedure to be followed in resolving future drainage issues in the City and UWW. This will ensure that future issues are addressed in an equitable and timely manner and locations of recurring problem areas can be identified for future planning purposes.

B. Recommended Policy

This Section includes a recommended policy for addressing drainage issues which should be reviewed by the City and UWW and, if appropriate, adopted as a formal policy.

1. Problem Identification and Drainage Evaluation

   a. After receiving a verbal or written complaint from a resident, the resident should be provided a Drainage Evaluation Form (City–Appendix E, UWW–Appendix J). The resident should complete Parts A, B, and C of the form and return it to the City or UWW.

   b. Within 30 calendar days of receiving the form with completed Parts A, B, and C, a City or UWW representative will inspect the location and review the information submitted by the resident. The City or UWW representative will complete Part D of the form based upon this review.

   c. The City or UWW representative will make a recommendation in Part E of the form regarding action to be taken (if any) to alleviate or mitigate the problem. Decision-making criteria will be clearly stated.

   d. A copy of the completed Drainage Evaluation Form will be returned to the resident. Additional copies will be maintained in the City or UWW files and the form and complaint location will be incorporated into the City's or UWW's GIS database for future analysis of drainage problem area trends.

2. City and UWW Authority

The City and UWW authority in addressing individual drainage issues should be determined on a case-by-case basis. Prior to the City or UWW taking corrective action, the ownership of the properties causing the problem and being damaged should be verified. Where the City or UWW has easement rights and the issue involves the obstruction of a natural watercourse (under

Section 88.90 of the Wisconsin Administrative Code), the City or UWW can move to correct the problem. If the drainage issue results from an activity that is not located on a City or UWW property or right-of-way, does not violate a City Ordinance, or does not involve obstruction of a natural watercourse, the City may be without jurisdiction to act.

3. Determination of City or UWW Responsibility

In cases where it is determined the City or UWW can take corrective action to address the drainage deficiency, the following steps should be taken:

a. Alternative solutions to the identified problem should be developed and incorporated into the City's or UWW's Stormwater Management Plan(s).

b. Opinions of probable engineering and construction costs of individual projects should be prepared.

c. As part of the annual budget process, projects to be constructed each year should be selected based upon priority ranking and funding availability.

## 7.06 CONCLUSION

The purpose of this report has been to provide the City and UWW with a WPDES Permit-compliant stormwater quality management program. The City and UWW must implement the recommendations included herein to remain in compliance with its stormwater permit.

Funding of the stormwater program is at the discretion of the City and UWW. At this time, it appears that the most economical way to implement a stormwater program is to leverage SWU funds (City) in addition to applying for WDNR UNPS&SW grants for the recommended alternative stormwater BMP(s) components required to close the TSS and TP reductions gaps and maintain permit compliance. WQT also appears to be a feasible method of compliance.

# APPENDIX A
# GENERAL STORMWATER PERMIT WPDES PERMIT NO. WI-S050075-2

WISCONSIN
DEPT. OF NATURAL RESOURCES

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

## GENERAL PERMIT TO DISCHARGE UNDER THE WISCONSIN POLLUTANT DISCHARGE ELIMINATION SYSTEM WPDES PERMIT NO. WI-S050075-2

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

**MUNICIPAL SEPARATE STORM SEWER SYSTEM**

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

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

State of Wisconsin Department of Natural Resources
For the Secretary

By Pam Biersach
Pamela A. Biersach, Director
Bureau of Watershed Management
Division of Water

April 29, 2014
Date Permit Signed/Issued

**PERMIT EFFECTIVE DATE:** May 1, 2014 **EXPIRATION DATE:** April 30, 2019

## TABLE OF CONTENTS


| SECTION | | | PAGE |
|---|---|---|---|
| 1. | APPLICABILITY CRITERIA | | 3 |
| | 1.1 | Permitted area | 3 |
| | 1.2 | Authorized Discharges | 3 |
| | 1.3 | Water Quality Standards | 3 |
| | 1.4 | Outstanding and Exceptional Resource Waters | 3 |
| | 1.5 | Impaired Waterbodies and Total Maximum Daily Load Requirements | 4 |
| | 1.6 | Wetlands | 7 |
| | 1.7 | Endangered and Threatened Resources | 7 |
| | 1.8 | Historic Property | 7 |
| | 1.9 | General Storm Water Discharge Limitations | 7 |
| | 1.10 | Obtaining Permit Coverage | 8 |
| | 1.11 | Transfers | 8 |
| | 1.12 | Exclusions | 8 |
| 2. | PERMIT CONDITIONS | | 9 |
| | 2.1 | Public Education and Outreach | 9 |
| | 2.2 | Public Involvement and Participation | 10 |
| | 2.3 | Illicit Discharge Detection and Elimination | 10 |
| | 2.4 | Construction Site Pollutant Control | 12 |
| | 2.5 | Post-Construction Storm Water Management | 13 |
| | 2.6 | Pollution Prevention | 14 |
| | 2.7 | Storm Water Quality Management | 17 |
| | 2.8 | Storm Sewer System Map | 18 |
| | 2.9 | Annual Report | 18 |
| | 2.10 | Cooperation | 19 |
| | 2.11 | Compliance Schedule for New and Updated Permit Requirements | 19 |
| | 2.12 | Amendments | 21 |
| | 2.13 | Reapplication for Permit Coverage | 21 |
| 3. STANDARD CONDITIONS | | | 21 |
| 4. DEFINITIONS USED IN THIS PERMIT | | | 24 |

## 1. APPLICABILITY CRITERIA

### 1.1 Permitted Area

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

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

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

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

### 1.2 Authorized Discharges

This permit authorizes storm water point source discharges from the MS4 to waters of the state in the permitted area. This permit also authorizes the discharge of storm water co-mingled with flows contributed by process wastewater, non-process wastewater, and storm water associated with industrial activity, provided the discharges are regulated by other WPDES permits or are discharges which are not considered illicit discharges pursuant to Section 2.3.1.2 of this permit.

### 1.3 Water Quality Standards

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

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

### 1.4 Outstanding and Exceptional Resource Waters

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

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

**1.4.2** The permittee may not establish a new MS4 discharge of pollutants to an ORW or an ERW unless the storm water management programs required under this permit are designed to ensure

that any new MS4 discharge of pollutants to an ORW or ERW will not exceed background levels within the ORW or ERW.

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

**1.4.2.2** "Original start date of coverage under an MS4 permit" means the permittee's Start Date of coverage under the first MS4 permit under which it received coverage.

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

**1.4.4** If the permittee has an existing MS4 discharge to an ORW, it may increase the discharge of pollutants provided all of the following are met:

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

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

## 1.5 Impaired Waterbodies and Total Maximum Daily Load Requirements

**1.5.1** Within 90 days after the start date of permit coverage under this permit and by March 31 of each odd-numbered year thereafter, the permittee shall determine whether any part of its MS4 discharges to an impaired waterbody listed in accordance with section 303(d)(1) of the federal Clean Water Act, 33 USC §1313(d)(1)(C), and the implementing regulation of the US Environmental Protection Agency, 40 CFR §130.7(c)(1).

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

**1.5.2** If the permittee's MS4 discharges to an impaired waterbody, the permittee shall include a written section in its storm water management program that discusses the management practices and control measures it will implement as part of its program to reduce, with the goal of eliminating, the discharge of pollutant(s) of concern that contribute to the impairment of the waterbody. This section of the permittee's program shall specifically identify control measures and practices that will collectively be used to try to eliminate the MS4's discharge of pollutant(s) of concern that contribute to the impairment of the waterbody and explain why these control measures and practices were chosen as opposed to other alternatives.

**1.5.3** After the effective date of this permit, the permittee may not establish a new MS4 discharge of a pollutant of concern to an impaired waterbody or increase the discharge of a pollutant of concern to an impaired waterbody unless the new or increased discharge causes the receiving water to meet applicable water quality standards, or the Department and the USEPA have approved a total maximum daily load (TMDL) for the impaired waterbody. If there is an

approved TMDL for the receiving water, the permittee shall comply with Section 1.5.4 below. "New MS4 discharge of a pollutant" has the meaning specified under section 1.4.2.1 of this permit.

**1.5.4** For the purposes of implementing an approved TMDL, a permittee shall comply with sections 1.5.4.3, 1.5.4.4, and 1.5.4.5 in accordance with the applicable compliance schedule of either section 1.5.4.1 or 1.5.4.2. An MS4 covered under this permit, which is not specifically identified as having a wasteload allocation in a TMDL approved by the Department and the USEPA, shall comply with this section by using the same percent reduction for a pollutant of concern as the city or village in which it is physically located.

**Note:** Some approved TMDLs do not assign a wasteload allocation to certain permitted MS4s such as a county, WisDOT transportation facilities, or University of Wisconsin campus. These MS4s and their wasteload allocations were not separated out from the city or village in which they are physically located.

**1.5.4.1** If prior to the effective date of this permit the Department and the USEPA have approved a TMDL to which the permittee's MS4 discharges a pollutant of concern and the TMDL assigns MS4 wasteload allocations, the permittee shall submit the information requested in accordance with the following compliance schedule:

**1.5.4.1.1** For section 1.5.4.3, with the annual report due March 31, 2016.

**1.5.4.1.2** For section 1.5.4.4, with the annual report due March 31, 2018.

**1.5.4.1.3** For section 1.5.4.5, with the annual report due March 31, 2018.

**1.5.4.2** If after the effective date of this permit the Department and the USEPA have approved a TMDL to which the permittee's MS4 discharges a pollutant of concern and the TMDL assigns MS4 wasteload allocations, the permittee shall submit the information requested in accordance with the following compliance schedule:

**1.5.4.2.1** For section 1.5.4.3, within 24 months of the approval date of the TMDL.

**1.5.4.2.2** For section 1.5.4.4, within 48 months of the approval date of the TMDL.

**1.5.4.2.3** For section 1.5.4.5, within 48 months of the approval date of the TMDL.

**Note:** Approved TMDLs are listed on the Department's Internet site at: http://dnr.wi.gov/topic/impairedwaters/.

**1.5.4.3** In accordance with the applicable compliance schedule specified in section 1.5.4.1 or 1.5.4.2, the permittee shall submit all of the following:

**1.5.4.3.1** An updated storm sewer system map that identifies:

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

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

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

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

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

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

**Note:** The information requested in section 1.5.4.3 will be used by the Department to facilitate implementation of the TMDL.

**1.5.4.4** In accordance with the applicable compliance schedule specified in section 1.5.4.1 or 1.5.4.2, the permittee shall submit a tabular summary that includes the following for each MS4 drainage boundary associated with each TMDL reachshed as identified under section 1.5.4.3.1.3 and for each pollutant of concern:

**1.5.4.4.1** The permittee's percent reduction needed to comply with its TMDL wasteload allocation from the no-controls modeling condition. The no-controls modeling condition means taking no (zero) credit for storm water control measures that reduce the discharge of pollutants.

**1.5.4.4.2** The modeled MS4 annual average pollutant load without any storm water control measures.

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

**1.5.4.4.3** The modeled MS4 annual average pollutant load with existing storm water control measures.

**1.5.4.4.4** The percent reduction in pollutant load achieved calculated from the no-controls condition determined under section 1.5.4.4.2 and the existing controls condition determined under section 1.5.4.4.3.

**1.5.4.4.5** The existing storm water control measures including the type of measure, area treated in acres, the pollutant load reduction efficiency, and

confirmation of the permittee's authority for long-term maintenance of each practice.

**1.5.4.5** If the tabular summary required under section 1.5.4.4 shows that the permittee is not achieving the applicable percent reductions needed to comply with its TMDL wasteload allocation for each TMDL reachshed, then in accordance with the applicable compliance schedule specified in section 1.5.4.1 or 1.5.4.2, the permittee shall submit a written plan to the Department that describes how the permittee will make progress toward achieving compliance. The plan shall include the following information:

**1.5.4.5.1** Recommendations and options for storm water control measures that will be considered to reduce the discharge of each pollutant of concern.

**1.5.4.5.2** A proposed schedule for implementation of the recommendations and options identified under section 1.5.4.5.1.

**Note:** The proposed schedule may extend beyond the expiration date of this permit.

**1.5.4.5.3** A cost effectiveness analysis for implementation of the recommendations and options identified under section 1.5.4.5.1.

**Note:** The Department has developed the guidance document "TMDL Guidance for MS4 Permits: Planning, Implementation, and Modeling Guidance" and will make it available on the Department's Internet site to assist a permittee with complying with the requirements of sections 1.5.4.3 through 1.5.4.5. For many pollutants of concern, water quality trading may be an option considered by a permittee as part of its plan. For phosphorus reduction, a permittee may consider entering into an adaptive management agreement with a traditional point source discharger as described in s. NR 217.18, Wis. Adm. Code.

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

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

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

**1.9 General Storm Water Discharge Limitations**
The permittee may not discharge the following substances from the MS4 in amounts that have an unreasonable effect on receiving water quality, human health, or aquatic life:

**1.9.1** Solids that may settle to form putrescence or otherwise objectionable sludge deposits.

**1.9.2** Oil, grease, and other floating material that form noticeable accumulations of debris, scum, foam, or sheen.

**1.9.3** Color or odor that is unnatural and to such a degree as to create a nuisance.

**1.9.4** Toxic substances in amounts harmful to aquatic life, wildlife, or humans.

**1.9.5** Nutrients conducive to the excessive growth of aquatic plants and algae to the extent that such growth is detrimental to desirable forms of aquatic life, creates conditions that are unsightly, or is a nuisance.

**1.9.6** Any other substances that may impair, or threaten to impair, beneficial uses of the receiving water.

## 1.10 Obtaining Permit Coverage

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

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

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

## 1.11 Transfers

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

## 1.12 Exclusions

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

### 1.12.1 Combined Sewer and Sanitary Sewer Systems

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

### 1.12.2 Agricultural Facilities and Practices

Discharges from agricultural facilities and agricultural practices. "Agricultural facility" means a structure associated with an agricultural practice. "Agricultural practice" means beekeeping; commercial feedlots; dairying; egg production; floriculture; fish or fur farming; grazing; livestock raising; orchards; poultry raising; raising of grain, grass, mint and seed crops; raising of fruits, nuts and berries; sod farming; placing land in federal programs in return for payments in kind; owning land, at least 35 acres of which is enrolled in the conservation reserve program under 16 USC 3831 to 3836; and vegetable raising.

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

**1.12.4 Indian Country**
Storm water discharges within Indian Country. The federal Clean Water Act requires that owners and operators of storm water discharges within Indian Country in Wisconsin to obtain permit coverage directly from the United States Environmental Protection Agency.

**1.12.5 Non-MS4 Discharge**
Storm water discharges that do not enter an MS4.

## 2. PERMIT CONDITIONS

The permittee shall maintain compliance with the measurable goals for the programs developed under sections 2.1 through 2.6. The following permit conditions apply to the permittee, unless the Department issues a written determination that a condition is not appropriate under the circumstances.

**2.1 Public Education and Outreach**
The permittee shall maintain its public education and outreach program to increase the awareness of storm water pollution impacts on waters of the state and to encourage changes in public behavior to reduce such impacts. The program shall have measurable goals and, at a minimum, include the following elements:

**2.1.1** Promote detection and elimination of illicit discharges and water quality impacts associated with such discharges from municipal separate storm sewer systems.

**2.1.2** Inform and educate the public about the proper management of materials that may cause storm water pollution from sources including automobiles, pet waste, household hazardous waste and household practices.

**2.1.3** Promote beneficial onsite reuse of leaves and grass clippings and proper use of lawn and garden fertilizers and pesticides.

**2.1.4** Promote the management of streambanks and shorelines by riparian landowners to minimize erosion and restore and enhance the ecological value of waterways.

**2.1.5** Promote infiltration of residential storm water runoff from rooftop downspouts, driveways and sidewalks.

**2.1.6** Inform and where appropriate educate those responsible for the design, installation, and maintenance of construction site erosion control practices and storm water management facilities on how to design, install and maintain the practices.

**2.1.7** Identify businesses and activities that may pose a storm water contamination concern, and where appropriate, educate specific audiences on methods of storm water pollution prevention.

**2.1.8** Promote environmentally sensitive land development designs by developers and designers, including green infrastructure and low impact development.

**Note:** Additional information on green infrastructure and low impact development may be found on the USEPA's Internet site at:
http://water.epa.gov/infrastructure/greeninfrastructure/index.cfm
http://water.epa.gov/polwaste/green/index.cfm

**2.2 Public Involvement and Participation**
The permittee shall maintain its program to notify the public of activities required by this permit and to encourage input and participation from the public regarding these activities. This program shall have measurable goals for public involvement and participation and comply with applicable state and local public notice requirements.

**2.3 Illicit Discharge Detection and Elimination**
The permittee shall continue to implement and enforce its program to detect and remove illicit connections and discharges to the MS4. The program shall have measurable goals and include all of the following:

**2.3.1** 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 shall:

**2.3.1.1** Prohibit illicit discharges and the discharge, spilling or dumping of non-storm water substances or materials into waters of the state or the MS4.

**2.3.1.2** Identify non-storm water discharges or flows that are not considered illicit discharges. Categories of non-storm water discharges that are not considered illicit discharges include water line flushing, landscape irrigation, diverted stream flows, uncontaminated groundwater infiltration, uncontaminated pumped groundwater, discharges from potable water sources, foundation drains, air conditioning condensation, irrigation water, lawn watering, individual residential car washing, flows from riparian habitats and wetlands, fire-fighting and discharges authorized under a WPDES permit. However, the occurrence of a discharge listed above may be considered an illicit discharge on a case-by-case basis if the permittee or the Department identifies it as a significant source of a pollutant to waters of the state.

**2.3.1.3** Establish inspection and enforcement authority.

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

**2.3.2** On-going dry weather field screening of outfalls during the term of the permit. Field screening shall be conducted at selected outfalls on an annual basis. Consideration shall be given to hydrological conditions, total drainage area of the site, population density of the site, traffic density, age of the structures or buildings in the area, history of the area and land use types when selecting outfalls for annual field screening. However, field screening shall be conducted at all major outfalls at least once during the term of the permit. At a minimum, field screening shall be documented and include:

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

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

**2.3.2.2.1** Field screening points shall, where possible, be located downstream of any source of suspected illicit activity.

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

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

**2.3.3** Procedures for responding to known or suspected illicit discharges. At a minimum, procedures shall be established for:

**2.3.3.1** As soon as possible, investigating portions of the MS4 that, based on the results of field screening or other information, indicate a reasonable potential for containing illicit discharges or other sources of non-storm water discharges.

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

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

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

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

**2.3.3.6** Providing the Department with advance notice of the time and location of dye testing within an MS4. Department notification prior to dye testing is required due to the

likelihood that dye observed in waterways will be reported to the Department as an illicit discharge or spill.

**2.3.4** The permittee shall take appropriate action to remove illicit discharges from its MS4 system as soon as possible. If it will take more than 30 days to remove an illicit connection, the Department shall be contacted to discuss an appropriate action and/or timeframe for removal.

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

**2.3.5.1** An illicit discharge that originates from the permittee's permitted area that discharges directly to a municipal separate storm sewer or property under the jurisdiction of another municipality.

**2.3.5.2** An illicit discharge that has been tracked upstream to the interconnection point with or outfall from another municipality.

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

**2.4 Construction Site Pollutant Control**

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

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

**2.4.1.1** Applicability and jurisdiction.

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

**2.4.1.2** Requirements for design and implementation of erosion and sediment control practices consistent with the criteria of those approved by the Department.

**Note:** Department approved erosion and sediment control practices may be found on the Department's Internet site at:
http://dnr.wi.gov/topic/stormwater/standards/const_standards.html

**2.4.1.3** Construction site performance standards equivalent to those in ss. NR 151.11(6m) and 151.23(4m), Wis. Adm. Code. If the current ordinance does not contain construction site performance standards equivalent to those in ss. NR 151.11(6m) and 151.23(4m), Wis. Adm. Code, the permittee shall create or amend the ordinance to meet this requirement within 24 months of the date of notification of coverage under this permit.

**Note:** The construction site performance standards in Chapter NR 151, Wis. Adm. Code, were amended January 1, 2011.

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

**2.4.1.5** Inspection and enforcement authority.

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

**2.4.2** Procedures for construction site inspection and enforcement of erosion and sediment control measures. At a minimum, the procedures shall establish:

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

**2.4.2.2** Construction site inspection frequency.

**2.4.2.3** Construction site inspection documentation.

**2.4.2.4** Enforcement mechanisms that will be used to obtain compliance.

**2.4.3** Procedures for receipt and consideration of information submitted by the public.

**2.4.4** Procedures for construction site plan review which incorporate consideration of potential water quality impacts.

**2.4.5** Procedures for the administration of the construction site pollutant control program including the process for obtaining local approval, managing and responding to complaints, and tracking regulated construction sites.

**Note:** A town may demonstrate to the Department that an adequate county ordinance that meets the requirements of this permit is administered and enforced within its town and then the town could be excused from having to adopt its own ordinance.

**2.5 Post-Construction Storm Water Management**

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

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

**2.5.1.1** Applicability and jurisdiction that shall apply to construction sites with one acre or more of land disturbance, and sites of less than one acre if they are part of a larger common plan of development or sale under the jurisdiction of the permittee.

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

**Note:** Department approved post-construction storm water management control practices may be found on the Department's Internet site at: http://dnr.wi.gov/topic/stormwater/standards/postconst_standards.html

**2.5.1.3** For new development and infill, post-construction performance standards equivalent to those in ss. NR 151.122 through 151.126 and 151.242 through 151.246, Wis. Adm. Code. If the current ordinance does not contain post-construction performance standards for new development and infill equivalent to those in ss. NR 151.122 through 151.126 and 151.242 through 151.246, Wis. Adm. Code, the permittee shall create or amend the ordinance to meet this requirement within 24 months of the date of notification of coverage under this permit. Post-construction performance standards for new development and infill may be more restrictive than those required in this section 2.5.1.3 if necessary to comply with federally approved TMDL requirements.

**2.5.1.4** For redevelopment, post-construction performance standards equivalent to or more restrictive than those in ss. NR 151.122 through 151.126 and 151.242 through 151.246, Wis. Adm. Code. If the current ordinance does not contain post-construction performance standards for redevelopment that, at a minimum, are at least as restrictive as those in ss. NR 151.122 through 151.126 and 151.242 through 151.246, Wis. Adm. Code, the permittee shall create or amend the ordinance to meet this requirement within 24 months of the date of notification of coverage under this permit.

**Note:** The post- construction performance standards in Chapter NR 151, Wis. Adm. Code, were amended January 1, 2011.

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

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

**2.5.1.7** Inspection and enforcement authority.

**2.5.2** Procedures that will be used by the permittee to ensure the long-term maintenance of storm water management facilities.

**2.5.3** Procedures for the administration of the post-construction storm water management program including the process for obtaining local approval, managing and responding to complaints, and tracking regulated post-construction sites.

**Note:** A town may demonstrate to the Department that an adequate county ordinance that meets the requirements of this permit is administered and enforced within its town and then the town could be excused from having to adopt its own ordinance.

**2.6 Pollution Prevention**

The permittee shall continue to implement its pollution prevention program. The program shall have measurable goals and include:

**2.6.1** An inventory of municipally owned or operated structural storm water management facilities.

**2.6.2** Routine inspection and maintenance of municipally owned or operated structural storm water management facilities to maintain their pollutant removal operating efficiency.

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

**2.6.3** Routine street sweeping and cleaning of catch basins with sumps where appropriate.

**2.6.4** Proper disposal of street sweeping and catch basin cleaning waste.

**2.6.5** If road salt or other deicers are applied by the permittee, no more shall be applied than necessary to maintain public safety. Information on deicing activities shall be submitted with the annual report required under section 2.9 of this permit beginning with the annual report due by March 31, 2016 and annually thereafter and include:

**2.6.5.1** Contact information for the individual(s) with overall responsibility for winter roadway maintenance.

**2.6.5.2** Description of the types of deicing products used.

**2.6.5.3** The amount of deicing product used per month.

**2.6.5.4** Description of the type of equipment used.

**2.6.5.5** Snow disposal locations, if applicable.

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

**2.6.5.6** Anti-icing, equipment calibration, and salt reduction strategies considered.

**2.6.5.7** Other measurable data or information that the permittee used to evaluate its deicing activities.

**Note:** The Wisconsin Department of Transportation (WisDOT) "Highway Maintenance Manual", chapter 35, contains guidance on application of road salt and other deicers that can be used to determine whether not application is necessary and what application rate is appropriate for deicing and ice prevention. This information is held on a secured server and users must first register with the state of Wisconsin to obtain an ID and password. You can learn more about getting connected to this secured server at: http://www.dot.wisconsin.gov/business/extranet/. The WisDOT highway salt storage requirements are contained in ch. Trans 277, Wis. Adm. Code.

**2.6.6** Proper management of leaves and grass clippings, which may include on-site beneficial reuse as opposed to collection.

**2.6.7** Storm water pollution prevention planning for municipal garages, storage areas and other sources of storm water pollution from municipal facilities. Information on storm water pollution prevention activities for municipal garages, storage areas and other sources of storm water pollution from municipal facilities shall be submitted with the annual report required under section 2.9 of this permit beginning with the annual report due by March 31, 2016 and annually thereafter and include the information in sections 2.6.7.1 through 2.6.7.7. The Department may waive the requirements of this section on a case-by-case basis for a municipal facility provided the permittee certifies that the facility qualifies for a conditional no exposure exclusion pursuant to s. NR 216.21(3), Wis. Adm. Code and with the Department's written concurrence.

**Note**: The conditional no exposure exclusion provisions of s. NR 216.21(3), Wis. Adm. Code and the related certification request form (Form 3400-188) are intended for industrial facilities regulated under subch. II of NR 216. However, if a permittee believes that materials and activities at a municipal facility are not exposed to storm water, s. NR 216.21(3) provides an appropriate means for the permittee to evaluate the facility and request a waiver from the requirements of this section. The No Exposure Certification Form, Form 3400-1288, is available on the Department's Internet site at: http://dnr.wi.gov/topic/stormwater/industrial/forms.html

Information on storm water pollution prevention activities shall include:

**2.6.7.1** Location of each facility and contact information for the individual(s) with overall responsibility for each facility.

**2.6.7.2** A map of each facility, drawn to scale, and including the following features:

**2.6.7.2.1** The locations of major activities and storage areas.

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

**2.6.7.2.3** Identification of nearby receiving waters or wetlands.

**2.6.7.2.4** Identification of connections to the permittees MS4.

**2.6.7.3** A description of good housekeeping activities and any best management practices installed to reduce or eliminate storm water contamination.

**2.6.7.4** Recommendations for improvements to current storm water management practices at the facility and a timeline for installation and/or implementation of these recommendations.

**2.6.7.5** Information on inspections of the facility to identify and address potential sources of storm water contamination.

**2.6.7.6** Employee training on storm water pollution prevention at the facility.

**2.6.7.7** Spills prevention and response procedures.

**2.6.8** Application of turf and garden fertilizers on municipally controlled properties, with pervious surfaces over 5 acres each, in accordance with a site-specific nutrient application schedule based on appropriate soil tests.

**2.6.9** Consideration of environmentally sensitive land development designs for municipal projects, including green infrastructure and low impact development.

**Note:** Additional information on green infrastructure and low impact development may be found on the USEPA's Internet site at:
http://water.epa.gov/infrastructure/greeninfrastructure/index.cfm
http://water.epa.gov/polwaste/green/index.cfm

**2.6.10** Education of appropriate municipal and other personnel involved in implementing this program.

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

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

**2.7 Storm Water Quality Management**

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

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

**2.7.1.1** The permittee shall maintain source area controls, structural storm water management facilities, and non-structural storm water best management practices that the permittee implemented on or before July 1, 2011 to achieve a reduction of 20% or more of total suspended solids carried by storm water runoff from existing development to waters of the state.

**2.7.1.2** A 20% reduction in the annual average mass of total suspended solids discharging from the MS4 to surface waters of the state as compared to implementing no storm water management controls. Source area controls, structural storm water management practices, and non-structural control practices implemented to achieve the 20% reduction in total suspended solids shall be maintained.

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

**2.8 Storm Sewer System Map**
The permittee shall continue to maintain its MS4 map. The municipal storm sewer system map shall include:

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

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

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

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

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

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

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

**2.8.8** Identification of streets.

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

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

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

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

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

**2.9.5** An evaluation of program compliance, the appropriateness of identified best management practices, and progress towards achieving identified measurable goals. Any program changes made as a result of this evaluation shall be identified and described in the annual report. For any

identified deficiencies towards achieving the requirements under section 2 of this permit or lack of progress towards meeting a measureable goal, the permittee shall initiate program changes to improve their effectiveness.

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

**2.9.7** A duly authorized representative of the permittee shall sign and certify the annual report and include a statement or resolution that the permittee's governing body or delegated representatives have reviewed or been apprised of the content of the annual report. A signed copy of the annual report and other required reports shall be submitted to the appropriate Department regional storm water contact or to the Wisconsin DNR, Storm Water Program – WT/3, P.O. Box 7921, Madison, WI 53707-7921.

**2.10 Cooperation**

The permittee may, by written agreement, implement this permit with another municipality or contract with another entity to perform one or more of the conditions of this permit. For example, if a county is implementing and enforcing an adequate storm water ordinance(s) within a town, the town would then not have to adopt its own ordinance. However, the permittee is ultimately responsible for compliance with the conditions of this permit. The permittee may rely on another municipality or contract with another entity to satisfy a condition of this permit if all of the following are met:

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

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

**2.10.3** The other municipality or entity agrees to implement a control measure or permit requirement on the permittee's behalf.

**2.11 Compliance Schedule for New and Updated Permit Requirements**

The permittee shall meet the compliance schedule for the new and updated permit requirements listed in Table 1 below.

**Note:** Table 1 does not list all the requirements of this permit.

TABLE 1. Compliance Schedule for New and Updated Permit Requirements

| PERMIT SECTION | ACTIVITY | COMPLIANCE DATE | COMMENTS |
|---|---|---|---|
| Section 1.5.1 | Discharges to an impaired waterbody | Within 90 days of start date and by March 31 of each odd-numbered year thereafter | All permittees. |
| Section 1.5.4.3 | Updated storm sewer system map and excluded areas | TMDL approved prior to the effective date of this permit: March 31, 2016<br><br>TMDL approved after the effective date of this permit: Within 24 months of date of approval of TMDL | Applies to a permittee that discharges to an impaired waterbody with an approved TMDL that assigns the permittee a wasteload allocation. |
| Section 1.5.4.4 | Tabular summary | TMDL approved prior to the effective date of this permit: March 31, 2018<br><br>TMDL approved after the effective date of this permit: Within 48 months of date of approval of TMDL | Applies to a permittee that discharges to an impaired waterbody with an approved TMDL that assigns the permittee a wasteload allocation. |
| Section 1.5.4.5 | Written plan | TMDL approved prior to the effective date of this permit: March 31, 2018<br><br>TMDL approved after the effective date of this permit: Within 48 months of date of approval of TMDL | Applies to a permittee not meeting all its wasteload allocations. |
| Section 2.4.1.3 | Updated construction site pollutant control ordinance | Within 24 months of date of notification of coverage under this permit | All permittees. |
| Sections 2.5.1.3 and 2.5.1.4 | Updated post-construction storm water management ordinance | Within 24 months of date of notification of coverage under this permit | All permittees. |
| Section 2.6.5 | Information on deicing activities | With annual report due March 31, 2016 and annually thereafter | All permittees. |
| Section 2.6.7 | Storm water pollution prevention planning for municipal facilities | With annual report due March 31, 2016 and annually thereafter | All permittees. |
| Section 2.9 | Annual report | March 31 of each year reporting on previous calendar year | All permittees. |

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

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

## 3. STANDARD CONDITIONS

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

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

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

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

**3.4 Noncompliance**

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

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

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

**3.6 Spill Reporting:** The permittee shall immediately notify the Department, in accordance with ch. NR 706, Wis. Adm. Code, in the event of a spill or accidental release of hazardous substances which has resulted or may result in a discharge of pollutants into waters of the state. The Department shall be notified via the 24-hour spill hotline at 1-800-943-0003.

**3.7 Proper Operation and Maintenance:** The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control which are installed or used by the municipality to achieve compliance with the conditions of the permit and the storm water management plan. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems only when necessary to achieve compliance with conditions of this permit.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

**3.19 Attainment of Water Quality Standards after Authorization:** At any time after authorization, the Department may determine that the discharge of storm water from a permittee's MS4 may cause, have the reasonable potential to cause, or contribute to an excursion of any applicable water quality standard. If such determination is made, the Department may require the permittee to do one of the following:

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

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

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

**3.20 Continuation of the Expired General Permit:** The Department's goal is to reissue this general permit prior to its expiration date. However, in accordance with s. NR 216.09, Wis. Adm. Code, a permittee shall reapply to the Department at least 180 days prior to the expiration date for continued coverage under this permit after its expiration. If the permit is not reissued by the time the existing permit expires, the existing permit remains in effect. To reapply for permit coverage, a permittee shall send a letter to the Department that includes proposed changes to the storm sewer system map, storm water management program and any other relevant change.

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

## 4. DEFINITIONS USED IN THIS PERMIT

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

**4.1 Department** means the Wisconsin Department of Natural Resources.

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

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

**4.4 Illicit Connection** means any man-made conveyance connecting an illicit discharge to a municipal separate storm sewer system.

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

case basis if the permittee or the Department identifies it as a significant source of a pollutant to waters of the state.

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

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

**4.8 Jurisdiction** means the area where the permittee has authority to enforce its ordinance(s) or otherwise has authority to exercise control over a particular activity of concern.

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

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

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

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

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

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

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

**4.13.1** Owned or operated by a municipality.

**4.13.2** Designed or used for collecting or conveying storm water.

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

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

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

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

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

**4.17 Pollutant(s) of concern** means a pollutant that is causing impairment of a waterbody.

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

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

**4.20 Redevelopment** means areas where development is replacing older development.

**4.21 Riparian Landowners** are the owners of lands bordering lakes and rivers.

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

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

**4.24 Storm Water Management Practice** means structural or non-structural measures, practices, techniques or devices employed to avoid or minimize soil, sediment or pollutants carried in runoff to waters of the state.

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

**4.26 Structural Storm Water Management Facilities** are engineered and constructed systems that are designed to provide storm water quality control such as wet detention ponds, constructed wetlands, infiltration basins and grassed swales.

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

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

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

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

# APPENDIX B
# NR 151

# Chapter NR 151

## RUNOFF MANAGEMENT

**Subchapter I — General Provisions**
NR 151.001 Purpose.
NR 151.002 Definitions.
NR 151.003 BMP Location.
NR 151.004 State targeted performance standards.
NR 151.005 Performance standard for total maximum daily loads.
NR 151.006 Applicability of maximum extent practicable.

**Subchapter II — Agricultural Performance Standards and Prohibitions**
NR 151.01 Purpose.
NR 151.015 Definitions.
NR 151.02 Sheet, rill and wind erosion performance standard.
NR 151.03 Tillage setback performance standard.
NR 151.04 Phosphorus index performance standard.
NR 151.05 Manure storage facilities performance standards.
NR 151.055 Process wastewater handling performance standard.
NR 151.06 Clean water diversion performance standard.
NR 151.07 Nutrient management.
NR 151.08 Manure management prohibitions.
NR 151.09 Implementation and enforcement procedures for cropland performance standards.
NR 151.095 Implementation and enforcement procedures for livestock performance standards and prohibitions.
NR 151.096 Local livestock operation ordinances and regulations.
NR 151.097 Variances.

**Subchapter III — Non−Agricultural Performance Standards**
NR 151.10 Purpose.
NR 151.105 Construction site performance standard for non−permitted sites.
NR 151.11 Construction site performance standard for sites of one acre or more.
NR 151.12 Post−construction performance standard for new development and redevelopment.
NR 151.121 Post−construction performance standards.
NR 151.122 Total suspended solids performance standard.
NR 151.123 Peak discharge performance standard.
NR 151.124 Infiltration performance standard.
NR 151.125 Protective areas performance standard.
NR 151.126 Fueling and vehicle maintenance areas performance standard.
NR 151.127 Location.
NR 151.128 Timing.
NR 151.13 Developed urban area performance standard for municipalities.
NR 151.14 Turf and garden nutrient management performance standard.
NR 151.15 Implementation and enforcement.

**Subchapter IV — Transportation Facility Performance Standards**
NR 151.20 Purpose and applicability.
NR 151.21 Definitions.
NR 151.22 Responsible party.
NR 151.225 Construction site performance standard for non−permitted sites and routine maintenance.
NR 151.23 Construction site performance standard for sites of one acre or more.
NR 151.24 Post–construction performance standard.
NR 151.241 Post−construction performance standards.
NR 151.242 Total suspended solids performance standard.
NR 151.243 Peak discharge performance standard.
NR 151.244 Infiltration performance standard.
NR 151.245 Protective areas performance standard.
NR 151.246 Fueling and vehicle maintenance areas performance standard.
NR 151.247 Location.
NR 151.248 Timing.
NR 151.249 Swale treatment performance standard.
NR 151.25 Developed urban area performance standard for transportation facilities.
NR 151.26 Enforcement.

**Subchapter V — Technical Standards Development Process for Non−Agricultural Performance Standards**
NR 151.30 Purpose.
NR 151.31 Technical standards development process.
NR 151.32 Dissemination of technical standards.

## Subchapter I — General Provisions

**NR 151.001 Purpose.** This chapter establishes runoff pollution performance standards for non−agricultural facilities and transportation facilities and performance standards and prohibitions for agricultural facilities and practices designed to achieve water quality standards as required by s. 281.16 (2) and (3), Stats. This chapter also specifies a process for the development and dissemination of department technical standards to implement the non−agricultural performance standards as required by s. 281.16 (2) (b), Stats. If these performance standards and prohibitions do not achieve water quality standards, this chapter specifies how the department may develop targeted performance standards in conformance with s. NR 151.004.

**History:** CR 00−027: cr. Register September 2002 No. 561, eff. 10−1−02.

**NR 151.002 Definitions.** In this chapter:

**(1)** "Adequate sod, or self−sustaining vegetative cover" means maintenance of sufficient vegetation types and densities such that the physical integrity of the streambank or lakeshore is preserved. Self−sustaining vegetative cover includes grasses, forbs, sedges and duff layers of fallen leaves and woody debris.

**(2)** "Agricultural facilities and practices" has the meaning given in s. 281.16 (1), Stats.

**(3)** "Average annual rainfall" means a typical calendar year of precipitation as determined by the department for users of models such as SLAMM, P8, or equivalent methodology. The average annual rainfall is chosen from a department publication for the location closest to the municipality.

**Note:** Information on how to access SLAMM and P8 and the average annual rainfall files for five locations in the state, as published periodically by the department, is available at (608) 267−7694.

**(4)** "Best management practices" or "BMPs" means structural or non−structural measures, practices, techniques or devices employed to avoid or minimize soil, sediment or pollutants carried in runoff to waters of the state.

**(5)** "Combined sewer system" means a system for conveying both sanitary sewage and stormwater runoff.

**(6)** "Connected imperviousness" means an impervious surface connected to the waters of the state via a separate storm sewer, an impervious flow path, or a minimally pervious flow path.

**Note:** An example of minimally pervious flow path would be roof runoff flowing across a lawn of less than 20 feet, to the driveway, to the street, and finally to the storm sewer. The department has a guidance document to aid in the application of this term that is available from the department at (608) 267−7694.

**(7)** "Construction site" means an area upon which one or more land disturbing construction activities occur, including areas that are part of a larger common plan of development or sale where multiple separate and distinct land disturbing construction activities may be taking place at different times on different schedules but under one plan. A long−range planning document that describes separate construction projects, such as a 20−year transportation improvement plan, is not a common plan of development.

**(8)** "DATCP" means the department of agriculture, trade and consumer protection.

**(9)** "Department" means the department of natural resources.

**(10)** "Design storm" means a hypothetical discrete rainstorm characterized by a specific duration, temporal distribution, rainfall intensity, return frequency and total depth of rainfall.

**(11)** "Development" means residential, commercial, industrial or institutional land uses and associated roads.

**(11m)** "Direct conduits to groundwater" means wells, sinkholes, swallets, fractured bedrock at the surface, mine shafts, non−metallic mines, tile inlets discharging to groundwater, quarries, or depressional groundwater recharge areas over shallow fractured bedrock.

**(12)** "Effective infiltration area" means the area of the infiltration system that is used to infiltrate runoff and does not include the area used for site access, berms or pretreatment.

**(13)** "Erosion" means the process by which the land's surface is worn away by the action of wind, water, ice or gravity.

**(14)** "Exceptional resource waters" means waters listed in s. NR 102.11.

**(14g)** "Existing development" means development in existence on October 1, 2004, or development for which a notice of intent to apply for a storm water permit in accordance with subch. III of ch. NR 216 was received by the department or the department of commerce on or before October 1, 2004.

**(14r)** "Filtering layer" means soil that has at least a 3−foot deep layer with at least 20 percent fines; or at least a 5−foot deep layer with at least 10 percent fines; or an engineered soil with an equivalent level of protection as determined by the regulatory authority for the site.

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

**(16)** "Illicit discharge" means any discharge to a municipal separate storm sewer 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.

**(16m)** "Impaired water" means a waterbody impaired in whole or in part and listed by the department pursuant to 33 USC 1313 (d) (1) (A) and 40 CFR 130.7, for not meeting a water quality standard, including a water quality standard for a specific substance or the waterbody's designated use.

**Note:** The impaired waters list is available from the department at (608) 267−7694.

**(17)** "Impervious surface" means an area that releases as runoff all or a large portion of the precipitation that falls on it, except for frozen soil. Rooftops, sidewalks, driveways, gravel or paved parking lots, and streets are examples of surfaces that typically are impervious.

**(18)** "In−fill" means an undeveloped area of land located within an existing urban sewer service area, surrounded by development or development and natural or man−made features where development cannot occur. "In−fill" does not include any undeveloped area that was part of a larger new development for which a notice of intent to apply for a storm water permit in accordance with subch. III of ch. NR 216 was required to be submitted after October 1, 2004, to the department or the department of commerce.

**(19)** "Infiltration" means the entry and movement of precipitation or runoff into or through soil.

**(20)** "Infiltration system" means a device or practice such as a basin, trench, rain garden or swale designed specifically to encourage infiltration, but does not include natural infiltration in pervious surfaces such as lawns, redirecting of rooftop downspouts onto lawns or minimal infiltration from practices, such as swales or road side channels designed for conveyance and pollutant removal only.

**(22)** "Land disturbing construction activity" means any man−made alteration of the land surface resulting in a change in the topography or existing vegetative or non−vegetative soil cover, that may result in runoff and lead to an increase in soil erosion and movement of sediment into waters of the state. Land disturbing construction activity includes clearing and grubbing, demolition, excavating, pit trench dewatering, filling and grading activities.

**(23)** "Landowner" means any person holding fee title, an easement or other interest in property, which allows the person to undertake cropping, livestock management, land disturbing construction activity or maintenance of storm water BMPs on the property.

**(24)** "Local governmental unit" has the meaning given in s. 92.15 (1) (b), Stats.

**(25)** "MEP" or "maximum extent practicable" means the highest level of performance that is achievable but is not equivalent to a performance standard identified in subch. III or IV, as determined in accordance with s. NR 151.006.

**(26)** "Municipality" has the meaning given in s. 281.01 (6), Stats.

**(27)** "Navigable waters" and "navigable waterway" has the meaning given in s. 30.01 (4m), Stats.

**(28)** "New development" means development resulting from the conversion of previously undeveloped land or agricultural land uses.

**(29)** "NRCS" means the natural resources conservation service of the U.S. department of agriculture.

**(30)** "Ordinary high water mark" has the meaning given in s. NR 115.03 (6).

**(31)** "Outstanding resource waters" means waters listed in s. NR 102.10.

**(32)** "Percent fines" means the percentage of a given sample of soil, which passes through a # 200 sieve.

**Note:** Percent fines can be determined using the "American Society for Testing and Materials", volume 04.02, "Test Method C117−95 Standard Test Method for Materials Finer than 75−µm (No. 200) Sieve in Material Aggregates by Washing". Copies can be obtained by contacting the American society for testing and materials, 100 Barr Harbor Drive, Conshohocken, PA 19428−2959, or phone 610−832−9585, or on line at: http://www.astm.org/.

**(33)** "Performance standard" means a narrative or measurable number specifying the minimum acceptable outcome for a facility or practice.

**(34)** "Pervious surface" means an area that releases as runoff a small portion of the precipitation that falls on it. Lawns, gardens, parks, forests or similar vegetated areas are examples of surfaces that typically are pervious.

**(35)** "Pollutant" has the meaning given in s. 283.01 (13), Stats.

**(36)** "Pollution" has the meaning given in s. 281.01 (10), Stats.

**(37)** "Population" has the meaning given in s. 281.66 (1) (c), Stats.

**(38)** "Preventive action limit" has the meaning given in s. NR 140.05 (17).

**(39)** "Redevelopment" means areas where development is replacing older development.

**(40)** "Runoff" means storm water or precipitation including rain, snow, ice melt or similar water that moves on the land surface via sheet or channelized flow.

**(41)** "Sediment" means settleable solid material that is transported by runoff, suspended within runoff or deposited by runoff away from its original location.

**(42)** "Separate storm sewer" means 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 of 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 part of a publicly owned wastewater treatment works that provides secondary or more stringent treatment.

(d) Discharges directly or indirectly to waters of the state.

**(42m)** "Silviculture activity" means activities including tree nursery operations, tree harvesting operations, reforestation, tree thinning, prescribed burning, and pest and fire control. Clearing and grubbing of an area of a construction site is not a silviculture activity.

**(43)** "Storm water management plan" means a comprehensive plan designed to reduce the discharge of pollutants from storm water, after the site has undergone final stabilization, following completion of the construction activity.

**(44)** "Targeted performance standard" means a performance standard that will apply in a specific area, where additional practices beyond those contained in this chapter, are necessary to meet water quality standards.

**(45)** "Technical standard" means a document that specifies design, predicted performance and operation and maintenance specifications for a material, device or method.

**(46)** "Top of the channel" means an edge, or point on the landscape landward from the ordinary high water mark of a surface water of the state, where the slope of the land begins to be less than 12% continually for at least 50 feet. If the slope of the land is 12% or less continually for the initial 50 feet landward from the ordinary high water mark, the top of the channel is the ordinary high water mark.

**(46m)** "Total maximum daily load" or "TMDL" means the amount of pollutants specified as a function of one or more water quality parameters, that can be discharged per day into a water quality limited segment and still ensure attainment of the applicable water quality standard.

**(47)** "TR−55" means the United States department of agriculture, natural resources conservation service (previously soil conservation service), Urban Hydrology for Small Watersheds, Second Edition, Technical Release 55, June 1986, which is incorporated by reference for this chapter.

**Note:** Copies of this document may be inspected at the offices of the department's bureau of watershed management, the natural resources conservation service, the secretary of state, and the legislative reference bureau, all in Madison, WI.

**(48)** "Transportation facility" means a highway, a railroad, a public mass transit facility, a public−use airport, a public trail or any other public work for transportation purposes such as harbor improvements under s. 85.095 (1) (b), Stats. "Transportation facility" does not include building sites for the construction of public buildings and buildings that are places of employment that are regulated by the department pursuant to s. 281.33, Stats.

**(49)** "Type II distribution" means a rainfall type curve as established in the "United States Department of Agriculture, Soil Conservation Service, Technical Paper 149, published 1973", which is incorporated by reference for this chapter. The Type II curve is applicable to all of Wisconsin and represents the most intense storm pattern.

**Note:** Copies of this document may be inspected at the offices of the department's bureau of watershed management, the natural resources conservation service, the secretary of state, and the legislative reference bureau, all in Madison, WI.

**(49m)** "US EPA" means the United States environmental protection agency.

**(50)** "Waters of the state" has the meaning given in s. 283.01 (20), Stats.

**(51)** "WPDES permit" means a Wisconsin pollutant discharge elimination system permit issued under ch. 283, Stats.

**History:** CR 00−027: cr. Register September 2002 No. 561, eff. 10−1−02; CR 09−112: am. (3), (6), (17), (18), (25), (42) (c), cr. (11m), (14g), (14r), (16m), (42m), (46m), (49m), r. (21) Register December 2010 No. 660, eff. 1−1−11; corrections in (48) made under s. 13.92 (4) (b) 6. and 7., Stats., Register December 2010 No. 660.

**NR 151.003 BMP Location. (1)** NON−NAVIGABLE WATERS. For purposes of determining compliance with the performance standards of subchs. III and IV, the department may give credit for BMPs that function to provide treatment for runoff from existing development and post−construction runoff from new development, redevelopment, and in−fill development and that are located within non−navigable waters.

**(2)** NAVIGABLE WATERS. (a) *New development runoff.* Except as allowed under par. (b), BMPs designed to treat post−construction runoff from new development may not be located in navigable waters and, for purposes of determining compliance with the performance standards of subchs. III and IV, the department may not give credit for such BMPs.

(b) *New development runoff exemption.* BMPs to treat post−construction runoff from new development may be located within navigable waters and may be creditable by the department under subchs. III and IV, if all the following are met:

1. The BMP was constructed prior to October 1, 2002, and received all applicable permits.

2. The BMP functions or will function to provide runoff treatment for the new development.

(c) *Existing development and post−construction runoff from redevelopment and in−fill development.* Except as provided in par. (d), BMPs that function to provide runoff treatment for existing development and post−construction runoff from redevelopment and in−fill development may not be located in navigable waters and, for purposes of determining compliance with the performance standards of subchs. III and IV, the department may not give credit for such BMPs.

(d) *Existing development and post−construction runoff from redevelopment and in−fill development exemption*. BMPs that function to provide treatment of runoff from existing development and post−construction runoff from redevelopment and in−fill development may be located within navigable waters and may be creditable by the department under subchs. III and IV, if any of the following are met:

1. The BMP was constructed, contracts were signed or bids advertised and all applicable permits were received prior to January 1, 2011.

2. The BMP is on an intermittent waterway and all applicable permits are received.

**Note:** An intermittent waterway may be identified on a United States geological survey 7.5−minute series topographic map, a county soil survey map, the Surface Water Data Viewer Map, 24K hydro layer on the department's website, or determined by the department through a site evaluation, whichever is more current. The Surface Water Data Viewer Map, 24K hydro layer is available at http://dnr.wi.gov/topic/surfacewater/swdv/.

**(3)** CREDIT. The amount of credit that the department may give a BMP for purposes of determining compliance with the performance standards of subchs. III and IV is limited to the treatment capability of the BMP.

**Note:** This section does not supersede any other applicable federal, state, or local regulation such as ch. NR 103 or ch. 30, Stats. Federal, state, and local permits or approvals may be required to excavate, dredge, fill, or construct BMPs in or near wetlands, non−navigable or navigable waters. Other permits and approvals may not be authorized where the BMP construction will result in adverse environmental impacts to the waterway or wetland.

**History:** CR 00−027: cr. Register September 2002 No. 561, eff. 10−1−02; CR 09−112: r. and recr. Register December 2010 No. 660, eff. 1−1−11.

**NR 151.004 State targeted performance standards.** Implementation of the statewide performance standards and prohibitions in this chapter may not be sufficient to achieve water quality standards under chs. NR 102 to 105 or groundwater standards under ch. NR 140. In those cases, using modeling or monitoring, the department shall determine if a specific waterbody or area will not attain water quality standards or groundwater standards after substantial implementation of the performance standards and prohibitions in this chapter. If the department finds that water quality standards or groundwater standards will not be attained using statewide performance standards and prohibitions but the implementation of targeted performance standards would attain water quality standards or groundwater standards, the

department shall promulgate the targeted performance standards by rule.

**Note:** Pursuant to s. 281.16 (2) (a) and (3) (a), Stats., the performance standards shall be designed to meet state water quality standards.

**Note:** Pursuant to s. 281.16 (3), Stats., the department of agriculture, trade and consumer protection shall develop or specify the best management practices, conservation practices or technical standards used to demonstrate compliance with a performance standard developed under s. NR 151.004.

**History:** CR 00−027: cr. Register September 2002 No. 561, eff. 10−1−02; CR 09−112: am. Register December 2010 No. 660, eff. 1−1−11.

**NR 151.005 Performance standard for total maximum daily loads.** A crop producer or livestock producer subject to this chapter shall reduce discharges of pollutants from a livestock facility or cropland to surface waters if necessary to meet a load allocation in a US EPA and state approved TMDL.

**(1)** A crop producer or livestock producer subject to this chapter shall use the best management practices, conservation practices, or technical standards established under ch. ATCP 50 to meet a load allocation in a US EPA and state approved TMDL.

**(2)** If compliance with a more stringent or additional performance standard, other than the performance standards contained in this chapter, is required for crop producers or livestock producers to meet a load allocation in a US EPA and state approved TMDL, the department shall use the procedure in s. NR 151.004 to promulgate the more stringent or additional performance standard before compliance is required.

**History:** CR 09−112: cr. Register December 2010 No. 660, eff. 1−1−11.

**NR 151.006 Applicability of maximum extent practicable.** Maximum extent practicable applies when a person who is subject to a performance standard of subchs. III and IV demonstrates to the department's satisfaction that a performance standard is not achievable and that a lower level of performance is appropriate. In making the assertion that a performance standard is not achievable and that a level of performance different from the performance standard is the maximum extent practicable, an applicant shall take into account the best available technology, cost effectiveness, geographic features, and other competing interests such as protection of public safety and welfare, protection of endangered and threatened resources, and preservation of historic properties.

**History:** CR 09−112: cr. Register December 2010 No. 660, eff. 1−1−11.

## Subchapter II — Agricultural Performance Standards and Prohibitions

**NR 151.01 Purpose.** The purpose of this subchapter is to prescribe performance standards and prohibitions in accordance with the implementation and enforcement procedures contained in ss. NR 151.09 and 151.095 for agricultural facilities, operations and practices.

**History:** CR 00−027: cr. Register September 2002 No. 561, eff. 10−1−02.

**NR 151.015 Definitions.** In this subchapter:

**(1)** "Accounting period" means the crop rotation period over which compliance is measured and consists of the current year and extends back the previous 7 years moving forward each consecutive year creating a rolling time period not to exceed 8 years.

**(3)** "Conservation practice" means a best management practice designed to reduce or prevent soil or sediment loss to the waters of the state.

**(4)** "Crop producer" means an owner or operator of an operation engaged in crop related agricultural practices specified in s. 281.16 (1) (b), Stats.

**(5)** "Cropland practice" means the method, activity or management measure used to produce or harvest crops.

**(6)** "County land conservation committee" means the committee created by a county board under s. 92.06, Stats. "County land conservation committee" includes employees or agents of the committee whom, with committee authorization, act on behalf of the committee.

**(7)** "Direct runoff" includes any of the following:

(a) Runoff from a feedlot that can be predicted to discharge a significant amount of pollutants to surface waters of the state or to a direct conduit to ground water.

(b) Runoff of stored manure, including manure leachate, that discharges a significant amount of pollutants to surface waters of the state or to a direct conduit to ground water.

(c) Construction of a manure storage facility in permeable soils or over fractured bedrock without a liner designed in accordance with s. NR 154.04 (3).

(d) Discharge of a significant amount of leachate from stored manure to waters of the state.

**(8)** "Feedlot" means a barnyard, exercise area, or other outdoor area where livestock are concentrated for feeding or other purposes and self−sustaining vegetative cover is not maintained. "Feedlot" does not include a winter grazing area or a bare soil area such as a cattle lane or a supplemental feeding area located within a pasture, provided that the bare soil area is not a significant source of pollution to waters of the state.

**(9)** "Livestock facility" means a structure or system constructed or established on a livestock operation.

**(10)** "Livestock producer" means an owner or operator of a livestock operation.

**(11)** "Livestock operation" has the meaning given in s. 281.16 (1) (c), Stats.

**(12)** "Manure" means a material that consists primarily of excreta from livestock, poultry or other animals.

**(13)** "Manure storage facility" means an impoundment made by constructing an embankment or excavating a pit or dugout or by fabricating a structure to contain manure and other animal or agricultural wastes.

**(13g)** "Margin of safety level" has the meaning given it in s. NR 243.03 (37).

**(13m)** "Municipality" has the meaning given in s. 281.01 (6), Stats.

**(14)** "NOD" means a notice of discharge issued under s. NR 243.24 (4).

**(15)** "Operator" means a person responsible for the oversight or management of equipment, facilities or livestock at a livestock operation, or is responsible for land management in the production of crops.

**(15e)** "Overflow" means discharge of manure to the environment resulting from flow over the brim of a facility or from flow directed onto the ground through a man−made device including a pump or pipe.

**(15m)** "Pasture" means land on which livestock graze or otherwise seek feed in a manner that maintains the vegetative cover over the grazing area. Pasture may include limited areas of bare soil such as cattle lanes and supplemental feeding areas provided the bare soil areas are not significant sources of pollution to waters of the state.

**(15s)** "Phosphorus index" or "P−index" means Wisconsin's agricultural land management planning tool for assessing the potential of a cropped or grazed field to contribute phosphorus to the surface water.

**(16)** "Process wastewater" has the meaning given in s. NR 243.03 (53).

**(18)** "Site that is susceptible to groundwater contamination" under s. 281.16 (1) (g), Stats., means any one of the following:

(a) An area within 250 feet of a private well.

(b) An area within 1000 feet of a municipal well.

(c) An area within 300 feet upslope or 100 feet downslope of a direct conduit to groundwater.

(d) A channel that flows to a direct conduit to groundwater.

(e) An area where the soil depth to groundwater or bedrock is less than 2 feet.

(f) An area where the soil does not exhibit one of the following soil characteristics:

1. At least a 2−foot soil layer with 40% fines or greater above groundwater and bedrock.

2. At least a 3−foot soil layer with 20% fines or greater above groundwater and bedrock.

3. At least a 5−foot soil layer with 10% fines, or greater above groundwater and bedrock.

**Note:** See s. NR 151.002 (32) for definition of percent fines.

**(19)** "Stored manure" means manure that is kept in a manure storage facility or an unconfined manure pile.

**(20)** "Substantially altered" means a change initiated by an owner or operator that results in a relocation of a structure or facility or significant changes to the size, depth or configuration of a structure or facility including:

(a) Replacement of a liner in a manure storage structure.

(b) An increase in the volumetric capacity or area of a structure or facility by greater than 20%.

(c) A change in a structure or facility related to a change in livestock management from one species of livestock to another such as cattle to poultry.

**(21)** "Tolerable soil loss" or "T" means the maximum rate of erosion, in tons per acre per year, allowable for particular soils and site conditions that will maintain soil productivity.

**(22)** "Unconfined manure pile" means a quantity of manure that is at least 175 $ft^3$ in volume and which covers the ground surface to a depth of at least 2 inches and is not confined within a manure storage facility, livestock housing facility or barnyard runoff control facility or covered or contained in a manner that prevents storm water access and direct runoff to surface water or leaching of pollutants to groundwater.

**(24)** "Water quality management area" or "WQMA" means the area within 1,000 feet from the ordinary high water mark of navigable waters that consist of a lake, pond or flowage, except that, for a navigable water that is a glacial pothole lake, the term means the area within 1,000 feet from the high water mark of the lake; the area within 300 feet from the ordinary high water mark of navigable waters that consist of a river or stream; and a site that is susceptible to groundwater contamination, or that has the potential to be a direct conduit for contamination to reach groundwater.

**(25)** "Winter grazing area" means a cropland or pasture where livestock feed on dormant vegetation or crop residue, with or without supplementary feed, during the period of October 1 to April 30.

**History:** CR 00−027: cr. Register September 2002 No. 561, eff. 10−1−02; CR 09−112: r. and recr. (1), (8), (16), am. (7), (18) (c), (d), cr. (13g), (15e), (15m), (15s), (25), r. (17) Register December 2010 No. 660, eff. 1−1−11.

**NR 151.02 Sheet, rill and wind erosion performance standard. (1)** All land where crops or feed are grown, including pastures, shall be managed to achieve a soil erosion rate equal to, or less than, the "tolerable" (T) rate established for that soil.

**(2)** This standard first applies to pastures beginning July 1, 2012.

**Note:** Soil loss will be calculated according to the revised universal soil loss equation II as referenced in ch. ATCP 50 and appropriate wind loss equations as referenced in ch. ATCP 50.

**History:** CR 00−027: cr. Register September 2002 No. 561, eff. 10−1−02; CR 09−112: am. Register December 2010 No. 660, eff. 1−1−11.

**NR 151.03 Tillage setback performance standard.** The purpose of this standard is to prevent tillage operations from destroying stream banks and depositing soil directly in surface waters. In this section, "surface water" has the meaning given in s. NR 102.03 (7).

**(1)** No crop producer may conduct a tillage operation that negatively impacts stream bank integrity or deposits soil directly in surface waters.

**(2)** No tillage operations may be conducted within 5 feet of the top of the channel of surface waters. Tillage setbacks greater than 5 feet but no more than 20 feet may be required to meet this standard.

**(3)** Crop producers shall maintain the area within the tillage setback required under sub. (2) in adequate sod or self−sustaining vegetative cover that provides a minimum of 70% coverage.

**(4)** This section does not apply to grassed waterways installed as conservation practices.

**History:** CR 09−112: cr. Register December 2010 No. 660, eff. 1−1−11; correction to (intro.) made under s. 13.92 (4) (b) 7., Stats., Register December 2010 No. 660.

**NR 151.04 Phosphorus index performance standard. (1)** All crop and livestock producers shall comply with this section.

**(2)** (a) Croplands, pastures, and winter grazing areas shall average a phosphorus index of 6 or less over the accounting period and may not exceed a phosphorus index of 12 in any individual year within the accounting period.

(b) Except as provided under sub. (3), for purposes of compliance with this section the phosphorus index shall be calculated using the version of the Wisconsin Phosphorus Index available as of January 1, 2011.

**Note:** The Wisconsin Phosphorus Index is maintained by the University of Wisconsin department of soil science and can be found at http://wpindex.soils.wisc.edu/.

**Note:** Soil test phosphorus concentration may be used to help identify fields that are high priority for evaluation with the Wisconsin Phosphorus Index. For example, croplands with soil test phosphorus concentrations of 35 parts per million or greater should be given higher priority for evaluation.

**Note:** Best management practices developed by the department of agriculture, trade and consumer protection may be used alone or in combination to meet the requirements of this section.

(c) The accounting period required under par. (a) shall meet the following conditions:

1. The accounting period shall begin once a nutrient management plan meeting the requirements of s. NR 151.07 and s. ATCP 50.04 (3) is completed.

2. During the first 8 years of implementation of this standard by a producer, computation of the phosphorus index may be based on a combination of planned crop management and historic data. Planned crop management data is based on projected management and crop rotations. Historic data is based on management and crop rotations that have actually occurred.

3. Once the nutrient management plan under s. NR 151.07 and s. ATCP 50.04 (3) is developed, historic data shall be used for each year as it becomes available.

**(3)** If the phosphorus index is not applicable to a particular crop or situation, an equivalent calculation approved by the department shall be used to meet the requirements of this section.

**Note:** The requirement provides for alternative methods to calculate a phosphorus index. Some strategies for assessing and reducing phosphorus index values, algorithms, and software can be found at http://wpindex.soils.wisc.edu/.

**(4)** Producers may not apply nutrients or manure directly, through mechanical means, to surface waters as defined in s. NR 102.03 (7).

**(5)** The phosphorus index requirement under sub. (2) (a) first takes effect for pastures beginning July 1, 2012.

**History:** CR 09−112: cr. Register December 2010 No. 660, eff. 1−1−11; correction to (4) made under s. 13.92 (4) (b) 7., Stats., Register December 2010 No. 660.

**NR 151.05 Manure storage facilities performance standards. (1)** APPLICABILITY. All livestock producers building new manure storage facilities, substantially altering manure storage facilities, or choosing to abandon their manure storage facilities shall comply with this section.

**(2)** NEW CONSTRUCTION AND ALTERATIONS. (a) New or substantially altered manure storage facilities shall be designed, constructed and maintained to minimize the risk of structural failure

of the facility and minimize leakage of the facility in order to comply with groundwater standards. The levels of materials in the storage facility may not exceed the margin of safety level.

(am) Storage facilities that are constructed or significantly altered on or after January 1, 2011, shall be designed and operated to contain the additional volume of runoff and direct precipitation entering the facility as a result of a 25−year, 24−hour storm.

(b) A new manure storage facility means a facility constructed after October 1, 2002.

(c) A substantially altered manure storage facility is a manure storage facility that is substantially altered after October 1, 2002.

**(3)** CLOSURE. (a) Closure of a manure storage facility shall occur when an operation where the facility is located ceases operations, or manure has not been added or removed from the facility for a period of 24 months. Manure facilities shall be closed in a manner that will prevent future contamination of groundwater and surface waters.

(b) The owner or operator may retain the facility for a longer period of time by demonstrating to the department that all of the following conditions are met:

1. The facility is designed, constructed and maintained in accordance with sub. (2).

2. The facility is designed to store manure for a period of time longer than 24 months.

3. Retention of the facility is warranted based on anticipated future use.

**(4)** EXISTING FACILITIES. (a) Manure storage facilities in existence as of October 1, 2002, that pose an imminent threat to public health, fish and aquatic life, or groundwater shall be upgraded, replaced, or abandoned in accordance with this section.

(b) Levels of materials in storage facilities may not exceed the margin of safety level.

**Note:** Manure storage facilities are sometimes used to store non−agricultural wastes, such as septage or organic food wastes. These facilities may be subject to additional regulatory and cost−sharing requirements.

**History:** CR 00−027: cr. Register September 2002 No. 561, eff. 10−1−02; CR 09−112: am. (title), (2) (a), (4), cr. (2) (am) Register December 2010 No. 660, eff. 1−1−11.

**NR 151.055 Process wastewater handling performance standard. (1)** All livestock producers shall comply with this section.

**(2)** There may be no significant discharge of process wastewater to waters of the state.

**(3)** The department shall consider all of the following factors when determining whether a discharge of process wastewater is a significant discharge to waters of the state:

(a) Volume and frequency of the discharge.

(b) Location of the source relative to receiving waters.

(c) Means of process wastewater conveyance to waters of the state.

(d) Slope, vegetation, rainfall, and other factors affecting the likelihood or frequency of process wastewater discharge to waters of the state.

(e) Available evidence of discharge to a surface water of the state or to a direct conduit to groundwater as defined under s. NR 151.002 (11m).

(f) Whether the process wastewater discharge is to a site that is defined as a site susceptible to groundwater contamination under s. NR 151.015 (18).

(g) Other factors relevant to the impact of the discharge on water quality standards of the receiving water or to groundwater standards.

**Note:** Existing technical standards contained in the U.S. department of agriculture natural resources conservation service field office technical guide may be used for managing process wastewater. When such standards are not applicable, the landowner or operator is expected to take reasonable steps to reduce the significance of the discharge in accordance with the agricultural performance standard and prohibition compliance requirements of this chapter. The Wisconsin department of agriculture, trade and consumer protection is responsible under s. 281.16 (3) (c), Stats., for developing additional management practices if needed.

**History:** CR 09−112: cr. Register December 2010 No. 660, eff. 1−1−11.

**NR 151.06 Clean water diversion performance standard. (1)** All livestock producers within a water quality management area shall comply with this section.

**(2)** Runoff shall be diverted away from contacting feedlot, manure storage areas and barnyard areas within water quality management areas except that a diversion to protect a private well under s. NR 151.015 (18) (a) is required only when the feedlot, manure storage area or barnyard area is located upslope from the private well.

**History:** CR 00−027: cr. Register September 2002 No. 561, eff. 10−1−02; CR 09−112: am. (title) Register December 2010 No. 660, eff. 1−1−11.

**NR 151.07 Nutrient management. (1)** All crop producers and livestock producers that apply manure or other nutrients directly or through contract to agricultural fields shall comply with this section.

**Note:** Manure management requirements for concentrated animal feeding operations covered under a WPDES permit are contained in ch. NR 243.

**(2)** This performance standard does not apply to the application of industrial waste and byproducts regulated under ch. NR 214, municipal sludge regulated under ch. NR 204, and septage regulated under ch. NR 113, provided the material is not commingled with manure prior to application.

**Note:** In accordance with ss. ATCP 50.04, 50.48 and 50.50, nutrient management planners, Wisconsin certified soil testing laboratories and dealers of commercial fertilizer are advised to make nutrient management recommendations based on the performance standard for nutrient management, s. NR 151.07, to ensure that their customers comply with this performance standard.

**Note:** If an application of material to cropland is regulated under ch. NR 113, 204, or 214, the management practices, loading limitations, and other restrictions specified in the applicable regulation apply to that application. However, nutrient management plans developed in accordance with this performance standard must account for all nutrient sources, including industrial waste and byproducts, municipal sludge, and septage. This means that the future application of manure and commercial fertilizer may be restricted by this performance standard due to other applications of industrial waste and byproducts, municipal sludge, and septage. In addition, it means that if industrial waste and byproducts, municipal sludge, or septage are placed in a manure storage structure and mixed with manure, the commingled material is also covered by this standard and must be accounted for by the producer when preparing and implementing a nutrient management plan.

**(3)** Manure, commercial fertilizer and other nutrients shall be applied in conformance with a nutrient management plan.

(a) The nutrient management plan shall be designed to limit or reduce the discharge of nutrients to waters of the state for the purpose of complying with state water quality standards and groundwater standards.

(b) Nutrient management plans for croplands in watersheds that contain impaired surface waters or in watersheds that contain outstanding or exceptional resource waters shall meet the following criteria:

1. Unless otherwise provided in this paragraph, the plan shall be designed to manage soil nutrient concentrations so as to maintain or reduce delivery of nutrients contributing to the impairment of impaired surface waters and to outstanding or exceptional resource waters.

2. The plan may allow for an increase in soil nutrient concentrations at a site if necessary to meet crop demands.

3. For lands in watersheds containing exceptional or outstanding resource waters, the plan may allow an increase in soil nutrient concentrations if the plan documents that any potential nutrient delivery to the exceptional or outstanding resource waters will not alter the background water quality of the exceptional or outstanding resource waters. For lands in watersheds containing impaired waters, the plan may allow an increase in soil nutrient concentrations if a low risk of delivery of nutrients from the land to the impaired water can be demonstrated.

(c) In this standard, impaired surface waters are waters identified as impaired pursuant to 33 USC 1313 (d) (1) (A) and 40 CFR

130.7. Outstanding or exceptional resource waters are identified in ch. NR 102.

**(4)** This section is in effect on January 1, 2005 for existing croplands under s. NR 151.09 (4) that are located within any of the following:

(a) Watersheds containing outstanding or exceptional resource waters.

(b) Watersheds containing impaired waters.

(c) Source water protection areas defined in s. NR 243.03 (61).

**(5)** This section is in effect on January 1, 2008 for all other existing croplands under s. NR 151.09 (4).

**(6)** This section is in effect for all new croplands under s. NR 151.09 (4) on October 1, 2003.

**Note:** The purpose of the phased implementation of this standard is to allow the department sufficient time to work with the Department of Agriculture, Trade and Consumer Protection and local governmental units to develop and implement an information, education and training program on nutrient management for affected stakeholders.

**History:** CR 00−027: cr. Register September 2002 No. 561, eff. 10−1−02; CR 09−112: am. (2) Register December 2010 No. 660, eff. 1−1−11; correction to (4) (c) made under s. 13.92 (4) (b) 7., Stats., Register December 2010 No. 660.

**NR 151.08 Manure management prohibitions. (1)** All livestock producers shall comply with this section.

**(2)** A livestock operation shall have no overflow of manure storage facilities.

**(3)** A livestock operation shall have no unconfined manure pile in a water quality management area.

**(4)** A livestock operation shall have no direct runoff from a feedlot or stored manure into the waters of the state.

**(5)** (a) A livestock operation may not allow unlimited access by livestock to waters of the state in a location where high concentrations of animals prevent the maintenance of adequate sod or self−sustaining vegetative cover.

(b) This prohibition does not apply to properly designed, installed and maintained livestock or farm equipment crossings.

**History:** CR 00−027: cr. Register September 2002 No. 561, eff. 10−1−02.

**NR 151.09 Implementation and enforcement procedures for cropland performance standards. (1)** PURPOSE. The purpose of this section is to identify the procedures the department will follow in implementing and enforcing the cropland performance standards pursuant to ss. 281.16 (3) and 281.98, Stats. This section will also identify circumstances under which an owner or operator of cropland is required to comply with the cropland performance standards. In this section, "cropland performance standards" means performance standards in ss. NR 151.005, 151.02, 151.03, 151.04, and 151.07.

**(2)** ROLE OF MUNICIPALITIES. The department may rely on municipalities to implement the procedures and make determinations established in this section.

**Note:** In most cases, the department will rely on municipalities to fully implement the cropland performance standards. The department intends to utilize the procedures in this section in cases where a municipality has requested assistance in implementing and enforcing the cropland performance standards or in cases where a municipality has failed to address an incident of noncompliance with the performance standards in a timely manner. The department recognizes that coordination between local municipalities, the Department of Agriculture, Trade and Consumer Protection and other state agencies is needed to achieve statewide compliance with the performance standards. Accordingly, the department plans on working with counties, the Department of Agriculture, Trade and Consumer Protection and other interested partners to develop a detailed intergovernmental strategy for achieving compliance with the performance standards that recognizes the procedures in these rules, state basin plans and the priorities established in land and water conservation plans.

**Note:** The department implementation and enforcement procedures for livestock performance standards relating to manure management are included in s. NR 151.095 and ch. NR 243.

**(3)** LANDOWNER AND OPERATOR REQUIREMENTS. (a) *Introduction.* This section identifies compliance requirements for landowners and operators based on whether the cropland is existing or new and whether cost sharing is required and made available to the landowner or operator.

(b) *General requirements.* If any cropland is meeting a cropland performance standard on or after the effective date of the standard, the cropland performance standard shall continue to be met by the existing landowner or operator, heirs or subsequent owners or operators of the cropland. If a landowner or operator alters or changes the management of the cropland in a manner that results in noncompliance with the performance standard, the landowner or operator shall bring the cropland back into compliance, regardless of whether cost−sharing is made available. This paragraph does not apply to croplands completing enrollment determined to be existing under sub. (4) (b) 2.

**Note:** The department or a municipality may use conservation plans, cost share agreements, deed restrictions, personal observations, landowner records, or other information to determine whether a change has occurred.

(c) *Existing cropland requirements.* 1. A landowner or operator of an existing cropland, defined under sub. (4) (b), shall comply with a cropland performance standard if all of the following have been done by the department:

a. Except as provided in subds. 2. and 3., a determination is made that cost sharing has been made available in accordance with sub. (4) (d) on or after the effective date of the cropland performance standard.

b. The landowner or operator has been notified in accordance with sub. (5) or (6).

2. A landowner or operator of existing cropland, defined under sub. (4) (b), shall comply with a cropland performance standard, regardless of whether cost sharing is available, in situations where the best management practices and other corrective measures needed to meet the performance standards do not involve eligible costs.

3. A landowner or operator of an existing cropland that voluntarily proposes to construct or reconstruct a manure storage system shall comply with s. NR 151.07, regardless of whether cost sharing is made available, if the nutrient management plan is required pursuant to a local permit for the manure storage system.

**Note:** Although the requirement for the nutrient management plan in this subd. 3 is tied to construction of a new manure storage system, the department intends to implement the nutrient management standard through s. NR 151.09 rather than through s. NR 151.095.

(d) *New cropland requirements.* A landowner or operator of a new cropland, defined under sub. (4) (b), shall comply with the cropland performance standards, regardless of whether cost sharing is available.

**Note:** Under s. 281.16 (3) (e), Stats., a landowner or operator may not be required by the state or a municipality through an ordinance to bring existing croplands into compliance with the cropland performance standards, technical standards or conservation practices unless cost−sharing is available in accordance with this section.

**(4)** DEPARTMENT DETERMINATIONS. (a) *Scope of determinations.* If croplands are not in compliance with a cropland performance standard, the department shall make determinations in accordance with the procedures and criteria in this subsection.

(b) *Cropland status.* The department shall classify non−complying croplands to be either new or existing for purposes of administering this section and s. 281.16 (3) (e), Stats. In making the determination, the department shall base the decision on the following:

1. An existing cropland is one that meets all of the following criteria:

a. The cropland was being cropped as of the effective date of the standard.

b. The cropland is not in compliance with a cropland performance standard in this subchapter as of the effective date of the standard. The reason for non−compliance of the cropland may not be failure of the landowner or operator to maintain an installed best management practice in accordance with a cost−share agreement or contract.

2. An existing cropland also includes land enrolled on October 1, 2002, in the conservation reserve or conservation reserve enhancement program administered by the U.S. department of

agriculture. This subdivision does not apply to croplands re−enrolled after October 1, 2002.

3. A new cropland is one that does not meet the definition under subd. 1. or 2., including:

a. Land without a previous history of cropping that is converted to cropland after the effective date of the standard. "Without a previous history of cropping" means land where crops have not been grown and harvested for agricultural purposes in the last 10 years prior to the conversion to cropland.

b. Cropland that is in existence and in compliance with a performance standard on or after the effective date of the standard and that undergoes a change in a cropland practice that results in noncompliance with the performance standards.

**Note:** The department or a municipality may use conservation plans, cost share agreements, deed restrictions, personal observations, landowner records, or other information to determine whether a change has occurred.

4. Change in ownership may not be used as the sole basis for determining whether a cropland is existing or new for purposes of administering this subsection.

(c) *Eligible costs.* 1. If cost sharing is required to be made available under sub. (3) (c), the department shall determine the total cost of best management practices and corrective measures needed to bring a cropland into compliance with performance standards and shall determine which of those costs are eligible for cost−sharing for the purposes of administering this section and s. 281.16 (3) (e), Stats.

2. The cost−share eligibility provisions identified in chs. NR 153 and 154 shall be used in identifying eligible costs for installation of best management practices and corrective measures.

3. Eligible technical assistance costs include best management practice planning, design, installation supervision, and installation certification.

4. If cost sharing is provided by DATCP or the department, the corrective measures shall be implemented in accordance with the BMPs and technical standards specified in ch. NR 154 or subch. VIII of ch. ATCP 50.

**Note:** Under chs. NR 153 and 154, eligible costs typically include capital costs and significant other expenses, including design costs, incurred by the landowner or operator. Eligible costs do not include the value or amount of time spent by a landowner or operator in making management changes.

(d) *Determination of cost−share availability.* 1. For purposes of administering this section and s. 281.16 (3) (e), Stats., if cost sharing is required to be made available under sub. (3), the department shall make a determination as to whether cost sharing has been made available on or after the effective date of the cropland standard to cover the eligible costs for a landowner or operator to comply with the cropland performance standard.

2. Cost sharing under s. 281.65, Stats., shall be considered available when all of the following have been met:

a. Cost share dollars are offered in accordance with either of the following: the department has entered into a runoff management grant agreement under ch. NR 153 or a nonpoint source grant agreement under ch. NR 120, and a notice under sub. (5), including any required offer of cost sharing, has been issued by the department or a municipality; or the department directly offers cost share assistance and issues a notice under sub. (5).

b. The grants in subd. 2. a., alone or in combination with other funding determined to be available under subd. 3., provide at least 70% of the eligible costs to implement the best management practices or other corrective measures for croplands needed to meet a cropland performance standard.

c. In cases of economic hardship determined in accordance with s. NR 154.03 (3), the grants in subd. 2. a., alone or in combination with other funding determined to be available under subd. 3., provide cost sharing consistent with the hardship determination.

3. For funding sources other than those administered by s. 281.65, Stats., the department may make a determination of cost share availability after consulting with DATCP and ch. ATCP 50.

**Note:** Under s. 281.16 (3) (e), DATCP is responsible for promulgating rules that specify criteria for determining whether cost−sharing is available from sources other than s. 281.65, Stats., including s. 92.14, Stats. Pursuant to s. 281.16 (3) (e), Stats., a municipality is required to follow the department's definition of cost−share availability if funds are utilized under s. 281.65, Stats. If funds are utilized from any other source, a municipality must defer to DATCP's definition of cost−share availability.

**(5)** NOTIFICATION REQUIREMENTS AND COMPLIANCE PERIODS FOR EXISTING CROPLANDS WHEN COST−SHARING IS REQUIRED. (a) *Landowner notification.* 1. The department shall notify a landowner or operator in writing of the determinations made under sub. (4) and implementation requirements for existing croplands where cost sharing is required for compliance.

2. The notice shall be sent certified mail, return receipt requested or personal delivery.

3. The following information shall be included in the notice:

a. A description of the cropland performance standard being violated.

b. The cropland status determination made in accordance with sub. (4) (b).

c. The determination made in accordance with sub. (4) (c) as to which best management practices or other corrective measures that are needed to comply with cropland performance standards are eligible for cost sharing.

**Note:** Some best management practices required to comply with cropland performance standards involve no eligible cost to the landowner or operator and are not eligible for cost sharing.

d. The determination made in accordance with sub. (4) (d) that cost sharing is available for eligible costs to achieve compliance with cropland performance standards, including a written offer of cost sharing.

e. An offer to provide or coordinate the provision of technical assistance.

f. A compliance period for meeting the cropland performance standard.

g. An explanation of the possible consequences if the landowner or operator fails to comply with provisions of the notice, including enforcement or loss of cost sharing, or both.

(b) *Compliance schedule.* 1. A landowner or operator that receives the notice under par. (a) shall install or implement best management practices and corrective measures to meet the performance standards in the time period specified in the notice, if cost sharing is available in accordance with sub. (4) (d) 2.

2. The compliance period identified in the notice in par. (a) shall be determined by the department as follows:

a. The compliance period shall begin on the postmark date of the notice or the date of personal delivery.

b. The length of the compliance period shall be not less than 60 days nor more than 3 years unless otherwise provided for in this subdivision.

c. The length of the compliance period may be less than 60 days if the site is an imminent threat to public health, fish and aquatic life.

d. The department may authorize an extension up to 4 years on a case−by−case basis provided that the reasons for the extension are beyond the control of the landowner or operator. A compliance period may not be extended to exceed 4 years in total.

3. Once a landowner or operator achieves compliance with a cropland performance standard, compliance with the standard shall be maintained by the existing landowner or operator and heirs or subsequent owners, regardless of cost sharing.

**(6)** NOTIFICATION REQUIREMENTS AND COMPLIANCE PERIODS FOR EXISTING CROPLANDS IN SITUATIONS WHEN NO ELIGIBLE COSTS ARE INVOLVED. (a) *Landowner notification.* 1. The department

shall notify a non−complying landowner or operator of existing croplands of the determinations made under sub. (4).

2. The notice shall be sent certified mail, return receipt requested, or via personal delivery.

3. The following information shall be included in the notice:

a. A description of the cropland performance standard that is being violated and the determination that corrective measures do not involve eligible costs under sub. (4) (c).

b. The cropland status determination made in accordance with sub. (4) (b).

c. A compliance period for achieving the cropland performance standard. The compliance period may not exceed the time limits in par. (b).

d. An explanation of the consequences if the landowner or operator fails to comply with provisions of the notice.

(b) *Compliance period.* 1. The compliance period for existing croplands where best management practices and other corrective measures do not involve eligible costs shall be in accordance with the following:

a. The compliance period shall begin on the postmark date of the notice or the date of personal delivery.

b. The length of the compliance period shall be not less than 60 days nor more than 3 years unless otherwise provided for in this subsection.

c. The length of the compliance period may be less than 60 days if the site is an imminent threat to public health, fish and aquatic life.

2. Once compliance with a cropland performance standard is attained, compliance with the standard shall be maintained by the existing landowner or operator and heirs or subsequent owners.

(c) *Combined notices.* The department may meet multiple notification requirements under par. (a), sub. (5) and s. NR 151.095 within any single notice issued to a landowner or operator.

**(7)** ENFORCEMENT. (a) *Authority to initiate enforcement.* The department may take enforcement action pursuant to s. 281.98, Stats., or other appropriate actions, against the landowner or operator of a cropland for failing to comply with the cropland performance standards in this subchapter or approved variances to the cropland performance standards provided by the department under s. NR 151.097.

(b) *Enforcement following notice and direct enforcement.* The department shall provide notice to the landowner or operator of an existing cropland in accordance with subs. (5) and (6) prior to the department initiating enforcement action under s. 281.98, Stats., except in cases of repeated mismanagement. In such cases, the department may pursue direct enforcement under s. 281.98, Stats., for the second and any subsequent offenses.

**Note:** The implementation and enforcement procedures in this section are limited to actions taken by the department under s. 281.98, Stats., for noncompliance with a cropland performance standard. Pursuant to other statutory authority, the department may take direct enforcement action without cost sharing against a crop producer for willful or intentional acts or other actions by a landowner or operator that pose an immediate or imminent threat to human health or the environment.

**Note:** An owner or operator of a new cropland is required to meet the cropland performance standards by incorporating necessary management measures at the time the new cropland is created. This requirement shall be met regardless of cost sharing. The department may pursue direct enforcement under s. 281.98, Stats., against landowners or operators of new croplands not in compliance.

**(8)** NOTIFICATION TO MUNICIPALITIES. The department shall notify the appropriate municipality, including a county land conservation committee, prior to taking any of the following actions under this section:

(a) Contacting a landowner or operator to investigate compliance with cropland performance standards.

(b) Issuing a notice under sub. (5) or (6) to a landowner or operator.

(c) Taking enforcement action under s. 281.98, Stats., against a landowner or operator for failing to comply with cropland performance standards in this subchapter.

(d) Notification is not required if the site is an imminent threat to public health or fish and aquatic life.

**History:** CR 00−027: cr. Register September 2002 No. 561, eff. 10−1−02; CR 09−112: am. (1), (4) (b) 2., (c) 3., (d) 2. a., c., (5) (b) 2. b., (6) (b) 1. b., (7) (b), r. (5) (a) 3. h., (6) (a) 3. e. Register December 2010 No. 660, eff. 1−1−11.

**NR 151.095 Implementation and enforcement procedures for livestock performance standards and prohibitions. (1)** PURPOSE. The purpose of this section is to identify the procedures the department will follow in implementing and enforcing the livestock performance standards and prohibitions pursuant to ss. 281.16 (3) and 281.98, Stats. If a livestock performance standard is also listed as a cropland performance standard under s. NR 151.09, the department may choose the procedures of either s. NR 151.09 or this section to obtain compliance with the standard. This section will also identify circumstances under which an owner or operator of a livestock facility is required to comply with livestock performance standards and prohibitions. In this section, "livestock performance standards and prohibitions" means the performance standards and prohibitions in ss. NR 151.005, 151.05, 151.055, 151.06, and 151.08.

**Note:** The nutrient management standard in s. NR 151.07 should be implemented through the procedures in s. NR 151.09.

**(2)** ROLE OF MUNICIPALITIES. The department may rely on municipalities to implement the procedures and make determinations outlined in this section.

**Note:** In most cases, the department will rely on municipalities to fully implement the livestock performance standards and prohibitions. The department intends to utilize the procedures in this section in cases where a municipality has requested assistance in implementing and enforcing the performance standards or prohibitions or in cases where a municipality has failed to address an incident of noncompliance with the performance standards or prohibitions in a timely manner. The department recognizes that coordination between local municipalities, the department of agriculture, trade and consumer protection and other state agencies is needed to achieve statewide compliance with the performance standards and prohibitions. Accordingly, the department plans on working with counties, the department of agriculture, trade and consumer protection and other interested partners to develop a detailed intergovernmental strategy for achieving compliance with the performance standards and prohibitions that recognizes the procedures in these rules, state basin plans and the priorities established in land and water conservation plans.

**Note:** Additional implementation and enforcement procedures for livestock performance standards and prohibitions are in ch. NR 243, including the procedures for the issuance of a NOD.

**(3)** EXEMPTIONS. The department may follow the procedures in ch. NR 243 and is not obligated to follow the procedures and requirements of this section in the following situations:

(a) If the livestock operation holds a WPDES permit.

(b) If the department has determined that the issuance of a NOD to the owner or operator of the livestock operation is warranted. Circumstances in which a NOD may be warranted include:

1. The department has determined that a livestock facility has a point source discharge under s. NR 243.24.

2. The department has determined that a discharge to waters of the state is occurring and the discharge is not related to noncompliance with the performance standards or prohibitions.

3. The department has determined that a municipality is not addressing a facility's noncompliance with the performance standards and prohibitions in a manner consistent with the procedures and timelines established in this section.

**(4)** LIVESTOCK OWNER AND OPERATOR REQUIREMENTS. (a) *Introduction.* This section identifies compliance requirements for a livestock owner or operator based on whether a livestock facility is existing or new and whether cost sharing is required to be made available to a livestock owner or operator.

(b) *General requirements.* If any livestock facility is meeting a livestock performance standard or prohibition on or after the effective date of the standard or prohibition, the livestock performance standard or prohibition shall continue to be met by the

existing owner or operator, heirs or subsequent owners or operators of the facility. If an owner or operator alters or changes the management of the livestock facility in a manner that results in noncompliance with a livestock performance standard or prohibition, the owner or operator shall bring the livestock facility back into compliance regardless of cost−share availability.

**Note:** The department or a municipality may use conservation plans, cost share agreements, deed restrictions, personal observations, landowner records, or other information to determine whether a change has occurred.

(c) *Existing livestock facility requirements.* 1. An owner or operator of an existing livestock facility, defined under sub. (5) (b), shall comply with a livestock performance standard or prohibition if all of the following have been done by the department:

a. Except as provided in subd. 2., a determination is made that cost sharing has been made available in accordance with sub. (5) (d) on or after the effective date of the livestock performance standard or prohibition.

b. The owner or operator of the livestock facility has been notified in accordance with sub. (6) or (7).

2. An owner or operator of an existing livestock facility, defined under sub. (5) (b), shall comply with the livestock performance standards and prohibitions, regardless of whether cost sharing is available, in situations where best management practices and other corrective measures needed to meet the performance standards do not involve eligible costs.

(d) *New livestock facility requirements.* An owner or operator of a new livestock facility, defined under sub. (5) (b), shall comply with the livestock performance standards and prohibitions, regardless of whether cost sharing is available.

**Note:** Under s. 281.16 (3) (e), Stats., an owner or operator may not be required by the state or a municipality through an ordinance or regulation to bring existing livestock facilities into compliance with the livestock performance standards or prohibitions, technical standards or conservation practices unless cost−sharing is available in accordance with this section.

**(5)** DEPARTMENT DETERMINATIONS. (a) *Scope of determinations.* If a livestock facility is not in compliance with a livestock performance standard or prohibition, the department shall make determinations in accordance with the procedures and criteria in this subsection.

(b) *Livestock facility status.* The department shall classify a non−complying livestock facility on an operation to be either new or existing for purposes of administering this section and s. 281.16 (3) (e), Stats. In making the determination, the department shall base the decision on the following:

1. An existing livestock facility is one that meets all of the following criteria:

a. The facility is in existence as of the effective date of the livestock performance standard or prohibition.

b. The facility is not in compliance with a livestock performance standard or prohibition in this subchapter as of the effective date of the livestock performance standard or prohibition. The reason for noncompliance of the livestock facility may not be failure of the owner or operator to maintain an installed best management practice in accordance with a cost−share agreement or contract.

2. A new livestock operation or facility is one that does not meet the definition under subd. 1., including:

a. A livestock operation or facility that is established or installed after the effective date of the livestock performance standard or prohibition, including the placement of livestock structures on a site that did not previously have structures, or placement of animals on lands that did not have animals as of the effective date of the livestock performance standard or prohibition, unless the land is part of an existing rotational grazing or pasturing operation.

b. For a livestock operation that is in existence as of the effective date of the livestock performance standard or prohibition that establishes or constructs or substantially alters a facility after the effective date of the livestock performance standard or prohibition, the facilities constructed, established or substantially altered after the effective date of the livestock performance standard or prohibition are considered new, except as specified in subd. 3.

c. A livestock facility that is in existence and in compliance with a livestock performance standard or prohibition on or after the effective date of the livestock performance standard or prohibition and that undergoes a change in the livestock facility that results in noncompliance with the livestock performance standard or prohibition. This includes manure storage facilities that fail to meet the requirements of s. NR 151.05 (3) and were either: constructed on or after October 1, 2002; or were constructed prior to October 1, 2002, and subject through October 1, 2002, to the operation and maintenance provisions of a cost share agreement.

3. Pursuant to the implementation procedures in this section, if the department or a municipality directs an owner or operator of an existing livestock facility to construct a facility as a corrective measure to comply with a performance standard or prohibition on or after the effective date of the livestock performance standard or prohibition, or directs the owner or operator to reconstruct the existing facility as a corrective measure on or after the effective date of the livestock performance standard or prohibition, the constructed facilities are not considered new for purposes of installing or implementing the corrective measure.

4. A livestock facility that meets the criteria in subd. 1. and has subsequently been abandoned shall retain its status as an existing livestock facility if livestock of similar species and number of animal units are reintroduced within 5 years of abandonment.

5. Change in ownership may not be used as the basis for determining whether a livestock facility is existing or new for purposes of administering this subsection.

(c) *Eligible costs.* 1. If cost sharing is required to be made available under sub. (4) (c), the department shall determine the total cost of best management practices and corrective measures needed to bring a livestock facility into compliance with a livestock performance standard or prohibition and shall determine which of those costs are eligible for cost sharing for the purposes of administering this section and s. 281.16 (3) (e), Stats.

2. The cost−share eligibility provisions identified in chs. NR 153 and 154 shall be used in identifying eligible costs for installation of best management practices and corrective measures.

3. Eligible technical assistance costs include best management practice planning, design, installation supervision, and installation certification.

4. If cost sharing is provided by DATCP or the department, the corrective measures shall be implemented in accordance with the best management practices and technical standards specified in ch. NR 154 or subch. VIII of ch. ATCP 50.

**Note:** Under chs. NR 153 and 154, eligible costs typically include capital costs and significant other expenses, including design costs, incurred by the owner or operator of the livestock operation. Eligible costs do not include the value or amount of time spent by an owner or operator in making management changes.

(d) *Determination of cost−share availability.* 1. For purposes of administering this section and s. 281.16 (3) (e), Stats., if cost sharing is required to be made available under sub. (4) (c), the department shall make a determination as to whether cost sharing has been made available on or after the effective date of the livestock performance standard or prohibition to cover eligible costs for an owner or operator to comply with a livestock performance standard or prohibition.

2. Cost sharing under s. 281.65, Stats., shall be considered available when all of the following have been met:

a. Cost share dollars are offered in accordance with either of the following: the department has entered into a runoff management grant agreement under ch. NR 153 or a nonpoint source grant agreement under ch. NR 120, and a notice under sub. (6) or under s. NR 243.24 (4), including any required offer of cost sharing, has been issued by the department or a municipality; or the depart-

ment directly offers cost sharing and issues a notice under sub. (6) or s. NR 243.24 (4).

b. The grants in subd. 2. a., alone or in combination with other funding determined to be available under subd. 3., provide at least 70% of the eligible costs to implement the best management practices or other corrective measures needed for a livestock facility to meet a livestock performance standard or prohibition.

c. In cases of economic hardship determined in accordance with s. NR 154.03 (3), the grants in subd. 2. a., alone or in combination with other funding determined to be available under subd. 3., provide cost sharing consistent with the hardship determination.

d. If an existing livestock operation with less than 250 animal units wants to expand at the time it is upgrading a facility to meet a performance standard or prohibition pursuant to a notice in sub. (6) or under s. NR 243.24 (4), the grants in subd. 2. a., alone or in combination with other funding determined to be available under subd. 3., shall also provide at least 70% of eligible costs needed to bring any expansion of facilities of up to 300 animal units into compliance with the performance standard or prohibition. In cases of economic hardship, the grants in subd. 2. a., alone or in combination with other funding determined to be available under subd. 3., shall also provide between 70% and 90% of the eligible costs needed to bring any expansion of facilities of up to 300 animal units into compliance with the performance standards and prohibitions.

**Note:** For livestock operations with less than 250 animal units, that portion of any expansion of facilities to accommodate more than 300 animal units is not eligible for cost sharing under s. NR 153.15 (2) (d) 1. For an existing livestock operation with greater than 250 animal units, but less than the number of animal units requiring a WPDES permit under s. NR 243.12 (1) (a), (b) or (c), cost sharing may be provided under s. NR 153.15 (2) (d) 2., for at least 70% of eligible costs to bring up to a 20% increase in livestock population into compliance with the performance standards and prohibitions; however, cost sharing for eligible costs up to a 20% expansion in livestock population is not required to be made available for compliance.

3. For funding sources other than those administered by s. 281.65, Stats., the department may make a determination of cost share availability after consulting with DATCP and ch. ATCP 50.

**Note:** Under s. 281.16 (3) (e), Stats., DATCP is responsible for promulgating rules that specify criteria for determining whether cost sharing is available from sources other than s. 281.65, Stats., including s. 92.14, Stats. Pursuant to s. 281.16 (3) (e), Stats., a municipality is required to follow the department's definition of cost share availability if funds are utilized under s. 281.65, Stats. If funds are utilized from any other source, a municipality shall defer to DATCP's definition of cost share availability.

**(6)** NOTIFICATION REQUIREMENTS AND COMPLIANCE PERIODS FOR EXISTING LIVESTOCK FACILITIES WHEN COST SHARING IS REQUIRED. (a) *Owner or operator notification.* 1. The department shall notify an owner or operator in writing of the determinations made under sub. (5) and implementation requirements for existing livestock facilities where cost sharing is required for compliance.

2. The notice shall be sent certified mail, return receipt requested or personal delivery.

3. The following information shall be included in the notice:

a. A description of the livestock performance standard or prohibition being violated.

b. The livestock facility status determination made in accordance with sub. (5) (b).

c. The determination made in accordance with sub. (5) (c) as to which best management practices or other corrective measures needed to comply with a livestock performance standard or prohibition are eligible for cost sharing.

**Note:** Some best management practices required to comply with a livestock performance standard or prohibition involves no eligible costs to the owner or operator.

d. The determination made in accordance with sub. (5) (d) that cost sharing is available for eligible costs to achieve compliance with a livestock performance standard or prohibition, including a written offer of cost sharing.

e. An offer to provide or coordinate the provision of technical assistance.

f. A compliance period for meeting the livestock performance standard or prohibition.

g. An explanation of the possible consequences if the owner or operator fails to comply with provisions of the notice, including enforcement or loss of cost sharing, or both.

(b) *Compliance period.* 1. An owner or operator that receives the notice under par. (a) shall install or implement best management practices and corrective measures to meet a performance standard or prohibition in the time period specified in the notice, if cost sharing is available in accordance with sub. (5) (d) 2.

2. The compliance period identified in the notice in par. (a) shall be determined by the department as follows:

a. The compliance period shall begin on the post−mark date of the notice or the date of personal delivery.

b. The length of the compliance period shall be not less than 60 days nor more than 3 years unless otherwise provided for in this subdivision.

c. The length of the compliance period may be less than 60 days if the site is an imminent threat to public health or fish and aquatic life.

d. The department may authorize an extension up to 4 years on a case−by−case basis provided that the reasons for the extension are beyond the control of the owner or operator of the livestock facility. A compliance period may not be extended to exceed 4 years in total.

3. Once an owner or operator achieves compliance with a livestock performance standard or prohibition, compliance with the standard or prohibition shall be maintained by the existing owner or operator and heirs or subsequent owners or operators, regardless of cost sharing.

**(7)** NOTIFICATION REQUIREMENTS AND COMPLIANCE PERIODS FOR EXISTING LIVESTOCK FACILITIES IN SITUATIONS WHEN NO ELIGIBLE COSTS ARE INVOLVED. (a) *Owner or operator notification.* 1. The department shall notify a non−complying owner or operator of an existing livestock facility of the determinations made under sub. (5).

2. The notice shall be sent certified mail, return receipt requested or personal delivery.

3. The following information shall be included in the notice:

a. A description of the livestock performance standard or prohibition that is being violated and the determination that corrective measures do not involve eligible costs under sub. (5) (c).

b. The livestock operation status determination made in accordance with sub. (5) (b).

c. A compliance period for meeting the livestock performance standard or prohibition. The compliance period may not exceed the time limits in par. (b).

d. An explanation of the consequences if the owner or operator fails to comply with provisions of the notice.

(b) *Compliance period.* 1. The compliance period for existing livestock facilities where best management practices and other corrective measures do not involve eligible costs shall be in accordance with the following;

a. The compliance period shall begin on the postmark date of the notice or the date of personal delivery.

b. The length of the compliance period shall be not less than 60 days nor more than 3 years unless otherwise provided for in this subsection.

c. The length of the compliance period may be less than 60 days if the site is an imminent threat to public health, or fish and aquatic life.

2. Once compliance with a livestock performance standard or prohibition is attained, compliance with the performance standard or prohibition shall be maintained by the existing owner or operator and heirs or subsequent owners or operators.

(c) *Combined notices.* The department may meet multiple notification requirements under par. (a), sub. (6) and s. NR 151.09 within any single notice issued to the owner or operator.

**(8)** ENFORCEMENT. (a) *Authority to initiate enforcement.* The department may take action pursuant s. 281.98, Stats., or other appropriate actions, against the owner or operator of a livestock operation for failing to comply with the livestock performance standards and prohibitions in this subchapter or approved variances to the livestock performance standards provided by the department under s. NR 151.097.

(b) *Enforcement following notice and direct enforcement.* The department shall provide notice to the owner or operator of an existing livestock facility in accordance with sub. (6) or (7) prior to the department initiating enforcement action under s. 281.98, Stats., except in cases of repeated mismanagement, such as allowing repeated manure storage overflows, where the department may pursue direct enforcement under s. 281.98, Stats., for the second and subsequent offenses.

**Note:** The implementation and enforcement procedures in this section are limited to actions taken by the department under s. 281.98, Stats., for noncompliance with a livestock performance standard or prohibition. Pursuant to other statutory authority, the department may take direct enforcement action without cost sharing against a livestock producer for willful or intentional acts or other actions by a producer that pose an imminent or immediate threat to human health or the environment.

**Note:** An owner or operator of a new livestock facility is required to meet the livestock performance standards and prohibitions at the time the new facility is created. This requirement shall be met regardless of cost sharing.

**(9)** NOTIFICATION TO MUNICIPALITIES. The department shall notify the appropriate municipality, including a county land conservation committee, prior to taking any of the following actions under this subsection:

(a) Contacting an owner or operator to investigate compliance with livestock performance standards and prohibitions.

(b) Issuing a notice under sub. (6) or (7) to an owner or operator.

(c) Taking enforcement action under s. 281.98, Stats., against an owner or operator for failing to comply with a livestock performance standard or prohibition in this subchapter.

(d) Notification is not required if the site is an imminent threat to public health or fish and aquatic life.

**History:** CR 00−027: cr. Register September 2002 No. 561, eff. 10−1−02; CR 09−112: am. (1) (intro.), (5) (b) 2. c., 5., (c) 3., (d) 2. a., c., (6) (b) 2. b., (7) (b) 1. b., (8) (b), r. (6) (a) 3. h., (7) (a) 3. e. Register December 2010 No. 660, eff. 1−1−11.

**NR 151.096 Local livestock operation ordinances and regulations. (1)** LOCAL REGULATIONS THAT EXCEED STATE STANDARDS; APPROVAL REQUIRED. (a) Except as provided in par. (b), a local governmental unit may not enact a livestock operation ordinance or regulation for water quality protection that exceeds the performance standards or prohibitions in ss. NR 151.05 to 151.08 or the related conservation practices or technical standards in ch. ATCP 50, unless the local governmental unit obtains approval from the department under sub. (2), or receives approval from DATCP pursuant to s. ATCP 50.60.

(b) Paragraph (a) does not apply to any of the following:

1. Local ordinances or regulations that address cropping practices that are not directly related to the livestock operation.

2. Local ordinances or regulations enacted prior to October 1, 2002.

**Note:** See s. 92.15, Stats. A person adversely affected by a local livestock regulation may oppose its adoption at the local level. The person may also challenge a local regulation in court if the person believes that the local governmental unit has violated sub. (1) or s. 92.15, Stats. A local governmental unit is responsible for analyzing the legal adequacy of its regulations, and may exercise its own judgment in deciding whether to seek state approval under this section.

**Note:** Subsection (1) does not limit or expand the application of s. 92.15, Stats., to ordinances or regulations enacted prior to October 1, 2002.

**(2)** DEPARTMENT APPROVAL. (a) To obtain department approval under sub. (1) for an existing or proposed regulation, the head of the local governmental unit or the chair of the local governmental unit's governing board shall do all of the following:

1. Submit a copy of the livestock operation ordinance or regulation or portion thereof to the department and to the department of agriculture, trade and consumer protection.

2. Identify the provisions of the regulation for which the local governmental unit seeks approval.

3. Submit supporting documentation explaining why the specific regulatory provisions that exceed the performance standards, prohibitions, conservation practices or technical standards are needed to achieve water quality standards, and why compliance cannot be achieved with a less restrictive standard.

(b) The department shall notify the local governmental unit in writing within 90 calendar days after the department receives the ordinance or regulation as to whether the ordinance or regulation, or portion thereof is approved or denied and shall state the reasons for its decision. Before the department makes its decision, the department shall solicit a recommendation from DATCP. If the department finds the regulatory provisions are needed to achieve water quality standards, the department may approve the ordinance or regulation or portion thereof.

**(3)** LOCAL PERMITS. Local permits or permit conditions are not subject to the review and approval procedures in this section unless the permit conditions are codified in a local ordinance or regulation.

**Note:** A local permit requirement does not, in and of itself, violate sub. (1), but permit conditions codified in a local ordinance or regulation must comply with sub. (1). If a local governmental unit routinely requires permit holders to comply with uncodified water quality protection standards that exceed state standards, those uncodified requirements may be subject to court challenge for noncompliance with s. 92.15, Stats., and sub. (1) as *de facto* regulatory enactments. A local governmental unit may forestall a legal challenge by codifying standard permit conditions and obtaining any necessary state approval under this section. The department will review codified regulations, but will not review individual permits or uncodified permit conditions under sub. (2).

**History:** CR 00−027: cr. Register September 2002 No. 561, eff. 10−1−02.

**NR 151.097 Variances. (1)** The department may grant a variance to the performance standards, technical standards or other non−statutory requirements in this subchapter.

**(2)** The department may not grant a variance solely on the basis of economic hardship.

**(3)** The department may grant a variance only if all of the following conditions are met:

(a) Compliance with the performance standard or technical standard is not feasible due to site conditions. This condition does not apply to research activities conducted as part of a planned agricultural research and farming curriculum.

(b) The landowner or operator will implement best management practices or other corrective measures that ensure a level of pollution control that will achieve a level of water quality protection comparable to that afforded by the performance standards in this subchapter.

(c) The conditions for which the variance is requested are not created by the landowner or operator or their agents or assigns. This condition does not apply to research activities conducted as part of a planned agricultural research and farming curriculum.

**(4)** The department shall use the following process when administering a variance request:

(a) The landowner or operator shall submit the variance request to the department or governmental unit, including a county land conservation committee within 60 days of receiving the notice.

(b) The governmental unit shall forward any variances that it receives to the department. The department may consider a recommendation from the governmental unit concerning acceptance of the variance request.

(c) The department shall make its determination based on the factors in sub. (3).

(d) The department shall notify the landowner or operator and the governmental unit of its determination. If the variance is

granted, the department or governmental unit shall send to the landowner or operator an amended notice.

(e) The period of time required to make a ruling on a variance request does not extend the compliance periods allowed under ss. NR 151.09 and 151.095.

**Note:** The department may consider decisions made by a governmental unit, in accordance with local ordinance provisions, when making its determination whether to accept or deny the variance.

**History:** CR 00−027: cr. Register September 2002 No. 561, eff. 10−1−02.

## Subchapter III — Non−Agricultural Performance Standards

**NR 151.10 Purpose.** This subchapter establishes performance standards, as authorized by s. 281.16 (2) (a), Stats., for non−agricultural facilities and practices that cause or may cause nonpoint runoff pollution. These performance standards are intended to limit nonpoint runoff pollution in order to achieve water quality standards. Design guidance and the process for developing technical standards to implement this section are set forth in subch. V.

**History:** CR 00−027: cr. Register September 2002 No. 561, eff. 10−1−02.

**NR 151.105 Construction site performance standard for non−permitted sites. (1)** APPLICABILITY. Except as provided under sub. (2), this section applies to all of the following:

(a) A construction site that consists of land disturbing construction activity of less than one acre.

**Note:** Land disturbing construction sites of less than one acre are not regulated under subch. III of ch. NR 216 unless designated by the department under s. NR 216.51 (3).

(b) Construction projects that are exempted by federal statutes or regulations from the requirement to have a national pollutant discharge elimination system permit issued under 40 CFR 122, for land disturbing construction activity.

**(2)** EXEMPTIONS. This section does not apply to the following:

(a) One− and two− family dwellings regulated by the department of commerce pursuant to s.101.653, Stats.

(b) Agricultural facilities and practices.

(c) Silviculture activities.

**(3)** RESPONSIBLE PARTY. The landowner of the construction site or other person contracted or obligated by other agreement with the landowner to implement and maintain construction site BMPs is the responsible party and shall comply with this section.

**(4)** REQUIREMENTS. Erosion and sediment control practices at each site where land disturbing construction activity is to occur shall be used to prevent or reduce all of the following:

(a) The deposition of soil from being tracked onto streets by vehicles.

(b) The discharge of sediment from disturbed areas into on−site storm water inlets.

(c) The discharge of sediment from disturbed areas into adjacent waters of the state.

(d) The discharge of sediment from drainage ways that flow off the site.

(e) The discharge of sediment by dewatering activities.

(f) The discharge of sediment eroding from soil stockpiles existing for more than 7 days.

(g) The transport by runoff into waters of the state of chemicals, cement and other building compounds and materials on the construction site during the construction period. However, projects that require the placement of these materials in waters of the state, such as constructing bridge footings or BMP installations, are not prohibited by this paragraph.

**Note:** In accordance with subch. V, the department has developed technical standards to help meet the construction site performance standards. These technical standards are available from the department at (608) 267−7694.

**(5)** LOCATION. BMPs shall be located so that treatment occurs before runoff enters waters of the state.

**(6)** IMPLEMENTATION. The BMPs used to comply with this section shall be implemented as follows:

(a) Erosion and sediment control practices shall be constructed or installed before land disturbing construction activities begin.

(b) Erosion and sediment control practices shall be maintained until final stabilization.

(c) Final stabilization activity shall commence when land disturbing activities cease and final grade has been reached on any portion of the site.

(d) Temporary stabilization activity shall commence when land disturbing construction activities have temporarily ceased and will not resume for a period exceeding 14 calendar days.

(e) BMPs that are no longer necessary for erosion and sediment control shall be removed by the responsible party.

**History:** CR 09−112: cr. Register December 2010 No. 660, eff. 1−1−11.

**NR 151.11 Construction site performance standard for sites of one acre or more. (1)** DETERMINATION OF SOIL LOSS. In this section, soil loss is calculated using the appropriate rainfall or runoff factor, also referred to as the R factor, or an equivalent design storm using a type II distribution, with consideration given to the geographic location of the site and the period of disturbance.

**Note:** The universal soil loss equation and its successors, revised universal soil loss equation and revised universal soil loss equation 2, utilize an R factor which has been developed to estimate soil erosion, averaged over extended time periods. The R factor can be modified to estimate monthly and single−storm erosion.

**(2)** APPLICABILITY. This section applies to any construction site that consists of one acre or more of land disturbing construction activity.

(a) Subsections (3), (4), (5), (6), and (7) apply to all of the following:

1. Construction sites for which the department received a notice of intent in accordance with subch. III of ch. NR 216 before January 1, 2011.

2. Construction sites for which the department of commerce received a notice of intent in accordance with ch. SPS 360 before January 1, 2011.

3. Construction sites for which a bid has been advertised or construction contract signed for which no bid was advertised, before January 1, 2011.

(b) Subsections (3) (a) to (d), (4), (5), (6m), (7), and (8) apply to all of the following:

1. Construction sites for which the department received a notice of intent in accordance with subch. III of ch. NR 216 on or after January 1, 2011.

2. Construction sites for which a bid has been advertised or construction contract signed for which no bid was advertised, on or after January 1, 2011.

**(3)** EXEMPTIONS. This section does not apply to the following:

(a) Construction projects that are exempted by federal statutes or regulations from the requirement to have a national pollutant discharge elimination system permit issued under 40 CFR 122, for land disturbing construction activity.

(b) Transportation facilities, except transportation facility construction projects that are part of a larger common plan of development such as local roads within a residential or industrial development.

**Note:** Transportation facility performance standards are given in subch. IV.

(c) Nonpoint discharges from agricultural facilities and practices.

**Note:** This exemption is for nonpoint discharges from agricultural facilities and practices, such as cropping and pasturing. Subchapter III of ch. NR 216 also exempts nonpoint discharges, but regulates point source discharges of storm water, such as the construction of barns, manure storage facilities, sand settling lanes, and barnyard runoff control systems. Under s. NR 216.42 (2), such construction sites are subject to the construction performance standards of this section.

(d) Nonpoint discharges from silviculture activities.

(e) Routine maintenance for project sites that have less than 5 acres of land disturbance if performed to maintain the original line and grade, hydraulic capacity or original purpose of the facility.

**(4)** RESPONSIBLE PARTY. The landowner or other person performing services to meet the performance standards of this subchapter, through a contract or other agreement with the landowner, is the responsible party and shall comply with this section.

**(5)** PLAN. The responsible party under sub. (4) shall develop and implement a written plan for each construction site. The plan shall incorporate the applicable requirements of this section.

**Note:** The written plan may be that specified within s. NR 216.46, the erosion control portion of a construction plan or other plan.

**(6)** PRE−JANUARY 1, 2011 REQUIREMENTS. The plan required under sub. (5) shall include the following:

(a) Best management practices that, by design, achieve, to the maximum extent practicable, a reduction of 80% of the sediment load carried in runoff, on an average annual basis, as compared with no sediment or erosion controls, until the construction site has undergone final stabilization. No person shall be required to exceed an 80% sediment reduction to meet the requirements of this paragraph. Erosion and sediment control BMPs may be used alone or in combination to meet the requirements of this paragraph. Credit toward meeting the sediment reduction shall be given for limiting the duration or area, or both, of land disturbing construction activity, or other appropriate mechanism.

**Note:** Soil loss prediction tools that estimate the sediment load leaving the construction site under varying land and management conditions, or methodology identified in subch. V., may be used to calculate sediment reduction.

(b) Notwithstanding par. (a), if BMPs cannot be designed and implemented to reduce the sediment load by 80%, on an average annual basis, the plan shall include a written and site−specific explanation why the 80% reduction goal is not attainable and the sediment load shall be reduced to the maximum extent practicable.

(c) Where appropriate, the plan shall include sediment controls to do all of the following to the maximum extent practicable:

1. Prevent tracking of sediment from the construction site onto roads and other paved surfaces.

2. Prevent the discharge of sediment as part of site de−watering.

3. Protect separate storm drain inlet structures from receiving sediment.

(d) The use, storage and disposal of chemicals, cement and other compounds and materials used on the construction site shall be managed during the construction period to prevent their transport by runoff into waters of the state. However, projects that require the placement of these materials in waters of the state, such as constructing bridge footings or BMP installations, are not prohibited by this paragraph.

**(6m)** POST−JANUARY 1, 2011 REQUIREMENTS. The plan required under sub. (5) shall meet all of the following:

(a) *Erosion and sediment control practices.* Erosion and sediment control practices at each site where land disturbing construction activity is to occur shall be used to prevent or reduce all of the following:

1. The deposition of soil from being tracked onto streets by vehicles.

2. The discharge of sediment from disturbed areas into on−site storm water inlets.

3. The discharge of sediment from disturbed areas into adjacent waters of the state.

4. The discharge of sediment from drainage ways that flow off the site.

5. The discharge of sediment by dewatering activities.

6. The discharge of sediment eroding from soil stockpiles existing for more than 7 days.

7. The discharge of sediment from erosive flows at outlets and in downstream channels.

8. The transport by runoff into waters of the state of chemicals, cement, and other building compounds and materials on the construction site during the construction period. However, projects that require the placement of these materials in waters of the state, such as constructing bridge footings or BMP installations, are not prohibited by this subdivision.

9. The transport by runoff into waters of the state of untreated wash water from vehicle and wheel washing.

**Note:** Wastewaters, such as from concrete truck washout, needs to be properly managed to limit the discharge of pollutants to waters of the state. A separate permit may be needed from the department where a wastewater discharge has the potential to adversely impact waters of the state. The appropriate department wastewater specialist should be contacted to determine if wastewater permit coverage is needed where wastewater will be discharged to waters of the state.

(b) *Sediment performance standards*. In addition to the erosion and sediment control practices under par. (a), the following erosion and sediment control practices shall be employed:

1. For construction sites for which the department received a notice of intent for the construction project in accordance with subch. III of ch. NR 216, within 2 years after January 1, 2011, BMPs that, by design, achieve a reduction of 80 percent, or to the maximum extent practicable, of the sediment load carried in runoff, on an average annual basis, as compared with no sediment or erosion controls, until the construction site has undergone final stabilization.

2. For construction sites for which the department received a notice of intent for the construction project in accordance with subch. III of ch. NR 216, 2 years or more after January 1, 2011, BMPs that, by design, discharge no more than 5 tons per acre per year, or to the maximum extent practicable, of the sediment load carried in runoff from initial grading to final stabilization.

3. The department may not require any person to employ more BMPs than are needed to meet a performance standard in order to comply with maximum extent practicable. Erosion and sediment control BMPs may be combined to meet the requirements of this paragraph. The department may give credit toward meeting the sediment performance standard of this paragraph for limiting the duration or area, or both, of land disturbing construction activity, or for other appropriate mechanisms.

4. Notwithstanding subd. 1. or 2., if BMPs cannot be designed and implemented to meet the sediment performance standard, the plan shall include a written, site−specific explanation of why the sediment performance standard cannot be met and how the sediment load will be reduced to the maximum extent practicable.

**Note:** Soil loss prediction tools such as revised universal soil loss equation 2 that estimate the sediment load leaving the construction site under varying land and management conditions, or methodology identified in subch. V, may be used to calculate sediment reduction.

**Note:** In accordance with subch. V, the department has developed technical standards to help meet the construction site performance standards. These technical standards are available from the department at (608) 267−7694.

(c) *Preventive measures*. The plan shall incorporate all of the following:

1. Maintenance of existing vegetation, especially adjacent to surface waters whenever possible.

2. Minimization of soil compaction and preservation of topsoil.

3. Minimization of land disturbing construction activity on slopes of 20% or more.

4. Development of spill prevention and response procedures.

**(7)** LOCATION. BMPs shall be located so that treatment occurs before runoff enters waters of the state.

**Note:** While regional treatment facilities are appropriate for control of post−construction pollutants they should not be used for construction site sediment removal.

**(8)** IMPLEMENTATION. The BMPs used to comply with this section shall be implemented as follows:

(a) Erosion and sediment control practices shall be constructed or installed before land disturbing construction activities begin in accordance with the plan developed under sub. (5).

(b) Erosion and sediment control practices shall be maintained until final stabilization.

(c) Final stabilization activity shall commence when land disturbing activities cease and final grade has been reached on any portion of the site.

(d) Temporary stabilization activity shall commence when land disturbing construction activities have temporarily ceased and will not resume for a period exceeding 14 calendar days.

(e) BMPs that are no longer necessary for erosion and sediment control shall be removed by the responsible party.

**History:** CR 00−027: cr. Register September 2002 No. 561, eff. 10−1−02; CR 09−112: am. (title), (1), (2), (4), (5), (6) (title), (7), cr. (6m), (8) Register December 2010 No. 660, eff. 1−1−11; correction in (2) (a) 2. made under s. 13.93 (4) (b) 7., Stats., Register February 2012 No. 674.

**NR 151.12 Post−construction performance standard for new development and redevelopment. (1)** GENERAL. In this section:

(a) "Post−construction site" means a construction site subject to regulation under this subchapter, after construction is completed and final stabilization has occurred.

(b) Average annual rainfall is determined by the following years and locations: Madison, 1981 (Mar. 12−Dec. 2); Green Bay, 1969 (Mar. 29−Nov. 25); Milwaukee, 1969 (Mar. 28−Dec. 6); Minneapolis, 1959 (Mar. 13−Nov. 4); Duluth, 1975 (Mar. 24−Nov. 19). Of the 5 locations listed, the location closest to a project site best represents the average annual rainfall for that site.

**(2)** APPLICABILITY. This section applies to a post−construction site that is or was subject to the construction performance standards of s. NR 151.11, except any of the following:

(a) A post−construction site where the department has received a notice of intent for the construction project, in accordance with subch. III of ch. NR 216, within 2 years after October 1, 2002.

(b) A post−construction site where the department of commerce has received a notice of intent, in accordance with s. Comm 61.115, within 2 years after October 1, 2002.

**Note:** Section Comm 61.115 was repealed effective 4−1−07.

(bm) A post−construction site for which the department received a notice of intent for the construction project, in accordance with subch. III of ch. NR 216, on or after January 1, 2011. Post−construction sites for which the department received a notice of intent for the construction project, in accordance with subch. III of ch. NR 216, on or after January 1, 2011, shall meet the performance standards of ss. NR 151.122 to 151.128.

(c) A redevelopment post−construction site with no increase in exposed parking lots or roads.

(d) A post−construction site with less than 10% connected imperviousness based on complete development of the post−construction site, provided the cumulative area of all parking lots and rooftops is less than one acre.

**Note:** Projects that consist of only the construction of bicycle paths or pedestrian trails generally meet this exception as these facilities have minimal connected imperviousness.

(e) Agricultural facilities and practices.

(f) An action for which a final environmental impact statement was approved before October 1, 2002.

(g) An action for which a finding of no significant impact is made under ch. NR 150 before October 1, 2002.

(h) Underground utility construction such as water, sewer and fiberoptic lines, but not including the construction of any above ground structures associated with utility construction.

**(3)** RESPONSIBLE PARTY. The landowner of the post−construction site or other person contracted or obligated by other agreement to implement and maintain post−construction storm water BMPs shall comply with this section.

**(4)** STORM WATER MANAGEMENT PLAN. A written storm water management plan shall be developed and implemented for each post−construction site and shall incorporate the requirements of this subsection.

**Note:** Examples of storm water management plans that may be used to comply with this section may be that specified within s. NR 216.47 or the municipal storm water management program specified within s. NR 216.07 (1) to (6).

**(5)** REQUIREMENTS. The plan required under sub. (4) shall include:

(a) *Total suspended solids.* Best management practices shall be designed, installed and maintained to control total suspended solids carried in runoff from the post−construction site as follows:

1. For new development, by design, reduce to the maximum extent practicable, the total suspended solids load by 80%, based on an average annual rainfall, as compared to no runoff management controls. No person shall be required to exceed an 80% total suspended solids reduction to meet the requirements of this subdivision.

2. For redevelopment, by design, reduce to the maximum extent practicable, the total suspended solids load by 40%, based on an average annual rainfall, as compared to no runoff management controls. No person shall be required to exceed a 40% total suspended solids reduction to meet the requirements of this subdivision.

3. For in−fill development under 5 acres that occurs within 10 years after October 1, 2002, by design, reduce to the maximum extent practicable, the total suspended solids load by 40%, based on an average annual rainfall, as compared to no runoff management controls. No person shall be required to exceed a 40% total suspended solids reduction to meet the requirements of this subdivision.

4. For in−fill development that occurs 10 or more years after October 1, 2002, by design, reduce to the maximum extent practicable, the total suspended solids load by 80%, based on an average annual rainfall, as compared to no runoff management controls. No person shall be required to exceed an 80% total suspended solids reduction to meet the requirements of this subdivision.

5. Notwithstanding subds. 1. to 4., if the design cannot achieve the applicable total suspended solids reduction specified, the storm water management plan shall include a written and site−specific explanation why that level of reduction is not attained and the total suspended solids load shall be reduced to the maximum extent practicable.

**Note:** Pollutant loading models such as SLAMM, P8 or equivalent methodology may be used to evaluate the efficiency of the design in reducing total suspended solids. Information on how to access SLAMM and P8 is available from the storm water coordinator in the runoff management section of the bureau of watershed management at (608) 267−7694.

(b) *Peak discharge.* 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 2−year, 24−hour design storm applicable to the post−construction site. Pre−development conditions shall assume "good hydrologic conditions" for appropriate land covers as identified in TR−55 or an equivalent methodology. The meaning of "hydrologic soil group" and "runoff curve number" are as determined in TR−55. However, when pre−development land cover is cropland, rather than using TR−55 values for cropland, the runoff curve numbers in Table 2 shall be used.

**Table 2 – Maximum Pre−Development Runoff Curve Numbers for Cropland Areas**

| Hydrologic Soil Group | A | B | C | D |
|---|---|---|---|---|
| Runoff Curve Number | 56 | 70 | 79 | 83 |

**Note:** The curve numbers in Table 2 represent mid−range values for soils under a good hydrologic condition where conservation practices are used and are selected to be protective of the resource waters.

2. This paragraph does not apply to:

a. A post−construction site where the change in hydrology due to development does not increase the existing surface water elevation at any point within the downstream receiving water by more than 0.01 of a foot for the 2−year, 24−hour storm event.

**Note:** Hydraulic models such as HEC−RAS or another methodology may be used to determine the change in surface water elevations.

b. A redevelopment post−construction site.

c. An in−fill development area less than 5 acres.

**Note:** The intent of par. (b) is to minimize streambank erosion under bank full conditions.

(c) *Infiltration.* BMPs shall be designed, installed and maintained to infiltrate runoff to the maximum extent practicable in accordance with the following, except as provided in subds. 5. to 8.:

1. For residential developments one of the following shall be met:

a. Infiltrate sufficient runoff volume so that the post−development infiltration volume shall be at least 90% of the pre−development infiltration volume, based on an average annual rainfall. However, when designing appropriate infiltration systems to meet this requirement, no more than 1% of the project site is required as an effective infiltration area.

b. Infiltrate 25% of the post−development runoff volume from the 2–year, 24−hour design storm with a type II distribution. Separate curve numbers for pervious and impervious surfaces shall be used to calculate runoff volumes and not composite curve numbers as defined in TR−55. However, when designing appropriate infiltration systems to meet this requirement, no more than 1% of the project site is required as an effective infiltration area.

2. For non−residential development, including commercial, industrial and institutional development, one of the following shall be met:

a. For this subdivision only, the "project site" means the rooftop and parking lot areas.

b. Infiltrate sufficient runoff volume so that the post−development infiltration volume shall be at least 60% of the pre−development infiltration volume, based on an average annual rainfall. However, when designing appropriate infiltration systems to meet this requirement, no more than 2% of the project site is required as an effective infiltration area.

c. Infiltrate 10% of the post−development runoff volume from the 2−year, 24−hour design storm with a type II distribution. Separate curve numbers for pervious and impervious surfaces shall be used to calculate runoff volumes and not composite curve numbers as defined in TR−55. However, when designing appropriate infiltration systems to meet this requirement, no more than 2% of the project site is required as an effective infiltration area.

3. Pre−development condition shall be the same as specified in par. (b).

**Note:** A model that calculates runoff volume, such as SLAMM, P8 or an equivalent methodology may be used. Information on how to access SLAMM and P8 is available from the storm water coordinator in the runoff management section of the bureau of watershed management at (608) 267−7694.

4. Before infiltrating runoff, pretreatment shall be required for parking lot runoff and for runoff from new road construction in commercial, industrial and institutional areas that will enter an infiltration system. The pretreatment shall be designed to protect the infiltration system from clogging prior to scheduled maintenance and to protect groundwater quality in accordance with subd. 8. Pretreatment options may include, but are not limited to, oil/grease separation, sedimentation, biofiltration, filtration, swales or filter strips.

**Note:** To achieve the infiltration requirement for the parking lots or roads, maximum extent practicable should not be interpreted to require significant topography changes that create an excessive financial burden. To minimize potential groundwater impacts it is desirable to infiltrate the cleanest runoff. To achieve this, a design may propose greater infiltration of runoff from low pollutant sources such as roofs, and less from higher pollutant source areas such as parking lots.

5. Exclusions. The runoff from the following areas are prohibited from meeting the requirements of this paragraph:

a. Areas associated with tier 1 industrial facilities identified in s. NR 216.21 (2) (a), including storage, loading, rooftop and parking.

b. Storage and loading areas of tier 2 industrial facilities identified in s. NR 216.21 (2) (b).

**Note:** Runoff from tier 2 parking and rooftop areas may be infiltrated but may require pretreatment.

c. Fueling and vehicle maintenance areas.

d. Areas within 1000 feet upgradient or within 100 feet downgradient of karst features.

e. Areas with less than 3 feet separation distance from the bottom of the infiltration system to the elevation of seasonal high groundwater or the top of bedrock, except this subd. 5. e. does not prohibit infiltration of roof runoff.

f. Areas with runoff from industrial, commercial and institutional parking lots and roads and residential arterial roads with less than 5 feet separation distance from the bottom of the infiltration system to the elevation of seasonal high groundwater or the top of bedrock.

g. Areas within 400 feet of a community water system well as specified in s. NR 811.16 (4) or within 100 feet of a private well as specified in s. NR 812.08 (4) for runoff infiltrated from commercial, industrial and institutional land uses or regional devices for residential development.

h. Areas where contaminants of concern, as defined in s. NR 720.03 (2), are present in the soil through which infiltration will occur.

i. Any area where the soil does not exhibit one of the following characteristics between the bottom of the infiltration system and the seasonal high groundwater and top of bedrock: at least a 3−foot soil layer with 20% fines or greater; or at least a 5−foot soil layer with 10% fines or greater. This subd. 5. i. does not apply where the soil medium within the infiltration system provides an equivalent level of protection. Subdivision 5. i. does not prohibit infiltration of roof runoff.

**Note:** The areas listed in subd. 5. are prohibited from infiltrating runoff due to the potential for groundwater contamination.

6. Exemptions. The following are not required to meet the requirements of this paragraph:

a. Areas where the infiltration rate of the soil is less than 0.6 inches/hour measured at the bottom of the infiltration system.

b. Parking areas and access roads less than 5,000 square feet for commercial and industrial development.

c. Redevelopment post−construction sites.

d. In−fill development areas less than 5 acres.

e. Infiltration areas during periods when the soil on the site is frozen.

f. Roads in commercial, industrial and institutional land uses, and arterial residential roads.

7. Where alternate uses of runoff are employed, such as for toilet flushing, laundry or irrigation, such alternate use shall be given equal credit toward the infiltration volume required by this paragraph.

8. a. Infiltration systems designed in accordance with this paragraph shall, to the extent technically and economically feasible, minimize the level of pollutants infiltrating to groundwater and shall maintain compliance with the preventive action limit at a point of standards application in accordance with ch. NR 140. However, if site specific information indicates that compliance with a preventive action limit is not achievable, the infiltration BMP may not be installed or shall be modified to prevent infiltration to the maximum extent practicable.

b. Notwithstanding subd. 8. a., the discharge from BMPs shall remain below the enforcement standard at the point of standards application.

(d) *Protective areas.* 1. In this paragraph, "protective area" means an area of land that commences at the top of the channel of lakes, streams and rivers, or at the delineated boundary of wetlands, and that is the greatest of the following widths, as measured horizontally from the top of the channel or delineated wetland boundary to the closest impervious surface. However, in this paragraph, "protective area" does not include any area of land adjacent to any stream enclosed within a pipe or culvert, such that runoff cannot enter the enclosure at this location.

a. For outstanding resource waters and exceptional resource waters, and for wetlands in areas of special natural resource interest as specified in s. NR 103.04, 75 feet.

b. For perennial and intermittent streams identified on a United States geological survey 7.5−minute series topographic map, or a county soil survey map, whichever is more current, 50 feet.

c. For lakes, 50 feet.

d. For highly susceptible wetlands, 50 feet. Highly susceptible wetlands include the following types: fens, sedge meadows, bogs, low prairies, conifer swamps, shrub swamps, other forested wetlands, fresh wet meadows, shallow marshes, deep marshes and seasonally flooded basins. Wetland boundary delineation shall be made in accordance with s. NR 103.08 (1m). This paragraph does not apply to wetlands that have been completely filled in accordance with all applicable state and federal regulations. The protective area for wetlands that have been partially filled in accordance with all applicable state and federal regulations shall be measured from the wetland boundary delineation after fill has been placed.

e. For less susceptible wetlands, 10% of the average wetland width, but no less than 10 feet nor more than 30 feet. Less susceptible wetlands include degraded wetlands dominated by invasive species such as reed canary grass.

f. In subd. 1. a., d. and e., determinations of the extent of the protective area adjacent to wetlands shall be made on the basis of the sensitivity and runoff susceptibility of the wetland in accordance with the standards and criteria in s. NR 103.03.

g. For concentrated flow channels with drainage areas greater than 130 acres, 10 feet.

2. This paragraph applies to post−construction sites located within a protective area, except those areas exempted pursuant to subd. 4.

3. The following requirements shall be met:

a. Impervious surfaces shall be kept out of the protective area to the maximum extent practicable. The storm water management plan shall contain a written site−specific explanation for any parts of the protective area that are disturbed during construction.

b. Where land disturbing construction activity occurs within a protective area, and where no impervious surface is present, adequate sod or self−sustaining vegetative cover of 70% or greater shall be established and maintained. The adequate sod or self−sustaining vegetative cover shall be sufficient to provide for bank stability, maintenance of fish habitat and filtering of pollutants from upslope overland flow areas under sheet flow conditions. Non−vegetative materials, such as rock riprap, may be employed on the bank as necessary to prevent erosion such as on steep slopes or where high velocity flows occur.

**Note:** It is recommended that seeding of non−aggressive vegetative cover be used in the protective areas. Vegetation that is flood and drought tolerant and can provide long−term bank stability because of an extensive root system is preferable. Vegetative cover may be measured using the line transect method described in the university of Wisconsin extension publication number A3533, titled "Estimating Residue Using the Line Transect Method".

c. Best management practices such as filter strips, swales or wet detention basins, that are designed to control pollutants from non−point sources may be located in the protective area.

**Note:** Other regulations, such as ch. 30, Stats., and chs. NR 103, 115, 116 and 117 and their associated review and approval process may apply in the protective area.

4. Exemptions. This paragraph does not apply to:

a. Redevelopment post−construction sites.

b. In−fill development areas less than 5 acres.

c. Structures that cross or access surface waters such as boat landings, bridges and culverts.

d. Structures constructed in accordance with s. 59.692 (1v), Stats.

e. Post−construction sites from which runoff does not enter the surface water, except to the extent that vegetative ground cover is necessary to maintain bank stability.

**Note:** A vegetated protective area to filter runoff pollutants from post−construction sites described in subd. 4. e. is not necessary since runoff is not entering the surface water at that location. Other practices necessary to meet the requirements of this section, such as a swale or basin, will need to be designed and implemented to reduce runoff pollutants prior to runoff entering a surface water of the state.

(e) *Fueling and vehicle maintenance areas.* Fueling and vehicle maintenance areas shall, to the maximum extent practicable, have BMPs designed, installed and maintained to reduce petroleum within runoff, such that the runoff that enters waters of the state contains no visible petroleum sheen.

**Note:** A combination of the following BMPs may be used: oil and grease separators, canopies, petroleum spill cleanup materials, or any other structural or non−structural method of preventing or treating petroleum in runoff.

(f) *Location.* To comply with the standards required under this subsection, BMPs may be located on−site or off−site as part of a regional storm water device, practice or system, but shall be installed in accordance with s. NR 151.003.

(g) *Timing.* The BMPs that are required under this subsection shall be installed before the construction site has undergone final stabilization.

**History:** CR 00−027: cr. Register September 2002 No. 561, eff. 10−1−02; CR 09−112: cr. (2) (bm) Register December 2010 No. 660, eff. 1−1−11.

**NR 151.121 Post−construction performance standards. (1)** GENERAL. In ss. NR 151.121 to 151.128, "post−construction site" means a construction site subject to regulation under this subchapter, after construction is completed and final stabilization has occurred.

**(2)** APPLICABILITY. Sections NR 151.121 to 151.128 apply to a post−construction site that is or was subject to the construction performance standards of s. NR 151.11, except any of the following:

(a) A post−construction site with less than 10 percent connected imperviousness, based on the area of land disturbance, provided the cumulative area of all impervious surfaces is less than one acre. However, the exemption of this paragraph does not include exemption from the protective area standard of s. NR 151.125.

(b) Agricultural facilities and practices.

**Note:** This exemption includes both point and nonpoint discharges from agricultural facilities and practices. Therefore, post−construction structures such as barns, manure storage facilities, sand settling lanes, and barnyard runoff control systems are subject to subch. II and are not subject, under s. NR 216.47 (1), to the post−construction performance standards of this subchapter.

(c) Underground utility construction, but not including the construction of any above ground structures associated with utility construction.

**(3)** RESPONSIBLE PARTY. The landowner of the post−construction site or other person contracted or obligated by other agreement with the landowner to implement and maintain post−construction storm water BMPs is the responsible party and shall comply with ss. NR 151.121 to 151.128.

**(4)** STORM WATER MANAGEMENT PLAN. A written storm water management plan shall be developed and implemented for each post−construction site and shall incorporate the requirements of ss. NR 151.122 to 151.128.

**Note:** Examples of storm water management plans that may be used to comply with ss. NR 151.122 to 151.128 may include those specified in s. NR 216.47 or the municipal storm water management program specified in s. NR 216.07 (5).

**(5)** MAINTENANCE OF EFFORT. For redevelopment sites where the redevelopment will be replacing older development that was subject to post−construction performance standards of this chapter in effect on or after October 1, 2004, the responsible party shall

meet the total suspended solids reduction, peak flow control, infiltration, and protective areas standards applicable to the older development or meet the redevelopment standards of ss. NR 151.122 to 151.125, whichever are more stringent.

**History:** CR 09−112: cr. Register December 2010 No. 660, eff. 1−1−11.

**NR 151.122 Total suspended solids performance standard. (1)** REQUIREMENT. BMPs shall be designed, installed and maintained to control total suspended solids carried in runoff from the post−construction site. BMPs shall be designed in accordance with Table 1., or to the maximum extent practicable as provided in sub. (3). The design shall be based on an average annual rainfall, as compared to no runoff management controls.

**Table 1. TSS Reduction Standards**

| Development Type | TSS Reduction |
|---|---|
| New Development | 80 percent |
| In−fill ≥ 5 acres | 80 percent |
| In−fill < 5 acres on or after October 1, 2012 | 80 percent |
| Redevelopment | 40 percent of load from parking areas and roads |
| In−fill < 5 acres and before October 1, 2012 | 40 percent |

**(2)** REDEVELOPMENT. Except as provided in s. NR 151.121 (5), the redevelopment total suspended solids reduction standard of Table 1., applies to redevelopment.

**(3)** MAXIMUM EXTENT PRACTICABLE. If the design cannot meet a total suspended solids reduction performance standard of sub. (1), Table 1., the storm water management plan shall include a written, site−specific explanation of why the total suspended solids reduction performance standard cannot be met and why the total suspended solids load will be reduced only to the maximum extent practicable. The department may not require any person to exceed the applicable total suspended solids reduction performance standard to meet the requirements of maximum extent practicable.

**Note:** Pollutant loading models such as DETPOND, SLAMM, P8, or equivalent methodology may be used to evaluate the efficiency of the design in reducing total suspended solids. Information on how to access these models is available from the department's storm water management program at (608) 267−7694. Use the most recent version of the model and the rainfall files and other parameter files identified for Wisconsin users unless directed otherwise by the regulatory authority.

**(4)** OFF−SITE DRAINAGE. When designing BMPs, runoff draining to the BMP from off−site shall be taken into account in determining the treatment efficiency of the practice. Any impact on the efficiency shall be compensated for by increasing the size of the BMP accordingly.

**History:** CR 09−112: cr. Register December 2010 No. 660, eff. 1−1−11.

**NR 151.123 Peak discharge performance standard. (1)** REQUIREMENT. By design, BMPs shall be employed to maintain or reduce the 1−year, 24−hour and the 2−year, 24−hour post−construction peak runoff discharge rates to the 1−year, 24−hour and the 2−year, 24−hour pre−development peak runoff discharge rates respectively, or to the maximum extent practicable. The runoff curve numbers in Table 2. shall be used to represent the actual pre−development condition.

**Table 2. Maximum Pre−Development Runoff Curve Numbers**

| Runoff Curve Number | Hydrologic Soil Group | | | |
|---|---|---|---|---|
| | A | B | C | D |
| Woodland | 30 | 55 | 70 | 77 |
| Grassland | 39 | 61 | 71 | 78 |
| Cropland | 55 | 69 | 78 | 83 |

**Note:** Where the pre−development condition is a combination of woodland, grassland, or cropland, the runoff curve number should be pro−rated by area.

**(2)** EXEMPTIONS. This section does not apply to the following:

(a) A post−construction site where the discharge is directly into a lake over 5,000 acres or a stream or river segment draining more than 500 square miles.

(b) Except as provided under s. NR 151.121 (5), a redevelopment post−construction site.

(c) An in−fill development area of less than 5 acres.

**Note:** The intent of s. NR 151.123 is to minimize streambank and shoreline erosion under bank−full conditions.

**History:** CR 09−112: cr. Register December 2010 No. 660, eff. 1−1−11.

**NR 151.124 Infiltration performance standard. (1)** REQUIREMENT. BMPs shall be designed, installed, and maintained to infiltrate runoff in accordance with the following or to the maximum extent practicable:

(a) *Low imperviousness*. For development up to 40 percent connected imperviousness, such as parks, cemeteries, and low density residential development, infiltrate sufficient runoff volume so that the post−development infiltration volume shall be at least 90 percent of the pre−development infiltration volume, based on an average annual rainfall. However, when designing appropriate infiltration systems to meet this requirement, no more than one percent of the post−construction site is required as an effective infiltration area.

(b) *Moderate imperviousness*. For development with more than 40 percent and up to 80 percent connected imperviousness, such as medium and high density residential, multi−family development, industrial and institutional development, and office parks, infiltrate sufficient runoff volume so that the post−development infiltration volume shall be at least 75 percent of the pre−development infiltration volume, based on an average annual rainfall. However, when designing appropriate infiltration systems to meet this requirement, no more than 2 percent of the post−construction site is required as an effective infiltration area.

(c) *High imperviousness*. For development with more than 80 percent connected imperviousness, such as commercial strip malls, shopping centers, and commercial downtowns, infiltrate sufficient runoff volume so that the post−development infiltration volume shall be at least 60 percent of the pre−development infiltration volume, based on an average annual rainfall. However, when designing appropriate infiltration systems to meet this requirement, no more than 2 percent of the post−construction site is required as an effective infiltration area.

**Note:** A histogram showing the relationship between connected imperviousness and land use is available from the department at (608) 267−7694.

**(2)** PRE−DEVELOPMENT. Pre−development condition shall be the same as specified in s. NR 151.123 (1), Table 2.

**Note:** A model that calculates runoff volume, such as SLAMM, P8, or an equivalent methodology may be used. For performance standards based on an average annual rainfall, specific rainfall files for five geographic locations around the state may be used. Information on how to access SLAMM and P8 and the rainfall files is available from the department's storm water management program at (608) 267−7694. Use the most recent version of the model and the parameter files for Wisconsin users unless directed otherwise by the regulatory authority.

**(3)** SOURCE AREAS. (a) *Prohibitions*. Runoff from the following areas may not be infiltrated and may not qualify as contributing to meeting the requirements of this section unless demonstrated to meet the conditions of sub. (6):

1. Areas associated with a tier 1 industrial facility identified in s. NR 216.21 (2) (a), including storage, loading, and parking. Rooftops may be infiltrated with the concurrence of the regulatory authority.

2. Storage and loading areas of a tier 2 industrial facility identified in s. NR 216.21 (2) (b).

**Note:** Runoff from the employee and guest parking and rooftop areas of a tier 2 facility may be infiltrated but runoff from the parking area may require pretreatment.

3. Fueling and vehicle maintenance areas. Rooftops of fueling and vehicle maintenance areas may be infiltrated with the concurrence of the regulatory authority.

(b) *Exemptions*. Runoff from the following areas may be credited toward meeting the requirement when infiltrated, but the decision to infiltrate runoff from these source areas is optional:

1. Parking areas and access roads less than 5,000 square feet for commercial development.

2. Parking areas and access roads less than 5,000 square feet for industrial development not subject to the prohibitions under par. (a).

3. Except as provided under s. NR 151.121 (5), redevelopment post−construction sites.

4. In−fill development areas less than 5 acres.

5. Roads in commercial, industrial, and institutional land uses, and arterial residential roads.

**(4)** LOCATION OF PRACTICES. (a) *Prohibitions*. Infiltration practices may not be located in the following areas:

1. Areas within 1,000 feet upgradient or within 100 feet downgradient of direct conduits to groundwater.

2. Areas within 400 feet of a community water system well as specified in s. NR 811.16 (4) or within the separation distances listed in s. NR 812.08 for any private well or non−community well for runoff infiltrated from commercial, including multi−family residential, industrial, and institutional land uses or regional devices for one− and two−family residential development.

3. Areas where contaminants of concern, as defined in s. NR 720.03 (2), are present in the soil through which infiltration will occur.

(b) *Separation distances*. 1. Infiltration practices shall be located so that the characteristics of the soil and the separation distance between the bottom of the infiltration system and the elevation of seasonal high groundwater or the top of bedrock are in accordance with Table 3:

**Table 3. Separation Distances and Soil Characteristics**

| Source Area | Separation Distance | Soil Characteristics |
|---|---|---|
| Industrial, Commercial, Institutional Parking Lots and Roads | 5 feet or more | Filtering Layer |
| Residential Arterial Roads | 5 feet or more | Filtering Layer |
| Roofs Draining to Subsurface Infiltration Practices | 1 foot or more | Native or Engineered Soil with Particles Finer than Coarse Sand |
| Roofs Draining to Surface Infiltration Practices | Not Applicable | |
| All Other Impervious Source Areas | 3 feet or more | Filtering Layer |

2. Notwithstanding par. (b), applicable requirements for injection wells classified under ch. NR 815 shall be followed.

(c) *Infiltration rate exemptions*. Infiltration practices located in the following areas may be credited toward meeting the requirement under the following conditions, but the decision to infiltrate under these conditions is optional:

1. Where the infiltration rate of the soil measured at the proposed bottom of the infiltration system is less than 0.6 inches per hour using a scientifically credible field test method.

2. Where the least permeable soil horizon to 5 feet below the proposed bottom of the infiltration system using the U.S. department of agriculture method of soils analysis is one of the following: sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay, or clay.

**(5)** ALTERNATE USE. Where alternate uses of runoff are employed, such as for toilet flushing, laundry or irrigation or storage on green roofs where an equivalent portion of the runoff is captured permanently by rooftop vegetation, such alternate use shall be given equal credit toward the infiltration volume required by this section.

**(6)** GROUNDWATER STANDARDS. (a) Infiltration systems designed in accordance with this section shall, to the extent technically and economically feasible, minimize the level of pollutants infiltrating to groundwater and shall maintain compliance with the preventive action limit at a point of standards application in accordance with ch. NR 140. However, if site specific information indicates that compliance with a preventive action limit is not achievable, the infiltration BMP may not be installed or shall be modified to prevent infiltration to the maximum extent practicable.

(b) Notwithstanding par. (a), the discharge from BMPs shall remain below the enforcement standard at the point of standards application.

**(7)** PRETREATMENT. Before infiltrating runoff, pretreatment shall be required for parking lot runoff and for runoff from new road construction in commercial, industrial, and institutional areas that will enter an infiltration system. The pretreatment shall be designed to protect the infiltration system from clogging prior to scheduled maintenance and to protect groundwater quality in accordance with sub. (6). Pretreatment options may include, but are not limited to, oil and grease separation, sedimentation, biofiltration, filtration, swales, or filter strips.

**(8)** MAXIMUM EXTENT PRACTICABLE. Where the conditions of subs. (3) and (4) limit or restrict the use of infiltration practices, the performance standard of s. NR 151.124 shall be met to the maximum extent practicable.

**History:** CR 09−112: cr. Register December 2010 No. 660, eff. 1−1−11.

**NR 151.125 Protective areas performance standard. (1)** DEFINITION. In this section, "protective area" means an area of land that commences at the top of the channel of lakes, streams and rivers, or at the delineated boundary of wetlands, and that is the greatest of the following widths, as measured horizontally from the top of the channel or delineated wetland boundary to the closest impervious surface. However, in this section, "protective area" does not include any area of land adjacent to any stream enclosed within a pipe or culvert, so that runoff cannot enter the enclosure at this location.

(a) For outstanding resource waters and exceptional resource waters, 75 feet.

(b) For perennial and intermittent streams identified on a U.S. geological survey 7.5−minute series topographic map, or a county soil survey map, whichever is more current, 50 feet.

(c) For lakes, 50 feet.

(d) For wetlands not subject to par. (e) or (f), 50 feet.

(e) For highly susceptible wetlands, 75 feet. Highly susceptible wetlands include the following types: calcareous fens, sedge meadows, open and coniferous bogs, low prairies, coniferous swamps, lowland hardwood swamps, and ephemeral ponds.

**Note:** Information on wetland types, including ephemeral ponds, is available at (608) 266−7012.

(f) For less susceptible wetlands, 10 percent of the average wetland width, but no less than 10 feet nor more than 30 feet. Less susceptible wetlands include: degraded wetlands dominated by invasive species such as reed canary grass; cultivated hydric soils; and any gravel pits, or dredged material or fill material disposal sites that take on the attributes of a wetland.

(g) In pars. (d) to (f), determinations of the extent of the protective area adjacent to wetlands shall be made on the basis of the sensitivity and runoff susceptibility of the wetland in accordance with the standards and criteria in s. NR 103.03.

(h) Wetland boundary delineation shall be made in accordance with s. NR 103.08 (1m). This paragraph does not apply to wetlands that have been completely filled in compliance with all applicable state and federal regulations. The protective area for wetlands that have been partially filled in compliance with all

applicable state and federal regulations shall be measured from the wetland boundary delineation after fill has been placed. Where there is a legally authorized wetland fill, the protective area standard need not be met in that location.

(i) For concentrated flow channels with drainage areas greater than 130 acres, 10 feet.

(j) Notwithstanding pars. (a) to (i), the greatest protective area width shall apply where rivers, streams, lakes, and wetlands are contiguous.

**Note:** A stream or lake is not eligible for a lower protective area width even if contiguous to a less susceptible wetland.

**(2)** APPLICABILITY. This section applies to post−construction sites located within a protective area, except those areas exempted pursuant to sub. (4).

**(3)** REQUIREMENTS. The following requirements shall be met:

(a) Impervious surfaces shall be kept out of the protective area entirely or to the maximum extent practicable. If there is no practical alternative to locating an impervious surface in the protective area, the storm water management plan shall contain a written, site−specific explanation.

(b) Where land disturbing construction activity occurs within a protective area, adequate sod or self−sustaining vegetative cover of 70 percent or greater shall be established and maintained where no impervious surface is present. The adequate sod or self−sustaining vegetative cover shall be sufficient to provide for bank stability, maintenance of fish habitat, and filtering of pollutants from upslope overland flow areas under sheet flow conditions. Non−vegetative materials, such as rock riprap, may be employed on the bank as necessary to prevent erosion such as on steep slopes or where high velocity flows occur.

**Note:** It is recommended that seeding of non−invasive vegetative cover be used in the protective areas. Some invasive plants are listed in ch. NR 40. Vegetation that is flood and drought tolerant and can provide long−term bank stability because of an extensive root system is preferable. Vegetative cover may be measured using the line transect method described in the University of Wisconsin extension publication number A3533, titled "Estimating Residue Using the Line Transect Method".

(c) Best management practices such as filter strips, swales, or wet detention ponds, that are designed to control pollutants from non−point sources, may be located in the protective area.

**Note:** Other laws, such as ch. 30, Stats., and chs. NR 103, 115, 116, and 117 and their associated review and approval processes may apply in the protective area.

**(4)** EXEMPTIONS. This section does not apply to any of the following:

(a) Except as provided under s. NR 151.121 (5), redevelopment post−construction sites.

(b) In−fill development areas less than 5 acres.

(c) Structures that cross or access surface waters such as boat landings, bridges, and culverts.

(d) Structures constructed in accordance with s. 59.692 (1v), Stats.

(e) Areas of post−construction sites from which the runoff does not enter the surface water, including wetlands, without first being treated by a BMP to meet the requirements of ss. NR 151.122 to 151.123, except to the extent that vegetative ground cover is necessary to maintain bank stability.

**Note:** A vegetated protective area to filter runoff pollutants from post−construction sites described in par. (e) is not necessary since the runoff at that location is treated prior to entering the surface water. Other practices necessary to meet the requirements of this section, such as a swale or pond, will need to be designed and implemented to reduce runoff pollutants prior to runoff entering a surface water of the state. The requirements of ch. NR 103 still apply and should be considered before runoff is diverted to or from a wetland.

**History:** CR 09−112: cr. Register December 2010 No. 660, eff. 1−1−11.

**NR 151.126 Fueling and vehicle maintenance areas performance standard.** Fueling and vehicle maintenance areas shall have BMPs designed, installed, and maintained to reduce petroleum within runoff, so that the runoff that enters waters of the state contains no visible petroleum sheen, or to the maximum extent practicable.

**Note:** A combination of the following BMPs may be used: oil and grease separators, canopies, petroleum spill cleanup materials, or any other structural or non−structural method of preventing or treating petroleum in runoff.

**History:** CR 09−112: cr. Register December 2010 No. 660, eff. 1−1−11.

**NR 151.127 Location.** To comply with the standards required under ss. NR 151.122 to 151.124, BMPs may be located on−site or off−site as part of a regional storm water device, practice, or system, but shall be installed in accordance with s. NR 151.003.

**History:** CR 09−112: cr. Register December 2010 No. 660, eff. 1−1−11.

**NR 151.128 Timing.** The BMPs that are required under ss. NR 151.122 to 151.126 shall be installed before the construction site has undergone final stabilization.

**Note:** In accordance with subch. V, the department has developed technical standards to help meet the post−construction performance standards. These technical standards are available from the department at (608) 267−7694.

**History:** CR 09−112: cr. Register December 2010 No. 660, eff. 1−1−11.

**NR 151.13 Developed urban area performance standard for municipalities. (1)** INCORPORATED MUNICIPALITIES. (a) *Applicability.* This subsection applies to any incorporated municipality with an average density of 1,000 people per square mile or greater, based on the latest decennial census made by the U.S. census, as well as any commercial and industrial areas contiguous to these areas.

**Note:** The municipality has primary responsibility for complying with this subsection. However, the public is expected to follow municipal ordinance requirements and requests to carry out activities such as: proper curbside placement of leaves for collection, relocating vehicles for street sweeping, and utilizing proper disposal methods for oils and other chemicals.

(b) *Requirements*. For areas identified under par. (a), all of the following shall be implemented:

1. A public information and education program, utilizing materials identified by the department, promoting beneficial on−site reuse of leaves and grass clippings and proper use of turf and garden fertilizers and pesticides, proper management of pet wastes, and prevention of dumping oil and other chemicals in storm sewers.

2. A municipal program, as appropriate, for the management of leaf and grass clippings, including public education about this program.

3. The application of turf and garden fertilizers on five acres or more of municipally controlled properties shall be done in accordance with a site specific nutrient application schedule based on appropriate soil tests. The nutrient application schedule shall be designed to maintain the optimal health of the turf or garden vegetation.

**Note:** In accordance with subch. V, the department has developed a technical standard to help meet the nutrient management performance standard. The technical standard is available from the department at (608) 267−7694.

4. Detection and elimination of illicit discharges to storm sewers.

**(2)** PERMITTED MUNICIPALITIES. (a) *Applicability.* This subsection applies to municipalities that are subject to the municipal storm water permit requirements of subch. I of ch. NR 216.

(b) *Program.* A municipality shall develop and implement a storm water management program, including the adoption and administration of any necessary ordinance, to meet the following requirements:

1. 'Stage 1 requirements.' The municipalities identified under par. (a) shall implement all of the following within 2 years of receiving permit coverage under subch. I of ch. NR 216:

a. All of the requirements contained in sub. (1) (b).

b. A 20 percent reduction in total suspended solids, or to the maximum extent practicable, as compared to no controls, for runoff from existing development that enters waters of the state.

2. 'Stage 2 requirements.' The municipalities identified under par. (a) shall implement one of the following for runoff from

existing development that enters waters of the state, as compared to no controls:

a. A 40 percent reduction in total suspended solids, by March 31, 2013, if permit coverage was received under subch. I of ch. NR 216 on or before January 1, 2010.

b. A 40 percent reduction in total suspended solids within 7 years of the date of receiving permit coverage for municipalities identified under par. (a), if permit coverage was received under subch. I of ch. NR 216 after January 1, 2010.

c. If a municipality identified under par. (a) has determined that it will not achieve a 40 percent reduction in total suspended solids in runoff that enters waters of the state as compared to no controls, by the applicable date of subd. 2. a. or b., then 6 months before the applicable date the municipality shall submit a report to the department describing the control measures that it has implemented and shall submit a long term storm water management plan in accordance with subd. 3.

3. 'Long term storm water management plan.' Plans shall include all of the following elements:

a. A baseline report showing the existing development boundary, drainage basins, and land uses; and applicable model results to justify the loading for total suspended solids for no controls and controls implemented by the applicable date in subd. 2. to meet the requirements in subd. 2. Modeling shall conform to that described in subd. 5.

b. Any agreements with an adjacent municipality, or with municipalities within a 10 digit hydrologic unit code level, to implement the 40 percent total suspended solids reduction on a regional basis per s. NR 216.07 (6).

c. Any long−term maintenance agreements with non−publicly owned control measures where credit for the total suspended solids reduction is included in the analysis.

d. An implementation plan and its associated timetable for control measures identified in a cost−effectiveness analysis consistent with subd. 3. f., that would result in achieving a 40 percent total suspended solids reduction within a period not to exceed 10 years from the applicable compliance date in subd. 2 unless documentation in subd. 3. e. is provided. The plan shall include modeling data consistent with subd. 5.

e. If a municipality has determined that it cannot achieve 40 percent total suspended solids reduction within 10 years from the applicable compliance date in subd. 2, including the use of agreements with other municipalities and long term maintenance agreements for non−public control measures, the plan shall demonstrate why 40 percent reduction cannot be achieved. A long term storm water management plan under this subdivision shall describe the control measures identified in a cost−effectiveness analysis consistent with subd. 3. f. that the municipality will implement within 10 years and document the amount of reduction that will be achieved. The plan shall also include an implementation plan and associated timetable for control measures identified in a cost−effectiveness analysis consistent with subd. 3. f. that would result in achieving a 40 percent total suspended solids reduction. The plan shall include modeling data consistent with subd. 5.

f. A cost−effectiveness analysis shall include a systematic comparison of alternatives to meet the 40 percent total suspended solids reduction based on the cost per pound of pollutant removed. This analysis shall take into account anticipated redevelopment or reconstruction projects and the cost to retrofit the site versus the cost to install practices during redevelopment or reconstruction. The analysis shall consider the cost to ensure long term maintenance of non−publicly owned control practices for which the municipality is taking credit as well as publicly owned control practices, the source of funding for installation and maintenance of control measures, and competing interests for that funding source. The municipality may include an analysis of affordability in the cost−effectiveness analysis. The analysis shall consider the feasibility and commensurate increase in cost of installing a control measure where there are competing issues such as human safety and welfare, endangered and threatened resources, historic properties, and geographic features.

4. 'Long term plan review.' a. The department shall review the plan required under subd. 3. and provide comments within 6 months of receipt. The municipality shall modify the plan to correct any deficiencies identified by the department.

b. The department shall accept documentation that demonstrates to the department's satisfaction that the 40 percent reduction will be met by the applicable compliance date of subd. 2.

c. The department shall review plans where the 40 percent reduction can be made within the schedule proposed by the municipality under subd. 3. d. However, the department upon review of the plan may request a modification of the schedule or control measures if the department determines that control measures can achieve the 40 percent reduction within a shorter timeframe. The department shall include in the acceptance of the plan the provision in subd. 4. e.

d. The department shall review a plan with an extended timetable beyond 10 years from the applicable compliance date in subd. 2. where the municipality has demonstrated to the department's satisfaction that the 40 percent reduction cannot be made within 10 years from the applicable compliance date in subd. 2. However, upon review of the plan the department may request a modification of the schedule or control measures if the department determines that control measures can achieve the 40 percent reduction within a shorter timeframe than proposed by the municipality. The department shall include in the acceptance of the plan the provision in subd. 4. e.

e. The municipality shall submit a report on an initial schedule set by the department and every 5 years thereafter documenting progress and reviewing whether changes in land use, local regulations, control technology or other factors have affected the use or timing of control measures meeting the performance standard of subd. 2. The report shall include a modeling analysis documenting progress and recommending any changes in control measures or timetables for achieving a 40 percent reduction.

5. 'Model requirements.' Evidence of meeting the performance standard of subd. 2. shall be based on the use of a model or an equivalent methodology approved by the department. Acceptable models and model versions include SLAMM version 9.2 and P8 version 3.4 or subsequent versions of those models. Earlier versions of SLAMM are acceptable when the municipality is not taking any credit for street cleaning.

**Note:** Information on how to access SLAMM and P8 and the relevant parameter files are available by contacting the department's storm water management program at (608) 267−7694.

**Note:** It is expected that a municipality will be able to achieve the 40 percent reduction with a combination of practices including the use of high efficiency street cleaning, structural BMP retrofit practices, structural BMP redevelopment or reconstruction practices, and entering into maintenance agreements for BMPs on privately owned lands, such as shopping centers, to receive credit.

(c) *Location.* To comply with the standards required under this subsection, BMPs may be located on−site or off−site as part of a regional storm water device, practice or system, but shall be installed in accordance with s. NR 151.003.

(d) *Exemption*. The requirements of par. (b) 1. and 2. do not apply to areas subject to a permit issued under subch. II of ch. NR 216.

(e) *Calculation of reduction.* The department shall recognize total suspended solids reduction not otherwise accounted for in computer models for the implementation of programs, ordinances and other institutional controls that result in scientifically supported reductions of total suspended solids and are developed as a technical standard under s. NR 151.31.

**History:** CR 00−027: cr. Register September 2002 No. 561, eff. 10−1−02; CR 09−112: r. and recr. Register December 2010 No. 660, eff. 1−1−11.

**NR 151.14 Turf and garden nutrient management performance standard. (1)** APPLICABILITY. This section applies when all of the following conditions are met:

(a) The property is not subject to s. NR 151.13 (1) (b) 3.

(b) Nutrients are applied to over 5 acres of turf or garden.

(c) The property discharges runoff to waters of the state.

(d) The property is not an agricultural facility or practice.

(e) The property does not conduct silviculture activity.

**(2)** RESPONSIBLE PARTY. The landowner is the responsible party and shall comply with this section.

**(3)** REQUIREMENTS. The application of turf and garden fertilizers on these properties shall be done in accordance with site−specific nutrient application schedules based on appropriate soil tests. The nutrient application schedule shall be designed to maintain the optimal health of the turf or garden vegetation.

**Note:** In accordance with subch. V, the department has developed a technical standard to help meet the nutrient management performance standard. The technical standard is available from the department at (608) 267−7694.

**History:** CR 00−027: cr. Register September 2002 No. 561, eff. 10−1−02; CR 09−112: r. and recr. Register December 2010 No. 660, eff. 1−1−11.

**NR 151.15 Implementation and enforcement. (1)** IMPLEMENTATION. This subchapter shall be implemented as follows:

(a) *Construction sites and post−construction sites.* The provisions of ss. NR 151.11, 151.12, and 151.121 to 151.128 shall be implemented through subch. III of ch. NR 216.

**Note:** The department may develop and revise available model ordinances to reflect the applicability and performance standards in ss. NR 151.11, 151.12, and 151.121 to 151.128. These model ordinances are in ch. NR 152. Municipalities are encouraged to adopt the requirements of ss. NR 151.11, 151.12, and 151.121 to 151.128, into local ordinances. Incentives are included in the grant programs identified in chs. NR 153 and 155, for municipalities that adopt the performance standards into their ordinances, provide an information and education program, and track and report their enforcement activity.

(b) *Developed urban areas.* The provisions of s. NR 151.13 (2) shall be implemented through subch. I of ch. NR 216.

**(2)** ENFORCEMENT. The department shall enforce this subchapter under s. 281.98, Stats., except for those requirements that are implemented through ch. NR 216, which shall be enforced under ss. 283.89 and 283.91, Stats.

**History:** CR 00−027: cr. Register September 2002 No. 561, eff. 10−1−02; CR 09−112; am. (1), (2) Register December 2010 No. 660, eff. 1−1−11; correction to numbering of (2) made under s. 13.92 (4) (b) 1., Stats., Register December 2010 No. 660.

## Subchapter IV — Transportation Facility Performance Standards

**NR 151.20 Purpose and applicability. (1)** This subchapter establishes performance standards, as authorized by s. 281.16 (2) (a), Stats., for transportation facilities that cause or may cause runoff pollution. These performance standards are intended to limit runoff pollution in order to achieve water quality standards. Design guidance and the process for developing technical standards to implement this subchapter are set forth in subch. V.

**(2)** Transportation facilities that are directed and supervised by the department of transportation and that are regulated by an administrative rule administered by the department of transportation, where the department determines in writing that the rule meets or exceeds the performance standards of this subchapter and is implemented in accordance with the administrative rule provisions, shall be deemed to meet the requirements of the portions of this subchapter determined by the department.

**(3)** In s. NR 151.23, soil loss is calculated using the appropriate rainfall or runoff factor, also referred to as the R factor, or an equivalent design storm using a type II distribution, with consideration given to the geographic location of the site and the period of disturbance.

**Note:** The universal soil loss equation and its successors, revised universal soil loss equation and revised universal soil loss equation 2, utilize an R factor which has been developed to estimate soil erosion, averaged over extended time periods. The R factor can be modified to estimate monthly and single−storm erosion.

**History:** CR 00−027: cr. Register September 2002 No. 561, eff. 10−1−02; CR 09−112: am. Register December 2010 No. 660, eff. 1−1−11.

**NR 151.21 Definitions.** In this subchapter:

**(1m)** "Average annual rainfall" means a typical calendar year of precipitation as determined by the department for users of models such as SLAMM, P8, or equivalent methodology. The average annual rainfall is chosen from a department publication for the location closest to the municipality.

**Note:** Information on how to access SLAMM and P8 and the average annual rainfall files for five locations in the state, as published periodically by the department, is available by contacting the storm water management program at (608) 267−7694.

**(2)** "Borrow site" means an area outside of a project site from which stone, soil, sand or gravel is excavated for use at the project site, except the term does not include commercial pits.

**(3)** "Highway" has the meaning given in s. 340.01 (22), Stats.

**(4)** "Material disposal site" means an area outside of a project site, which is used, for the lawful disposal of surplus materials or materials unsuitable for use within the project site that is under the direct control of the contractor. A municipally owned landfill or private landfill that is not managed by the contractor is excluded from this definition.

**(5)** "Minor reconstruction" means either of the following:

(a) For transportation facility construction sites where, before January 1, 2011, a bid was advertised, a construction contract was signed and no bid was advertised, or a notice of intent was received by the department in accordance with subch. III of ch. NR 216, reconstruction that is limited to 1.5 miles in continuous or aggregate total length of realignment and that does not exceed 100 feet in width of roadbed widening.

(b) For transportation facility construction sites where, on or after January 1, 2011, a bid is advertised, a construction contract signed where no bid is advertised or a notice of intent was received by the department in accordance with subch. III of ch. NR 216, reconstruction that is limited to 1.5 miles in continuous or aggregate total length of realignment and that does not exceed 100 feet in width of roadbed widening, and that does not include replacement of a vegetated drainage system with a non−vegetated drainage system except where necessary to convey runoff under a highway or private road or driveway.

**(6)** "Prime contractor" means a person authorized or awarded a contract to perform, directly or using subcontractors, all the work of a project directed and supervised by the transportation facility authority.

**(7)** "Private road or driveway" has the meaning given in s. 340.01 (46), Stats.

**(8)** "Public−use airport" has the meaning given it in 49 USC 47102(21).

**(9)** "Public mass transit facility" means any area of land or water which is used, or intended for use, by bus or light rail, and any appurtenant areas which are used, or intended for use, by bus or light rail, including buildings or other facilities or rights−of−way, either publicly or privately owned, that provide the public with general or special service on a regular and continuing basis.

**(10)** "Public trail" means a "state ice age trail area" designated under s. 23.17 (2), Stats., a state trail under s. 23.175 (2) (a), Stats., an "all−terrain vehicle trail" under s. 23.33 (1) (d), Stats., an "off−the−road motorcycle trail" under s. 23.33 (9) (b) 4., Stats., a "recreational trail" under s. 30.40 (12m), Stats., a "walkway" under s. 30.40 (22), Stats., a state trail under s. 84.06 (11), Stats., a "bikeway" under s. 84.60 (1) (a), Stats., a "snowmobile trail" under s. 350.01 (17), Stats., a "public snowmobile corridor" under s. 350.12 (3j) (a) 1., Stats., or any other trail open to the public as a matter of right.

**(11)** "Railroad" means any area of land or water which is used, or intended for use, in operating a railroad as defined in s. 85.01 (5), Stats., and any appurtenant areas which are used, or intended

for use, for railroad buildings or other railroad facilities or rights−of−way, together with all railroad buildings and facilities located thereon.

**(12)** "Reconditioning" has the meaning given in s. 84.013 (1) (b), Stats.

**(13)** "Reconstruction" has the meaning given in s. 84.013 (1) (c), Stats.

**(14)** "Resurfacing" has the meaning given in s. 84.013 (1) (d), Stats.

**(15)** "Transportation facility authority" means any person or entity that is authorized to approve work on a transportation facility by contract, permit or with its own forces or by force account. A permit or approval granted by the department pursuant to ch. 283, Stats., does not qualify as authorization needed to meet this definition.

**History:** CR 00−027: cr. Register September 2002 No. 561, eff. 10−1−02; CR 09−112: r. (1), cr. (1m), am. (5), (8) Register December 2010 No. 660, eff. 1−1−11.

**NR 151.22 Responsible party. (1)** TRANSPORTATION FACILITY AUTHORITY. (a) The transportation facility authority shall develop a design plan to meet the performance standards of this subchapter for land disturbing construction activity at the transportation facility construction site.

**Note:** This design plan may be the erosion control plan specified in s. Trans 401.07.

(b) The transportation facility authority, in consultation with the department, shall approve the implementation plan submitted under sub. (2) (a). The transportation facility authority shall incorporate the implementation plan into the contract for project construction.

(c) The transportation facility authority shall administer and enforce the implementation plan submitted by the prime contractor under sub. (2) (a) under the contract for project construction. The transportation facility authority shall ensure that the prime contractor follows and maintains the implementation plan under par. (b). If the prime contractor does not follow the implementation plan incorporated into the contract for project construction, the transportation facility authority shall control erosion and sediment at the construction site consistent with the design plan prepared under par. (a) or implementation plan prepared under sub. (2) (a).

(d) Before accepting the completed project, the transportation facility authority shall verify in writing that the prime contractor has satisfactorily completed the implementation plan pursuant to sub. (2) (b). The transportation authority shall submit the written verification to the prime contractor and to the authority in charge of maintenance of the transportation facility. Upon written verification by the transportation facility authority under this paragraph, the prime contractor is released from the responsibility under this subchapter, except for any responsibility for defective work or materials, damages by its own operations, or as may be otherwise required in the project construction contract.

**(2)** PRIME CONTRACTOR. (a) The prime contractor shall develop and submit to the transportation facility authority an implementation plan that identifies applicable BMPs and contains a schedule for implementing the BMPs in accordance with design plan to meet the performance standards under sub. (1) (a). The implementation plan shall identify an array of BMPs that may be employed to meet the performance standards. The implementation plan shall also address the design and implementation of BMPs required in ss. NR 151.23 and 151.24 for land disturbing construction activity within borrow sites and material disposal sites that are related to the construction project.

**Note:** This implementation plan may be the erosion control implementation plan specified in s. Trans 401.08.

(b) The prime contractor shall implement the implementation plan as required by the contract for project construction prepared pursuant to sub. (1) (b).

(c) A transportation authority that carries out the construction activity with its own employees and resources shall comply with the prime contractor requirements contained in this subsection, including preparing and carrying out an implementation plan.

**(3)** SINGLE PLAN. For transportation projects that are not administered under ch. Trans 401, the requirements of this subchapter may be developed under one plan instead of 2 separate plans as described under subs. (1) (a) and (2) (a). A plan created under this subsection shall contain both the design components required under sub. (1) (a) and the implementation components required under sub. (2) (a).

**Note:** This single plan may be the erosion control plan specified in s. NR 216.46.

**(4)** MAINTENANCE AUTHORITY. Upon execution of the written verification prepared under sub. (1) (d) by the transportation facility authority, the authority in charge of maintenance of the transportation facility shall maintain the BMPs to meet the performance standards of this subchapter. However, BMPs no longer necessary for erosion and sediment control shall be removed by the maintenance authority.

**History:** CR 00−027: cr. Register September 2002 No. 561, eff. 10−1−02; CR 09−112: am. (1) (a) Register December 2010 No. 660, eff. 1−1−11.

**NR 151.225 Construction site performance standard for non−permitted sites and routine maintenance. (1)** APPLICABILITY. This section applies to any transportation facility construction site that consists of land disturbing construction activity for any of the following:

(a) Transportation facility construction sites of less than one acre.

(b) Routine maintenance if performed for storm water conveyance system cleaning for sites that consist of less than 5 acres.

**Note:** Land disturbing construction sites of less than one acre and routine maintenance if performed for storm water conveyance system cleaning for sites that consist of less than 5 acres of land disturbance are not regulated under subch. III of ch. NR 216 unless designated by the department under s. NR 216.51 (3).

(c) Transportation facility construction projects that are exempted by federal statutes or regulations from the requirement to have a national pollutant discharge elimination system permit issued under 40 CFR 122, for land disturbing construction activity.

**(2)** RESPONSIBLE PARTY. The transportation facility authority or other person contracted or obligated by other agreement with the transportation facility authority to implement and maintain construction site BMPs is the responsible party and shall comply with this section.

**(3)** REQUIREMENTS. Erosion and sediment control practices at each site where land disturbing construction activity is to occur shall be used to prevent or reduce all of the following:

(a) The deposition of soil from being tracked onto streets by vehicles.

(b) The discharge of sediment from disturbed areas into on−site storm water inlets.

(c) The discharge of sediment from disturbed areas into adjacent waters of the state.

(d) The discharge of sediment from drainage ways that flow off the site.

(e) The discharge of sediment by dewatering activities.

(f) The discharge of sediment eroding from soil stockpiles existing for more than 7 days.

(g) The transport by runoff into waters of the state of chemicals, cement and other building compounds and materials on the construction site during the construction period. However, projects that require the placement of these materials in waters of the state, such as constructing bridge footings or BMP installations, are not prohibited by this paragraph.

**Note:** In accordance with subch. V, the department has developed technical standards to help meet the construction site performance standards. These technical standards are available from the department at (608) 267−7694.

**(4)** LOCATION. BMPs shall be located so that treatment occurs before runoff enters waters of the state.

**(5)** IMPLEMENTATION. The BMPs used to comply with this section shall be implemented as follows:

(a) Erosion and sediment control practices shall be constructed or installed before land disturbing construction activities begin.

(b) Erosion and sediment control practices shall be maintained until final stabilization.

(c) Final stabilization activity shall commence when land disturbing activities cease and final grade has been reached on any portion of the site.

(d) Temporary stabilization activity shall commence when land disturbing construction activities have temporarily ceased and will not resume for a period exceeding 14 calendar days.

(e) BMPs that are no longer necessary for erosion and sediment control shall be removed by the responsible party.

**History:** CR 09−112: cr. Register December 2010 No. 660, eff. 1−1−11.

**NR 151.23 Construction site performance standard for sites of one acre or more. (1)** APPLICABILITY. This section applies to any transportation facility construction site that consists of one acre or more of land disturbing construction activity.

(a) Subsections (2), (3), (4), and (5) apply to all of the following:

1. Transportation facility construction sites for which the department received a notice of intent in accordance with subch. III of ch. NR 216 before January 1, 2011.

2. Transportation facility construction sites for which a bid has been advertised or construction contract signed for which no bid was advertised, before January 1, 2011.

(b) Subsections (2) (a), (b), and (cm), (3), (4m), (5), and (6) apply to all of the following:

1. Transportation facility construction sites for which the department received a notice of intent in accordance with subch. III of ch. NR 216 on or after January 1, 2011.

2. Transportation facility construction sites for which a bid has been advertised or construction contract signed for which no bid was advertised, on or after January 1, 2011.

**(2)** EXEMPTION. This section does not apply to the following:

(a) Transportation facility construction projects that are exempted by federal statutes or regulations from the requirement to have a national pollutant discharge elimination system permit issued under 40 CFR 122, for land disturbing construction activity.

(b) Transportation facility construction projects that are part of a larger common plan of development, such as a residential or industrial development, and are in compliance with the performance standards of subch. III.

(c) Routine maintenance for transportation facilities that have less than 5 acres of land disturbance if performed to maintain the original line and grade, hydraulic capacity or original purpose of the facility.

**Note:** Construction projects such as installations of utilities within a transportation right−of−way that are not directed and supervised by the Department of Transportation are subject to the performance standards of subch. III and are not subject to this subchapter.

(cm) Routine maintenance if performed for storm water conveyance system cleaning for sites that consist of less than 5 acres of land disturbance.

**(3)** PLAN. (a) The responsible party under s. NR 151.22 shall develop and implement a written design plan for each construction site. The plan shall incorporate the applicable requirements of this section.

**Note:** The design plan may be the erosion control plan specified in s. NR 216.46 or the design plan in s. NR 151.22 (1) (a).

(b) The plan required under s. NR 151.22 (2) (a) or (3) shall be properly installed to implement the plan under s. NR 151.22 (1) (a).

**(4)** PRE−JANUARY 1, 2011 REQUIREMENTS. The design plan required under sub. (3) shall include the following:

(a) BMPs that, by design, achieve, to the maximum extent practicable, a reduction of 80% of the sediment load carried in runoff, on an average annual basis, as compared with no sediment or erosion controls, as specified in s. NR 151.22 (1) (a) or (3), until the construction site has undergone final stabilization. No person shall be required to exceed an 80% sediment reduction to meet the requirements of this paragraph. Erosion and sediment control BMPs may be used alone or in combination and shall be installed according to any associated implementation plan to meet the requirements of this paragraph. Credit toward meeting the sediment reduction shall be given for limiting the duration or area, or both, of land disturbing construction activity, or other appropriate mechanism.

**Note:** Soil loss prediction tools that estimate the sediment load leaving the construction site under varying land and management conditions, or methodology identified in subch. V., may be used to calculate sediment reduction.

(b) Notwithstanding par. (a), if BMPs cannot be designed and implemented to reduce the sediment load by 80%, based on an average annual rainfall, the design plan shall include a written and site−specific explanation why the 80% reduction goal is not attainable and the sediment load shall be reduced to the maximum extent practicable.

(c) Where appropriate, the design plan shall include sediment controls to do all of the following to the maximum extent practicable:

1. Prevent tracking of sediment from the construction site onto roads and other paved surfaces.

2. Prevent the discharge of sediment as part of site de−watering.

3. Protect the separate storm drain inlet structure from receiving sediment.

(d) The use, storage and disposal of chemicals, cement and other compounds and materials used on the construction site shall be managed during the construction period to prevent their transport by runoff into waters of the state. However, projects that require the placement of these materials in waters of the state, such as constructing bridge footings or BMP installations, are not prohibited by this paragraph.

**(4m)** POST−JANUARY 1, 2011 REQUIREMENTS. The design plan required under sub. (3) shall meet all of the following:

(a) *Erosion and sediment control practices.* Erosion and sediment control practices at each site where land disturbing construction activity is to occur shall be used to prevent or reduce all of the following:

1. The deposition of soil from being tracked onto streets by vehicles.

2. The discharge of sediment from disturbed areas into on−site storm water inlets.

3. The discharge of sediment from disturbed areas into adjacent waters of the state.

4. The discharge of sediment from drainage ways that flow off the site.

5. The discharge of sediment by dewatering activities.

6. The discharge of sediment eroding from soil stockpiles existing for more than 7 days.

7. The discharge of sediment from erosive flows at outlets and in downstream channels.

8. The transport by runoff into waters of the state of chemicals, cement and other building compounds and materials on the construction site during the construction period. However, projects that require the placement of these materials in waters of the

state, such as constructing bridge footings or BMP installations, are not prohibited by this subdivision.

9. The transport by runoff into waters of the state of untreated wash water from vehicle and wheel washing.

**Note:** Wastewaters, such as from concrete truck washout, need to be properly managed to limit the discharge of pollutants to waters of the state. A separate permit may be needed from the department where a wastewater discharge has the potential to adversely impact waters of the state. The appropriate department regional wastewater specialist should be contacted to determine if wastewater permit coverage is needed where wastewater will be discharged to waters of the state.

(b) *Sediment performance standards*. In addition to the erosion and sediment control practices under par. (a), the following erosion and sediment control practices shall be employed:

1. For transportation facility construction sites for which the department received a notice of intent for the construction project in accordance with subch. III of ch. NR 216 within 2 years after January 1, 2011, BMPs that, by design, achieve a reduction of 80 percent, or to the maximum extent practicable, of the sediment load carried in runoff, on an average annual basis, as compared with no sediment or erosion controls, until the construction site has undergone final stabilization.

2. For transportation facility construction sites for which the department received a notice of intent for the construction project in accordance with subch. III of ch. NR 216, 2 years or more after January 1, 2011, BMPs that, by design, discharge no more than 5 tons per acre per year, or to the maximum extent practicable, of the sediment load carried in runoff from initial grading to final stabilization.

3. The department may not require any person to employ more BMPs than are needed to meet a performance standard in order to comply with maximum extent practicable. Erosion and sediment control BMPs may be combined to meet the requirements of this paragraph. The department shall give credit toward meeting the sediment performance standard of this paragraph for limiting the duration or area, or both, of land disturbing construction activity, or for other appropriate mechanisms.

4. Notwithstanding subd. 1. or 2., if BMPs cannot be designed and implemented to meet the sediment performance standard, the plan shall include a written, site−specific explanation of why the sediment performance standard cannot be met and how the sediment load will be reduced to the maximum extent practicable.

**Note:** Soil loss prediction tools such as revised universal soil loss equation 2 that estimate the sediment load leaving the construction site under varying land and management conditions, or methodology identified in subch. V, may be used to calculate sediment reduction.

**Note:** In accordance with subch. V, the department has developed technical standards to help meet the construction site performance standards. These technical standards are available from the department at (608) 267−7694.

(c) *Preventive measures*. The plan shall incorporate all of the following:

1. Maintenance of existing vegetation, especially adjacent to surface waters, whenever possible.

2. Minimization of soil compaction and preservation of topsoil.

3. Minimization of land disturbing construction activity on slopes of 20% or more.

4. Development of spill prevention and response procedures.

**(5)** LOCATION. BMPs shall be located so that treatment occurs before runoff enters waters of the state.

**Note:** While regional treatment facilities are appropriate for control of post−construction pollutants, they should not be used for construction site sediment removal.

**(6)** IMPLEMENTATION. The BMPs used to comply with this section shall be implemented as follows:

(a) Erosion and sediment control practices shall be constructed or installed before land disturbing construction activities begin and in accordance with the plan developed under sub. (3).

(b) Erosion and sediment control practices shall be maintained until final stabilization.

(c) Final stabilization activity shall commence when land disturbing activities cease and final grade has been reached on any portion of the site.

(d) Temporary stabilization activity shall commence when land disturbing construction activities have temporarily ceased and will not resume for a period exceeding 14 calendar days.

(e) BMPs that are no longer necessary for erosion and sediment control shall be removed by the responsible party.

**History:** CR 00−027: cr. Register September 2002 No. 561, eff. 10−1−02; CR 09−112: am. (title), (1), (3) (a), (4) (title), (5), cr. (2) (cm), (4m), (6) Register December 2010 No. 660, eff. 1−1−11.

**NR 151.24 Post−construction performance standard. (1)** APPLICABILITY. This section applies to a transportation facility that is or was subject to the construction performance standards of s. NR 151.23, except any of the following:

(a) A transportation construction site where the department has received a notice of intent for the construction project in accordance with subch. III of ch. NR 216 within 2 years after October 1, 2002.

(b) A transportation facility construction site that has undergone final stabilization within 2 years after October 1, 2002.

(bm) A transportation post−construction site for which the department received a notice of intent for the construction project in accordance with subch. III of ch. NR 216 on or after January 1, 2011. Transportation post−construction sites for which the department received a notice of intent for the construction project, in accordance with subch. III of ch. NR 216, on or after January 1, 2011, shall meet the performance standards of ss. NR 151.242 to 151.249.

(c) Reconditioning or resurfacing of a highway.

(d) Minor reconstruction of a highway. Notwithstanding the exemption under this paragraph, the protective areas requirements in sub. (6) apply to minor reconstruction of a highway.

(e) A redevelopment transportation facility with no increase in exposed parking lots or roads.

(f) A transportation facility with less than 10% connected imperviousness based on complete development of the transportation facility, provided the cumulative area of all parking lots and rooftops is less than one acre.

**Note:** Projects that consist of only the construction of bicycle paths or pedestrian trails generally meet this exception as these facilities have minimal connected imperviousness.

(g) Protective area requirements under sub. (6) do apply to actions described in s. NR 151.20 (2).

(h) A transportation facility, the construction of which involves activity described in s. NR 151.23 (1) (a) 2. but that has less than one acre of land disturbing construction activity.

(i) Transportation facility construction projects that are part of a larger common plan of development, such as a residential or industrial development, that are in compliance with the performance standards of subch. III.

(j) Routine maintenance for transportation facilities if performed to maintain the original line and grade, hydraulic capacity or original purpose of the facility.

**(2)** PLAN. A written plan shall be developed and implemented for each transportation facility and shall incorporate the requirements of subs. (3) to (10).

**Note:** Examples of plans that may be used to comply with this section may be that specified within s. NR 216.47, the municipal storm water management program specified within s. NR 216.07 (1) to (6) or the erosion control plan specified in s. Trans 401.07.

**(3)** TOTAL SUSPENDED SOLIDS. Best management practices shall be designed, installed and maintained to control total suspended solids carried in runoff from the transportation facility as follows:

(a) For new transportation facilities, by design, reduce to the maximum extent practicable, the suspended solids load by 80%, based on an average annual rainfall, as compared to no runoff

management controls. No person shall be required to exceed an 80% total suspended solids reduction to meet the requirements of this paragraph.

(b) For highway reconstruction and non−highway redevelopment, by design, reduce to the maximum extent practicable, the total suspended solids load by 40%, based on an average annual rainfall, as compared to no runoff management controls. No person shall be required to exceed a 40% total suspended solids reduction to meet the requirements of this paragraph.

(c) Notwithstanding pars. (a) and (b), if the design cannot achieve the applicable total suspended solids reduction specified, the design plan shall include a written and site−specific explanation why that level of reduction is not attained and the total suspended solids load shall be reduced to the maximum extent practicable.

**Note:** Pollutant loading models such as SLAMM, P8 or equivalent methodology may be used to evaluate the efficiency of the design in reducing total suspended solids. Information on how to access SLAMM and P8 is available from the storm water coordinator in the runoff management section of the bureau of watershed management at (608) 267−7694.

**(4)** PEAK DISCHARGE. (a) 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 site conditions for the 2−year, 24−hour design storm applicable to the transportation facility. Pre−development conditions shall assume "good hydrologic conditions" for appropriate land covers as identified in TR−55 or an equivalent methodology. The meaning of "hydrologic soil group" and "runoff curve number" are as determined in TR−55. However, when pre−development land cover is cropland, rather than using TR−55 values for cropland, the runoff curve numbers in Table 2 of subch. III shall be used.

**Note:** The curve numbers in Table 2 represent mid−range values for soils under a good hydrologic condition where conservation practices are used and are selected to be protective of the resource waters.

(b) This subsection does not apply to:

1. A transportation facility where the change in hydrology due to development does not increase the existing surface water elevation at any point within the downstream receiving surface water by more than 0.01 of a foot for the 2−year, 24−hour storm event.

**Note:** Hydraulic models such as HEC−RAS or another methodology may be used to determine the change in surface water elevations.

2. A highway reconstruction site.

3. A transportation facility that is part of a redevelopment project.

**Note:** The intent of sub. (4) is to minimize streambank erosion under bank full conditions.

**(5)** INFILTRATION. (a) Except as provided in pars. (d) to (g), BMPs shall be designed, installed and maintained to infiltrate runoff to the maximum extent practicable in accordance with one of the following:

1. Infiltrate sufficient runoff volume so that the post−development infiltration volume shall be at least 60% of the pre−development infiltration volume, based on an average annual rainfall. However, when designing appropriate infiltration systems to meet this requirement, no more than 2% of the project site is required as an effective infiltration area.

2. Infiltrate 10% of the post−development runoff volume from the 2−year, 24−hour design storm with a type II distribution. Separate curve numbers for pervious and impervious surfaces shall be used to calculate runoff volumes and not composite curve numbers as defined in TR−55. However, when designing appropriate infiltration systems to meet this requirement, no more than 2% of the project site is required as an effective infiltration area.

(b) Pre−development condition shall be the same as specified in sub. (4) (a).

**Note:** A model that calculates runoff volume, such as SLAMM, P8 or an equivalent methodology may be used. Information on how to access SLAMM and P8 is available from the storm water coordinator in the runoff management section of the bureau of watershed management at (608) 267−7694.

(c) Before infiltrating runoff, pretreatment shall be required for parking lot runoff and for runoff from new road construction in commercial, industrial and institutional areas that will enter an infiltration system. The pretreatment shall be designed to protect the infiltration system from clogging prior to scheduled maintenance and to protect groundwater quality in accordance with par. (g). Pretreatment may include, but is not limited to, oil/grease separation, sedimentation, biofiltration, filtration, swales or filter strips.

**Note:** To minimize potential groundwater impacts it is desirable to infiltrate the cleanest runoff. To achieve this, a design may propose greater infiltration of runoff from low pollutant sources such as roofs, and less from higher pollutant source areas such as parking lots.

(d) The following are prohibited from meeting the requirements of this subsection:

1. Areas associated with tier 1 industrial facilities identified in s. NR 216.21 (2) (a), including storage, loading, rooftop and parking.

2. Storage and loading areas of tier 2 industrial facilities identified in s. NR 216.21 (2) (b).

**Note:** Runoff from tier 2 parking and rooftop areas may be infiltrated but may require pretreatment.

3. Fueling and vehicle maintenance areas.

4. Areas within 1000 feet upgradient or within 100 feet downgradient of karst features.

5. Areas with less than 3 feet separation distance from the bottom of the infiltration system to the elevation of seasonal high groundwater or the top of bedrock.

6. Areas with runoff from industrial, commercial and institutional parking lots and roads and residential arterial roads with less than 5 feet separation distance from the bottom of the infiltration system to the elevation of seasonal high groundwater or the top of bedrock.

7. Areas within 400 feet of a community water system well as specified in s. NR 811.16 (4) or within 100 feet of a private well as specified in s. NR 812.08 (4) for runoff infiltrated from commercial, industrial and institutional land uses or regional devices for residential development.

8. Areas where contaminants of concern, as defined in s. NR 720.03 (2), are present in the soil through which infiltration will occur.

9. Any area where the soil does not exhibit one of the following characteristics between the bottom of the infiltration system and seasonal high groundwater and top of bedrock:

a. At least a 3−foot soil layer with 20% fines or greater.

b. At least a 5−foot soil layer with 10% fines or greater.

c. Where the soil medium within the infiltration system does not provide an equivalent level of protection.

**Note:** The areas listed in par. (d) are prohibited from infiltrating runoff due to the potential for groundwater contamination.

(e) Transportation facilities located in the following areas and otherwise subject to the requirements of this subchapter are not required to meet the requirements of this subsection:

1. Areas where the infiltration rate of the soil is less than 0.6 inches/hour measured at the bottom of the infiltration system.

2. Parking areas and access roads less than 5,000 square feet for commercial and industrial development.

3. Redevelopment post−construction sites.

4. In−fill development areas less than 5 acres.

5. Infiltration areas during periods when the soil on the site is frozen.

6. Roads in commercial, industrial and institutional land uses, and arterial residential roads.

7. Highways.

(f) Where alternate uses of runoff are employed, such as for toilet flushing, laundry or irrigation, such alternate use shall be

given equal credit toward the infiltration volume required by this subsection.

(g) 1. Infiltration systems designed in accordance with this subsection shall, to the extent technically and economically feasible, minimize the level of pollutants infiltrating to groundwater and shall maintain compliance with the preventive action limit at a point of standards application in accordance with ch. NR 140. However, if site specific information indicates that compliance with a preventive action limit is not achievable, then the infiltration BMP may not be installed or shall be modified to prevent infiltration to the maximum extent practicable.

2. Notwithstanding subd.1., the discharge from BMPs shall remain below the enforcement standard at the point of standards application.

**(6)** PROTECTIVE AREAS. (a) In this subsection, "protective area" means an area of land that commences at the top of the channel of lakes, streams and rivers, or at the delineated boundary of wetlands, and that is the greatest of the following widths, as measured horizontally from the top of the channel or delineated wetland boundary to the closest impervious surface. However, in this paragraph, "protective area" does not include any area of land adjacent to any stream enclosed within a pipe or culvert, such that runoff cannot enter the enclosure at this location.

1. For outstanding resource waters and exceptional resource waters, and for wetlands in areas of special natural resource interest as specified in s. NR 103.04, 75 feet.

2. For perennial and intermittent streams identified on a United States geological survey 7.5−minute series topographic map, or a county soil survey map, whichever is more current, 50 feet.

3. For lakes, 50 feet.

4. For highly susceptible wetlands, 50 feet. Highly susceptible wetlands include the following types: fens, sedge meadows, bogs, low prairies, conifer swamps, shrub swamps, other forested wetlands, fresh wet meadows, shallow marshes, deep marshes and seasonally flooded basins. Wetland boundary delineation shall be made in accordance with s. NR 103.08 (1m). This paragraph does not apply to wetlands that have been completely filled in accordance with all applicable state and federal regulations. The protective area for wetlands that have been partially filled in accordance with all applicable state and federal regulations shall be measured from the wetland boundary delineation after fill has been placed.

5. For less susceptible wetlands, 10% of the average wetland width, but no less than 10 feet nor more than 30 feet. Less susceptible wetlands include degraded wetlands dominated by invasive species such as reed canary grass.

6. In subds. 1., 4. and 5., determinations of the extent of the protective area adjacent to wetlands shall be made on the basis of the sensitivity and runoff susceptibility of the wetland in accordance with the standards and criteria in s. NR 103.03.

7. For concentrated flow channels with drainage areas greater than 130 acres, 10 feet.

(b) 1. Beginning with land acquired within a protective area for a transportation facility on or after October 1, 2002, no impervious surface of a transportation facility may be constructed within a protective area, unless the transportation facility authority determines, in consultation with the department, that there is no practical alternative. If there is no practical alternative to locating a transportation facility within a protective area, the transportation facility may be constructed in the protective area only to the extent the transportation facility authority, in consultation with the department, determines is reasonably necessary, and the transportation facility authority shall state in the design plan prepared pursuant to s. NR 151.22 (1) (a), why it is necessary to construct the transportation facility within a protective area.

2. If a transportation facility is constructed within a protective area, adequate sod or self−sustaining vegetative cover of 70% or greater shall be established and maintained in the area that is the width of the protective area, or the greatest width practical, and throughout the length of the protective area in which the transportation facility is located. The adequate sod or self−sustaining vegetative cover required under this paragraph shall be sufficient to provide for bank stability, maintenance of fish habitat and filtering of pollutants from upslope overland flow areas under sheet flow conditions. Non−vegetative materials, such as rock riprap, may be employed on the bank as necessary to prevent erosion such as on steep slopes or where high velocity flows occur.

**Note:** It is recommended that seeding of non−aggressive vegetative cover be used in the protective areas. Vegetation that is flood and drought tolerant and can provide long−term bank stability because of an extensive root system is preferable. Vegetative cover may be measured using the line transect method described in the university of Wisconsin−extension publication number A3533, titled "Estimating Residue Using the Line Transect Method".

3. Best management practices such as filter strips, swales or wet detention basins, that are designed to control pollutants from nonpoint sources may be located in the protective width area.

**Note:** Other regulations, such as ch. 30, Stats., and chs. NR 103, 115, 116 and 117 and their associated review and approval process may apply in the protective area.

4. This subsection does not apply to:

a. Non−highway transportation redevelopment sites.

b. Transportation facilities that cross or access surface waters, such as boat landings, bridges and culverts.

c. Structures constructed in accordance with s. 59.692 (1v), Stats.

d. Transportation facilities from which runoff does not enter the surface water, except to the extent that vegetative ground cover is necessary to maintain bank stability.

**Note:** A vegetated protective area to filter runoff pollutants from transportation facilities described in subd. 4. d. is not necessary since runoff is not entering the surface water at that location. Other practices necessary to meet requirements of this section, such as a swale or basin, will need to be designed and implemented to reduce runoff pollutants prior to runoff entering a surface water of the state.

**(7)** FUELING AND VEHICLE MAINTENANCE AREAS. Fueling and vehicle maintenance areas shall, to the maximum extent practicable, have BMPs designed, installed and maintained to reduce petroleum within runoff, such that the runoff that enters waters of the state contains no visible petroleum sheen.

**Note:** A combination of the following BMPs may be used: oil and grease separators, canopies, petroleum spill cleanup materials, or any other structural or non−structural method of preventing or treating petroleum in runoff.

**(8)** LOCATION. To comply with the standards required under this section, BMPs may be located on−site or off−site as part of a regional storm water device, practice or system, but shall be installed in accordance with s. NR 151.003.

**(9)** TIMING. The BMPs required under this section shall be installed before the construction site has undergone final stabilization.

**(10)** SWALE TREATMENT. (a) *Applicability.* Except as provided in par. (b), transportation facilities that use swales for runoff conveyance and pollutant removal meet all of the requirements of this section, if the swales are designed to the maximum extent practicable to do all of the following:

1. Be vegetated. However, where appropriate, non−vegetative measures may be employed to prevent erosion or provide for runoff treatment, such as rock riprap stabilization or check dams.

**Note:** It is preferred that tall and dense vegetation be maintained within the swale due to its greater effectiveness at enhancing runoff pollutant removal.

2. Carry runoff through a swale for 200 feet or more in length that is designed with a flow velocity no greater than 1.5 feet per second for the peak flow generated using either a 2−year, 24−hour design storm or a 2−year design storm with a duration equal to the time of concentration as appropriate. If a swale of 200 feet in length cannot be designed with a flow velocity of 1.5 feet per second or less, the flow velocity shall be reduced to the maximum extent practicable.

**Note:** Check dams may be included in the swale design to slow runoff flows and improve pollutant removal. Transportation facilities with continuous features such as curb and gutter, sidewalks or parking lanes do not comply with the design requirements of this subsection. However, a limited amount of structural measures such as curb and gutter may be allowed as necessary to account for other concerns such as human safety or resource protection.

(b) *Exemptions.* 1. Notwithstanding par. (a), the department may, consistent with water quality standards, require other provisions of this section, in addition to swale treatment, be met on a transportation facility with an average daily traffic rate greater than 2500 and where the initial surface water of the state that the runoff directly enters is any of the following:

a. An outstanding resource water.

b. An exceptional resource water.

c. Waters listed in section 303 (d) of the federal clean water act that are identified as impaired in whole or in part, due to nonpoint source impacts.

d. Waters where targeted performance standards are developed pursuant to s. NR 151.004.

2. The transportation facility authority shall contact the department's regional storm water staff or the department's liaison to the department of transportation to determine if additional BMPs beyond a water quality swale are needed under this paragraph.

**History:** CR 00−027: cr. Register September 2002 No. 561, eff. 10−1−02; CR 09−112: cr. (1) (bm) Register December 2010 No. 660, eff. 1−1−11.

**NR 151.241 Post−construction performance standards. (1)** GENERAL. In ss. NR 151.241 to 151.249, "post−construction site" means a construction site subject to regulation under this subchapter, after construction is completed and final stabilization has occurred.

**(2)** APPLICABILITY. Sections NR 151.241 to 151.249 apply to a transportation facility post−construction site that is or was subject to the construction performance standards of s. NR 151.23, except any of the following:

(a) A transportation facility post−construction site with less than 10 percent connected imperviousness, based on the area of land disturbance, provided the cumulative area of all impervious surfaces is less than one acre. However, the exemption of this paragraph does not include exemption from the protective area standard of s. NR 151.245.

(b) Reconditioning or resurfacing of a highway.

(c) Minor reconstruction of a highway. Notwithstanding the exemption under this paragraph, the protective area performance standard in s. NR 151.245 applies to minor reconstruction of a highway.

(d) Transportation facility construction projects that are part of a larger common plan of development, such as a residential or industrial development, that are in compliance with the performance standards of subch. III.

(e) Routine maintenance if performed for storm water conveyance system cleaning.

**(3)** STORM WATER MANAGEMENT PLAN. The responsible party under s. NR 151.22 shall develop and implement a written storm water management plan for each transportation facility post−construction site and shall incorporate the requirements of ss. NR 151.242 to 151.249.

**Note:** Examples of storm water management plans that may be used to comply with ss. NR 151.242 to 151.249 may include those specified in s. NR 216.47 or s. TRANS 401.106 (2).

**(4)** MAINTENANCE OF EFFORT. For non−highway transportation facility redevelopment sites and highway reconstruction where the redevelopment or reconstruction will be replacing older development or highway that was subject to post−construction performance standards of this chapter in effect on or after October 1, 2004, the responsible party shall meet the total suspended solids reduction, peak flow control, infiltration, and protective areas standards applicable to the older development or highway, or meet the redevelopment or highway reconstruction standards of ss. NR 151.242 to 151.249, whichever are more stringent.

**History:** CR 09−112: cr. Register December 2010 No. 660, eff. 1−1−11.

**NR 151.242 Total suspended solids performance standard. (1)** REQUIREMENT. Except as provided in sub. (3), BMPs shall be designed, installed, and maintained to control total suspended solids carried in runoff from the transportation facility post−construction site. BMPs shall be designed in accordance with Table 1., or to the maximum extent practicable as provided in sub. (4). The design shall be based on an average annual rainfall, as compared to no runoff management controls.

**Table 1. TSS Reduction Standards**

| Development Type | TSS Reduction |
|---|---|
| New Transportation Facilities | 80 percent |
| Highway Reconstruction | 40 percent |
| Non−highway transportation facility redevelopment | 40 percent of load from parking areas and roads |

**(2)** NON−HIGHWAY TRANSPORTATION REDEVELOPMENT AND HIGHWAY RECONSTRUCTION. Except as provided in s. NR 151.241 (4), the non−highway transportation facility redevelopment and highway reconstruction total suspended solids reduction standard of Table 1. applies to non−highway transportation facility redevelopment and highway reconstruction.

**(3)** DELAYED IMPLEMENTATION. For municipalities that are regulated under subch. I of ch. NR 216 and for transportation facilities under the jurisdiction of the department of transportation for maintenance purposes that are located within municipalities regulated under subch. I of ch. NR 216, the highway reconstruction total suspended solids performance standard first applies January 1, 2017.

**(4)** MAXIMUM EXTENT PRACTICABLE. If the design cannot meet a total suspended solids reduction performance standard of sub. (1), Table 1., the storm water management plan shall include a written, site−specific explanation of why the total suspended solids reduction performance standard cannot be met and why the total suspended solids load will be reduced only to the maximum extent practicable. The department may not require any person to exceed the applicable total suspended solids reduction performance standard to meet the requirements of maximum extent practicable.

**Note:** Pollutant loading models such as DETPOND, SLAMM, P8, or equivalent methodology may be used to evaluate the efficiency of the design in reducing total suspended solids. Information on how to access these models is available from the department's storm water management program at (608) 267−7694. Use the most recent version of the model and the rainfall files and other parameter files identified for Wisconsin users unless directed otherwise by the regulatory authority.

**(5)** OFF−SITE DRAINAGE. When designing BMPs, runoff draining to the BMP from off−site shall be taken into account in determining the treatment efficiency of the practice. Any impact on the efficiency shall be compensated for by increasing the size of the BMP accordingly.

**History:** CR 09−112: cr. Register December 2010 No. 660, eff. 1−1−11.

**NR 151.243 Peak discharge performance standard. (1)** REQUIREMENT. By design, BMPs shall be employed to maintain or reduce the 1−year, 24−hour and the 2−year, 24−hour post−construction peak runoff discharge rates to the 1−year, 24−hour and the 2−year, 24−hour pre−development peak runoff discharge rates respectively, or to the maximum extent practicable. The runoff curve numbers in Table 2. shall be used to represent the actual pre−development condition.

| Table 2. Maximum Pre−Development Runoff Curve Numbers | | | | |
|---|---|---|---|---|
| **Runoff Curve Number** | **Hydrologic Soil Group** | | | |
| | **A** | **B** | **C** | **D** |
| Woodland | 30 | 55 | 70 | 77 |
| Grassland | 39 | 61 | 71 | 78 |
| Cropland | 55 | 69 | 78 | 83 |

**Note:** Where the pre−development condition is a combination of woodland, grassland, or cropland, the runoff curve number should be pro−rated by area.

**(2)** EXEMPTIONS. This section does not apply to the following:

(a) A transportation facility post−construction site where the discharge is directly into a lake over 5,000 acres or a stream or river segment draining more than 500 square miles.

(b) Except as provided under s. NR 151.241 (4), a transportation facility that is part of a redevelopment project.

(c) Except as provided under s. NR 151.241 (4), a highway reconstruction site.

**Note:** The intent of s. NR 151.243 is to minimize streambank and shoreline erosion under bank−full conditions.

**History:** CR 09−112: cr. Register December 2010 No. 660, eff. 1−1−11.

**NR 151.244 Infiltration performance standard. (1)** REQUIREMENT. Except as provided in sub. (2), the requirements are the same as those given in s. NR 151.124.

**(2)** EXEMPTIONS. Except as provided under s. NR 151.241 (4), transportation facility highway reconstruction and new highways are not required to meet the performance standards of this section.

**History:** CR 09−112: cr. Register December 2010 No. 660, eff. 1−1−11; renumbering of (1), (2) made under s. 13.92 (4) (b) 1., Stats., Register December 2010 No. 660.

**NR 151.245 Protective areas performance standard. (1)** DEFINITION. In this section, "protective area" means an area of land that commences at the top of the channel of lakes, streams, and rivers, or at the delineated boundary of wetlands, and that is the greatest of the following widths, as measured horizontally from the top of the channel or delineated wetland boundary to the closest impervious surface. However, in this section, "protective area" does not include any area of land adjacent to any stream enclosed within a pipe or culvert, so that runoff cannot enter the enclosure at this location.

(a) For outstanding resource waters and exceptional resource waters, 75 feet.

(b) For perennial and intermittent streams identified on a U.S. geological survey 7.5−minute series topographic map, or a county soil survey map, whichever is more current, 50 feet.

(c) For lakes, 50 feet.

(d) For wetlands not subject to par. (e) or (f), 50 feet.

(e) For highly susceptible wetlands, 75 feet. Highly susceptible wetlands include the following types: calcareous fens, sedge meadows, open and coniferous bogs, low prairies, coniferous swamps, lowland hardwood swamps, and ephemeral ponds.

**Note:** Information on wetland types, including ephemeral ponds, is available from the department at (608) 266−7012.

(f) For less susceptible wetlands, 10 percent of the average wetland width, but no less than 10 feet nor more than 30 feet. Less susceptible wetlands include: degraded wetlands dominated by invasive species such as reed canary grass; cultivated hydric soils; and any gravel pits, or dredged material or fill material disposal sites that take on the attributes of a wetland.

(g) In pars. (d) to (f), determinations of the extent of the protective area adjacent to wetlands shall be made on the basis of the sensitivity and runoff susceptibility of the wetland in accordance with the standards and criteria in s. NR 103.03.

(h) Wetland boundary delineation shall be made in accordance with s. NR 103.08 (1m). This paragraph does not apply to wetlands that have been completely filled in compliance with all applicable state and federal regulations. The protective area for wetlands that have been partially filled in compliance with all applicable state and federal regulations shall be measured from the wetland boundary delineation after fill has been placed. Where there is a legally authorized wetland fill, the protective area standard need not be met in that location.

(i) For concentrated flow channels with drainage areas greater than 130 acres, 10 feet.

(j) Notwithstanding pars. (a) to (i), the greatest protective area width shall apply where rivers, streams, lakes, and wetlands are contiguous.

**Note:** A stream or lake is not eligible for a lower protective area width even if contiguous to a less susceptible wetland.

**(2)** APPLICABILITY. This section applies to transportation facility post−construction sites located within a protective area, except those areas exempted pursuant to sub. (4).

**(3)** REQUIREMENTS. The following requirements shall be met:

(a) No impervious surface of a transportation facility may be constructed within a protective area, unless the transportation facility authority determines, in consultation with the department, that there is no practical alternative. If there is no practical alternative to locating a transportation facility within a protective area, the transportation facility may be constructed in the protective area only to the extent the transportation facility authority, in consultation with the department, determines is reasonably necessary. The transportation facility authority shall state in the design plan prepared pursuant to s. NR 151.241 (3), why it is necessary to construct the transportation facility within a protective area.

(b) Where land disturbing construction activity occurs within a protective area, adequate sod or self−sustaining vegetative cover of 70 percent or greater shall be established and maintained where no impervious surface is present. The adequate sod or self−sustaining vegetative cover shall be sufficient to provide for bank stability, maintenance of fish habitat, and filtering of pollutants from upslope overland flow areas under sheet flow conditions. Non−vegetative materials, such as rock riprap, may be employed on the bank as necessary to prevent erosion such as on steep slopes or where high velocity flows occur.

**Note:** It is recommended that seeding of non−invasive vegetative cover be used in the protective areas. Some invasive plants are listed in ch. NR 40. Vegetation that is flood and drought tolerant and can provide long−term bank stability because of an extensive root system is preferable. Vegetative cover may be measured using the line transect method described in the University of Wisconsin extension publication number A3533, titled "Estimating Residue Using the Line Transect Method".

(c) Best management practices such as filter strips, swales, or wet detention ponds, that are designed to control pollutants from non−point sources, may be located in the protective area.

**Note:** Other laws, such as ch. 30, Stats., and chs. NR 103, 115, 116, and 117 and their associated review and approval processes may apply in the protective area.

**(4)** EXEMPTIONS. This section does not apply to any of the following:

(a) Except as provided under s. NR 151.241 (4), non−highway transportation redevelopment post−construction sites.

(b) Structures that cross or access surface waters such as boat landings, bridges, and culverts.

(c) Structures constructed in accordance with s. 59.692 (1v), Stats.

(d) Transportation facilities from which the runoff does not enter the surface water, including wetlands, without first being treated by a BMP to meet the requirements of ss. NR 151.242 to 151.243, except to the extent that vegetative ground cover is necessary to maintain bank stability.

**Note:** A vegetated protective area to filter runoff pollutants from transportation facilities described in par. (d) is not necessary since the runoff at that location is treated prior to entering the surface water. Other practices necessary to meet the requirements of this section, such as a swale or pond, will need to be designed and implemented to reduce runoff pollutants prior to runoff entering a surface water of the state. The requirements of ch. NR 103 still apply and should be considered before runoff is diverted to or from a wetland.

**History:** CR 09−112: cr. Register December 2010 No. 660, eff. 1−1−11.

**NR 151.246 Fueling and vehicle maintenance areas performance standard.** Fueling and vehicle maintenance areas shall have BMPs designed, installed, and maintained to

reduce petroleum within runoff, so that the runoff that enters waters of the state contains no visible petroleum sheen, or to the maximum extent practicable.

**Note:** A combination of the following BMPs may be used: oil and grease separators, canopies, petroleum spill cleanup materials, or any other structural or non−structural method of preventing or treating petroleum in runoff.

**History:** CR 09−112: cr. Register December 2010 No. 660, eff. 1−1−11.

**NR 151.247 Location.** To comply with the standards required under ss. NR 151.242 to 151.244, BMPs may be located on−site or off−site as part of a regional storm water device, practice or system, but shall be installed in accordance with s. NR 151.003.

**History:** CR 09−112: cr. Register December 2010 No. 660, eff. 1−1−11.

**NR 151.248 Timing.** The BMPs that are required under ss. NR 151.242 to 151.246 and 151.249 shall be installed before the construction site has undergone final stabilization.

**Note:** In accordance with subch. V, the department has developed technical standards to help meet the post−construction performance standards. These technical standards are available from the department at (608) 267−7694.

**History:** CR 09−112: cr. Register December 2010 No. 660, eff. 1−1−11.

**NR 151.249 Swale treatment performance standard. (1)** REQUIREMENT. Except as provided in sub. (2), transportation facilities that use swales for runoff conveyance and pollutant removal are exempt from the requirements of ss. NR 151.242 to 151.244, if the swales are designed to do all of the following or to the maximum extent practicable:

(a) Swales shall be vegetated. However, where appropriate, non−vegetative measures may be employed to prevent erosion or provide for runoff treatment, such as rock riprap stabilization or check dams.

**Note:** It is preferred that tall and dense vegetation be maintained within the swale due to its greater effectiveness at enhancing runoff pollutant removal.

(b) Swales shall comply with the department technical standard 1005, "Vegetated Infiltration Swale", dated May, 2007, except as otherwise authorized in writing by the department.

**Note:** In accordance with subch. V, the department has developed technical standards to help meet the post−construction performance standards. These technical standards are available from the department at (608) 267−7694.

**(2)** OTHER REQUIREMENTS. (a) Notwithstanding sub. (1), the department may, consistent with water quality standards, require that other requirements, in addition to swale treatment, be met on a transportation facility with an average daily traffic rate greater than 2,500 and where the initial surface water of the state that the runoff directly enters is any of the following:

1. An outstanding resource water.

2. An exceptional resource water.

3. Waters listed in section 303 (d) of the federal clean water act that are identified as impaired in whole or in part, due to non-point source impacts.

4. Waters where targeted performance standards are developed pursuant to s. NR 151.004.

(b) The transportation facility authority shall contact the department's regional storm water staff or the department's liaison to the department of transportation to determine if additional BMPs beyond a water quality swale are needed under this subsection.

**History:** CR 09−112: cr. Register December 2010 No. 660, eff. 1−1−11.

**NR 151.25 Developed urban area performance standard for transportation facilities. (1)** APPLICABILITY. This section applies to transportation facilities under the jurisdiction of the department of transportation for maintenance purposes that are located within a municipality regulated under subch. I of ch. NR 216.

**Note:** Transportation facilities that are not under the jurisdiction of the department of transportation for maintenance purposes are subject to the performance standards in s. NR 151.13.

**(2)** REQUIREMENTS. (a) Except as provided in par. (c), the department of transportation shall develop and implement a storm water management plan in consultation with the department to control pollutants from transportation facilities described in sub. (1), for runoff from existing transportation facilities that enters waters of the state as compared to no storm water management controls. By design, the plan shall do the following:

1. A 20 percent reduction in total suspended solids or to the maximum extent practicable, beginning not later than a date consistent with the municipality regulated under subch. I of ch. NR 216.

2. A 40 percent reduction in total suspended solids in runoff by March 31, 2013, for transportation facilities within a municipality that received permit coverage under subch. I of ch. NR 216 on or before January 1, 2010.

3. A 40 percent reduction in total suspended solids in runoff within 7 years, for transportation facilities within a municipality receiving permit coverage under subch. I of ch. NR 216 after January 1, 2010.

4. Evidence of meeting the performance standard of this paragraph shall require the use of a model or an equivalent methodology approved by the department. Acceptable models and model versions include SLAMM version 9.2 and P8 version 3.4 or subsequent versions of those models. An earlier version of SLAMM is acceptable if no credit is being taken for street cleaning.

**Note:** Information on how to access SLAMM and P8 and the relevant parameter files is available from the department's storm water management program at (608) 267−7694.

(b) The department of transportation shall inform and educate appropriate department of transportation staff and any transportation facility maintenance authority contracted by the department of transportation to maintain transportation facilities owned by the department of transportation regarding nutrient, pesticide, salt and other deicing material and vehicle maintenance management activities in order to prevent runoff pollution of waters of the state.

(c) If the department of transportation has determined that it will not achieve a 40 percent reduction in total suspended solids in runoff that enters waters of the state as compared to no controls by the applicable date of par. (a) 2. or 3., then 6 months before the applicable date, the department of transportation shall submit a report to the department describing the control measures that it has implemented and shall submit a long term storm water management plan in accordance with s. NR 151.13 (2) (b) 3. The department shall review the plan in accordance with s. NR 151.13 (2) (b) 4.

(d) To comply with the standards required under this subsection, BMPs may be located on−site or off−site as part of a regional storm water device, practice or system, but shall be installed in accordance with s. NR 151.003.

**History:** CR 00−027: cr. Register September 2002 No. 561, eff. 10−1−02; CR 09−112: r. and recr. Register December 2010 No. 660, eff. 1−1−11.

**NR 151.26 Enforcement.** This subchapter shall be enforced as follows:

**(1)** If a transportation facility that is exempt from prohibitions, permit or approval requirements by s. 30.2022 (1), Stats., does not comply with the performance standards of this subchapter, the department shall initiate the conflict resolution process specified in the cooperative agreement between the department of transportation and the department established under the interdepartmental liaison procedures under s. 30.2022 (2), Stats.

**(2)** The department shall enforce this subchapter where applicable for transportation facilities not specified in sub. (1) under s. 281.98, Stats.

**History:** CR 00−027: cr. Register September 2002 No. 561, eff. 10−1−02; corrections in (1) made under s. 13.93 (2m) (b) 7., Stats., Register July 2004 No. 583; CR 09−112: am. (1) Register December 2010 No. 660, eff. 1−1−11.

## Subchapter V — Technical Standards Development Process for Non−Agricultural Performance Standards

**NR 151.30 Purpose.** This subchapter specifies the process for developing and disseminating technical standards to

implement the performance standards in subchs. III and IV, as authorized by s. 281.16 (2) (b), Stats., and establishes the procedures that the department shall use to determine if technical standards adequately and effectively implement, as appropriate, the performance standards in subchs. III and IV. This subchapter applies to technical standards developed or implemented by any agency of the state of Wisconsin.

**History:** CR 00−027: cr. Register September 2002 No. 561, eff. 10−1−02.

**NR 151.31 Technical standards development process. (1)** The department shall develop and revise technical standards to implement the performance standards in subchs. III and IV through a process outlined as follows:

(a) The department may decide that a new or revised technical standard is necessary to implement a performance standard.

(b) Any person may request the department to develop or revise a technical standard designed to meet a performance standard. The request shall be made in writing to the director of the department's bureau of watershed management and shall include the performance standard for which technical standard development or revision may be needed, and an explanation why a new or revised technical standard is requested.

(c) The department shall evaluate a request submitted pursuant to par. (b), to determine if it is necessary to develop or revise a technical standard to implement a performance standard. If the department determines that a new or revised technical standard is not necessary to implement a performance standard, it shall reply to the requester in writing as to the reasons that a technical standard does not need to be developed or revised.

(d) If the department determines that a new or revised technical standard is necessary to implement a performance standard, it shall:

1. Determine the state agency responsible for the technical standard.

2. If the responsible state agency is not the department, request the responsible state agency to develop or revise a technical standard.

3. If the responsible agency denies the request to develop or revise a technical standard, the department may initiate conflict resolution procedures outlined under any existing memorandum of understanding or agreement between the department and the responsible agency. If no conflict resolution procedures exist, the department may attempt to resolve the disagreement through stepped negotiations between increasing higher levels of management.

(e) The department shall use the following procedures when it acts to develop or revise technical standards to implement the performance standards in subchs. III and IV.

1. Convene a work group to develop or revise the technical standard that includes agencies and persons with technical expertise and direct policy interest. The work group shall include at least one representative from the agency or person that made an initial request to develop or revise the technical standard.

2. The work group shall publish a class 1 public notice and consider public comments received on the technical standard prior to providing recommendations to the department under subd. 3.

3. The work group shall provide a recommended technical standard to the department within 18 months of its formation unless the director of the bureau of watershed management grants an extension to this deadline.

(f) 1. Notwithstanding other provisions of this section, and acting jointly with the department of transportation and in consultation with other appropriate stakeholders, the department shall:

a. Develop a technical standard that, by design, meets the performance standard established in s. NR 151.23 (4) and (4m). This technical standard shall address slope erosion and channel erosion and identify BMPs that may be used given a variety of site conditions.

b. Annually review this technical standard.

**Note:** This technical standard is sometimes referred to as the standardized erosion control reference matrix for transportation.

2. For transportation facility construction sites, the technical standard developed under this paragraph shall also indicate any conditions under which it may not be used to implement the performance standard established in s. NR 151.23 (4) and (4m).

3. This technical standard and future revisions become effective upon signatures from both secretaries of the department and the department of transportation, or their designees.

**(2)** (a) Upon receipt of a proposed technical standard or technical standard revision, either developed by the department or a responsible state agency, the department shall determine if the technical standard will effectively achieve or contribute to achievement of the performance standards in subchs. III and IV. The department shall provide its determination in writing to the responsible state agency that prepared the proposed technical standard.

(b) If the department determines that a proposed technical standard will not adequately or effectively implement a performance standard in subchs. III and IV, the proposed technical standard may not be used to implement a performance standard in whole or in part.

(c) If the department determines that a proposed technical standard will adequately and effectively implement a performance standard in subchs. III and IV in whole or in part, the new or revised technical standard shall be used in lieu of any existing standards to implement the performance standard beginning with plans developed after the date of this determination.

(d) The department may determine a portion of a technical standard is adequate and effective to implement the performance standards under subch. III or IV.

**(3)** The department shall accept technical standards and best management practices developed by the department, the department of safety and professional services, the department of transportation or other appropriate state agencies, existing on October 1, 2002, unless the department identifies a technical standard as not adequate or effective to implement a performance standard in subchs. III and IV in whole or in part, and informs the responsible state agency of this determination and the basis for it.

**(4)** Until the processes under subs. (1) and (2) are completed, an existing technical standard identified by the department under sub. (3), or previously accepted by the department as adequate and effective to implement a performance standard under subch. III or IV shall be recognized as appropriate for use under this chapter.

**(5)** The department may identify technical standards that exist or are developed by qualified groups or organizations as adequate and effective to implement the performance standards under subch. III or IV.

**(6)** Except as provided in s. NR 151.26, if a technical standard that the department determines is not adequate or effective to implement a performance standard in whole or in part is used to implement a performance standard under subch. III or IV, the department may initiate enforcement proceedings for failure to meet the performance standard under s. 281.98, Stats.

**History:** CR 00−027: cr. Register September 2002 No. 561, eff. 10−1−02; CR 09−112: am. (1) (intro.), 1. a., 2. Register December 2010 No. 660, eff. 1−1−11; correction in (3) made under s. 13.93 (4) (b) 6., Stats., Register February 2012 No. 674.

**NR 151.32 Dissemination of technical standards. (1)** Technical standards developed or revised under this section may be made available through the responsible state agency's appropriate rules, manuals or guidance in keeping with normal publication schedules. If the responsible state agency does not publish appropriate manuals or guidance, the department shall

request the agency provide the department with a copy of the technical standard. Where provided, the department shall publish or reproduce the technical standard for public use.

**(2)** The department shall maintain a list of technical standards that it has determined adequate and effective to implement the performance standards under subch. III or IV and make the list available upon request.

**History:** CR 00−027: cr. Register September 2002 No. 561, eff. 10−1−02.

# APPENDIX C
# WDNR GUIDANCE DOCUMENTS

# APPENDIX C1
# WDNR TMDL SLAMM MODELING GUIDANCE




# BUREAU OF WATERSHED MANAGEMANT PROGRAM GUIDANCE

## Storm Water Management Program

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

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

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

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APPROVED:

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10/28/14
Date

## A. Statement of Problem

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

## B. Background

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

Establishing WLAs for storm water sources requires an understanding of under what flow conditions impairments occur, and how storm water discharges are contributing to the identified impairments. Establishing WLAs for storm water sources also requires an understanding of exactly where the discharges are occurring. In many cases, municipal separate storm sewer systems (MS4s) have multiple discharge points that can be located in more than one reachshed[1]. In a TMDL, WLAs are assigned for each pollutant of concern and by reach. In a TMDL a MS4 can have multiple and different pollutant reduction goals within its municipal jurisdiction.

## C. Discussion

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

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

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

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

## D. Guidance

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

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

**PART 1 – Expressing WLAs and Reduction Targets**

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

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

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

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

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

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

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

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

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

Percent Reduction (from baseline) = 100 * (1 – (WLA Loading Condition / Baseline Loading Condition))

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

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

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

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

TSS Percent Reduction (no-controls) = 20 + (0.80 * % control from baseline in TMDL)
TP Percent Reduction (no-controls) = 15 + (0.85 * % control from baseline in TMDL)

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

TSS Percent Reduction (no-controls) = 40 + (0.60 * % control from baseline in TMDL)
TP Percent Reduction (no-controls) = 27 + (0.73 * % control from baseline in TMDL)

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

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

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

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

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

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

**PART 2 – Implementation and Compliance Benchmarks**

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

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

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

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

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

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

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

- **Quantifiable Management Practices** – These practices include, but are not limited to, structural controls such as wet detention ponds, infiltration basin, bioretention, sump cleaning, low impact development (LID), street cleaning and vegetated swales where reductions can be quantified through water quality modeling such as WinSLAMM and P-8.

- **Non-Quantifiable Management Practices –** Quantifiable pollutant reductions may be difficult to determine for some practices such as residential leaf and yard debris management programs, lawn fertilizer bans and information and education outreach activities. This could also include strengthened provisions of the core SWMP. For example, if bacteria is a pollutant of concern the MS4 may place greater emphasis on detecting and eliminating cross connections, stronger pet waste programs and greater focus on elimination of leaching from dumpsters. As data becomes available to quantify reductions the appropriate credit will be given toward meeting the TMDL reduction requirements. In the interim, DNR and the permittee should be able to come to an agreement as to whether the measure is beneficial. In cases where quantifiable reductions are not possible, the use of a non-quantifiable but beneficial practice shall be deemed as making progress toward compliance with the TMDL reductions. The DNR, in consultation with stakeholders, will evaluate these practices as new science and data becomes available.

- **Stabilization of MS4** – Stabilization of eroding streambanks are eligible for a 50% cost share match through DNR's Runoff Management Grant Program. DNR considers streambank stabilization activities an important step in reducing the discharge of sediment. However, TMDL baseline modeling already assumes that drainage systems are stable; therefore, it is not appropriate to take credit against the WLA or percent reduction in the TMDL for stabilization of a drainage ditch or channel of the MS4. However stabilization projects should be identified in the TMDL implementation plan and can serve as a compliance benchmark toward meeting overall TMDL goals.

- **Streambank Stabilization Outside of the Permitted MS4** – Permitted MS4s may take credit through pollutant trading for stabilization of channels and streambanks which are outside of the area served by their MS4. Applicable credit thresholds and trade ratios would apply.

- **Water Quality Trading and Adaptive Management -** If economically beneficial, a MS4 may wish to participate in one of these programs. MS4s are eligible to participate in water quality trading to help meet WLAs. MS4 permittees with areas in the same reachshed can share load reduction credits for practices within those reachsheds using a 1:1 trade ratio. Also a MS4 may be invited by a Waste Water Treatment Facility (WWTF) to participate in an adaptive management program pursuant to s. NR 217.18, Wis. Adm. Code, to reduce phosphorus. Water quality trading and adaptive management guidance are covered under separate DNR guidance documents available on the DNR website.

- **Constructed Wetland Treatment –** Wetlands constructed for the purpose of providing storm water treatment are eligible for treatment credit provided that a long-term maintenance plan is implemented. Wetlands that receive runoff pollutants are expected to, at some point, reach a certain equilibrium point

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

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

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

**Compliance Schedule and Benchmarks**

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

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

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

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

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

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

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

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

## PART 3 – Modeling

### Discussion

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

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

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

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

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

As noted above, MS4s subject to a TMDL should perform analyses and planning to identify cost-effective approaches for reducing discharges of pollutants of concern. To cost-effectively achieve pollutant reductions, MS4s should look for opportunities such as site redevelopment and road reconstruction projects, implementation of streambank stabilization and wetland restoration projects, implementation of traditional BMPs, and possibly water quality trading and adaptive management[2]. Each of these elements can be considered for implementation to meet the requirements of a TMDL. It is likely that existing MS4 water quality modeling and mapping can be used and adjusted as necessary for SWM planning needs for TMDL implementation.

## Guidance

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

### TMDL Analysis Area

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

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

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

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

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

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

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

**MS4 Water Quality Models and Related Information**

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

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

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

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

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

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

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

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

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

The efficiency of a storm water management practice on both public and private property must be modeled using the best information the municipality can obtain on the design of the practice. For example, permanent pool area is not sufficient information to know the pollutant reduction efficiency of a wet detention basin even if it matches the area requirements identified in Technical Standard 1001 Wet Detention Basin for an 80% reduction. Information on the depth of the wet pool and the outlet design are critical features that determine the level of control a detention pond is providing.

**Modeling Clarifications**

- A TMDL might remove certain internally drained areas from its analysis. If an internally drained area is removed from the TMDL analysis, the MS4 permittee shall not include such area in its MS4 analysis to show compliance with its TMDL requirements. Under this scenario if stormwater is pumped from inside the internally drained area to an external drainage area, then this additional pollutant discharge needs to be accounted for in the MS4 analysis to show compliance with its TMDL requirements.
- Where an internally drained area is included in the TMDL analysis, an MS4 permittee has the option of including this area in its TMDL analysis to show compliance with its TMDL requirements. However, credit for pollutant removal in internally drained areas may only be taken provided the April 6, 2009 DNR Internally Drained Area guidance memo is met with respect to taking pollutant reduction credit within internally drained areas.

- When water is pumped rather than gravity drained from an internally drained area of many acres in area, the MS4 will be expected to use monitoring data to determine the annual average mass of pollutants discharged to the surface water to which the TMDL applies. This does not apply to dewatering covered under a DNR storm water construction site general permit.
- If a portion of a municipality's MS4 drains to a stormwater treatment facility in an adjacent municipality, the municipality generating the load will not receive any treatment credit due to the downstream municipality's treatment facility unless there is an inter-municipal agreement where the downstream municipality agrees to allow the upstream municipality to take credit for such treatment. DNR anticipates that such an agreement would have the upstream municipality assist with the construction and/or maintenance of the treatment facility. This contract must be in writing with signatures from both municipalities specifying how the treatment credit will be shared.
- For reporting purposes, the pollutant reductions must be summarized by TMDL reachshed. Additionally, pollutant loads for grouped drainage areas as modeled shall also be reported. Drainage areas may be grouped at the discretion of the modeler for such reasons as to emphasize higher priority areas, balance model development with targeting or for cost-effectiveness.
- The additional runoff volume from areas that are outside of the analysis area needs to be accounted for when it drains into treatment devices. The pollutant load can be "turned off" but the runoff hydrology needs to be accounted for to properly calculate the treatment efficiency of the device.
- Due to concerns of sediment resuspension, basins with an outlet on the bottom are generally not eligible for pollutant removal based solely on settling. However, credit may be taken for treatment due to infiltration or filtration. Filtration might occur through engineered soil or proprietary filters. Features to prevent scour should always be included for any practice where appropriate.
- Credit should not be taken for street cleaning unless a curb or equivalent barrier is present which leads to sediment buildup on the street.
- To model a combination of mechanical broom and vacuum assisted street cleaning, it may require an analysis of several model runs depending on the timing of the mechanical and vacuum cleaning. If mechanical broom and vacuum cleaning occur at generally the same time (e.g. within two weeks of each other) then only the removal efficiency of the vacuum cleaning should be taken. If the municipality performs broom sweeping in the spring or fall and vacuum clean the remained of the year, calculate the combined cleaning efficiency using the following method:
  (A) Model the entire street cleaning program as if entire period is done by a mechanical broom cleaner.
  (B) Model just the period of time for vacuum cleaning (do not include the mechanical broom cleaning).
  (C) Model the same period as B) but with a mechanical broom.
  (D) The overall combined efficiency would be A + B – C.

**WinSLAMM clarification**

- WinSLAMM 9.4 and earlier versions of WinSLAMM result in double counting of pollutant removal for most treatment practices modeled in series. WinSLAMM 9.2 and subsequent versions contain warnings to help alert modelers of this issue. The modeler will need to make adjustments to ensure that the results do not include double credit for removal of the same particle size. PV & Associates has created a document titled 'Modeling Practices in Series Using WinSLAMM' which helps to guide a user as to whether and or how certain practices can be modeled in series and this document is available at: http://winslamm.com/Select_documentation.html
- In WinSLAMM 9.4 and earlier versions, when street cleaning is applied across a larger modeled area with devices that serve only a certain area within the larger modeled area, it is acceptable to first take credit for street cleaning across the entire larger area but then the treatment efficiency for other devices must be reduced by the efficiency of the street cleaning to prevent double counting.

**P8 clarifications**

- P8 does not account for scour and sediment resuspension. DNR requires that a wet basin with less than a 3-foot permanent pool have its treatment efficiency reduced. A basin with zero permanent pool depth should be considered to get zero credit for pollutant removal due to settling and a basin with 3 or more feet of permanent pool depth can be given the full pollutant removal efficiency credited by settling. The pollutant removal efficiency may be given straight-line depreciation such that a basin with a 1.5 foot-deep permanent pool would be eligible for 1/2 the pollutant removal efficiency that would be credited due to settling.
- A device that DNR gives no credit for pollutant removal may still be modeled if it is in series with other practices because of its benefit on runoff storage capacity that may enhance the treatment efficiency of downgradient treatment devices. To do so, turn the treatment efficiency off in P-8.
- P8 should be started an extra year or at least several months before the "keep dates", in order to allow the model to build up representative pollutant concentrations in wet basins.

CREATED:

Eric S. Rortvedt, Water Resource Engineer — Date 10/20/14
On behalf of the Storm Water Liaison Team

Kevin Kirsch, Water Resource Engineer — Date 10/20/14
TMDL Development Coordinator

APPROVED:

Mary Anne Lowndes, Chief — Date 10/21/14
Runoff Management Section

Runoff Management Policy Management Team approved on 9/30/14 (date).

## Attachment A: Technical Notes

Establishing relationships between multiple point and nonpoint pollutant sources and their influences on stream flow and water quality is complex. This process is often further complicated by the spatial scale under which TMDLs are developed. In order to help make TMDL development manageable, TMDLs are often developed using large scale modeling approaches that can be difficult to translate to the smaller scale often needed for implementation. For instance, loadings from "non-traditional" permitted MS4s (WDOT and county highways and UW campus systems) are often aggregated with the loadings of traditional MS4s (cities, villages and towns). This loss in resolution can result in inconsistencies in the WLA assignment necessitating a more thorough examination and possible reallocation of a portion of the WLA to non-traditional MS4 permittees.

In many cases where there is an existing TMDL that aggregated WLAs, the Wisconsin Department of Natural Resources (DNR) will need to review, and may need to reallocate WLAs to MS4 permittees. MS4 permittees will then need to conduct storm water management planning to evaluate their current pollutant loads relative to the TMDL reduction goals and create and implement a plan to meet the TMDL reductions.

Whether or not a municipality changes in size or land use, the allowable pollutant load that the receiving water can handle does not change. In the TMDL, the total allowable permitted MS4 load was determined by reach and typically was distributed uniformly across permitted MS4s on a unit area load basis. Since the permitted MS4 allowable unit area load is the same across a reachshed, MS4 WLAs can be reallocated between each other based on area. However, this reallocation must occur at the same time step that was used in the TMDL development process.

> Example: the Rock River TMDL generated allocations on a monthly basis so any reallocation of the WLA between sources must also proceed on a monthly basis. Simply adding the monthly allocations into an annual load and reallocating using an average annual unit load approach will result in a misrepresentation of the TMDL allocations. Analysis must be conducted on a monthly basis.

It is expected that the extent area that will need to be modeled for the MS4 WLA will be larger than that modeled under the s. NR 151.13 (developed urbanized area modeling analysis). This is because the s. NR 151.13 modeling area has many optional and excluded areas, whereas, the TMDL WLA analysis generally lumps all of these areas into the WLA. Also, s. NR 151.13 modeling was based on year 2004 developed area condition versus a TMDL which generally considers most recent development information.

In municipalities that have recently experienced significant growth, there may be a significant increase in urban area. In addition, in some instances the total actual permitted MS4 area within a reachshed is different than that used in the TMDL development process. Initially DNR believed that it would be easy to reallocate a portion of the non-point source LA to the permitted MS4s based on a unit load approach; however, the task can be more difficult than it initially appears. As explained above, the reallocation needs to be conducted using the same time step used in the development of the TMDL and at the same critical flow period used to develop the TMDL. In many cases, this critical flow period used in the development of the TMDL may not correspond with an average annual unit load.

Reallocation Option: In some cases, where TMDL analysis was conducted on an average annual basis it may be appropriate to adjust WLAs based on the acreage associated with each MS4 by reachshed. If reallocating WLAs and LAs within the same reach will still not be adequate to address significant area differences between actual and TMDL modeled reachsheds, DNR will consider on a case-by-case basis as to whether a reallocation between reaches is warranted. For example, an MS4 may collect runoff from a substantial amount of area from one reachshed and discharge it directly into another reachshed.

DNR would include reallocated WLAs in the next reissued permit of affected MS4s. MS4s would have the opportunity to comment and/or adjudicate reallocated WLAs when the permit is public noticed.

## Attachment B: TMDL Compliance Summary

TMDL Reach Number & Name: 64 (Yahara River, Lake Mendota & Lake Monona)
MS4 TMDL Percent Reductions needed (no controls): 73% (TSS) & 68% (TP)*
MS4 Existing Controls Percent Reduction (year 2014): 32% (TSS) & 24% (TP)
Modeled MS4 Annual Average Pollutant Load (no controls): 433 tons/yr (TSS) & 124 lb/yr
Modeled MS4 Annual Average Pollutant Load (existing controls): 294 tons/yr (TSS) & 94 lb/yr

| Benchmark (BM) | Description of BM Measure | Outfalls Affected by BM control | Affected Drainage Areas (as modeled) | Implementation Date | Measure Treatment Performance | BM % Reduction toward TMDL Reduction | MS4 Cumulative % Control (from no controls) |
|---|---|---|---|---|---|---|---|
| N/A | Existing control measures | All | All | Ongoing | TSS: 32%<br>TP: 24% | TSS: 32%<br>TP: 24% | TSS: 32%<br>TP: 24% |
| 1 | Increased SWM control for Roadway Reconstruction | All | All | 1/1/2020 | TSS: 60%<br>TP: 40%<br>to MEP | TSS: 0.6% (annually)<br>TP: 0.4% (annually)<br>(30% TSS reduction over 50 years) | TSS: 35%<br>TP: 26%<br>(Accounts for 5 years of reduction) |
| 2 | Implement Enhanced Street Cleaning Program | 001<br>003<br>004<br>008 | 1A - 1D<br>3A – 3K<br>4C – 4F<br>8D | 1/1/2020 | TSS: 12%<br>TP: 8%<br>(no redundant controls) | TSS: 9%<br>TP: 6%<br>(eff. reduced for redundant measures) | TSS: 44%<br>TP: 32% |
| 3 | Implement Enhanced Yard Waste Collection Program | All | All | 1/1/2021 | TSS: 2%<br>TP: 6%<br>(no redundant controls) | TSS: 1.6%<br>TP: 5%<br>(eff. reduced for redundant measures) | TSS: 46%<br>TP: 37% |
| 4 | Ordinance Revised – Higher Redevelopment Standard | All | All | 1/1/2022 | TSS: 60%<br>TP: 40%<br>to MEP | TSS: 0.6% (annually)<br>TP: 0.4% (annually)<br>(30% of TSS reduction over 50 years) | TSS: 49%<br>TP: 39%<br>(Accounts for 5 years of reduction) |
| 5 | Retrofit 2nd St. Basin into wet basin | 002 | B4 | 1/1/2023 | TSS: 60%<br>TP: 40% | TSS: 2%<br>TP: 1%<br>(only serves part of MS4) | TSS: 51%<br>TP: 40% |
| 6 | New Wet Basin B15 | 005 | 5B - 5H | 1/1/2023 | TSS: 60%<br>TP: 40%<br>to MEP | TSS: 3%<br>TP: 2%<br>(only serves part of MS4) | TSS: 54%<br>TP: 42% |
| 7 | Stabilize MS4 Drainage Ways between X and Y streets | 003 | 3D and 3E | 1/1/2024 | 20 tons/year sediment reduction | N/A<br>Streambank & MS4 stabilization does not count against TMDL reduction requirement | TSS: 54%<br>TP: 42% |

* The TSS and TP percent reductions were taken from the Rock River Report's Appendix H and I. All other mass and percent reductions listed are fictitious and shown for example purposes only.

## Attachment C: Rock River TMDL MS4 Annual Average Percent Reductions

| Reach | Appendix H TP reduction from baseline of 27% | Appendix I TSS reduction from baseline of 40% | Calculated TP reduction from no-controls | Calculated TSS reduction from no-controls |
|---|---|---|---|---|
| 2 | 29% | 1% | 48% | 41% |
| 3 | 82% | 26% | 87% | 56% |
| 20 | 14% | 0% | 37% | 40% |
| 21 | 10% | 0% | 34% | 40% |
| 23 | 12% | 11% | 36% | 47% |
| 24 | 11% | 12% | 35% | 47% |
| 25 | 64% | 32% | 74% | 59% |
| 26 | 35% | 29% | 53% | 57% |
| 27 | 0% | 0% | 27% | 40% |
| 28 | 1% | 0% | 28% | 40% |
| 29 | 51% | 7% | 64% | 44% |
| 30 | 0% | 0% | 27% | 40% |
| 33 | 29% | 9% | 48% | 45% |
| 34 | 81% | 31% | 86% | 59% |
| 37 | 66% | 54% | 75% | 72% |
| 39 | 0% | 0% | 27% | 40% |
| 45 | 13% | 8% | 36% | 45% |
| 51 | 14% | 0% | 37% | 40% |
| 54 | 61% | 6% | 72% | 44% |
| 55 | 68% | 43% | 77% | 66% |
| 56 | 19% | 0% | 41% | 40% |
| 59 | 54% | 15% | 66% | 49% |
| 60 | 29% | 1% | 48% | 41% |
| 61 | 6% | 2% | 31% | 41% |
| 62 | 70% | 70% | 78% | 82% |
| 63 | 14% | 11% | 37% | 47% |
| 64 | 47% | 55% | 61% | 73% |
| 65 | 49% | 46% | 63% | 68% |
| 66 | 37% | 37% | 54% | 62% |
| 67 | 0% | 0% | 27% | 40% |
| 68 | 52% | 18% | 65% | 51% |
| 69 | 72% | 21% | 80% | 53% |
| 70 | 1% | 1% | 28% | 41% |
| 71 | 29% | 31% | 48% | 59% |
| 72 | 0% | 0% | 27% | 40% |
| 73 | 51% | 49% | 64% | 69% |
| 74 | 17% | 20% | 39% | 52% |
| 75 | 15% | 19% | 38% | 51% |
| 76 | 75% | 29% | 82% | 57% |
| 78 | 4% | 0% | 30% | 40% |
| 79 | 54% | 37% | 66% | 62% |
| 81 | 20% | 7% | 42% | 44% |
| 83 | 37% | 25% | 54% | 55% |

Baseline reductions of TP = 27% & TSS = 40% were identified in the RR TMDL report on pages 25 & 27.
% TP reduction from no-controls = 27 + [0.73 x (% TP control in Appendix H)]
% TSS reduction from no-controls = 40 + [0.60 x (% TSS control in Appendix I)]
Reaches that are not listed above did not have a permitted MS4 within the reach.

Table developed by: Eric Rortvedt, DNR Stormwater Engineer
Dated: 9/16/2014

## Attachment D: Lower Fox River Basin TMDL MS4 Annual Average Percent Reductions

| Sub-Basin | TMDL Report TP reduction from baseline of 15% | TMDL Report TSS reduction from baseline of 20% | Calculated TP reduction from no-controls | Calculated TSS reduction from no-controls |
|---|---|---|---|---|
| East River | 30.0% | 40.0% | 41% | 52% |
| Baird Creek | 30.0% | 40.0% | 41% | 52% |
| Bower Creek | 30.0% | 40.0% | 41% | 52% |
| Apple Creek | 30.0% | 40.0% | 41% | 52% |
| Ashwaubenon Creek | 30.0% | 40.0% | 41% | 52% |
| Dutchman Creek | 30.0% | 40.0% | 41% | 52% |
| Plum Creek | 30.0% | 40.0% | 41% | 52% |
| Kankapot Creek | 30.0% | 40.0% | 41% | 52% |
| Garners Creek | 63.1% | 49.9% | 69% | 60% |
| Mud Creek | 39.0% | 28.5% | 48% | 43% |
| Duck Creek | 30.0% | 40.0% | 41% | 52% |
| Trout Creek | 30.0% | 40.0% | 41% | 52% |
| Neenah Slough | 30.0% | 40.0% | 41% | 52% |
| Lower Fox River Main Stem | 30.0% | 65.2% | 41% | 72% |
| Lower Green Bay | 30.0% | 40.0% | 41% | 52% |

Baseline reductions of TP = 15% & TSS = 20%.
% TP reduction from no-controls = 15 + [0.85 x (% TP control in Lower Fox TMDL Report)]
% TSS reduction from no-controls = 20 + [0.80 x (% TSS control Lower Fox TMDL Report)]

Table checked by : Eric Rortvedt and Amy Minser, DNR Stormwater Engineers
Dated: 9/16/2014

# APPENDIX C2A
# WDNR GRASS SWALE MODELING GUIDANCE

# CORRESPONDENCE/MEMORANDUM

State of Wisco

DATE: November 24, 2010

TO: Regional Water Leaders, Basin Leaders and Experts
Storm Water Permit Staff (via email)

FROM: Russ Rasmussen, Director, Bureau of Watershed Management
DNR Storm Water Permit Engineers

SUBJECT: Process to Assess and Model Grass Swales for ss. NR 151.13(2) and NR 216.07(6), Wis. Adm. Code - Total Suspended Solids Reduction

*This document is intended solely as guidance, and does not contain any mandatory requirements except where requirements found in statute or administrative rule are referenced. This guidance does not establish or affect legal rights or obligations, and is not finally determinative of any of the issues addressed. This guidance does not create any rights enforceable by any party in litigation with the State of Wisconsin or the Department of Natural Resources. Any regulatory decisions made by the Department of Natural Resources in any matter addressed by this guidance will be made by applying the governing statutes and administrative rules to the relevant facts.* ***This guidance document supersedes the guidance document on Dated April 24, 2008 and subsequent erratas dated August, 2008 and April, 2009.***

**Issue**

Under s. NR 151.13(2), Wis. Adm. Code, a municipality subject to the municipal storm water permit requirements of s. NR 216.07(6), Wis. Adm. Code, must implement a 20% reduction in total suspended solids (TSS), by March 10, 2008 or 24 months from coverage under the Municipal Separate Storm Sewer System (MS4) general permit, and a 40% TSS reduction by March 10, 2013. This memorandum provides DNR staff with guidance to advise affected municipalities and their consultants on how to evaluate grassed swales in the developed urban area for water quality credit. (This guidance does not address design of grassed swales to serve new development. The Vegetated Infiltration Swale, Interim Technical Standard, No. 1005 provides information on construction of new grassed swales.)

**Discussion**

To meet the requirements of the MS4 permit and the TSS reduction goal of s. NR 151.13(2), Wis. Adm. Code, a municipality must assess existing best management practices (BMPs) for TSS control and propose additional BMPs if the performance standard cannot be met with existing practices. One BMP available to many permitted municipalities is the grassed swale. This guidance provides a basis for assessing and modeling swales for TSS reduction to foster consistent application of this practice in all permitted municipalities. The goals of this guidance are to:

- Determine which water quality swales in the MS4 are eligible to receive TSS reduction credit, and
- Identify a typical swale geometry that can be considered representative. (It may be appropriate to develop more than one typical swale geometry if the swale characteristics in the MS4 are highly variable.)

**DNR Guidance**

**Step 1**. Identify which swales in the municipality can be considered water quality swales for the purpose of meeting the 20% and 40% TSS reduction goal.

The following apply to all swales in the developed urban area if they are to be considered water quality swales:

A. Swales are not required to have pretreatment swales or equivalent pretreatment.
B. The longitudinal slope must be less than 4% unless slope interruption devices are installed in the swales to ensure low flow velocities. Slope interruption devices must be consistent with Ditch Check Technical

Standard, No. 1062. Swales with slope interruption devices will be evaluated using a modified longitudinal slope of 1%.

C. The Department is concerned about channel scouring and re-suspension of previously settled particles in swales that are being used for MS4 pollutant removal credit. To address this concern, all swales should be inspected for visual evidence of scour. Swales with visual evidence of scour, such as channel cuts in the bottom or areas of bare soil, can not be included.

There are two ways of identifying water quality swales within an MS4:

A. If swale survey data is available, determine the locations of water quality swales and arrive at typical swale geometry based on statistical methods.

B. In the absence of survey data, a desktop and field survey would be appropriate. The desktop and field procedure is as follows:

1. Identify potential water quality swale areas by using available topographic, land use and soil information.

2. Based on results of the desktop evaluation, select a representative number of typical swale locations in the MS4 by conducting a field survey. A minimum of five locations should be selected. At each location:

   - Measure the width of the swale bottom using a tape measure.
   - For side slopes, measure the vertical drop over the level length using a carpenter's level and tape measure.
   - Select at least three cross-sections of the swale and average the results to determine the bottom width and side slopes.
   - Determine longitudinal slope using 2-ft contour mapping or other available topographic information.

3. Use the typical swale geometry that best represents each drainage area.

**Step 2**. Model the swales identified in **Step 1.** using a model such as SLAMM or P8.

When modeling swales in SLAMM or P8 the following must be considered:

**How should drainage basins with a mix of swale and storm sewer conveyance systems be evaluated?**

Drainage basins with a combination of swales and storm sewer should be subdivided by conveyance system type and the subdivisions modeled separately. In SLAMM, swales need to be modeled separately because drainage system type (e.g., swale vs. storm sewer) cannot be assigned to individual source areas.

Where swale density varies within a modeled area, the swale density should be an area weighted average across the model area. For example, if a 100 acre modeled area has 90 acres of residential land use with an average swale density of 359 ft/acre and 10 acres of strip commercial with an average swale density of 412 ft/acre then the area weighted average across modeled area is [(90 x 359) + (10 x 412)] / 100 = 364 ft/acre.

Table 1 identifies the average swale density used in the standard land use files from SLAMM version 9.2. It is recommended that rather than using these averages, the municipality should identify the actual swale density for each of the representative areas.

**TABLE 1**

| Land use | Swale Density (ft/acre) |
|---|---|
| Low density residential | 238 |
| Medium density residential | 359 |
| High density residential | 385 |
| Strip commercial | 412 |
| Shopping centers | 92 |
| Industrial | 265 |
| Freeway (Shoulder only) | 1309 |
| Freeway (Shoulder and Center) | 1964 |

Note: These average swale density figures are from the SLAMM version 9.2 Standard Land Use files available on the USGS website at: http://wi.water.usgs.gov/slamm/

**Should swales be modeled using the "wetted perimeter" or "typical swale geometry" option?**

The typical swale geometry option must be used. Both SLAMM and P8 calculate wetted perimeter from the geometry for each storm event, which is more accurate than a user selected defined wetted perimeter.

**What Manning's "n" should be used for the typical swale geometry[1]?**

A Manning's "n" value of 0.30 or less is recommended, based on type of vegetation, mowing height and depth of flow. Supporting documentation should be provided if Manning's "n" values greater than 0.30 are used

**How should the infiltration rate be determined?**

The guidance provided in the Site Evaluation for Stormwater Infiltration Technical Standard, No. 1002 should be followed. The swale infiltration rate should be determined based on the representative soil texture identified in the NRCS soil survey or other soil data if available. When the representative soil texture has been determined, the appropriate design infiltration rate should be selected from Table 2 of the Technical Standard, No. 1002. If the infiltration rate is measured in the field using a scientifically credible field test method, the measured value can be used for the static infiltration rate without using the correction factors in Table 3 of Technical Standard, No. 1002. **Prior to entering an infiltration rate in the model, the design infiltration rate from Table 2, or the measured infiltration rate must be reduced by 50%.** The SLAMM default "infiltration rate by soil type" values should not be used.

**Existing language in Technical Standard 1002 V. Step C. 4.b indicates that a measured infiltration rate using a double-ring infiltrometer test must follow the requirements of ASTM D3385. While this may be appropriate for designing new swales, is there any flexibility for measuring an existing swale using a double-ring infiltrometer test?**

To determine the static infiltration rate of existing swales using a double-ring infiltrometer the following modifications to procedures in ASTM D3385 are allowed:

While the dimension and materials used for the double-ring should be based on the requirements of ASTM D3385, the infiltration rate can be measured in a time frame of a minimum of 2 hours instead of 24 hours and the water level in both rings does not have to stay constant during the test. The following procedure is a more cost-effective

[1] SLAMM version 9.3 will adjust Manning's "n" based on flow, swale geometry and vegetative retardance classifications

approach to obtaining a reasonable estimate of the infiltration rate of existing grass swales. For most soil types the infiltration rate measured by the procedure should represent the soils under more saturated conditions. Sandier soil types might not be represented by saturated conditions, but the higher infiltration rate will probably represent reality for the duration of most storm events. The lowest infiltration rate observed is the one to be used for estimating the TSS reduction for the swales and is considered a static infiltration rate. The static rate should be cut in half to represent the dynamic infiltration rate in the model.

Field Test Procedure for Double-Ring Infiltrometer

1. Select a relatively flat test area so that the double-ring infiltrometer will not be placed at an angle.
2. Cut the grass to a height of between two to four inches.
3. Gently drive the infiltrometer into the ground.
4. Inspect the soil seal around each ring to make sure that it is even and smooth.
5. Pour clean water into the inner chamber and allow it to overflow and fill up the outer ring. Maintain a level in the outer ring approximately equal to the level in the inner ring.
6. Add more water to both rings when the level in the inner ring has dropped a measurable amount. For most soil types this should be less than an inch.
7. Repeat this step until the rate the water level drops begins to decline.
8. When the rate of decline begins to slow, bring the water level up to the top and start timing the decrease in water level.
9. Record the start time.
10. Stop timing when the water level in the inner ring has gone down a measureable level (the ASTM standard requires keeping the water level constant). Timing the rate of decline should probably be started almost immediately for more clayey soils, since it might be difficult to observe when the rate change has slowed.
11. Record the time, elapsed time, and change in water level.
12. Refill both rings and restart the timing.
13. Record the time, elapsed time, change in water level, and the elapsed time since the beginning of the first measurement.
14. Repeat the timing steps until the infiltration rate has become relatively constant or the test has been conducted for a minimum of two hours. (The ASTM standard requires 24 hours).
15. The measured rate of infiltration is considered a static infiltration rate. The dynamic infiltration rate is ½ the static rate. Be aware some models, such as WinSLAMM, call for the dynamic rate for swales.

**I have taken a number of measurements along a swale length and have several infiltration rates to average. How do I average the results of my in-field tests?**

The geometric mean(s) of infiltration testing results should be used. However, equally important is to consider whether the measured infiltration rates should be 'grouped' in order to apply separate geometric means to different areas in order to provide representative TSS results across a municipality. Grouping of results might be done based on soil type, spatial reasons or simply done as a method to help provide representative results. For instance, if there are several relatively low infiltration rates measured and the geometric mean of the entire data set is quite high, it may be prudent to group the relatively low rates together and assign them to a representative area.

Note: In order to calculate a geometric mean, the data set of values must be greater than zero. Where the infiltration rate is too low to measure, a rate of 0.03 in/hr may be used to calculate a geometric mean of the data set.

**Are velocity calculations required?**

The swales that were not eliminated by visual inspection should be evaluated for scour and re-suspension using the results of velocity or shear stress calculations conducted at the representative swale locations

from **Step 1**. Velocity or shear stress calculations should be conducted based on the peak discharge rate for a 2-yr, 24-hr design event (or a reasonably equivalent event from the SLAMM or P8 rainfall file for the area) to verify that scour and re-suspension will not be a problem.

**Do water quality swales need to meet the slope parameters identified in Vegetated Infiltration Swale, Interim Technical Standard, No. 1005?**

If functioning as vegetated conveyance systems, swales with longitudinal slope less than 1% can be used. However, there is concern that swales with slopes less than 1% can clog. Where visual evidence indicates that the infiltration rate has been reduced (e.g., significant duration of ponded water or evidence of wetland vegetation), infiltration rates appropriate for clay soils should be used.

**How do I model road runoff that sheet flows off the road and is dispersed with no apparent concentrated flow path?**

For roads where runoff sheet flows off to the side of the road and is dispersed into adjacent pervious areas with no concentrated flow path in the vicinity, the roadway would be considered a disconnected impervious surface. Currently, SLAMM does not have the option of disconnecting a roadway, whereas rooftops and driveways can be disconnected. Therefore, an alternative method is needed to give treatment credit for such a system. If there is no concentrated flow path near the roadway and the runoff is dispersed as sheet flow across healthy vegetated areas, model this as a very broad, flat swale unless there is an option to model it as a vegetated filter strip.

Approved By:

Gordon Stevenson, Chief
Runoff Management Section

# APPENDIX C2B
# ERRATA GUIDANCE SWALES

# 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

The following are clarifications or revisions to the Department of Natural Resources guidance dated April 24, 2008.

## A. Measured Infiltration Rates in Swales

**Recommendation**: The geometric mean(s) of infiltration testing results should be used. However, equally important is to consider whether the measured infiltration rates should be 'grouped' in order to apply separate geometric means to different areas in order to provide representative TSS results across a municipality. Grouping of result might be done based on soil type, spatial reasons or simply done as a method to help provide representative results. For instance, if there are several relatively low infiltration rates measured and the geometric mean of the entire data set is quite high, it may be prudent to group the relatively low rates together and assign to a representative area.

Note: In order to calculate a geometric mean, the data set of values must be greater than zero. Where the infiltration rate is too low to measure, a rate of 0.03 in/hr may be used to calculate a geometric mean of the data set.

## B. Pretreatment for Existing Swales

Step 1.A of the April 24, 2008 guidance memo states that "Swales in commercial or industrial areas should have pretreatment swales or equivalent pretreatment in accordance with Vegetated Swale Infiltration Standard, No. 1005." The pretreatment language in Standard No. 1005 is specifically intended for infiltration swales to reduce potential clogging due to the higher pollutant loads associated with commercial and industrial areas and to prevent pretreatment areas from being counted toward the effective infiltration area credited toward meeting the infiltration cap under s. NR 151.12 (5)(c). The pretreatment portion of a swale effectively removes TSS thus the pretreatment requirement in Standard No. 1005 should only be applied to areas of new development trying to meet the infiltration standard of s. NR 151.12 (5)(c).

**Recommendation**: The Department hereby revises its April 24, 2008 guidance to <u>not</u> require pretreatment for swale treatment where swales are used to meet the developed urban area standard of s. NR 151.13(2).

**This Errata was approved by the Department's MS4 Liaison Team on January 8, 2010 and it is to be incorporated into an update of the Swale Guidance memo, dated April 24, 2008.**

# APPENDIX C3
# WDNR SLAMM MODELING GUIDANCE

# CORRESPONDENCE/MEMORANDUM

State of Wisco

DATE: November 24, 2010

TO: Regional Water Leaders, Basin Leader & Experts
Stormwater Permit Staff (via Email)

FROM: Russ Rasmussen, Director
Bureau of Watershed Management

SUBJECT: Developed Urban Areas and the 20% and 40% TSS Reductions
Sections NR 151.13(2) and NR 216.07(6), Wis. Adm. Code

*This document is intended solely as guidance, and does not contain any mandatory requirements except where requirements found in statute or administrative rule are referenced. This guidance does not establish or affect legal rights or obligations, and is not finally determinative of any of the issues addressed. This guidance does not create any rights enforceable by any party in litigation with the State of Wisconsin or the Department of Natural Resources. Any regulatory decisions made by the Department of Natural Resources in any matter addressed by this guidance will be made by applying the governing statutes and administrative rules to the relevant facts.* ***This document supersedes the guidance memo dated June 6, 2005, subsequent errata dated 8/15/05 and April, 2009 and the guidance memo dated May 14, 2010.***

## Issue

Under s. NR 151.13 (2), Wis. Adm. Code, a municipality subject to the municipal stormwater permit requirements of subch. I of ch. NR 216, Wis. Adm. Code, must, to the maximum extent practicable, implement a 20% and a 40% reduction in total suspended solids in runoff that enters waters of the state as compared to no controls, by March 10, 2008 and March 10, 2013, respectively. Staff who work with affected municipalities need guidance on what areas under the municipalities' jurisdictions will be included in this requirement. They also need to know what is meant by "no controls" and "with controls", and what methods are acceptable for making these calculations.

## Discussion

Chapter NR 216, Wis. Adm. Code, is the implementation code for the developed urban area performance standard. Applicability for permit coverage purposes is dictated by s. NR 216.02, Wis. Adm. Code. Under this provision, owners or operators of the following municipal separate storm sewer systems (MS4s) are required to obtain coverage under a WPDES municipal stormwater permit:

- MS4s serving populations of 100,000 or more.
- Previously notified owners or operators of municipal separate storm sewer systems.
- MS4s within urbanized areas as identified by EPA.
- MS4s serving populations over 10,000 unless exempted by DNR.

"MS4" is defined under s. NR 216.002 (17), Wis. Adm. Code, as a conveyance or system of conveyances, including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, constructed channels or storm drains, which meets all the following criteria:

- Owned or operated by a municipality.
- Designed or used for collecting or conveying stormwater.
- Not a combined sewer conveying both sanitary and stormwater.



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- Not part of a publicly owned wastewater treatment works that provides secondary or more stringent treatment.

"Waters of the state" is defined under s. 283.01 (20), Stats., and it includes surface water, wetlands and groundwater. Waters of the state may overlap with the definition of MS4. For this purpose, if a waterway meets the definition of an MS4, it will be regulated as an MS4. The significant language in that definition is whether or not the municipality owns or operates the drainage way (i.e., maintains, has easement access for work, dredges, etc.). For example, when a "stream" is designed or used for collecting or conveying stormwater such as flowing through a municipally owned or operated culvert or bridge restriction, that "stream" is part of the MS4.

Under s. NR 216.07 (6)(a), Wis. Adm. Code, a municipality must develop a stormwater management program to achieve compliance with the developed urban area performance standard (s. NR 151.13 (2), Wis. Adm. Code). Developed areas are generally those that were not subject to the post-construction performance standards (s. NR 151.12 or NR 151.24, Wis. Adm. Code). The total suspended solids control requirements of s. NR 151.13 (2)(b)1.b. and 2., Wis. Adm. Code, may be achieved on an individual municipal basis. Control does not have to apply uniformly across the municipality. The control may also be applied on a watershed or regional basis by involving several municipalities. However, note that the Department is proposing to revise s. NR 151.12, Wis. Adm. Code, to limit the geographic extent of the watershed or regional area that municipalities may collectively meet the developed urban area standard.

A municipality is required under s. NR 216.07 (6)(b), Wis. Adm. Code, to provide an assessment of the actions taken to comply with the performance standards. This assessment may take the form of an annual progress report. The initial assessment must include a pollutant-loading analysis using a model such as SLAMM, P8 or equivalent methodology that is approved by the department. At a minimum, a pollutant-loading analysis must be conducted for total suspended solids and phosphorus. A model would not be run again after the initial assessment unless significant management changes occurred that should be accounted for, or the progress report indicates a re-run is necessary.

**DNR Guidance**

To comply with the code, the developed urban area must be modeled under a "no control" condition and a "with controls" condition. The 20% and 40% TSS reductions are assessed against the "no control" condition for the entire area served by the MS4 as defined below. They are not applied uniformly across the municipality, nor are they applied drainage area by drainage area within the municipal boundary. In most cases however, a calculation drainage basin by drainage basin will be used to determine the total loading and the achieved reductions.

**Areas Required to be Included in the Calculations**

A municipality must include the following areas when calculating compliance with the developed urban area standard (s. NR 151.13, Wis. Adm. Code):

1. Any developed area that was not subject to the post-construction performance standards of s. NR 151.12 or 151.24, Wis. Adm. Code, for new development only, that drains to the MS4 owned or operated by the municipality. The baseline developed urban area does not change due to future redevelopment of existing urban areas.
2. Any area covered by an NOI submitted prior to October 1, 2004 where development is still underway. The pollutant load shall be based on full build out. If it is known that the future development of some parcels may require compliance with s. NR 151.12 or NR 151.24, Wis. Adm. Code, then these areas may be excluded from the calculation.
3. Any undeveloped (in-fill) areas under 5 acres. These areas must be modeled as fully developed, with a land use similar to the properties around them.
4. For municipalities with large areas of agricultural lands separating areas of development, only the developed areas within the urbanized area as defined by the U.S. Census Bureau.

5. Non-manufacturing areas of industrial facilities such as customer or employee parking lots. (The manufacturing, outside storage and vehicle maintenance areas of these industrial facilities are covered under subch. II of ch. NR 216, Wis. Adm. Code, industrial permit.)
6. Any industry that has certified a condition of "no exposure" in accordance with s. NR 216.21(3), Wis. Adm. Code.
7. Any connecting highways as identified and listed in the Official Highway State Truck Highway System Maps at: http://www.dot.wisconsin.gov/localgov/highways/connecting.htm

**Areas Prohibited from Inclusion in the Calculations**

Areas and loadings that shall not be included:

1. Lands zoned for agricultural use and operating as such.
2. Pollutant loadings from an upstream MS4 (independent of whether it is regulated under a ch. NR 216, Wis. Adm. Code, permit) unless the municipality has an agreement to share the pollutant control credit with the upstream municipality.
3. Undeveloped land parcels over 5 acres within the municipality. These areas will be subject to the new development post-construction performance standards of s. NR 151.12 or 151.24, Wis. Adm. Code, when developed.
4. Any internally drained area with natural infiltration. (This does not include engineered or constructed infiltration areas.) However, a separate guidance memo dated April 6, 2009 (Subject: Developed Urban Areas and the 20% and 40% Reductions - Internally Drained Areas) provides conditions under which an internally drained area may be included in the calculation.
5. Any active or inactive mining site unless it has been reclaimed into another land use. The pollutant load associated with a mining site is not included in the calculation. However, runoff which drains into a mining site would be eligible for treatment credit in accordance with the April 6, 2009 guidance memo.
6. Areas subject to the new development performance standards of s. NR 151.12, Wis. Adm. Code.

**Optional Areas to Include in the Calculations**

Areas a municipality may, but is not required to, include in the developed urban area load calculation:

1. Property that drains to *waters of the state* without passing through the permittee's MS4.
2. Any area that discharges to an adjacent municipality's MS4 (Municipality B) without passing through the jurisdictional municipality's MS4 (Municipality A). Municipality B that receives the discharge into their MS4 may choose to be responsible for this area from Municipality A. If Municipality B has a stormwater treatment practice that serves a portion of A as well as a portion of B, then the practice must be modeled as receiving loads from both areas, independent of who carries the responsibility for the area. However, if runoff from an area within Municipality A's jurisdiction drains into Municipality B's MS4 but then drains back into Municipality A's MS4 farther downgradient, then Municipality B does not have the option of including the load from Municipality A in their analysis and the load from that area is Municipality A's responsibility.
3. Industrial facilities subject to a permit under subch. II of ch. NR 216, Wis. Adm. Code, except the pollutant load associated with an active or inactive mining site. This exclusion covers the facilities that are required to have permit coverage. Contact the regional stormwater specialist or central office to get a list of permitted facilities within a municipality.
    - The industrial NR 216 permit covers areas with industrial materials and activities, specifically areas with manufacturing, vehicle maintenance, storage of materials, etc.

A municipality may include any of the areas identified above in their developed urban area as part of their load calculation provided the areas are not prohibited from inclusion in the calculation. If they choose to include an area, it must be included in both the "no controls" and "with controls" condition. Inclusion of areas they choose to be responsible for will allow them to take credit for any of those areas that may have controls in place. For example, if an industrial park would have been excluded because all the industries in the industrial park have an NR 216 industrial permit, but the municipality chooses to keep this area in their "no controls" area, then any best management practices existing or built to serve the industrial park can be included in the "with controls" scenario.

**Model Inputs**

Model Version:
To model the TSS load in the area served by the MS4, the municipality must select a model such as SLAMM, P8 or an equivalent method deemed acceptable by the Department. For the analysis to show compliance with the 40% developed urban area performance standard, SLAMM version 9.2 or P8 version 3.4 or a subsequent version of these models may be used. As part of the reporting process, the municipality must identify which model version is being used. The analysis must use the same version for both the "no controls" scenario and the "with controls" scenario unless it is verified that the "no controls" pollutant discharge load does not change between the model versions. If there is a change in the no controls pollutant discharge load then the new pollutant discharge load corresponding with the version of the model selected for the analysis needs to be utilized. An entire city-wide municipal "no controls" scenario does not need to be remodeled, only those areas being updated with the new version of the model.

"No control"
In SLAMM, the "no controls" condition generally will be based on the standard land use files for different land uses. This assumes certain default parameter files, an assumed level of disconnection and an assumed distribution of road smoothness. The "no controls" condition for each land use is based on this assumed percent of disconnected imperviousness. All land uses as modeled must be equal to the connected imperviousness values in the standard land use files unless site specific data is available. However under the "with controls" condition, land use that has a greater level of disconnection than the values in the standard land use files may take credit for volume and pollutant reduction. In P8, the help menu provides standard land use values that can be used for the percent directly connected versus indirectly connected impervious surfaces.

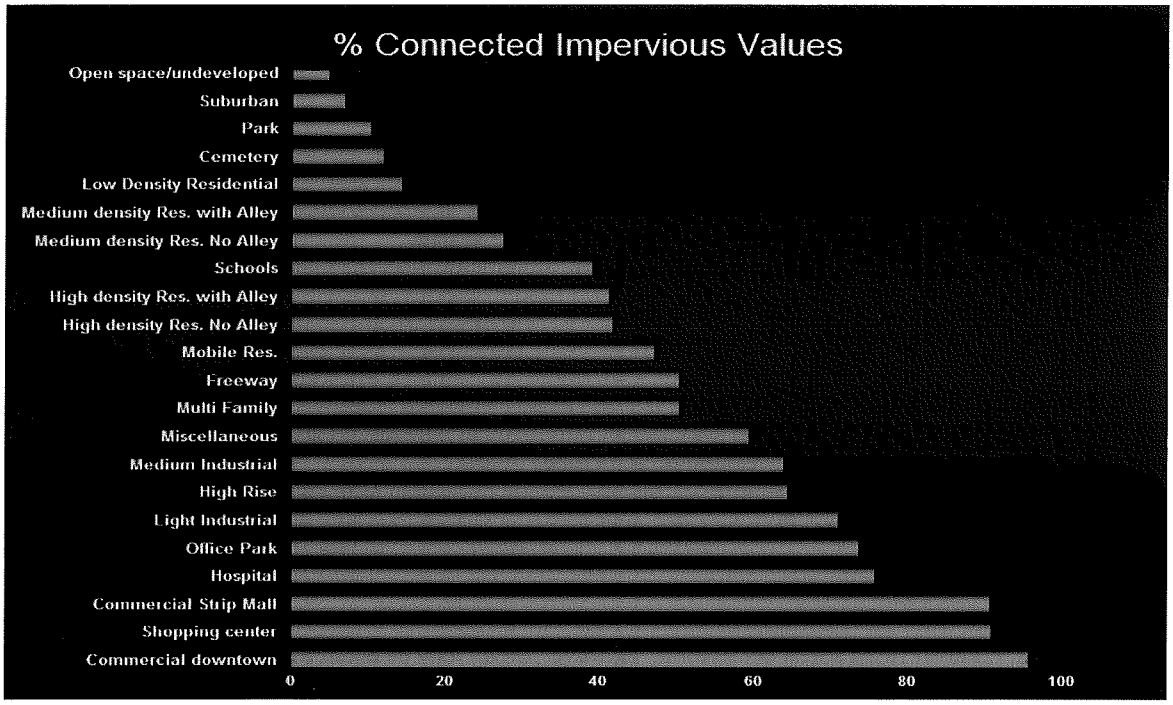
All roads within the urbanized area that are part of a county or town's MS4 are the responsibility of the county or town. To generate a load under "no controls", model the road based on the nearest urban land use, even if agricultural land use is on one or both sides of the road. Select the urban land use that will most likely typify the traffic that will be on that road (for example commercial or residential) and include that area in the corresponding standard land use file.

For the drainage system, the default will be curb and gutter (even if the drainage system is currently swale drainage), in fair condition. For "no controls" there will be no recognition of street sweeping, catch basin cleaning, swale drainage, or the existence of any engineered best management practices. These practices and facilities will be accounted for under the "with controls" condition.

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

- The source area flow length does not exceed 75 feet,
- The pervious area is covered with a self-sustaining vegetation in "good" condition and at a slope not exceeding 8%,
- The pervious area flow length is at least as long as the contributing impervious area and there can be no additional runoff flowing into the pervious area other than that from the source area.
- The pervious area must receive runoff in a sheet flow manner across an impervious area with a pervious width at least as wide as the contributing impervious source area.

The table below shows the overall percent connected imperviousness that is associated with SLAMM standard land use files. The overall percent disconnection shown in this table is not input into SLAMM as the percent disconnection, rather the individual road, roof top, sidewalk, etc. areas have their own individual connectedness included in the standard land use files.




"With controls"

The "with controls" condition is applied to the developed urban area with the inclusion of the practices and facilities (existing and proposed). Modeling is a means to confirm a practice's efficiency for the conditions found in Wisconsin. If the model cannot predict efficiencies for certain practices that the municipality identifies as water quality practices, then a literature review must be conducted to estimate the reduction value. Proprietary stormwater practices that utilize settling as their means of solids reduction should be modeled in accordance with DNR Technical Standard 1006 (Method for Predicting the Efficiency of Proprietary Storm Water Sedimentation Devices).

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

Practices on private property that drain to an MS4 can be included in the "with controls" scenario for a municipality, provided the municipality enters into an agreement or equivalent enforceable mechanism with the stormwater treatment facility owner that will ensure the practice is properly maintained. An operation and maintenance plan, including a maintenance schedule, must be developed for the stormwater treatment facility in accordance with relevant DNR technical standards. The agreement or equivalent mechanism between the municipality and the private owner should include the following:

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

The efficiency of the practice on private property must be modeled using the best information the municipality can obtain on the design of the practice. For example, permanent pool area is not sufficient information to know the pollutant reduction efficiency of a wet detention basin even if it matches the area requirements identified in Technical Standard 1001 Wet Detention Basin for an 80% reduction. Information on the depth of the wet pool and the outlet design are critical features that determine whether a detention pond is providing 80% TSS reduction.

**Further clarifications**

- If a portion of a municipality's MS4 drains to a stormwater treatment facility in an adjacent municipality, the municipality generating the load will not receive any treatment credit due to the downstream municipality's treatment facility unless there is an inter-municipal agreement where the downstream

municipality agrees to allow the upstream municipality to take credit for such treatment. DNR anticipates that such an agreement would have the upstream municipality assist with the construction and/or maintenance of the treatment facility. This contract must be in writing with signatures from both municipalities specifying how the treatment credit will be shared.

- The model results will be the basis for determining compliance with the permit for "no controls" and "with controls" TSS load.
- For reporting purposes, the pollutant load must be summarized as the cumulative total for the developed urban area served by the MS4. Additionally pollutant loads for grouped drainage areas as modeled shall also be reported. Drainage areas may be grouped at the discretion of the modeler for such reasons as to emphasize higher priority areas, balance model development with targeting or for cost-effectiveness.
- No credit should be taken for sweeping of non-curbed streets.
- The additional runoff volume from areas that are exempt or outside of the developed urban area to which the TSS standard applies needs to be accounted for when it drains into the treatment device. The pollutant load can be "turned off" but the runoff hydrology needs to be accounted for to properly calculate the treatment efficiency of the device.
- Due to concerns of sediment resuspension, basins with an outlet on the bottom are generally not eligible for pollutant removal based solely on settling. However, credit may be taken for treatment due to infiltration or filtration. Features to prevent scour should always be included for any practice where appropriate.
- When street cleaning is applied across a watershed with devices that serve only certain areas within the watershed, it is acceptable to first take credit for street cleaning across the entire watershed but then the treatment efficiency for devices must be reduced by the efficiency of the street cleaning to prevent double counting.
- To model a combination of mechanical broom and vacuum assisted street cleaning, it may require an analysis of several model runs depending on the timing of the mechanical and vacuum cleaning. If mechanical broom and vacuum cleaning occur at generally the same time (e.g. within two weeks of each other) then only the removal efficiency of the vacuum cleaning should be taken. If the municipality performs broom sweeping in the spring or fall and vacuum clean the remained of the year, calculate the combined cleaning efficiency using the following method:
  (A) Model the entire street cleaning program as if entire period is done by a mechanical broom cleaner.
  (B) Model just the period of time for vacuum cleaning (do not include the mechanical broom cleaning).
  (C) Model the same period as B) but with a mechanical broom.
  (D) The overall combined efficiency would be A + B – C.

**WinSLAMM clarification:**

- WinSLAMM 9.3.4 and earlier versions of WinSLAMM result in double counting of pollutant removal for most treatment practices modeled in series. WinSLAMM 9.2 and subsequent versions contain warnings to help alert modelers of this issue. The modeler will need to make adjustments to ensure that the results do not include double credit for removal of the same particle size. PV & Associates has created a document titled 'Modeling Practices in Series Using WinSLAMM' which helps to guide a user as to whether and or how certain practices can be modeled in series and this document is available at: http://winslamm.com/Select_documentation.html

**P8 clarifications**

- P8 does not account for scour and sediment resuspension. DNR requires that a wet basin with less than a 3-foot permanent pool have its treatment efficiency reduced. A basin with zero permanent pool depth should be considered to get zero credit for pollutant removal due to settling and a basin with 3 or more feet of permanent pool depth can be given the full pollutant removal efficiency credited by settling. The pollutant removal efficiency may be given straight-line depreciation such that a basin with a 1.5 foot-deep permanent pool would be eligible for 1/2 the pollutant removal efficiency that would be credited due to settling.
- A device that DNR gives no credit for pollutant removal may still be modeled if it is in series with other practices because of its benefit on runoff storage capacity that may enhance the treatment efficiency of downgradient treatment devices. To do so, turn the treatment efficiency off in P-8.

- P8 starts its model runs with no water in the basins. P8 should be started an extra year before the "keep dates", in order to allow the model to fill up ponds to the lowest outlet elevation.

Approved By:

Gordon Stevenson, Chief
Runoff Management Section

# APPENDIX C4
# WDNR INTERNALLY DRAINING MODELING GUIDANCE

# CORRESPONDENCE/MEMORANDUM — State of Wisco

DATE: April 6, 2009

TO: Regional Water Leaders, Basin Leader
Storm Water Permit Staff (via Email)

FROM: Russ Rasmussen, Director
Bureau of Watershed Management

SUBJECT: Developed Urban Areas and the 20% and 40% TSS Reductions
Internally Drained Areas

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

**Issue**

The Department of Natural Resources June 6, 2005 guidance memo, *Developed Urban Areas and the 20% and 40% TSS Reductions*, addresses areas prohibited from inclusion in the municipal modeling calculations including the following on page 3 of the guidance:

3. "Any internally drained area with natural infiltration. (This does not include engineered or constructed infiltration areas). However, an internally drained area that discharges to a karst feature is not likely to be receiving adequate treatment prior to contact with the groundwater. The municipality is encouraged to look at this area for possible treatment options."

Some municipal separate storm sewer systems (MS4s) contain areas that are internally drained, but drain to a constructed pond or quarry with no outlet under observed runoff event conditions. There are questions on how these areas could be included in the municipal analysis to demonstrate compliance with the developed urban area total suspended solids (TSS) performance standard of s. NR 151.13(2), Wis. Adm. Code.

**Discussion**

An internally drained area is an area where runoff from the MS4 does not enter a surface water of the state including wetlands. Determining if an area is internally drained may be made from aerial photos or historic data. If runoff from storm events up to a 10-year, 24-hour event does not leave the depression area, then this area is considered internally drained and shall not be included in the developed urban area analysis (i.e. not included in the base condition or any subsequent scenarios). If runoff leaves the depression area during lesser storm events, then this area is not internally drained and the drainage area to the depression area must be included in the developed urban area analysis.

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**DNR Guidance**

Notwithstanding the discussion above, there are situations where an internally drained area may be included in the analysis. For this to happen, all of the following conditions must be met:

1. Consistent with s. NR 151.12(5)(c)8., Wis. Adm. Code, the discharge of runoff from the MS4 into an internally drained area must to the extent technically and economically feasible minimize the level of pollutants infiltrating to groundwater and shall maintain compliance with the preventive action limit at a point of standards application in accordance with ch. NR 140, Wis. Adm. Code. However, if site specific information indicates that compliance with a preventive action limit is not achievable, the infiltration practice may not be installed or shall be modified to prevent infiltration to the maximum extent practicable. The municipality must assess the usual or potential presence of any toxic pollutant, the degradability of the pollutant and the capacity of the soil to remove the pollutant. A discharge to groundwater must remain below the enforcement standard at the point of standards application.

**Note:** Also consistent with s. NR 151.12(5)(c)5.i., Wis. Adm. Code, the following characteristics are believed to be protective of groundwater for the treatment of storm water: The soils between the bottom of an infiltration practice and the seasonal high groundwater or top of bedrock have at least a 3–foot soil layer with 20% fines or greater; or at least a 5–foot soil layer with 10% fines or greater or where the soil medium within the infiltration system provides an equivalent level of protection. "Percent fines" means the percentage of a given sample of soil, which passes through a # 200 sieve.

2. Any runoff from parking lots or roads in commercial, institutional or industrial areas directed into an internally drained area shall be pretreated to help prevent clogging of the internally drained area.

3. If the area is not owned by the municipality, then the municipality must have a long-term maintenance agreement in place with the property owner to ensure that the internally drained area will be maintained. If the municipality owns the area, then the municipality must include maintenance of the area in its storm water management program.

Where conditions 1-3 are met, internally drained areas can be included in the developed urban area analysis. Additional runoff may be directed to an internally drained area meeting conditions 1-3. One hundred percent credit for TSS removal may be taken for the runoff that stays within the internally drained area.

Department staff will assist in evaluating these determinations prior to allowing credit for TSS reduction from internally drained areas on a case by case basis. There may also need to be a determination regarding natural water features in the depression area prior to the Department's concurrence that these areas can be used toward the TSS removal credit.

Approved By:

Gordon Stevenson, Chief
Runoff Management Section

Mary Anne Lowndes
Storm Water Engineer

# APPENDIX C5
# DRY DETENTION BASIN MODELING

## Lindert, Jon

**From:** Lindert, Jon
**Sent:** Thursday, April 01, 2010 12:49 PM
**To:** Scott Brandmeier
**Subject:** FW: Modeling of Dry Detention Basins to gain MS4 TSS Reduction

Scott-This is the guidance received from the DNR regarding allowing for dry detention basin modeling to get TSS credit. I also talked with Mary Anne Lowndes and she said that the dry pond would also have to not be experiencing scour. Evidence would consist of pictures showing a flourishing turf that doesn't have sediment buildup that can be washed out during a storm event. If there is evidence, then the pond may have to have measures installed to guard against it, perhaps stone check dams at the inlet and outlet. I will send the draft scope of services and fee for your review shortly.

Have a nice Easter weekend. I am now off until Tuesday, April 6, but you could call me on my cell if you have any questions (608-669-6103)

Thanks,
Jon

Jon H. Lindert, P.E., LEED AP
Strand Associates, Inc.
608-251-4843
jon.lindert@strand.com

**From:** Rortvedt, Eric - DNR [mailto:Eric.Rortvedt@Wisconsin.gov]
**Sent:** Thursday, April 01, 2010 8:46 AM
**To:** McBroom, Maureen A - DNR; Lindert, Jon
**Cc:** Lowndes, MaryAnne - DNR; Sina, Tim; Hagie, Tom; Hartsook, Bryan D - DNR; Wood, Peter C - DNR
**Subject:** RE: Modeling of Dry Detention Basins to gain MS4 TSS Reduction

Jon,

Modeling a so called dry pond as a bioretention device with an appropriate static infiltration rate is acceptable.

Eric

**From:** McBroom, Maureen A - DNR
**Sent:** Thursday, April 01, 2010 8:18 AM
**To:** Lindert, Jon
**Cc:** Lowndes, MaryAnne - DNR; Rortvedt, Eric - DNR; Sina, Tim; Hagie, Tom; Hartsook, Bryan D - DNR; Wood, Peter C - DNR
**Subject:** RE: Modeling of Dry Detention Basins to gain MS4 TSS Reduction

Good morning, Jon-

The information below is from the WINSLAMM web-site, as well as comments from Bryan Hartsook, my stormwater engineer here in Waukesha. While we told folks they could not model dry ponds a few years ago, with the model updates, there are ways to include these structures to account for *some* credit. Usually not much. However, there is no standard guidance that I know of to explain how to do this. Why don't you take a look at this, and let the group cc'd above know if you have any questions or comments? Unfortunately, (mainly for me,) I will be in a deposition for most of the day, so I will not be available today.

Thanks - have a great day!

**Dry Detention Ponds (June 2008)**Q. How do you model dry ponds in WinSLAMM? After speaking with a few people at the WDNR, they were saying with the version 9.3 you can model them as wet ponds with a very small wet pool (like an inch) and get some credit for them. I have tried doing this and only came up with a 0.5% TSS reduction. Which I guess is some credit, but I would think it should be around 10%-15% (Similar to what I receive modeling swales)

A. The model currently calculates a reduced level of performance associated with dry ponds compared to wet ponds, due to scour. The dry pond literature is very confusing and conflicting; the wet pond literature is much more consistent. It takes a great deal of data to understand what is going on in a device having limited removals. Many of the available docs are limited in the number of samples obtained and the results vary greatly. In research that included much data, the long-term performance of dry ponds can approach zero. Also, there is a large variation in how dry ponds are defined.

The basic theory behind grass swales is different than the theory behind detention ponds in SLAMM. For grass swales, the runoff is being routed through a long area and thus the particles have more of an opportunity to be filtered out by the grass. Wet detention ponds are based on the settling of the particles in water. Therefore, the larger the surface area of the permanent pool, the more particles can settle out. The main difference between dry ponds and grass filters is the concentrated flows and flow depths present. Our plan is to eventually enhance the calculations for dry ponds based on recent grass filter research and on current scour research. During very low flows with a level spreader, high levels of particulate trapping will likely occur, as the water gets to be about 4 or 5 times the vegetation height, little trapping will occur. Scour will also occur in areas of concentrated flow, and if the water depth is shallow. When the water depth is about 3 ft, scour is minimized.

Another option for you to try is modeling the dry pond as an infiltration basin. The only reduction will be from the amount of runoff that is infiltrated into the native soil.

It is apparent that the door is open for modeling dry ponds in SLAMM for marginal TSS removal credit. But obvious problems with dry ponds such as concentrated flow paths from inlet to outlet and the potential for larger (larger meaning outside the limits of the "small storm hydrology" water quality model) to scour, resuspend, and flush particulates out the pipe, make modeling dry ponds a taboo? subject.

With the CYA part done, I am okay with what we worked out with Ruekert-Mielke with a couple more clarifications:

1) If a grass swale to dry basin 'system' is being modeled, the total swale length input for the model may be found by the following:

= A+B(C/D)

A) total swale length of the upstream grass swale

B) length of the dry basin from inlet to outlet

C) width of the dry basin

D) upstream swale bottom width plus the horizontal side slope value (this estimates the total width of the side slopes for a water depth of 0.5' or greater - conservative)

2) The 'average swale length to outlet' input parameter should not be adjusted to account for the added swale length used to represent the dry basin bottom since SLAMM uses this variable to calculate particulate filtering, and the flow path across the dry basin is from inlet to outlet and not along the entire 'zig-zag' length of the representative swale

3) Field evidence should be provided to document that the dry basin has similar capacity to infiltrate runoff volume as compared to the upstream drainage system since adding on the extra swale length in the basin increases the effective infiltration area of the swale 'system'.

4) If modeling just a dry basin (no upstream swale), then suggest modeling the dry pond as an infiltration basin with field evidence to support dynamic infiltration rate. (see other WinSLAMM FAQ notes above)

****Before finalizing any of the reported model runs for these dry basin scenarios, the modeler should submit the .dat files to WDNR for review and comment. ****

---

**From:** Lindert, Jon [mailto:Jon.Lindert@strand.com]
**Sent:** Tuesday, March 30, 2010 3:57 PM
**To:** McBroom, Maureen A - DNR
**Cc:** Lowndes, MaryAnne - DNR; Rortvedt, Eric - DNR; Sina, Tim; Hagie, Tom
**Subject:** Modeling of Dry Detention Basins to gain MS4 TSS Reduction

Maureen-As we discussed last week at the Town of Brookfield, I wanted to formally request that the DNR provide an email providing DNR guidance on how dry detention basins are being allowed to be modeled for TSS reduction. It sounds like the DNR is now allowing the infiltration dynamic of a dry detention basin to be modeled in WinSLAMM but not the filtration component. Any guidance on "how" the DNR would like to see these modeled (ie: drainage control: biofiltration without engineered soil or swale) or outfall control: biofiltration without engieneered soil or other control) would be appreciated. The Village of Fox Point would like to leverage this new guidance. When do you think you could provide this new guidance? If possible, I would like to get it by noon on Thursday, April 1, 2010.

A complicating factor is that for Fox Point and other communities drained by grass swales, it would be more difficult to just add in the length/width of the dry basin as a swale since there is really no place to add in another swale. Would it thus be acceptable to provide a weighted average for the swale serving the particular landuse? Or, could we just model the dry basin as a bioretention basin with no engineered soil and just with the in-situ static infiltration rate (use static because the water will be ponding)? It would seem that this would be acceptable (to model as a bioretention basin as described above) given that it is basically a turf rain garden.

We appreciate your assistance.

Thank you,
Jon

Jon H. Lindert, P.E., LEED AP

Strand Associates, Inc.
608-251-4843
jon.lindert@strand.com

# APPENDIX D
# WHITEWATER STORMWATER POLLUTION PREVENTION PLAN

Purpose

The City of Whitewater (City) has prepared the following Stormwater Pollution Prevention Plan (SWPPP) to provide the status of the City's Public Works Garage facility. This report is prepared in compliance with the conditions of the NR 216 permit pursuant to Section 2.6 of Wisconsin Pollutant Discharge Elimination System (WPDES) Permit Issuance No. WI-S050075-2. This report provides information related to the daily operations and maintenance activities for the Public Works Garage facility.

A. Site Location and Contact Information

| | |
|---|---|
| Name of Facility: | City of Whitewater Public Works Garage |
| Facility Address: | 150 East Starin Road, Whitewater, WI, 53190 |
| Facility Contact: | Chuck Nass |
| Title: | Street Superintendent |
| Telephone: | (262) 473-0540 |

B. Air Photo/Map of the Yard

Attached Figure D-1 includes the following:

1. Locations of major activities and storage areas.
2. Identification of drainage patterns and potential stormwater runoff source and discharge areas.
3. Identification of any wetlands and/or waterways on-site or nearby.
4. Identification of Municipal Separate Storm Sewer System (MS4) connections and where this portion of the MS4 system drains.

C. Overview

This SWPPP covers the operations at the City's Public Works Garage. This SWPPP describes the facility and associated operations, identifies potential sources of stormwater pollution, recommends appropriate best management practices (BMPs) or pollution control measures to reduce the discharge of pollutants in stormwater runoff, and provides for periodic review of this SWPPP with the annual report.

The primary goal of the stormwater permit program is to improve the quality of surface waters in the City's MS4 by reducing the amount of pollutants potentially contained in the stormwater runoff. The purpose of this SWPPP is to provide the following:

1. Identification of potential sources of stormwater and non-stormwater contamination to the MS4 system from the facility.
2. Identification of and recommendation of appropriate "source area control" BMPs designed to reduce or prevent stormwater contamination from occurring.
3. Identification of and recommendation of "stormwater treatment" BMPs to reduce potential pollutants within contaminated stormwater prior to discharging to the MS4 system and to Waters of the State.

D. Information

1. Inventory of Potential Sources of Contamination

The following have been identified as potential sources of contamination at the Public Works Garage.

a. Salt storage shed–The City's deicing and snow removal operations are described in Section 3.01 F. 4. and Table 3.01-3. Salt is stored in the salt storage building and salt brine equipment and tanks are stored inside the cold storage building. The salt and sand are delivered in bulk separately to the site. The salt is loaded into the salt storage shed. The sand is ordered as needed during the winter seasons and the salt-sand mixture is mechanically-mixed. The facility does not experience problems with salt leaking.

b. Drain oil and used oil-One aboveground steel storage tank stores drain oil and used oil. Waste oil is removed from the tank by a licensed disposal company as needed throughout the year. This tank is in a covered building.

c. Exterior materials storage area–A number of materials are stored on the site in uncovered areas. These include sand, topsoil, gravel, rip rap, asphalt, fill material, concrete manholes and pipes, miscellaneous metals, wood chips, and miscellaneous equipment.

d. Internal materials storage area–Miscellaneous materials used in everyday public works operations are stored in storage areas within covered buildings on the Public Works Garage site. These materials are properly stored, used, and disposed of and are not a stormwater contamination threat.

Various materials require a Material Safety Data Sheet (MSDS) such as brake cleaner, solvents, and lubricants. A full list of these items along with their MSDS is available at the Public Works Garage.

E. Recommendations to Prevent Polluted Runoff From Reaching Nearby Water Resources

Stormwater management controls or BMPs will be implemented to reduce the amount of pollutants associated with the Public Works Garage from entering the City's MS4 from and reaching nearby water resources.

1. Source Area Control

To the maximum extent practicable and where cost-effective, source area control BMPs designed to prevent stormwater from becoming contaminated will be used.

a. Erosion Control Measures

Material storage areas prone to erosion shall be protected and the material prevented from entering the storm sewer and discharging from the site. External storage areas are generally in flat areas with little off-site drainage. Potential

improvements are shown on Figure D-1 including perimeter sediment reduction devices (ie: silt sock).

b. Good Housekeeping

Good housekeeping practices are designed to maintain a clean and orderly work environment. This will reduce the potential for significant materials to come in contact with stormwater. The following practices are included in the Public Works Garage good housekeeping routine.

1) Routine sweeping is done in the City's storage buildings.
2) Oil dry is available in storage buildings and disposed of through a licensed disposal company.
3) Used oil rags and oil filters are drained and disposed of properly.
4) Miscellaneous metals are periodically recycled
5) Vehicle batteries and tires are routinely recycled.

c. Preventive Maintenance

Preventive maintenance involves the inspection, testing, and cleaning of facility equipment and operational systems before use. These inspections will help to uncover conditions that might lead to a release of materials. The following equipment/activities are included in the inspection schedule of each facility outlined in Section H.

1) Vehicles
2) Equipment
3) Catch basin sumps

d. Spill Prevention and Response Procedures

Spills and leaks together are the largest source of stormwater pollution. Thus, this SWPPP specifies material handling procedures and storage requirements for significant materials. The City maintains a Spill Control Plan. The Superintendent of Streets/Parks is responsible for maintenance and implementation of this plan. The following general procedures have been developed for spill response for the Public Works Garage facility.

1) Emergency–dial 911 (Major spills are defined as an emergency condition and generally include hazardous materials).
2) Nonemergency–Utilize on-site materials to contain the spill and pick up (floor dry or oil sorb napkins). Dispose in an appropriate container and contact licensed contractor to remove from site.

e. Bulk Storage

At the Public Works Garage, dry bulk storage is limited on the site. Salt is stored in a covered building. The State of Wisconsin inspects the storage annually.

Liquid bulk storage at the Public Works Garage is utilized for fuels and used oil. Used oil is collected in a tank in a covered building and disposed of properly. The fuel tanks are inspected regularly by public works staff.

2. Stormwater Treatment Best Management Practices

Structural control measures may be necessary to control pollutants that are still present in the stormwater after the nonstructural controls have been implemented. These types of controls are physical features that control and prevent stormwater pollution. Structural controls can include a range of application such as preventive measures, collection structures, or stormwater treatment systems. Structural controls may require the construction of a physical feature or barrier.

a. Preventive Measures

Preventive measures are controls that are intended to prevent the exposure of stormwater to contaminants. The following preventive measures have been chosen for the Public Works Garage facility.

(a) Perimeter sediment reduction devices (ie: silt sock) are recommended on the downhill side of external storage areas as shown on Figure D-1 and Figure D-2.



**Figure D-2 Example of perimeter sediment reduction device**

b. Diversions

Diversion structures (including grading and paving) are used to divert stormwater runoff away from high risk areas and prevent contaminants from coming in contact with stormwater runoff or to channel contaminated stormwater to a treatment facility or containment area. Diversions are currently not identified as an appropriate control at the Public Works Garage site.

c. Containment

Containment areas are structures designed to hold pollutants or contaminated stormwater runoff to prevent it from being discharged to nearby surface waters. Currently, the City's waste oil tank is protected within a building. Waste oil is

removed from the tank by a licensed disposal company as needed throughout the year.

Vehicle washing operations are completed within buildings that drain to sanitary sewer or are washed at private vehicle washing companies in the City of Whitewater that have drains to sanitary sewer.

Temporary street sweepings are stored on a depressed asphalt pad that contains these materials until they are disposed of. As described in Table 3.02-10, these materials must be disposed of at a licensed landfill unless the WDNR's Low Hazard Waste Exemption for Reuse of Street Sweepings Application (Form 4400-289) is submitted and approval obtained for reuse of these materials.

F. Suggested Retrofits to Current Stormwater Practices

On-Site Storm Sewer System-The on-site storm sewer system consists of three non-sumped storm sewer inlets draining to a storm sewer system in the southern portion of the Public Works Garage Site. The storm sewer inlet just southeast of building 5 shown on Figure D-1 and shown in Figure D-3 appears to be in a state of disrepair. It is recommended that this inlet be reconstructed. Downstream of this inlet, construction of a hydrodynamic separator is recommended to capture sand, trash, floatables, oil and grease, total suspended soils (TSS), and total phosphorus (TP). This will complement existing good housekeeping practices at the Public Works Garage and contribute to TSS and TP reductions for purposes of Rock River Basin TMDL compliance.



**Figure D-3 Storm sewer inlet southeast of building 5 shown on Figure D-1**

G. Installation/Implementation of Recommendations Timeline

It is recommended that the City Public Works Department implement the BMPs previously described and continue its current practices of preventing stormwater contamination from the site. Table 1 lists possible BMP activities and measurable goals the City may consider implementing.

| Activity | Installation/Implementation Schedule |
|---|---|
| Existing Public Works Garage pollution prevention activities. | Continue to implement. |
| Install perimeter sediment control devices on downhill side of external storage areas as shown on Figure D-1. | Install by April 15, 2017. Monitor for degradation and replace in the future as necessary. |
| Plan for, design, and construct a hydrodynamic separator as shown on Figure D-1. | Submit grant application for April 15, 2018, WDNR Urban Nonpoint Source and Stormwater Grant application deadline. If grant is successful, design (in 2019) and construct (in 2020) hydrodynamic separator. If not successful, continue to apply for grants in the future and/or budget for design/construction utilizing stormwater utility funds. Provide an update on the timing in MS4 annual reports. |
| Review existing spill prevention and response procedures for improvements. | Document potential improvements in the March 31, 2017, MS4 annual report. |
| Document the training provided to Public Works Department staff. Documentation shall include name and role of staff, date of training, length of training, location of training, and content of training. | Annually, document in the City's MS4 annual report, starting with the report due March 31, 2017. |
| Review existing Public Works Department staff training for stormwater pollution prevention at the Public Works Garage for improvements. | Document potential improvements in the March 31, 2017, MS4 annual report. At a minimum, training improvements must include: "Provide annual trainings to all Public Works Department staff with topics including but not limited to, spill prevention and response, BMP inspection and maintenance, winter road maintenance, and construction erosion control. All training events and attendance will be documented by the Streets Superintendent. |

**Table 1 BMP Activities and Installation/Implementation Schedule**

H. Inspection Frequency

Table 2 provides the current inspection schedule implemented by Public Works Department staff. It is recommended that all items are inspected a minimum of two times a year supplemented with a full inspection of the Public Works Garage yard once a year.

| Facility/Potential Source of Contamination | Inspection Frequency |
|---|---|
| Salt storage shed | Inspected annually by the state. Inspect area after delivery and/or removal of salt. |
| Drain oil and used oil | Inspect annually. |
| External materials storage area | Inspect area for erosion. |
| Public Works Garage buildings | Inspect annually. |
| Vehicles | Wash vehicles indoors in areas that drain to sanitary sewer. |
| Equipment | Inspect annually. |
| Catch basin sumps | Twice per year (once in spring, once in fall) |

**Table 2 Public Works Garage Inspection Frequency Schedule**

I. Employee Training on Stormwater Pollution Prevention

The City's Public Works Department 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 (CSWEA), and Wisconsin Wastewater Operator's Association (WWOA). It is recommended the City develop and implement a training program for employees to receive annually. The program should include instruction and training for illicit discharge detection and reporting, spill prevention and response procedures, good housekeeping procedures, material storage techniques, and related topics. Employees also could attend outside training sessions for various activities such as erosion control, winter road maintenance, and stormwater management practices related to the WPDES Permit.

J. Spills Prevention Plan and Response Procedures

The City has a Spills Prevention Program. The existing program provides procedures to prevent, contain, and respond to spills that may discharge into the MS4 and downstream receiving waters.

The updated Spills Prevention Plan and Response Procedures Program will include the following sections and information:

- Purpose
- Contact Information
- Spills Prevention

- Spill Containment




North View of Public Works Garage



Looking North At Storage Building (See Figure D-1, Storage Building 5)



Looking West at Fuel Tanks



Looking Northwest at Salt Storage Building



Looking North at northeast corner of Public Works Garage Property



Looking West at northwest corner of Public Works Garage property



Looking west at Hazardous Material Storage Buidling




Looking South at Miscellaneous Metals, Fittings, and Conduits Storage Area



Looking West at Wood Chips Piles



Looking Northeast in Cold Storage Building




Looking Northwest at Used Oil Tank and Used Oil Filter Container



Looking South at storm sewer manhole upstream of outfall to Whitewater Creek

Path: S:\MAD\1400-1499\1407\088\Data\GIS\Report Figures\SWPPP\Figure D-1 City Streets Facility 11x17.mxd

User: danc

Date: 9/28/2016

Time: 3:43:13 PM

## Legend

- UW Whitewater Boundary
- DNR Wetlands
- Inlet
- Manhole
- Outfall
- Culvert
- Storm Sewer
- Hydrant
- Valve
- Water Main
- Manhole
- Sanitary Sewer

T3K

E2K

Proposed Perimeter Sediment Control Device (Approx. 455 ft)

Proposed Perimeter Sediment Control Device (Approx. 90 ft)

Proposed Perimeter Sediment Control Device (Approx. 30 ft)

Proposed Storm Sewer Inlet Reconstruction

Proposed Hydrodynamic Separator

Whitewater Creek

STARIN RD

| Storage Area Summary | |
|---|---|
| No. | Description |
| 1 | Fuel Tanks (2) |
| 2 | Administration Building |
| 3 | Maintenance Building |
| 4 | Used Oil Tank and Used Oil Filters |
| 5 | Storage/Operations |
| 6 | Sand |
| 7 | Salt Storage |
| 8 | Dumpsters |
| 9 | Topsoil |
| 10 | Gravel |
| 11 | Rip Rap |
| 12 | Scrap Metal |
| 13 | Concrete Manholes |
| 14 | Concrete Pipe |
| 15 | Hazardous Materials Storage |
| 16 | Concrete Barrier Walls |
| 17 | Miscellaneous Metals, Fittings, Conduits |
| 18 | Wood Chips |
| 19 | Logs |
| 20 | Storage |
| 21 | Cold Storage |
| 22 | Salt Brine Tanks |
| 23 | Field Stone |
| 24 | Asphalt |

N W E S

0 20 40 80 Feet

FIGURE D-1
1407.088

STRAND ASSOCIATES®

# PUBLIC WORKS GARAGE

STORMWATER POLLUTION PREVENTION PLAN
CITY OF WHITEWATER
WALWORTH AND JEFFERSON COUNTIES, WISCONSIN

# APPENDIX E
# WHITEWATER DRAINAGE EVALUATION FORM

# City of Whitewater, Wisconsin

## Drainage Evaluation Form
## (Applicable to City-Owned Property and ROW Only)

**Part A–General** (To be completed by resident)

Today's Date:

Location of Drainage Problem (include building name, parking lot number or feature name):

Building Manager / Contact Name:

Phone Number:_____(Office)
_____(Mobile/Pager)

**Part B–Description of Problem** (To be completed by resident)

Provide detailed description or sketch or photo of the problem in the space below:

# City of Whitewater, Wisconsin

## Drainage Evaluation Form
## (Applicable to City-Owned Property and ROW Only)

How frequently or under what conditions does this problem occur (heavy rain, prolonged wet weather, frozen ground, etc.)?

Provide approximate dates of occurrence:

Describe damages incurred on your property. Note exterior versus interior damage:

Have you attempted to correct this problem? If so, what measures were taken?

**Part C–Attachments**

1. Photographs Attached?____Yes____No
2. Building or Utility Plans (if available) Attached?____Yes____No
3. Reports/Records (if available) Attached?____Yes____No
4. Other (Describe)

**Part D–DPW Inspection**

Name of Inspector:

Date of Field Inspection:

Inspector's Notes:

List of properties affected:

Photos: Attached or N/A

Is drainage problem:

1. Located on Village property? _____Yes_____No

2. Associated with a Village-owned or -maintained storm sewer facility or drainage way? Yes_____No

3. Caused by damage to the storm sewer or obstruction of the drainage way?_____Yes____No

**Part E–Evaluation/Responsibility** (To be completed by DPW)

Recommended Action:

Comments:

# City of Whitewater, Wisconsin

## Drainage Evaluation Form

| |
|---|
| |
| |

ROUTING: (PLACE CHECK MARK BY APPLICABLE REVIEWERS)

DPW (All Submittals)
City Building Inspector (Where Applicable)

REVIEWED BY:

_____
DPW

_____
City Building Inspector

# APPENDIX F
# FIELD SCREENING FORM

# FIELD SCREENING—VISUAL OBSERVATION

| | | | |
|---|---|---|---|
| NAME | | WEATHER | |
| DATE | | TIME | |
| OUTFALL # (Type this # in GPS Unit) | | LOCATION | |
| WISDOT # (leave blank unless structure plate is present) | | | |

**Outfall Type (Circle One)**

Swale Pipe Box Culvert Elliptical Buried Sewer Other: _____

**If Outfall includes pipe: Pipe Size _____ Material: _____**

**Major or Minor?** **(Major is any outfall which is greater than 36". Use best guess when you can't determine pipe sizes.)**

**Describe below how storm water flows to Outfall and where it goes.**

**IS THERE A FLOW PRESENT?** ☐ Yes ☐ No
**(If flow is present, then refer to illicit discharge notification procedures.)**

**IF THERE IS A FLOW, PROVIDE A NARRATIVE DESCRIPITON OF:**

**COLOR** _____

**ODOR** _____

**TURBIDITY** _____

**OIL SHEEN** ☐ Yes ☐ No

**SURFACE SCUM** ☐ Yes ☐ No

| DESCRIBE ANY OTHER RELEVANT OBSERVATIONS REGARDING POTENTIAL PRESENCE OF NON-STORM WATER DISCHARGES OR ILLEGAL DUMPING |
|---|
| |
| |
| |

**GPS Point #:** **Photos Taken:**

If screening of a flow (for color, odor, turbidity, oil sheen, and surface scum) gives indication of a suspected illicit discharge, the discharge shall be field analyzed for pH, total chlorine, total copper, total phenol, and detergents as illicit discharge indicator parameters. FIELD ANALYSIS COMPLETED? Yes No

# APPENDIX G
# STORMWATER FACILITY MAINTENANCE PROGRAM

# MAINTENANCE AND INSPECTION OF STORMWATER MANAGEMENT BEST MANAGEMENT PRACTICES CITY OF WHITEWATER AND UW-WHITEWATER SEPTEMBER 2016

1. BEST MANAGEMENT PRACTICE (BMP) OWNERSHIP

    a. Municipality-owned/maintained stormwater BMP.
        i. Develop a site specific maintenance plan/program, if necessary
        ii. Follow the maintenance plan/program, herein.
    b. Privately-owned/maintained BMP.
        i. Obtain a maintenance agreement that has an attached maintenance plan as required by the stormwater management ordinance.
        ii. Follow the maintenance plan/program, herein.

2. MAINTENANCE

The cornerstone of a preventive maintenance program is establishment of a routine inspection program. This program must contain routine and non-routine maintenance. The program is defined below. Use the attached Inspection and Maintenance Documentation Form to document the inspections and maintenance performed. Submit the forms by February 1 of each year to the Village of Waunakee Village Engineer/Director of Public Works or Town of Westport Utility Manager documenting the previous year's activities.

    a. Routine Maintenance
        i. Inspections
            1. Inspect wet and dry detention basins, bioretention basins, and grass-lined swales after major storm events (2-year, 24 hour storm event: 2.6 inches) and at a minimum once per year.
            2. Obtain the construction as-built plans for reference during the inspection.

        ii. Mowing
            1. Wet Detention Basins – Mow the side slopes, embankments, and swales on a regular basis to discourage weeds, woody plants, and invasive species.
            2. Dry Detention Basins- Mow the side slopes, embankments, bottom and swales on a regular basis to discourage weeds, woody plants, and invasive species.
            3. Grass-Lined Swales – Mow the side slopes and bottom twice per year to maintain a dense stand of grass.
            4. Bioretention Basins - Mow the side slopes on a regular basis to discourage weeds, woody plants, and invasive species. With a string trimmer, trim the bottom of basin to height of 6 to 9 inches in the fall of each year.
            5. Mow at heights beneficial to the planted and desired vegetation cover.
                a. 3 to 4 inches for grasses.
                b. 6 inches for native plantings.

iii. Debris/Litter Removal

Remove debris and litter on a monthly basis from the basin edges, embankments, bottom (for dry detention basins) and outlet structure including the emergency spillway, as applicable.

iv. Erosion Control/Revegetation

Eroded areas of the basin edges, embankments, bottom (for dry detention basins), emergency spillway, and rip rapped areas shall be repaired in a timely manner. Consider reseeding/replanting with native vegetation with appropriate erosion control mat suited to site condition with possible consultation with an ecological-restoration company. For grass-lined swales, reseed and repair eroded areas with appropriate erosion control mat.

v. Nuisance Control – Provide control of algae and mosquitoes per recommendations from a pond maintenance contractor, as necessary.

b. Non-Routine Maintenance (Dry and Wet Detention Basins)

It is recommended that a more detailed inspection be done every 3 years on wet detention basins (forebay and permanent pool) to determine sediment depth. A forebay is typically located where flows enter the detention basin and has the purpose of settling out sediment in a more convenient location for ease of maintenance. At this time, a sediment depth survey should be performed to determine the approximate average depth of sediment. The survey would normally be done by obtaining the water surface elevation by surveyor's level and then measuring the distance from water surface to top of sediment from a boat using applicable safety standards. The depth is converted to an elevation to determine depth of sediment and to determine the permanent pool depth. The survey can be completed by the Village or Town if the capability exists. Otherwise, this would be consulted out. Sediment survey and sampling would normally be consulted out once a sediment removal project is necessary.

i. Outlet Structure – Provide maintenance, as needed. Replace outlet structure when not performing as originally intended.

ii. Sediment Removal/Excavation from Wet Detention Basins

1. Sediment Forebay

a. Maintain 3 feet of water depth except on safety shelves which will be shallower.
b. When the forebay accumulates sediment and there is 3 feet or less water depth, perform sediment removal /excavation to original depth (typically 5 feet or more). See as-builts for original elevations.
c. Sediment Removal/Excavation Frequency: Every 3 to 5 years, depending on source area loadings. Maintain records of sediment loading.

2. Permanent Pool

    a. Maintain 3 feet of water depth except on safety shelves which will be shallower.
    b. When the forebay accumulates sediment and there is 3 feet or less water depth, perform sediment removal /excavation to original depth (typically 5 feet or more). See record drawings for original elevations.
    c. Sediment Removal/Excavation Frequency: Every 15 to 20 years, depending on source area loadings. Maintain records of sediment removal.

3. Sediment Removal/Excavation/Disposal Regulations-Perform sediment removal/excavation according to applicable state, federal and local regulations.

    a. NR 103.06(4) (a)-Artificial wetland exemptions – Allows maintenance of ponds that revert to wetlands. Contact DNR for confirmation.
    b. Contact DNR for Chapter 30 jurisdictional determination.
    c. NR 216 Stormwater Discharge Permit (NOI) necessary for disturbance of one or more acres of land.
    d. Sediment Sampling-Contact DNR to determine if sediment sampling is necessary.
        i. Sediment and parent material sampling procedures should follow DNR guidance documents and NR 347 and NR 528.
        ii. Resources:
            1. *Guidance for Applying the Sediment Sampling Requirements of NR 347,* Wisconsin Administrative Code, WDNR Publication WT-778, 2003.
            2. *Technical Guidance for Contaminated Sediment Cleanup Decisions in Wisconsin.* WDNR. December 21, 1995
            3. *Consensus-Based Sediment Quality Guidelines (CBSQG), Recommendations for Use and Application, Interim Guidance,* WDNR, December 2003.
            4. Laboratory results to be checked for conformance with NR 204.07(5) pollutant concentration limits. Consult NR 204 land application standards.
            5. NR 528-Management of Accumulated Sediment From Stormwater Management Structures
    e. Sediment Disposal-See NR 528 and the above resources. Contact the WDNR.

iii. Sediment Removal/Excavation from Dry Detention Basins-Remove sediment and dispose of properly to maintain the originally-designed flood-storage capacity of the facility.

c. Non-Routine Maintenance (Bioretention Basins)

Bioretention basins are designed to capture sediment on the surface of the bioretention basin. Plug planting in the bottom of the basins is typically initially protected with a hardwood mulch layer. Over time, a bioretention basin may become clogged causing ponding on the surface of

the bioretention basin. Bioretention basins are typically designed to drawdown within 24 hours of the end of a storm event. If the drawdown time of a bioretention basin is greater than 36 hours, maintenance shall occur consisting of: (1) remove all hardwood mulch material while not disturbing established native vegetation, (2) Gently scarify the engineered soil surface to promote infiltration into the engineered soil while not disturbing established native vegetation, (3) replace bioretention soil mixture per WDNR Bioretention for Infiltration Technical Standard 1004 as necessary, (4) replace hardwood mulch layer per WDNR Bioretention for Infiltration Technical Standard 1004. Maintenance shall occur only during dry conditions while taking measures to minimize compaction of remaining engineered soil.

If bioretention basins are experiencing scour, consider removing mulch and engineered soil in those areas to allow for replacing with geotextile and appropriately sized stone to provide energy dissipation.

If bioretention basins have appreciable bare areas, plant with appropriate native plugs.

If bioretention basins appear to be experiencing compaction due to snow storage in the footprint of the bioretention basin, reinforce with the property owner that snow storage is not allowed within the footprint of the bioretention basin.

If bioretention basins appear to be experiencing clogging due to underdrain failure, underdrains shall be inspected. If necessary, underdrains shall be jetted to remove debris. If needed, the underdrain and all components of the bioretention basin above the underdrain shall be replaced per the WDNR Bioretention for Infiltration Technical Standard 1004.

Inspection and Maintenance Documentation Form
Stormwater Best Management Practices (BMPs)
Wet and Dry Detention Basins, Bioretention Basins, and Grass-Lined Swales
City of Whitewater and UW-Whitewater, Wisconsin

Inspection Date: _____
Maintenance Date: _____

Inspector Name: _____ Maintenance Provided by: _____
Company Name: _____ Phone Number: _____
Company Address: _____
_____
Company Phone Number: _____
Company Fax Number: _____

Stormwater Facility Location: _____
_____

Wet Detention Basin ☐
Dry Detention Basin ☐
Bioretention Basin ☐
Grass-Lined Swale ☐

| Items Inspected | Checked | | Maintenance Needed | | Remarks |
|---|---|---|---|---|---|
| | Yes | No | Yes | No | |
| **Wet and Dry Detention Basin (Items below are applicable to both wet and dry basins. Items in italics are applicable to only wet basins)** | | | | | |
| | | | | | |
| A. Berms | | | | | |
| 1. Settlement | | | | | |
| 2. Breaks | | | | | |
| 3. Erosion | | | | | |
| 4. Signs of Piping Leakage | | | | | |
| 5. Signs of Seepage | | | | | |
| | | | | | |
| B. Vegetation | | | | | |
| 1. Woody growth on berm | | | | | |
| 2. Need for cutting/trimming | | | | | |
| 3. Need for reseeding | | | | | |
| 4. Ruts | | | | | |
| 5. *Dead vegetation at water's edge* | | | | | |
| | | | | | |
| C. Shoreline | | | | | |
| 1. Erosion and rip rap failure | | | | | |
| 2. Undermining | | | | | |
| 3. Damage or deterioration | | | | | |
| 4. Rodent or wildlife damage | | | | | |

| Items Inspected | Checked | | Maintenance Needed | | Remarks |
|---|---|---|---|---|---|
| | Yes | No | Yes | No | |
| **Wet and Dry Detention Basin** | | | | | |
| | | | | | |
| D. Outlet Structure and Emergency Outlet | | | | | |
| 1. Obstruction blocking outlet pipe, channel, or spillway | | | | | |
| 2. Condition of outlet and inlet structure | | | | | |
| a. Seepage | | | | | |
| b. Separation of joints | | | | | |
| c. Cracks, breaks or deterioration | | | | | |
| d. Differential Settlement | | | | | |
| e. Sediment level in relation to crest of inlet structure | | | | | |
| f. Sediment level in relation to crest of inlet structure | | | | | |
| g. Scour and erosion at outlet | | | | | |
| h. Condition of trash racks | | | | | |
| i. Gates or valves (Operate them twice per year) | | | | | |
| j. Damage by debris, ice, or freezing. | | | | | |
| k. Outlet channel condition downstream. | | | | | |
| | | | | | |
| E. Inlets | | | | | |
| 1. Is trash on or inside pipe grate? | | | | | |
| 2. Any ice damage to pipe outlet? | | | | | |
| 3. Undermining of any of the pipe? | | | | | |
| | | | | | |
| *F. Sediment Forebay* | | | | | |
| *1. Approximate depth of sediment =_____* | | | | | |
| *2. Sediment Removal Necessary* | | | | | |
| *3. Floating debris* | | | | | |
| | | | | | |
| *G. Permanent Pool* | | | | | |
| *1. Approximate depth of sediment =_____* | | | | | |
| *2. Sediment Removal Necessary* | | | | | |
| *3. Floating debris* | | | | | |

| Items Inspected | Checked | | Maintenance Needed | | Remarks |
|---|---|---|---|---|---|
| | Yes | No | Yes | No | |
| **Wet and Dry Detention Basin** | | | | | |
| | | | | | |
| H. Access for Maintenance Equipment | | | | | |
| 1. Obstructions | | | | | |
| 2. Soft Areas | | | | | |
| 3. Visible pollution | | | | | |
| *4. Shoreline problems* | | | | | |
| 5. Other (specify) | | | | | |
| | | | | | |
| I. Safety Features | | | | | |
| 1. Access Controls to Hazardous Areas | | | | | |
| 2. Fences | | | | | |
| a. Loose or damaged posts | | | | | |
| b. Loose or broken wires | | | | | |
| c. Accumulated debris in fences? | | | | | |
| d. Condition of gates | | | | | |
| | | | | | |
| Bioretention Basins | | | | | |
| A. Sediment buildup | | | | | |
| B. Clogging/ponding of water | | | | | |
| C. Eroded areas | | | | | |
| D. Bare spots | | | | | |
| E. Trash | | | | | |
| F. Overflow Structure | | | | | |
| G. Plant health | | | | | |
| H. Compaction due to snow storage | | | | | |
| I. Adequate mulch layer | | | | | |
| | | | | | |
| **Grass-Lined Swales** | | | | | |
| | | | | | |
| A. Eroded areas | | | | | |
| B. Bare spots | | | | | |
| C. Mowing Necessary | | | | | |

**NOTES:**

1. Inspection/Maintenance Comments:

   _____

   _____

   _____

2. Overall Condition of Facility (Check One)

   ___ Acceptable
   ___ Unacceptable
   ____ Maintenance Completed

# APPENDIX H
# UWW 2015-2016 SNOW PLAN

# FACILITIES PLANNING AND MANAGEMENT (FP&M)
# SNOW REMOVAL PLAN
# 2015-2016

## GENERAL

The intent of this snow plan is to standardize and document the routine actions normally taken by Facilities Planning and Management (FP&M) to combat a winter snow or ice storm. Every storm is different, with different starting times, temperatures, precipitation rates, accumulations and durations. Each, therefore, requires a slightly different approach to controlling and removing snow and ice accumulations. This plan identifies the general FPM staff resources, equipment resources, areas of responsibility and general strategies for managing any given storm.

Consistent with FP&M's goal to continually improve its work processes, we will routinely review the results of this plan and make revisions to improve the effectiveness of our snow and ice control efforts.

The presence of snow or ice on walk, road, stair and parking surfaces inhibits the movement of students, faculty, staff and visitors and presents a safety hazard. The control and removal of those snow or ice accumulations is the responsibility of FP&M, Residence Life and the auxiliaries' facilities management operations, not just the FP&M grounds operation. With the exception of providing safe, adequate utilities, on the day of a snow or ice storm; the control and removal of that storm's precipitation accumulation is the top priority of FP&M.

**GOALS: The goal of the University of WI-Whitewater's FP &M's snow and ice control operation is to maintain adequate traction for pedestrians and vehicles properly equipped for winter conditions. This does not mean bare, dry pavement should be expected after each snowfall or ice storm.**

Snow and ice storm control and removal efforts are focused towards making the campus accessible by 7:00am. Accessible means "one pass" by motorized snow and ice removal equipment or hand shovelers in the following areas:

Roadways and service drives
Walks
Commuter lots
Residence Hall lots (entrances and aisles only)
Stairs in academic zones and curb cuts throughout the campus

Due to FP&M's limited human, financial and equipment resources, it is not feasible to maintain 24 hour per day comprehensive motorized snow/ice removal throughout an extended storm. The focus, therefore, of this plan is to concentrate control and removal efforts for the 7:00am-10:00pm academic term weekday. Minimal services are provided after 3:00pm depending upon storm conditions, duration and operating hours already worked by the equipment operators. If staffing is available there may be a two person team dedicated to campus snow removal between 5:00pm and 10:00pm. Service may also be adjusted for weekend, holiday and break periods.

During a storm, while precipitation is falling, motorized snow removal efforts can be geared towards providing accessible paths to, from and between parking lots and buildings. Clearing of building entrances, stairs and ramps will be ongoing as long as custodians for the particular building are present. The full maximum motorized clean-up effort, however, will generally not begin until the storm's precipitation is over.

Salt or Treated Sand may be spread campus wide as necessary to provide additional safety and traction for vehicles and pedestrians.

### UW-Whitewater Snow Emergency Policy

To coincide with the declaration of a snow emergency by the city of Whitewater, the UW-Whitewater Facilities Planning and Management Department may declare a UWW snow emergency, to enable safe, timely,

and efficient snow removal from campus parking lots. The University will notify several media sources and provide as much advance notice to students and personnel as possible. UWW snow emergencies will appear on the home page of the UWW website and will be announced on radio stations WCLO-AM 1230, WJVL-FM 99.9, WSLD-FM 104.5, WTMJ-AM 620 and WISN-AM 1130.

During a declared snow emergency, no cars will be allowed to remain in academic and commuter parking lots between the hours of 12:00am (midnight) to 5:00am the following morning. Academic and commuter parking lots are: Lots 1 (CA south,) 2 (CA north,) 4 (Prairie Street east,) 7 (Visitor Center,) 9(Warhawk east),11 (Williams Center,) 12 and 12A (Library,University Center) 13 (Winther/Heide,) 14 (Upham,) 23 (Prairie Street west) and 15 (Health Center). Parking will be available during a declared snow emergency on a "first-come first-served" basis in lots 9, 23, 24 and 22.

There is no parking on either weekdays, weekends or holidays in academic or commuter parking lots between the hours 2;00AM TO 5:00AM from December 1st to April 1st. Any and all violators will be ticketed and possibly towed away at the vehicle owner's expense.

At FP&M's discretion, snow removal operations can be temporarily suspended during severely adverse weather conditions to prevent personal injury and/or property damage to our campus and municipal resources. FP&M,s snow removal staff reserves the right to provide safe operating conditions for parking lot and road plowing personnel. Based on operational needs, lots and roads may be barricaded from access during snow removal operations. During this process lot users must find alternative parking or road access until the barricades are removed. Special note: FP&M snow crews are not responsible for removing snow accumulated in front of, behind or next to parked vehicles. Vehicle owners are responsible for shoveling snow away from their vehicles.

## 1) MOTORIZED EQUIPMENT DEPLOYMENT

During snow storms (while precipitation is falling): Recognizing that a full campus-wide clean-up may follow, to conserve driver and equipment resources while precipitation is falling, the grounds crew may be called in to insure that the "one pass" on walks, roads and drives can be accomplished. The equipment used during storms will be dependent upon the snow accumulation and will generally be as follows:

**Accumulations less than 1"** - Motorized brooms for walks and the roadway plow/salter truck may be deployed. The remaining grounds crew members not driving brooms or the salter will be deployed as stair/curb cut shovelers. Note: parking lots are not plowed with accumulations less than one inch.

**Accumulations greater than 1"** - Plow trucks, tractors and loaders driven by the grounds staff, may be deployed. Stair shoveling will be accomplished by the designated grounds shovelers.

After snow storm (precipitation has stopped): The major primary clean-up effort may begin at this time. The equipment used after each storm will be dependent upon the snow accumulation and will generally be as follows:

**Accumulations less than 1"** - For accumulations less than 1", major clean-up deployment may be the same as for the accumulations less than 1" during above.

**Accumulation greater than 1"** - For accumulations greater than 1", the entire grounds crew plus auxiliary drivers may be called in.

**Ice storms**: The designated grounds ice crew may be called in for sand and salt operations. Due to the difficulty of driving on ice, the ice crew members are generally Whitewater residents. Four members will drive salters: one for roads and lots and three for walks. When out of town crew members arrive, they may hand sand/salt stairs, ramps and curb cuts.

All motorized equipment has assigned routes. A route map is kept in each vehicle. A master route map is also

available in the Grounds Shop.

For all storm conditions, it is the responsibility of all called operators to immediately contact the Grounds Shop if they are running late or find that they cannot make it in.

**SALT BRINE OPERATIONS**

When a forecast predicts a snow or ice event, it is the grounds snow team's intent to spread salt brine solution over heavily used traffic areas on roads, walks and parking lot lanes. The salt brine will be spread within 24 hours of the predicted snow or ice fall. The addition of brine to our campus will reduce snow and ice bonding and should provide a greater ability to plow heavily packed snow and ice. This added safety measure, we hope, will reduce the amount of salt needed for the bare pavement conditions that we strive for and reduce the negative impacts of sodium chloride to our landscapes and waterways.

**2) CALL-IN**

The Grounds Supervisor will monitor weather conditions during non-working hours and will call in the motorized equipment operators based upon the requirements of Section 1. Whenever possible, the decision to call in persons for early morning deployment will be made prior to 2:00p.m. the day before or at least by 7:00pm the evening before.

When equipment operators must be called after business hours, the Grounds Supervisor will notify all snow removal operators.

Whenever a decision is made to start snow or ice removal activities in advance of the normal 7:00am shift start time, or on weekends or holidays, University Police (473-0555) may be notified by the Grounds Supervisor of that start time and other relevant deployment details.

On weekends and holidays, the Custodial Shoveling Crew will be triggered by the Grounds Supervisor or a Custodial Supervisor.

**3) STAND-BY**

Local conditions may at times prompt University Police to request off-hours sanding/salting or plowing to address roadway or walk hazards. The grounds staff will only respond to plowing/sanding/salting calls from the University Police or a ranking campus administrator or supervisor. After normal 7:00am-4:30pm office hours, police officers are instructed to call FP&M at 262-472-1320 for automatic forwarding to the after-hours answering service who will notify appropriate staff.

When forecasts or storm conditions make hazardous pavement conditions likely, several members of the grounds crew may be placed on standby or on call to be available to respond to those calls.

If notified by the answering service that University Police has called regarding evening campus pavement conditions, it is expected that second or third shift personnel will check outdoor conditions and attempt to correct them within their limited available resources. If it is beyond their physical capabilities or requires large equipment, they should notify the Grounds Supervisor or standby grounds member, if one has been designated for the night. It is not the intent that second or third shift zone personnel provide thorough, expert walk and roadway snow/ice removal service throughout the night. Instead, they are to provide a night-time presence, eyes/ears for Grounds, and response to much localized hazardous pavement conditions.

The scheduled overtime seniority list will be used to determine who will be placed on stand-by for a particular 8/24 hour shift or 24/48 hour weekend/holiday period. The normal scheduled overtime contract rules will be followed for the assignment of stand-by. If a person refuses stand-by when offered, it will then be offered to next on the list. The stand-by persons will receive standby units for all hours identified by management.

When the Grounds Supervisor is unavailable due to absence, illness or vacation, a grounds crew member will be

placed on standby to call in crew members for motorized equipment deployment as described in Section 1. T full resources of the on-campus staff are at that person's disposal while serving in this role.

**4) HAND SHOVELING**

Building custodians are expected to shovel, clear, sweep and/or salt all building entrances, stairs and handicapped ramps out to the motorized equipment route point. This includes the Observatory Deck, south Winther stairs, deck and ramp and the Alumni Center area stairs and ramp. Since the Observatory Deck is used after 6:00pm each day, evening zone employees will be responsible for keeping it clear.

Campus stairs, curb cuts and recycling center approaches and gates in academic zones, which are not serviceable by motorized routes, will be shoveled, cleared, swept or salted by the custodial staff.

All shovelers and zone employees must communicate their equipment maintenance problems to the Equipment Garage and/or Grounds Shop using green work request forms.

After the primary storm clean up is over, grounds will continue to monitor and maintain the exterior stairs in academic zones, curb cuts, etc.

**5) SECONDARY CLEAN-UP**

Snow and ice control and removal efforts will generally continue throughout the 7:00am-3:00pm work day. The FP&M grounds team will provide coverage if staffing is available after 3:00pm as weather conditions warrant. Prior to parking their equipment after completion of their routes, all operators should check with the Grounds Supervisor to determine if they can provide assistance with other routes. Routes will be regularly inspected to insure satisfactory completion of snow and ice removal activities.

On days following the storm, the pushing back of snow piles to create additional snow storage will be performed using bobcats, tractors, loaders and snow throwers.

**6) TIME CONSTRAINTS**

Due to time constraints, sections of parking lots 22, 24 and dorm lots have been designated by the parking services director as lower priority lots (need not be cleaned by 7:00am).

**7) RESIDENCE HALL PARKING LOTS**

Residence hall parking lots will be cleared of snow and ice when maneuvering within them becomes hazardous. This determination will be made by Parking Services and the Residence Life Department in consultation with Grounds. When that decision is made, usually 2-3 days after a major accumulation or series of accumulations, lots will be mass vacated by 10:00am for late morning and early afternoon clean-up. The Parking and Residence Life units will notify occupants of the lots. Typically, east complex lots will be cleared one day and west lots the following day.

**8) AUXILIARY OPERATIONS**

Residence Life, University Center and Residential Dining maintain small removal crews to maintain the areas adjacent to their buildings.

**9) EQUIPMENT CLEAN-UP AND STORAGE**

Sand/salt spreaders should be emptied by their operators prior to being put away regardless of the next anticipated use. Trucks carrying sand ballast should also be emptied by their operators. Diesel powered equipment will be stored in a heated facility or be equipped with engine block heaters. Sanders will be stored under cover. All equipment should be washed off after the completion of all snow removal activities. The only exception would be the anticipated use of the equipment within the next 24-48 hours. Equipment clean-up will be assigned to grounds crew members based upon workload.

**10) FP&M LOT CLEARING**

Upon arrival, all FP&M snow removal personnel should park up against the dock in the General Services lot (Lot 21) to facilitate snow removal. Prior to starting their assigned routes, all necessary equipment will quickly gang clear the lot so personal vehicles can then be properly parked and the lot is clear for early morning maintenance staff arrivals. Final clean-up of the service truck compounds will be completed as part of the secondary campus clean-up after 7:00am.

Motor Pool fleet vehicles will be seasonally relocated to the west side of the east portion of Lot 21 to enable more efficient lot clearing and snow storage. The users of fleet vehicles leaving their personal vehicles overnight should also be instructed to park their vehicles along that west side.

**11) ILLEGALLY PARKED VEHICLES**

University Parking Regulations prohibit parking on any University street, including metered spaces, between the hours of 2:00am-5:00am from November 1 through March 31. The regulations further state that violation of this parking restriction will result in the issuance of a citation and towing of the vehicle at the owner's expense. It is hoped the University Police will ticket and tow all vehicles found in violation of this restriction prior to any snow/ice removal activities.

If vehicles are found illegally parked and in the way of plow equipment, notify Police Dispatch at (473-0555) to have the vehicles towed immediately.

**12) COMPLAINT CALLS**

All customer complaints should be directed to the FP&M office at 472-1320 and forwarded to the Grounds Supervisor. Complaints regarding building entrances, entrance stairs and handicapped entrances will be forwarded to Zone Supervisors for academic facilities or auxiliary staff for their facilities.

fpmsys/user/grounds/snowpln.doc

# APPENDIX I
# UWW STORMWATER POLLUTION PREVENTION PLAN

Purpose

The University of Wisconsin-Whitewater (UWW) has prepared the following Stormwater Pollution Prevention Plan (SWPPP) to provide the status of the UWW's General Services Building**.** This report is prepared in compliance with the conditions of the NR 216 permit pursuant to Section 2.6 of Wisconsin Pollutant Discharge Elimination System (WPDES) Permit Issuance No. WI-S050075-2. This report provides information related to the daily operations and maintenance activities for the General Services Building. It should be noted that UWW has a Spill Prevention Control and Countermeasure (SPCC) Plan by SCS Engineers dated December 2013.

A. Site Location and Contact Information

Name of Facility: Facilities Planning and Management General Services Building
Facility Address: 500 N. Fremont St. Whitewater, WI 53190

Facility Contact: Jeff Klamik
Title: Campus Facilities Engineer
Telephone: 262-472-6729 (Office)
262-903-6388 (Cell)
Email: klamikj@uww.edu

Facility Contact: Steve Bertagnolli
Title: Grounds Supervisor
Telephone: 262-472-6721
Email: bertagns@uww.edu

Facility Contact
(Oil Spill Prevention): Lance Fredrick
Title: Director of Risk Management and Safety
Telephone: 262-472-5723
Email: fredricl@uww.edu

B. Air Photo/Map of the Yard

See attached Figure I-1 includes the following:

1. Locations of major activities and storage areas.
2. Identification of drainage patterns and potential stormwater runoff source and discharge areas.
3. Identification of any wetlands and/or waterways on-site or nearby.
4. Identification of Municipal Separate Storm Sewer System (MS4) connections and where this portion of the MS4 system drains.

C. Overview

This SWPPP covers the operations at the UWW's General Services Building. This SWPPP describes the facility and associated operations, identifies potential sources of stormwater pollution, recommends appropriate best management practices (BMPs) or pollution control measures to reduce the discharge of pollutants in stormwater runoff, and provides for periodic review of this SWPPP with the annual report.

The primary goal of the stormwater permit program is to improve the quality of surface waters in the UWW's MS4 by reducing the amount of pollutants potentially contained in the stormwater runoff. The purpose of this SWPPP is to provide the following:

1. Identification of potential sources of stormwater and non-stormwater contamination to the MS4 system from the facility.
2. Identification of and recommendation of appropriate "source area control" BMPs designed to reduce or prevent stormwater contamination.
3. Identification of and recommendation of "stormwater treatment" BMPs to reduce potential pollutants within contaminated stormwater prior to discharging to the MS4 system and to Waters of the State.

D. Information

1. Inventory of Potential Sources of Contamination

The following have been identified as potential sources of contamination at the General Services Building.

a. Salt storage shed–The University's deicing and snow removal operations are described in Section 3.01 F. 4. and Table 3.01-3. The salt is delivered in bulk to the site and loaded into the salt storage shed. The facility experiences some issues with exposure of salt to the elements.

b. Fuel Tanks-As shown on Figure 2 in the SPCC plan, there is a 9,000 gallon gasoline fuel tank and a 1,000 gallon diesel fuel tank located in the paved area east of the General Services Building.

c. Used Oil Tank-As shown on Figure 2 in the SPCC plan and on Figure I-1, there is a 550 gallon used oil tank located in the paved area south of the General Services Building. The waste oil tank is protected and enclosed within a steel spill containment structure. Waste oil is removed from the tank by a private contractor bi-monthly throughout the year.

d. Miscellaneous Oil-As shown on Figure 2 in the SPCC plan, there are two locations of four 55 gallon oil drums located within the General Services Building.

e. Used oil filter container–Used oil filters are disposed of in a designated covered container. The used oil filters are disposed of by a licensed disposal company.

f. Exterior materials storage area–A number of materials are stored on the site in uncovered areas of the parking lot. These include, wood chips, compost, tree branches, pallets, logs, gravel, bricks, miscellaneous metals, and miscellaneous equipment.

g. Interior materials storage area– Miscellaneous materials used in everyday public works operations are stored in storage areas within covered buildings on the General Services Building site. These materials are properly stored, used, and disposed of and are not a stormwater contamination threat.

At the General Services Building, various materials require a Material Safety Data Sheet (MSDS) such as brake cleaner, solvents, and lubricants. A full list of these items along with their MSDS is available at the General Services Building.

E. Recommendations to Prevent Polluted Runoff From Reaching Nearby Water Resources

Stormwater management controls or BMPs will be implemented to reduce the amount of pollutants associated with the campus facilities from entering the UWW's MS4 from and reaching nearby water resources.

1. Source Area Control

To the maximum extent practicable and where cost-effective, source area control BMPs designed to prevent stormwater from becoming contaminated will be used.

a. Erosion Control Measures

Material storage areas prone to erosion shall be protected and the material prevented from entering the storm sewer and discharging from the site. External storage areas are generally in flat areas that drain overland to large turf grass areas with little observable erosion. Potential improvements are shown on Figure I-1 including perimeter sediment reduction devices (ie: silt sock).

b. Good Housekeeping

Good housekeeping practices are designed to maintain a clean and orderly work environment. This will reduce the potential for significant materials to come in contact with stormwater. The following practices are included in the General Services Building good housekeeping efforts.

1) Routine sweeping is done in the General Services Building and outdoor impervious area.
2) Oil dry is located throughout the General Services Building and disposed of through a licensed disposal company.
3) Used oil rags are collected and stored in a specific container and disposed of through a licensed disposal company.
4) Oil filters are stored in a drum container inside the General Services building and are removed by a licensed contractor on an as-needed basis.
5) Miscellaneous metals are periodically recycled.
6) Vehicle batteries and tires are routinely recycled.

c. Preventive Maintenance

Preventive maintenance involves the inspection, testing, and cleaning of facility equipment and operational systems before use. These inspections will help to uncover conditions that might lead to a release of materials. The following equipment/activities are included in the inspection schedule of each facility outlined in Section H.

1) Vehicles
2) Equipment

d. Spill Prevention and Response Procedures

Spills and leaks together are the largest source of stormwater pollution. Thus, this SWPPP specifies material handling procedures and storage requirements for significant materials. Equipment and procedures necessary for spill cleanup and prevention of spilled materials from being discharged have also been identified. All employees have been made aware of the proper procedures. The following procedures have been developed for spill response for the UWW facilities**.**

1) Emergency–dial 911 (Major spills are defined as an emergency condition and generally include hazardous materials).
2) Nonemergency–Utilize on-site materials to contain the spill and pick up (floor dry or oil sorb napkins). Dispose in an appropriate container and contact licensed contractor to remove from site.

e. Bulk Storage

At the General Services Building facility, dry bulk storage is limited on the site. Salt is stored in a covered storage shed. The State of Wisconsin inspects the storage shed annually.

Liquid bulk storage at the General Services Building site is utilized for fuels and used oil. The used oil tank is inspected annually by The State of Wisconsin. The fuel tanks are inspected regularly by UWW staff.

2. Stormwater Treatment Best Management Practices

Structural control measures may be necessary to control pollutants that are still present in the stormwater after the nonstructural controls have been implemented. These types of controls are physical features that control and prevent stormwater pollution. Structural controls can include a range of application such as preventive measures, collection structures, or stormwater treatment systems. Structural controls may require the construction of a physical feature or barrier.

a. Preventive Measures

Preventive measures are controls that are intended to prevent the exposure of stormwater to contaminants. The following preventive measures have been chosen for the General Services Building facility.

(a) Perimeter sediment reduction devices (ie: silt sock) are recommended on the downhill side of external storage areas as shown on Figure I-1 and Figure I-2.



**Figure I-2 Example of perimeter sediment reduction device**

b. Diversions

Diversion structures (including grading and paving) are used to divert stormwater runoff away from high risk areas and prevent contaminants from coming in contact with stormwater runoff or to channel contaminated stormwater to a treatment facility or containment area. Diversions are currently not identified as an appropriate control at the General Services Building site.

c. Containment

Containment areas are structures designed to hold pollutants or contaminated stormwater runoff to prevent it from being discharged to nearby surface waters. Currently, the UWW's waste oil tank is protected and enclosed within a steel spill containment structure. Waste oil is removed from the tank by a private contractor as needed throughout the year. It is recommended that a roof be constructed over the exterior used oil tank to keep the spill containment structure from filling with water. Or, the UWW could move the waste oil tank inside one of the future buildings proposed for construction south of the current location of the waste oil tank as shown on Figure I-1.

Vehicle washing operations are completed within buildings that drain to sanitary sewer or are washed at private vehicle washing companies in the City of Whitewater that have drains to sanitary sewer.

F. Suggested Retrofits to Current Stormwater Practices

Existing Salt Storage Shed-The existing salt storage shed experiences some exposure of salt to the elements. The UWW is currently in the planning phase for construction of two 30-

foot by 40-foot storage buildings as shown on Figure I-1 to replace the existing salt storage shed. A future additional 30-foot by 40-foot storage building is proposed west of the proposed salt storage building for future storage of snow plows and other equipment. Figure I-3 shows the existing salt storage building.



**Figure I-3 Existing salt storage shed and used oil storage tank.**

G. Installation/Implementation of Recommendations Timeline

It is recommended that the UWW implement the BMPs previously described and continue its current practices of preventing stormwater contamination from the site. Table 1 lists possible BMP activities and measurable goals the UWW may consider implementing.

| Activity | Installation/Implementation Schedule |
|---|---|
| Existing General Services Building pollution prevention activities. | Continue to implement. |
| Install perimeter sediment control devices on downhill side of external storage areas as shown on Figure I-1. | Install by April 15, 2017. Monitor for degradation and replace in the future as necessary. |
| Construct a roof over the used oil storage tank. Or, move used oil storage tank inside a future storage building proposed for the site. | Construct by March 31, 2018. Or, move upon construction of the new building. |
| Continue to implement the existing Spill Prevention Control and Countermeasure (SPCC) Plan | Ongoing |
| Review existing Public Works Department staff training for stormwater pollution prevention at the General Services Building for improvements. | Document potential improvements in the March 31, 2017, MS4 annual report. Provide training annually on stormwater pollution prevention. |

**Table 1 BMP Activities and Installation/Implementation Schedule**

H. Inspection Frequency

Table 2 provides the current inspection schedule implemented by UWW staff. It is recommended that all items are inspected a minimum of two times a year supplemented with a full inspection of the General Services Building yard once a year.

| Facility/Potential Source of Contamination | Inspection Frequency |
|---|---|
| Salt storage shed | Inspected annually by State. Inspect area after delivery and/or removal of salt. |
| Drain oil and used oil | Inspect regularly. |
| Used oil filter container | Disposal by licensed contractor. |
| General Services Building | Not routinely inspected. |
| Vehicles | Wash vehicles indoors in areas that drain to sanitary sewer. |
| Equipment | As needed. |
| Catch basin sumps | No sumps on-site. |

**Table 2 Inspection Frequency Schedule**

I. Employee Training

Per the 2013 SPCC Plan, appropriate UWW staff receive annual training related on spill prevention and response. This typically consists of Veolia Spill Prevention Training. Appropriate UWW staff also attended the 2014 Winer Road Maintenance Workshop for training on anti-ing and de-icing operations. In general, appropriate UWW staff receive annual training related to spill prevention and response procedures, stormwater pollution prevention, good housekeeping procedures, illicit discharge detection, material storage techniques, and related topics.

J. Spills Prevention Plan and Response Procedures

The UWW has a Spills Prevention Control and Countermeasure Plan prepared in December 2013. The existing program provides procedures to prevent, contain, and respond to spills that may discharge into the MS4 and downstream receiving waters.

The University staff currently implement the spills response program.

The General Services Building is equipped with three spills kits at locations shown in Figure 2 of the SPCC plan that include materials and information needed to properly contain and clean up a spill.

## General Services Building



Looking Southwest at fuel tanks.



Looking South at General Services Building near winter salt brine equipment.



Looking North at External Storage Area northwest of the General Services Building.



Looking East at wood chip pile.



Looking North at compost site.


Looking North at pallet, log, and tree branch storage



Looking Northwest at gravel storage areas.



Looking West at bricks and miscellaneous metals storage.



Looking West at south side of General Services Building.



Looking west at salt storage shed.



Looking Northwest at used oil storage tank.



Looking Southwest at inside of sand storage shed.



Looking Southeast at inside of cold storage building south of General Services Building.

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

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## Legend

- UW Whitewater Boundary
- DNR Wetlands
- Inlet
- Manhole
- Outfall
- Culvert
- Storm Sewer
- Hydrant
- Valve
- Water Main
- Manhole
- Sanitary Sewer

| Storage Area Summary | |
|---|---|
| No. | Description |
| 1 | Fuel Tanks (2) |
| 2 | Salt Brine Equipment (Winter Months Only) |
| 3 | Wood Chips |
| 4 | Compost |
| 5 | Tree Branches |
| 6 | Pallets |
| 7 | Logs |
| 8 | Gravel |
| 9 | Bricks |
| 10 | Miscellaneous Metals |
| 11 | Cold Storage Building |
| 12 | Storage Building |
| 13 | General Services Building |
| 14 | Used Oil Tank |
| 15 | Salt Storage Shed |
| 16 | Sand Storage Shed |

Proposed Perimeter Sediment Control Device (Approx. 160 ft)

Proposed Perimeter Sediment Control Device (Approx. 300 ft)

Proposed Perimeter Sediment Control Device (Approx. 50 ft)

Greenhouse

Proposed Roof Over Used Oil Storage Tank

Future 30'x40' Equipment Storage

Future 30'x40' Snowplow Storage

Future 30'x40' Salt Storage Building

N FREMONT ST

E LAUDERDALE DR

N E S W

0 25 50 100 Feet

FIGURE 1-1
1407.088

STRAND ASSOCIATES®

# FACILITIES PLANNING AND MANAGMENT: GENERAL SERVICES BUILDING

STORMWATER POLLUTION PREVENTION PLAN
UNIVERSITY OF WISCONSIN-WHITEWATER
WALWORTH AND JEFFERSON COUNTIES, WISCONSIN

# APPENDIX J
# UWW DRAINAGE EVALUATION FORM

# UW-Whitewater, Wisconsin

## Drainage Evaluation Form
## (Applicable to UWW-Owned Property and ROW Only)

**Part A–General** (To be completed by resident)

Today's Date:

Location of Drainage Problem (include building name, parking lot number or feature name):

Building Manager / Contact Name:

Phone Number:_____(Office)
_____(Mobile/Pager)

**Part B–Description of Problem** (To be completed by resident)

Provide detailed description or sketch or photo of the problem in the space below:

# UW-Whitewater, Wisconsin

## Drainage Evaluation Form
## (Applicable to UWW-Owned Property and ROW Only)

How frequently or under what conditions does this problem occur (heavy rain, prolonged wet weather, frozen ground, etc.)?

Provide approximate dates of occurrence:

Describe damages incurred on your property. Note exterior versus interior damage:

Have you attempted to correct this problem? If so, what measures were taken?

**Part C–Attachments**

1. Photographs Attached?____Yes____No
2. Building or Utility Plans (if available) Attached?____Yes____No
3. Reports/Records (if available) Attached?____Yes____No
4. Other (Describe)

**Part D–Facilities Engineer Inspection**

Name of Inspector:

Date of Field Inspection:

Inspector's Notes:

List of properties affected:

Photos: Attached or N/A

Is drainage problem:

1. Located on UWW property? _____Yes_____No

2. Associated with a UWW-owned or -maintained storm sewer facility or drainage way? Yes_____No

3. Caused by damage to the storm sewer or obstruction of the drainage way?_____Yes____No

**Part E–Evaluation/Responsibility** (To be completed by DPW)

Recommended Action:

Comments:

# UW-Whitewater, Wisconsin

## Drainage Evaluation Form

| |
|---|
| |
| |

ROUTING: (PLACE CHECK MARK BY APPLICABLE REVIEWERS)

Facilities Engineer (All Submittals)
UWW Building Inspector (Where Applicable)

REVIEWED BY:

_____
Facilities Engineer

_____
UWW Building Inspector

# APPENDIX K
# CITY MODELING OUTPUT (ON CD)

# APPENDIX L
# UWW MODELING OUTPUT (ON CD)

# APPENDIX M
# CITY ALTERNATIVE BMP FIGURES

**Legend**

- City Limits
- UW Whitewater Boundary
- Alternative BMPs
- Park/Recreation Area

Parking Lot 18 and 19 Porous Pavement
Parking Lot 20 Underground Wet Detention Pond
Armory Site Wet Detention Pond
HUSCO Wet Detention Pond
Public Works Hydrodynamic Separator
Starin Road Underground Wet Detention Pond
Universsal Boulevard Wet Detention Pond
Carriage Drive Wet Detention Pond
East Cravath Street Wet Detention Pond
Commercial Avenue Wet Detention Pond
DLK/Main Street Wet Detention Pond
McGraw Hall Wet Detention Pond/Basin
North Street Underground Wet Detention Pond
East Chicago Street Wet Detention Pond
East Main Street Wet Detention Pond
Mound Meadows Wet Detention Pond
Downtown Hydrodynamic Separators
East Bluff Road Wet Detention Pond
South Wisconsin Street Hydrodynamic Separator
West South Street Wet Detention Pond
West Caine Street Wet Detention Pond
South Janesville Street Hydrodynamic Separator

0 500 1,000 2,000 Feet

# ALTERNATIVE BMP OVERVIEW

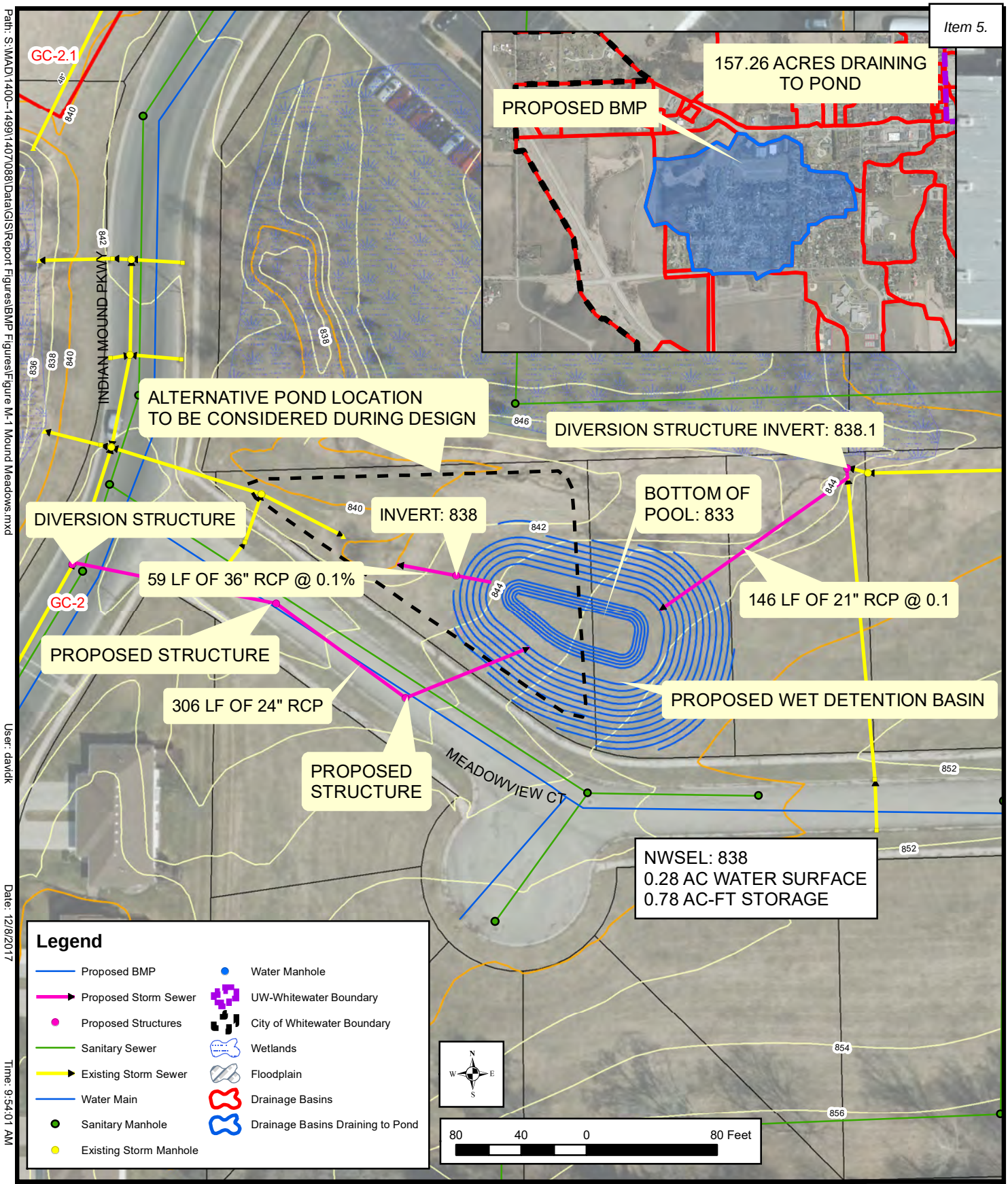
TMDL STORMWATER PLAN
CITY OF WHITEWATER
WALWORTH AND JEFFERSON COUNTIES

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FIGURE M
1407.088



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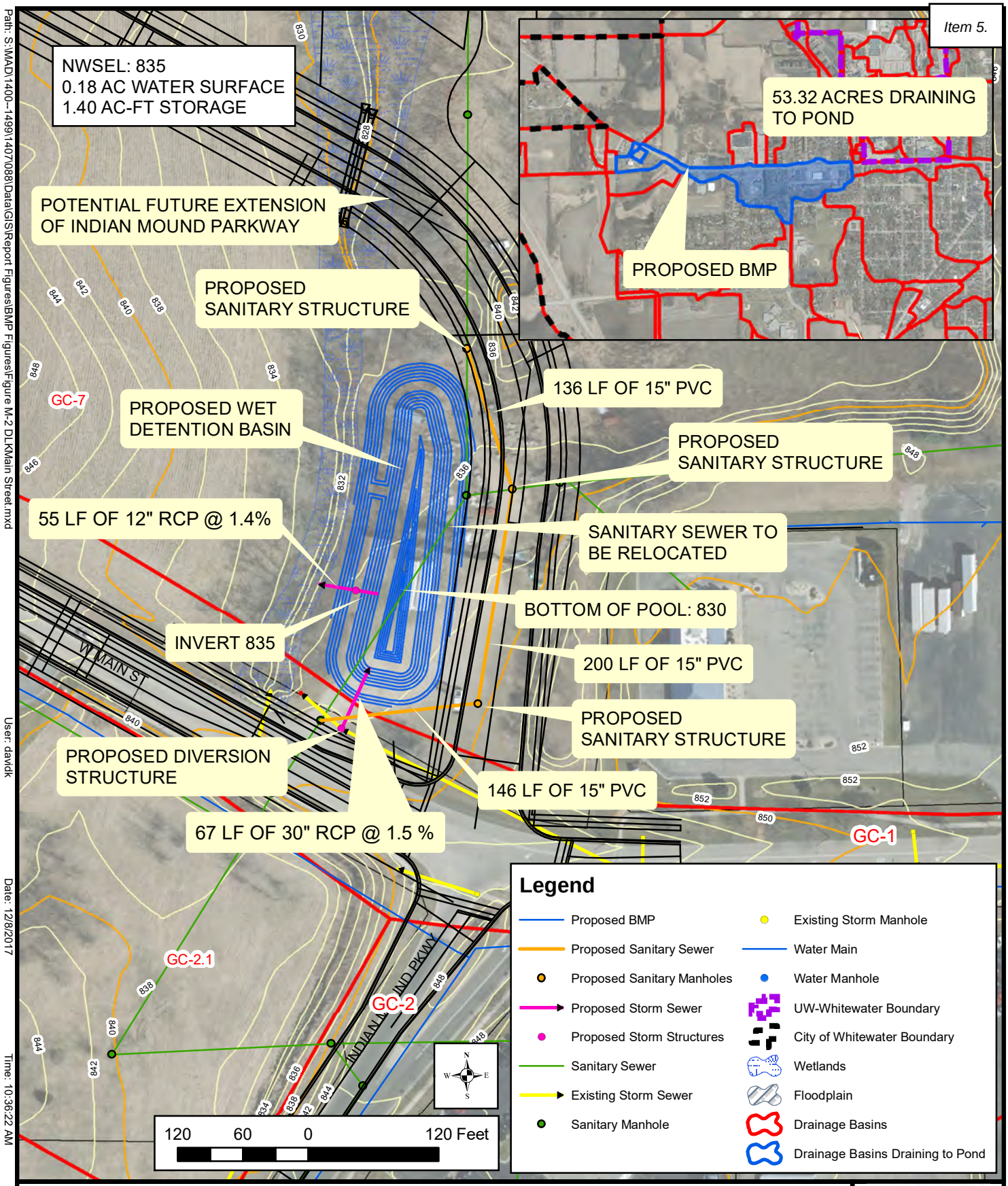
# MOUND MEADOWS WET DETENTION POND (GC-2)

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

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FIGURE 1407.08 357

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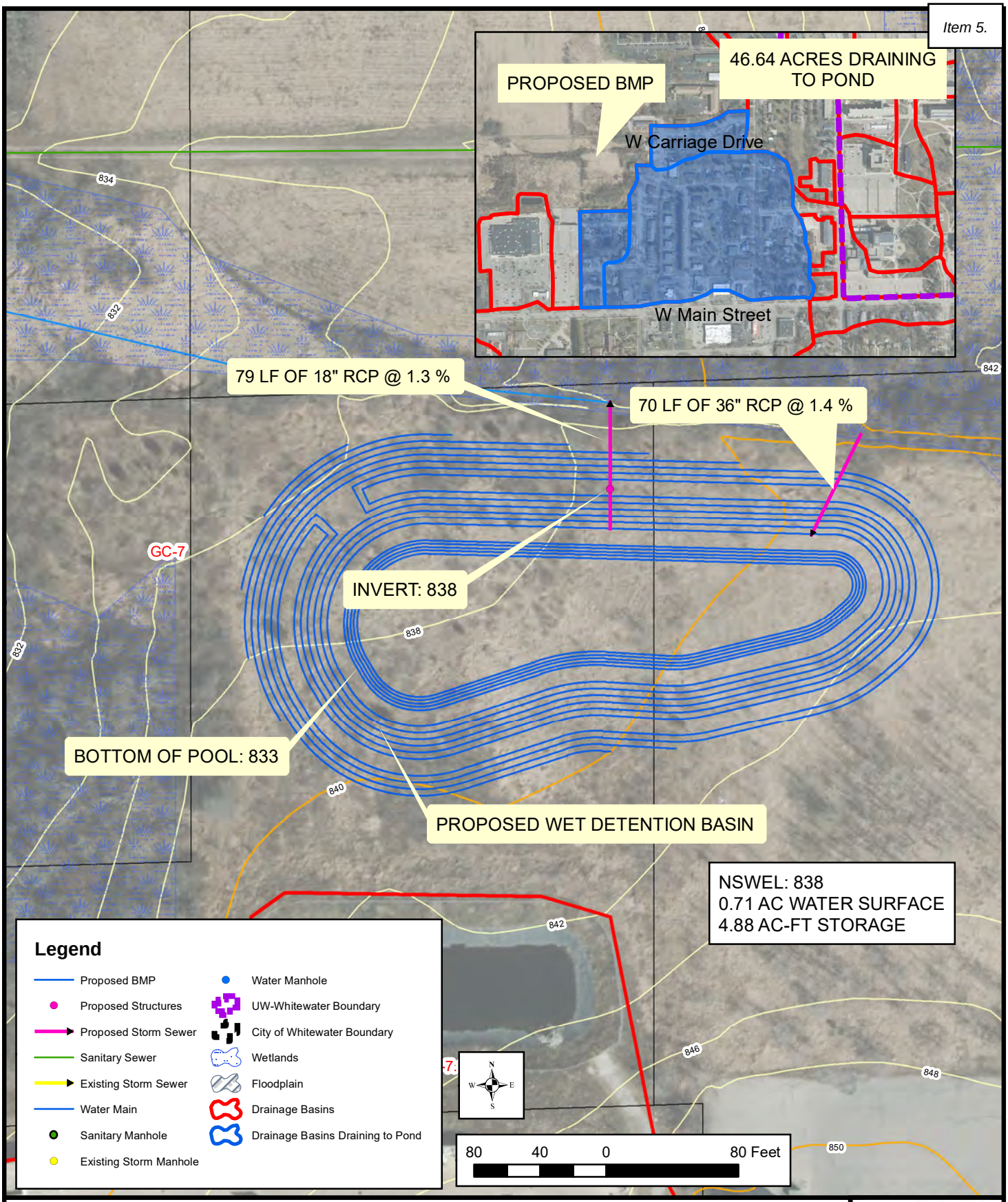

# DLK/MAIN STREET WET DETENTION POND (GC-1)

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

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FIGURE 1407.08 358

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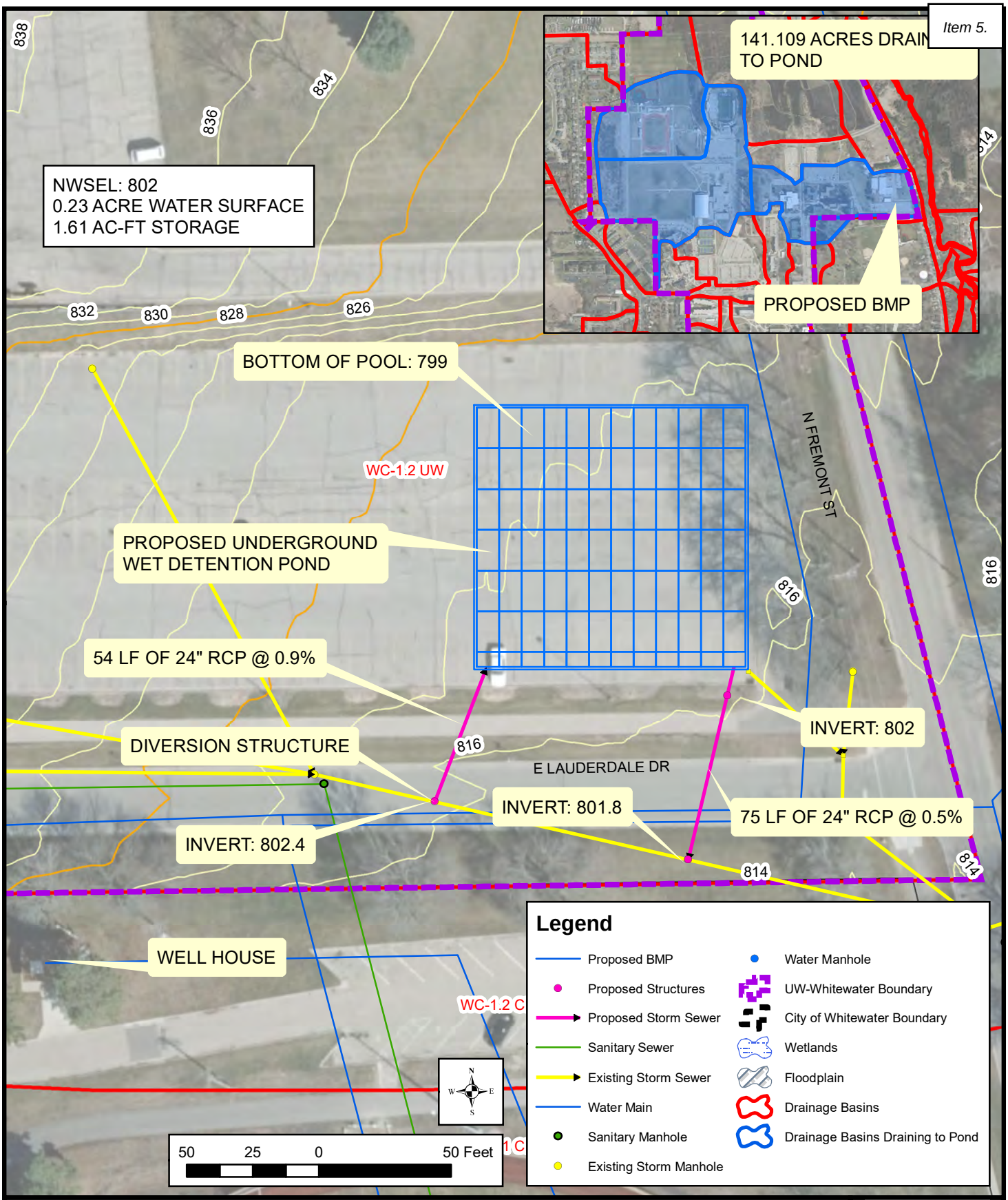



# CARRIAGE DRIVE WET DETENTION POND (GC-7)

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

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FIGURE 1407.08 359

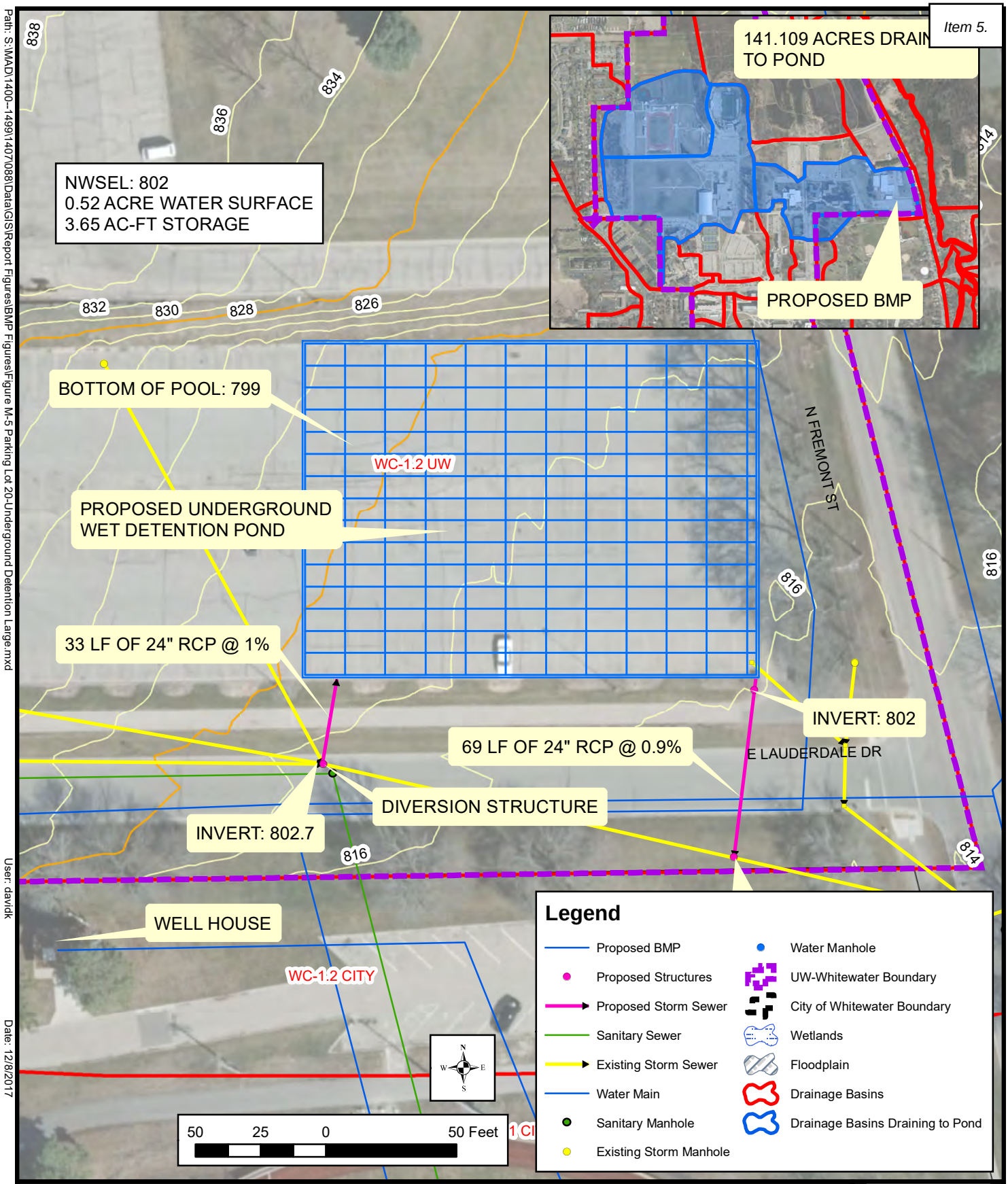



PARKING LOT 20 SMALL UNDERGROUND
WET DETENTION POND (WC-1.2 UW)
TMDL STORMWATER PLAN
CITY OF WHITEWATER
WALWORTH AND JEFFERSON COUNTIES, WISCONSIN

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FIGURE 1407.08 360

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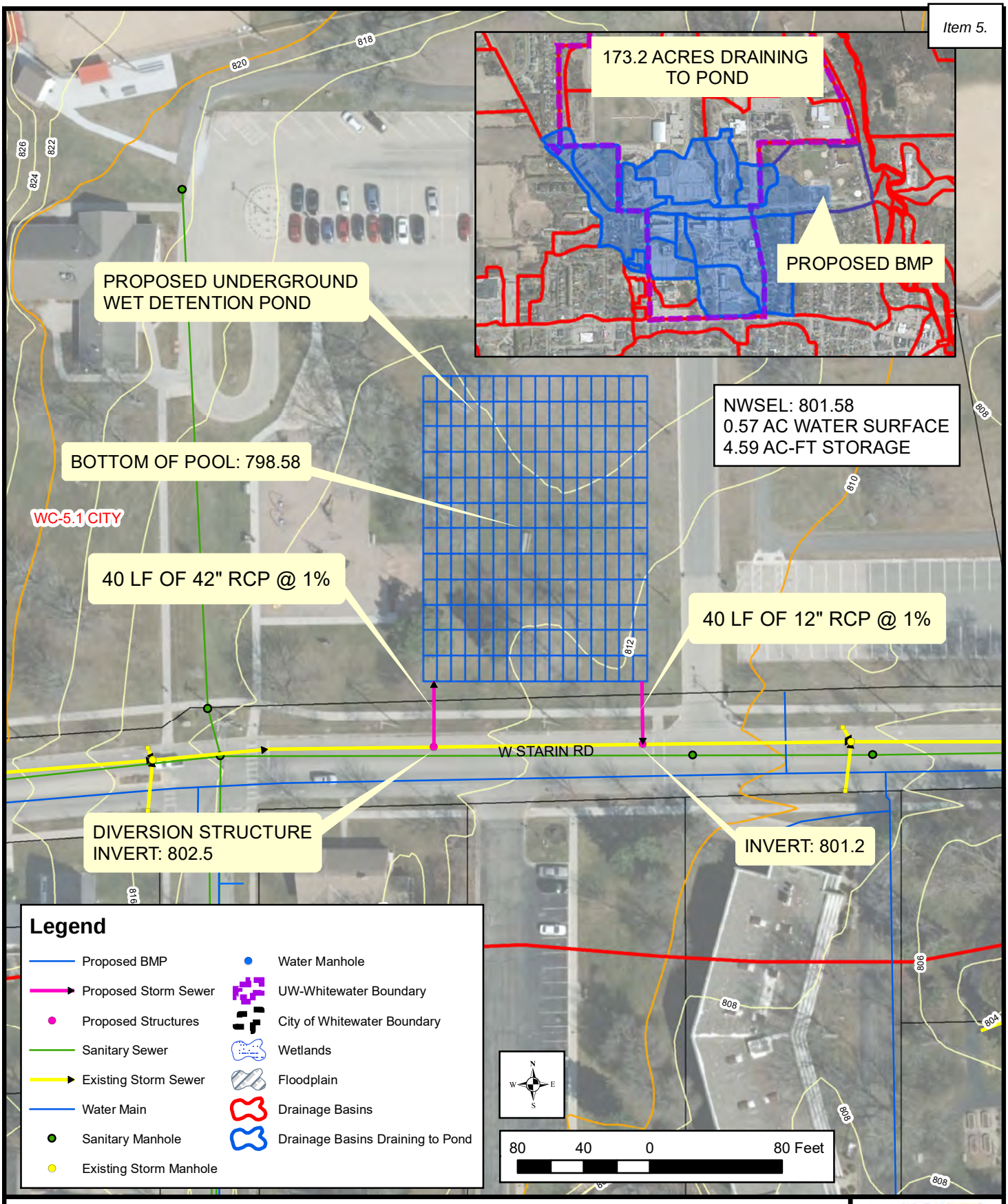

PARKING LOT 20 LARGE UNDERGROUND
WET DETENTION POND (WC-1.2 UW)
TMDL STORMWATER PLAN
CITY OF WHITEWATER
WALWORTH AND JEFFERSON COUNTIES, WISCONSIN

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FIGURE 1407.08 361

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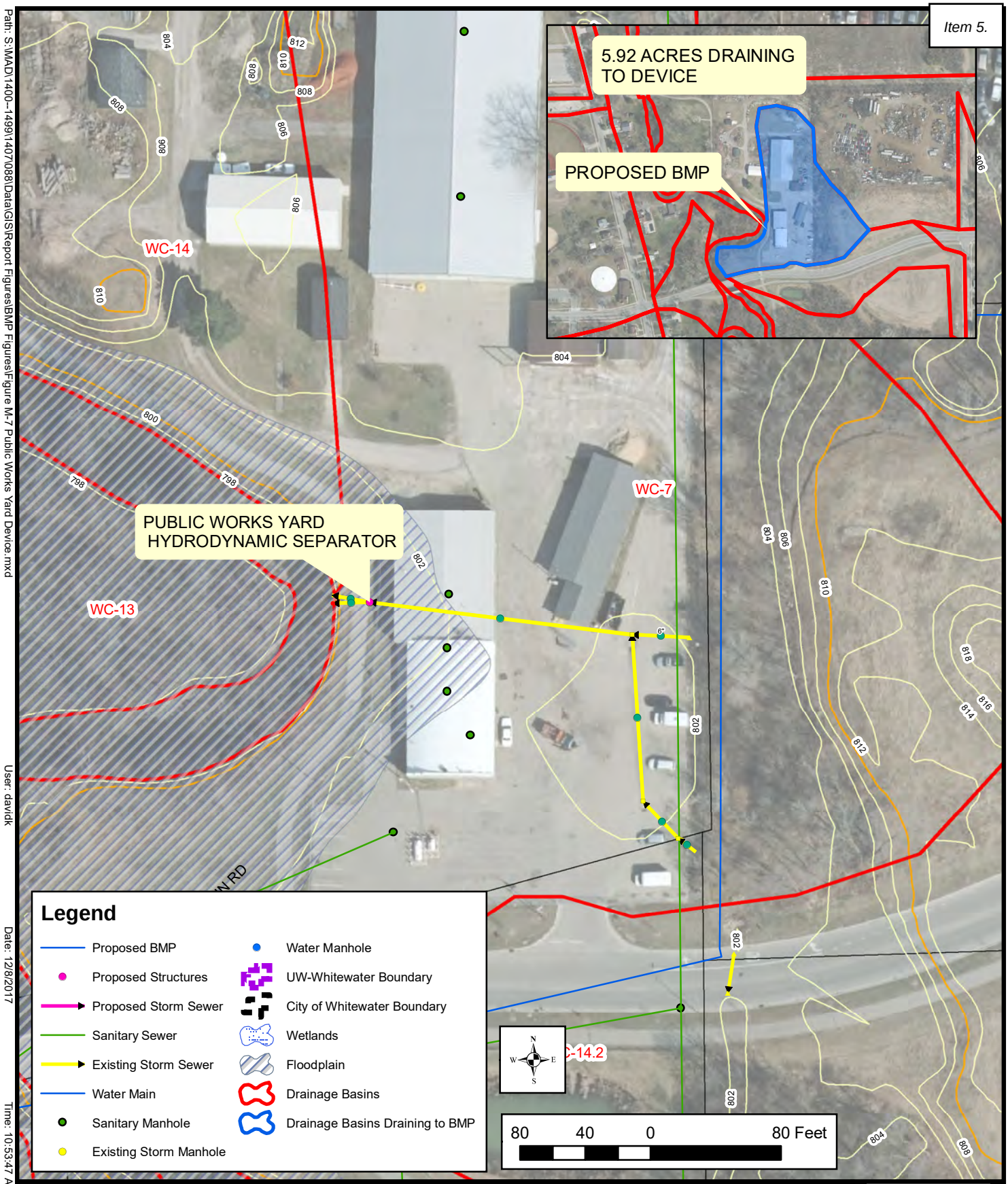



# STARIN ROAD UNDERGROUND WET DETENTION POND (WC-5.1 CITY)

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

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FIGURE 1407.08 362




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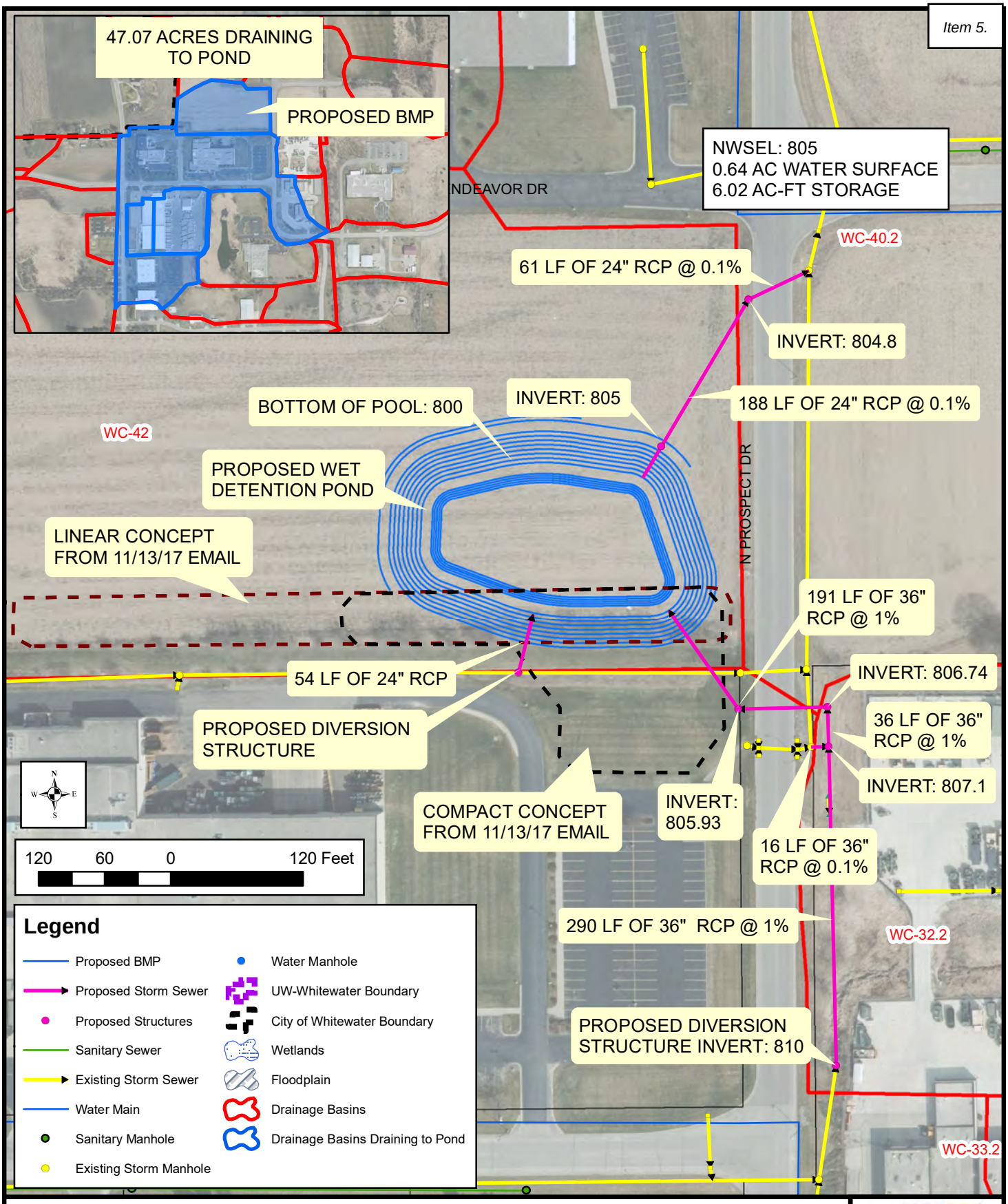
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# PUBLIC WORKS YARD HYDRODYNAMIC SEPARATOR (WC-7)

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

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FIGURE 1407.08 363



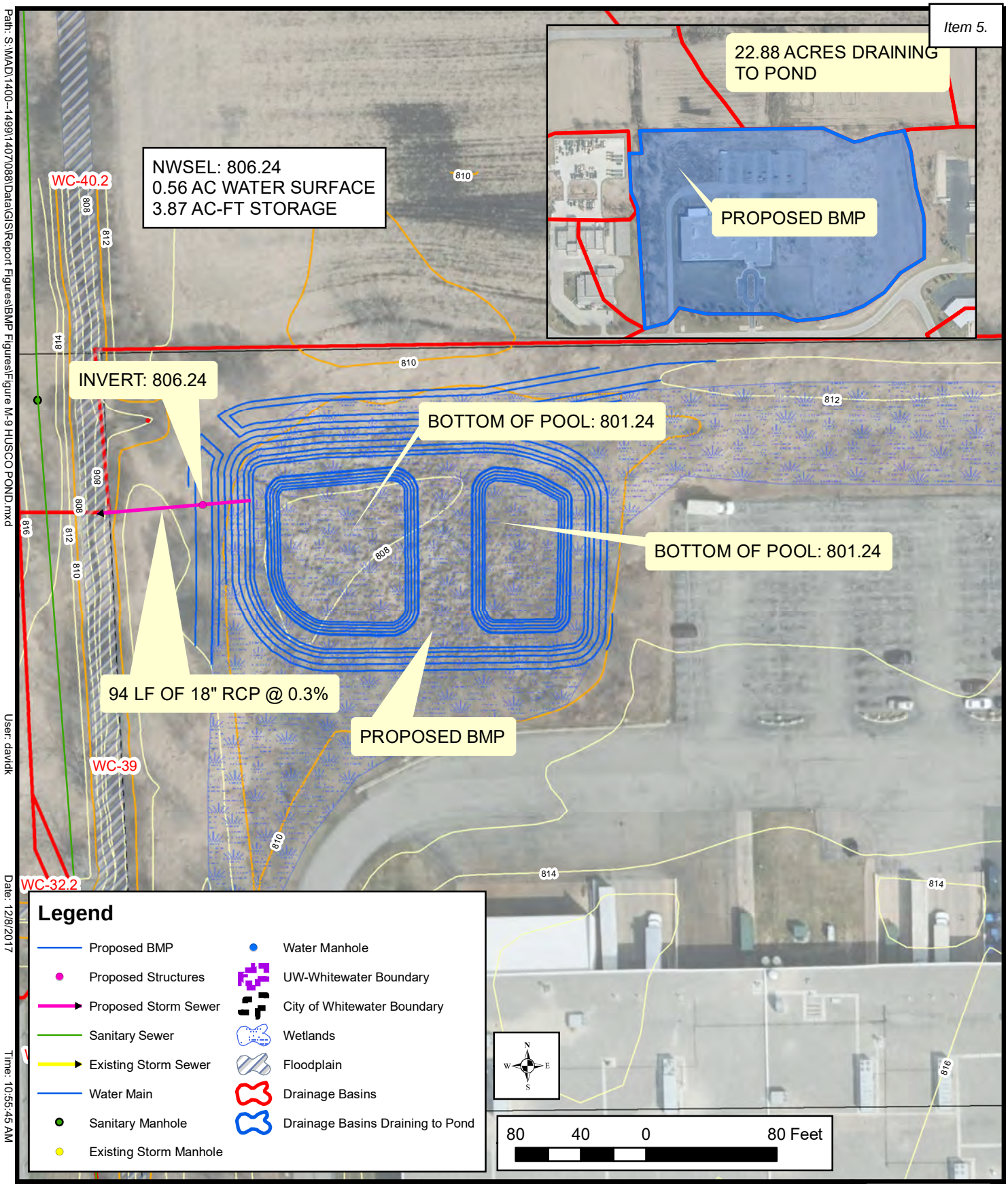

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# ARMORY SITE WET DETENTION POND (WC-42)

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

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FIGURE 1407.08 364




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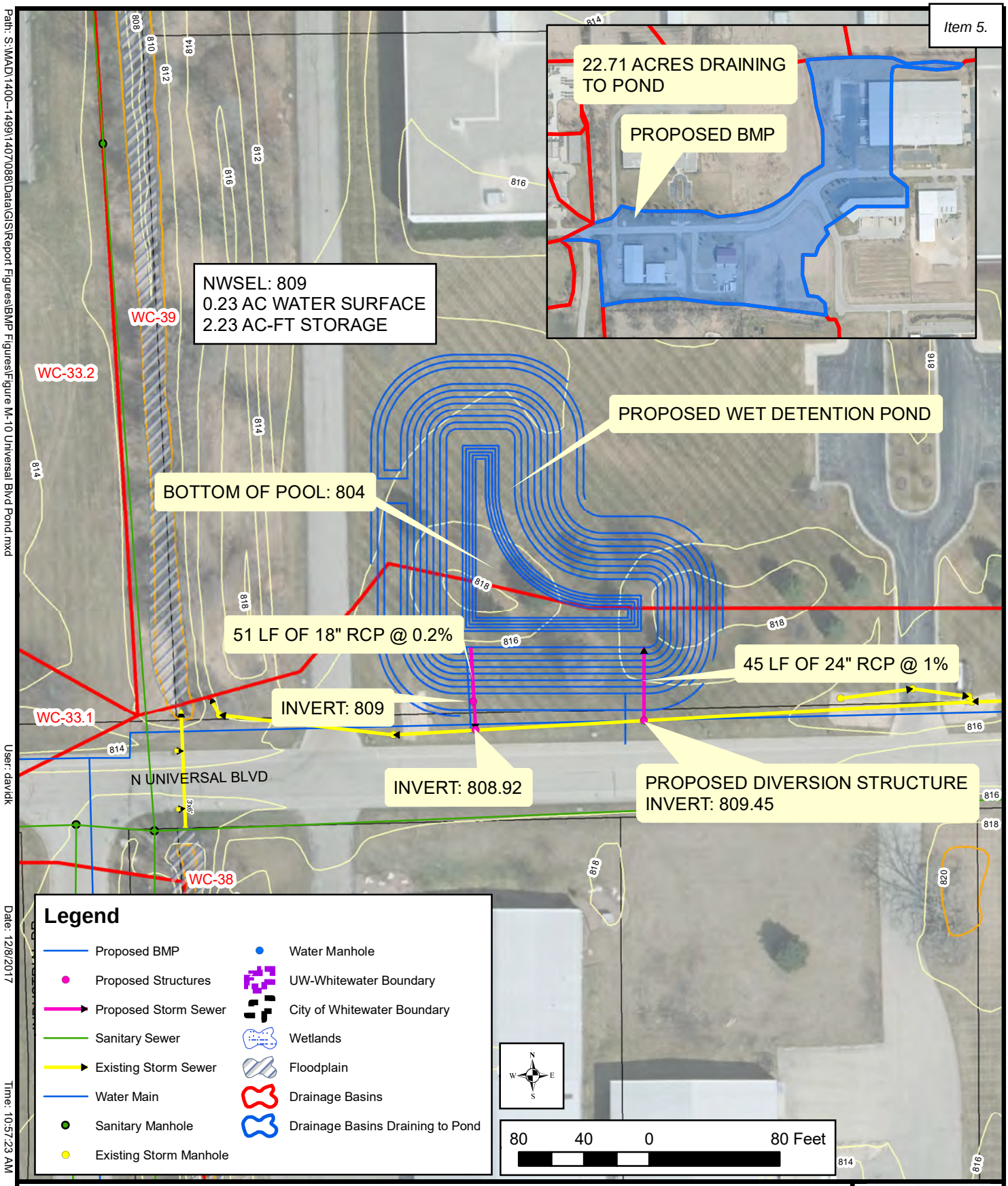
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# HUSCO DRY TO WET DETENTION POND (WC-39)

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

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FIGURE 1407.08 365



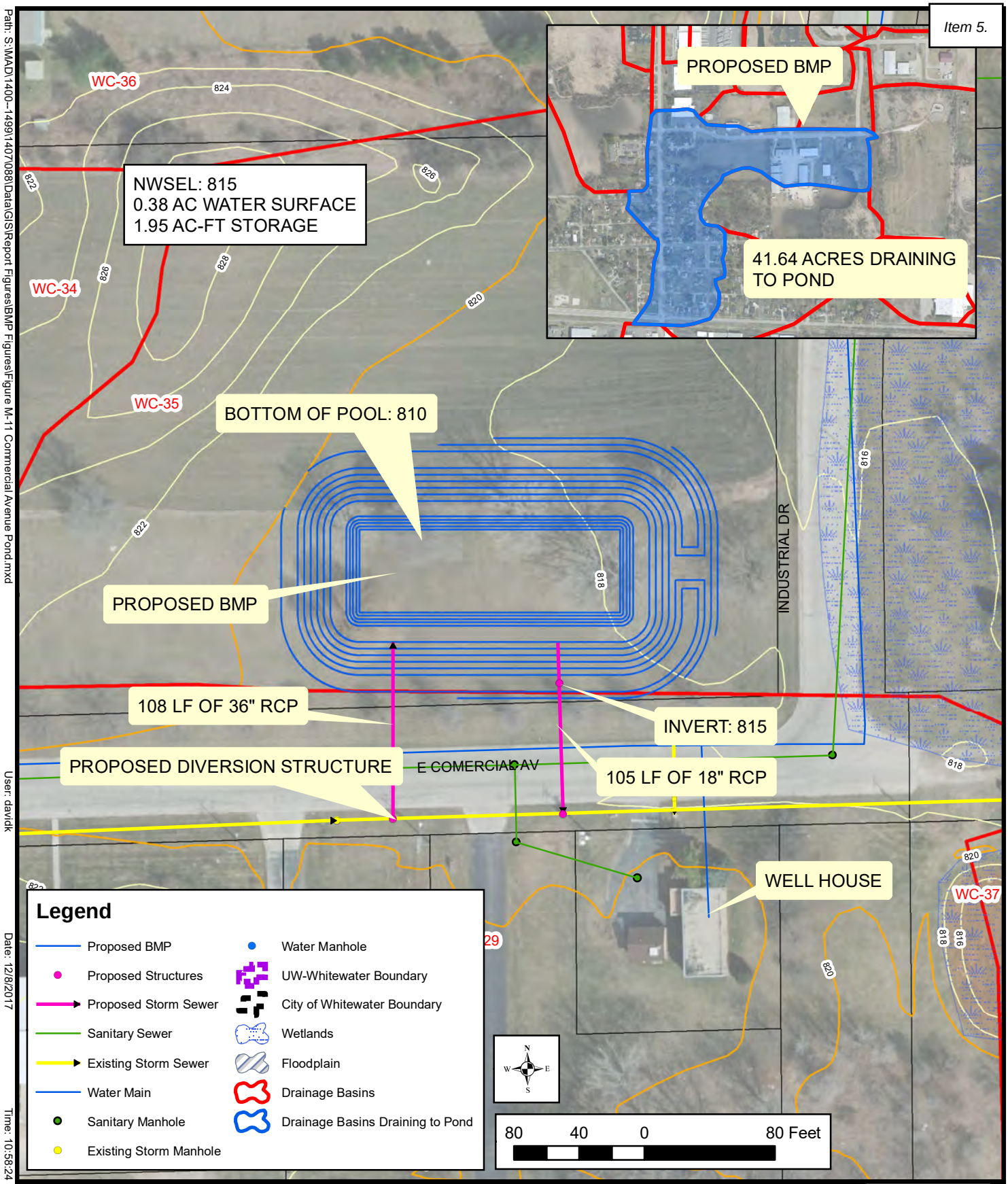

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# UNIVERSAL BOULEVARD WET DETENTION POND (WC-38)

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

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FIGURE M
1407.08



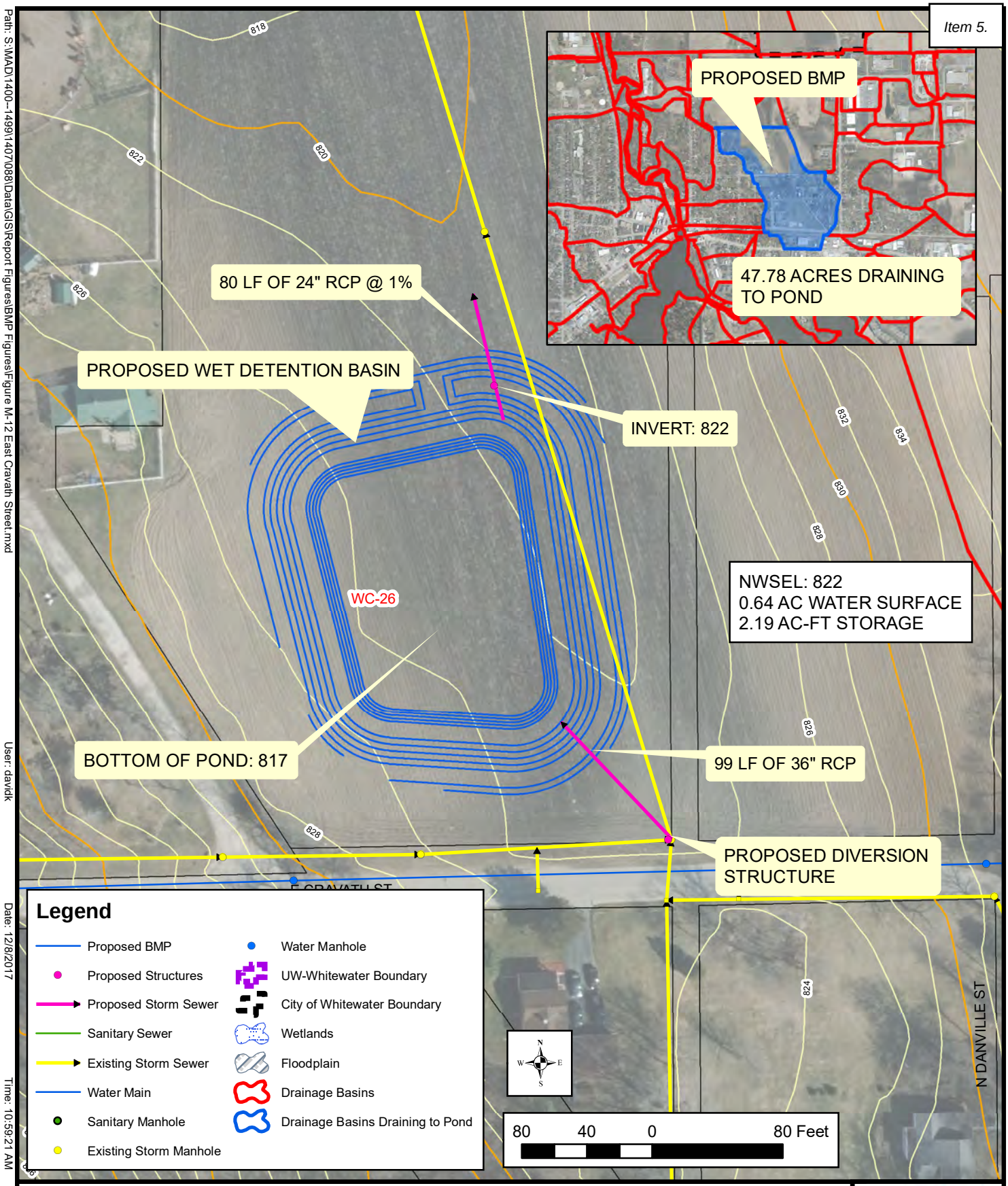

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# COMMERCIAL AVENUE WET DETENTION POND (WC-35)

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

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FIGURE M
1407.08




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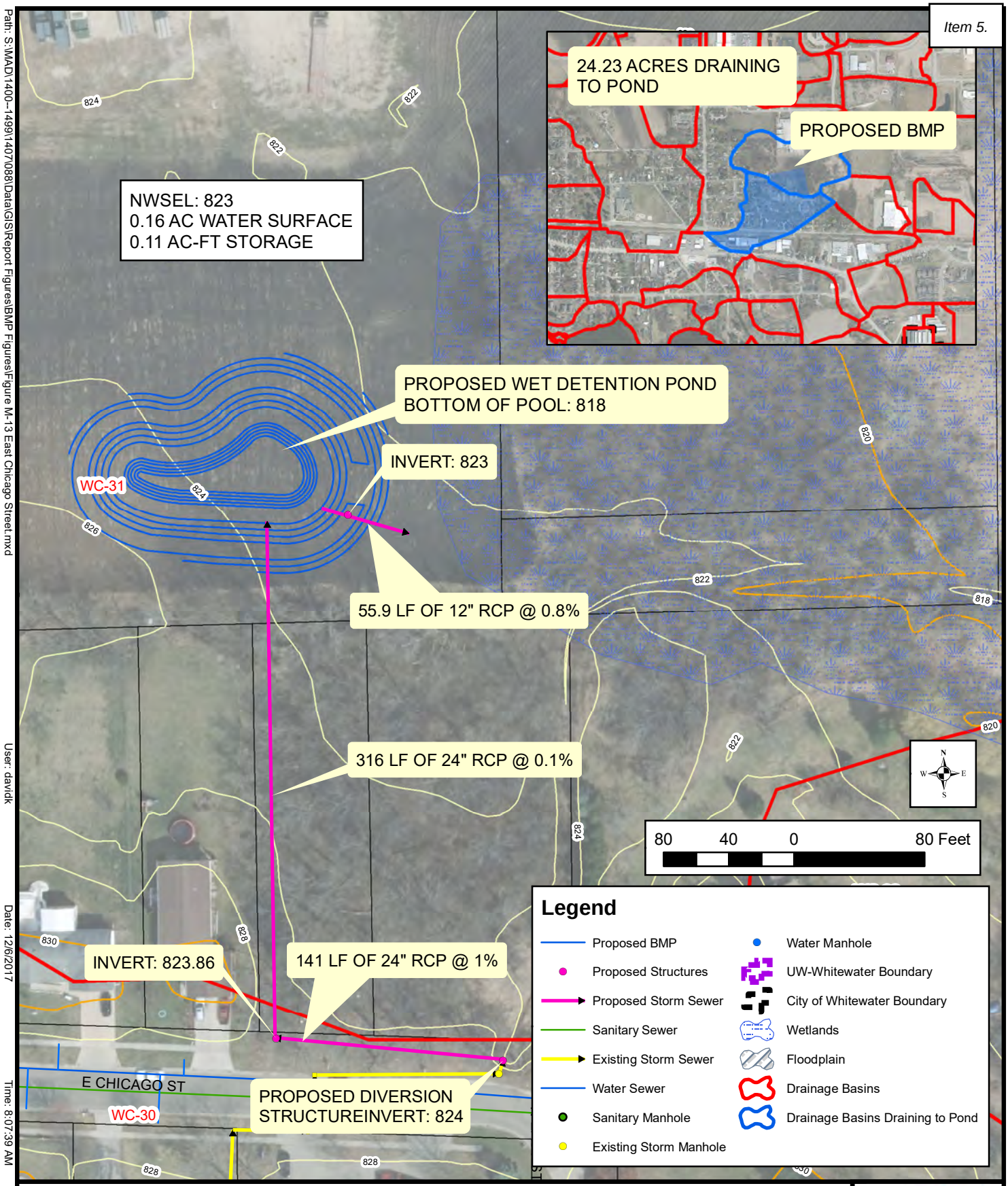
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# EAST CRAVATH STREET WET DETENTION POND (WC-26)

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

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FIGURE M
1407.08




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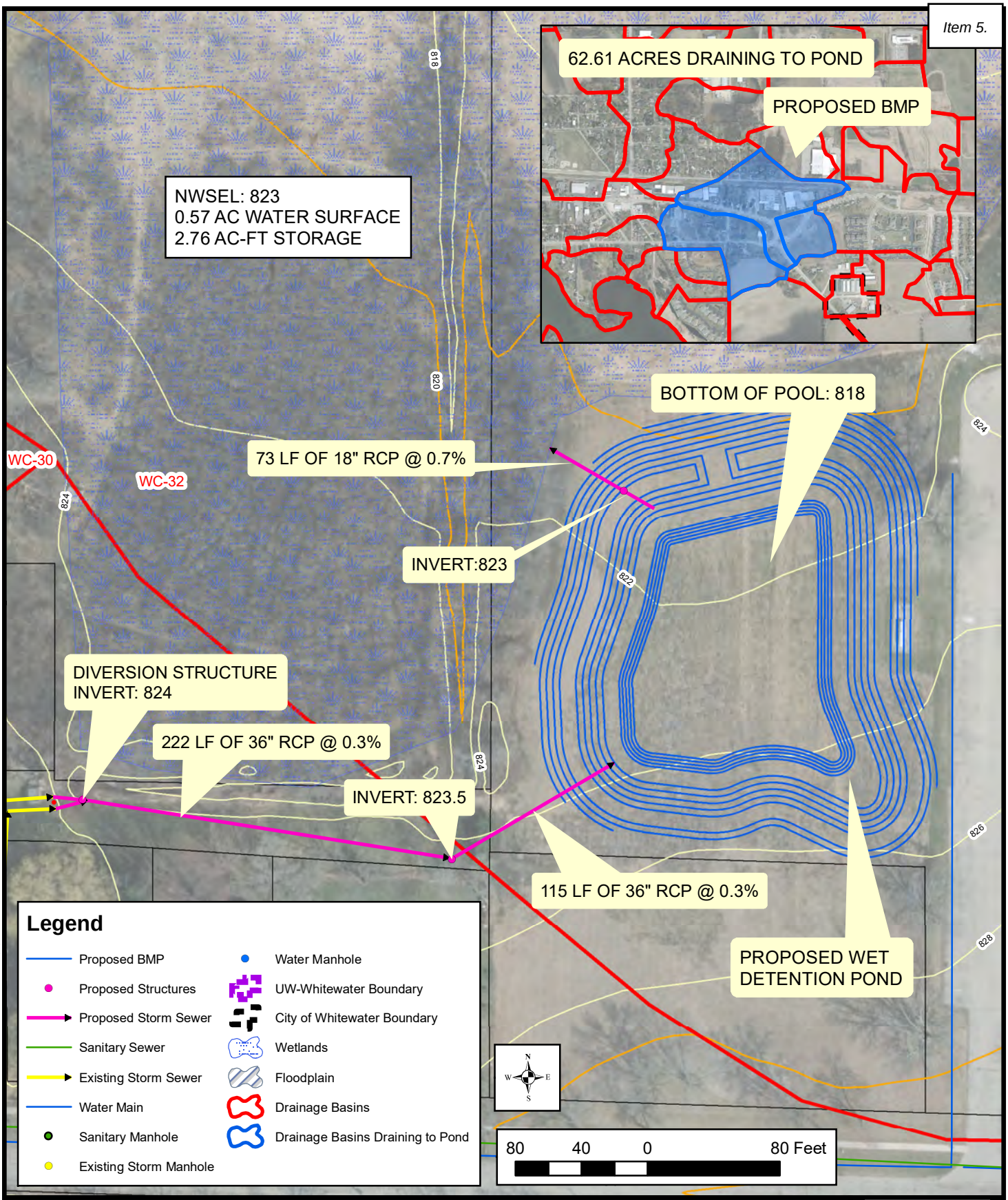
# EAST CHICAGO STREET WET DETENTION POND (WC-31)

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

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FIGURE M
1407.08

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Date: 12/8/2017
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# EAST MAIN STREET WET DETENTION POND (WC-32)

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

STRAND ASSOCIATES®

FIGURE M
1407.08

EAST NORTH STREET
HYDRODYNAMIC SEPARATOR

EAST MAIN STREET
HYDRODYNAMIC SEPARATOR

WEST MAIN STREET
HYDRODYNAMIC SEPARATOR

EAST MILWAUKEE STREET
HYDRODYNAMIC SEPARATOR

CRAVATH PARK
HYDRODYNAMIC SEPARATOR

SOUTH WISCONSIN STREET
HYDRODYNAMIC SEPARATOR

20.98 ACRES DRAINING TO DEVICE
PROPOSED BMP
PROPOSED BMP
17.12 ACRES DRAINING TO DEVICE
PROPOSED BMP
4.64 ACRES DRAINING TO DEVICE
PROPOSED BMP
12.83 ACRES DRAINING TO DEVICE
PROPOSED BMP
3.26 ACRES DRAINING TO DEVICE
12.04 ACRES DRAINING TO DEVICE

N GEORGE ST
W NORTH ST
N SECOND ST
N FIRST ST
N JEFFERSON ST
N CHERRY ST
W MAIN ST
W CENTER ST
W WHITEWATER ST
S SECOND ST
S FREMONT ST
WANN ST
S WISCONSIN ST
S GREEN ST
S RIDGE ST
E MILWAUKEE ST
E CLAY ST

WC-11 WC-12.5 WC-12.1 WC-8 WC-10 WC-2 CITY WC-9 CL-10 CL-8 CL-9 CL-7 CL-3 CL-13 CL-12 CL-1 CL-2 CL-15 CL-11

200 100 0 200 Feet

N W E S

## Legend

- Proposed BMP
- Proposed Structures
- Proposed Storm Sewer
- Sanitary Sewer
- Existing Storm Sewer
- Water Main
- Sanitary Manhole
- Existing Storm Manhole
- Water Manhole
- UW-Whitewater Boundary
- City of Whitewater Boundary
- Wetlands
- Floodplain
- Drainage Basins
- Drainage Basins Draining to BMP

# DOWNTOWN HYDRODYNAMIC SEPARATORS

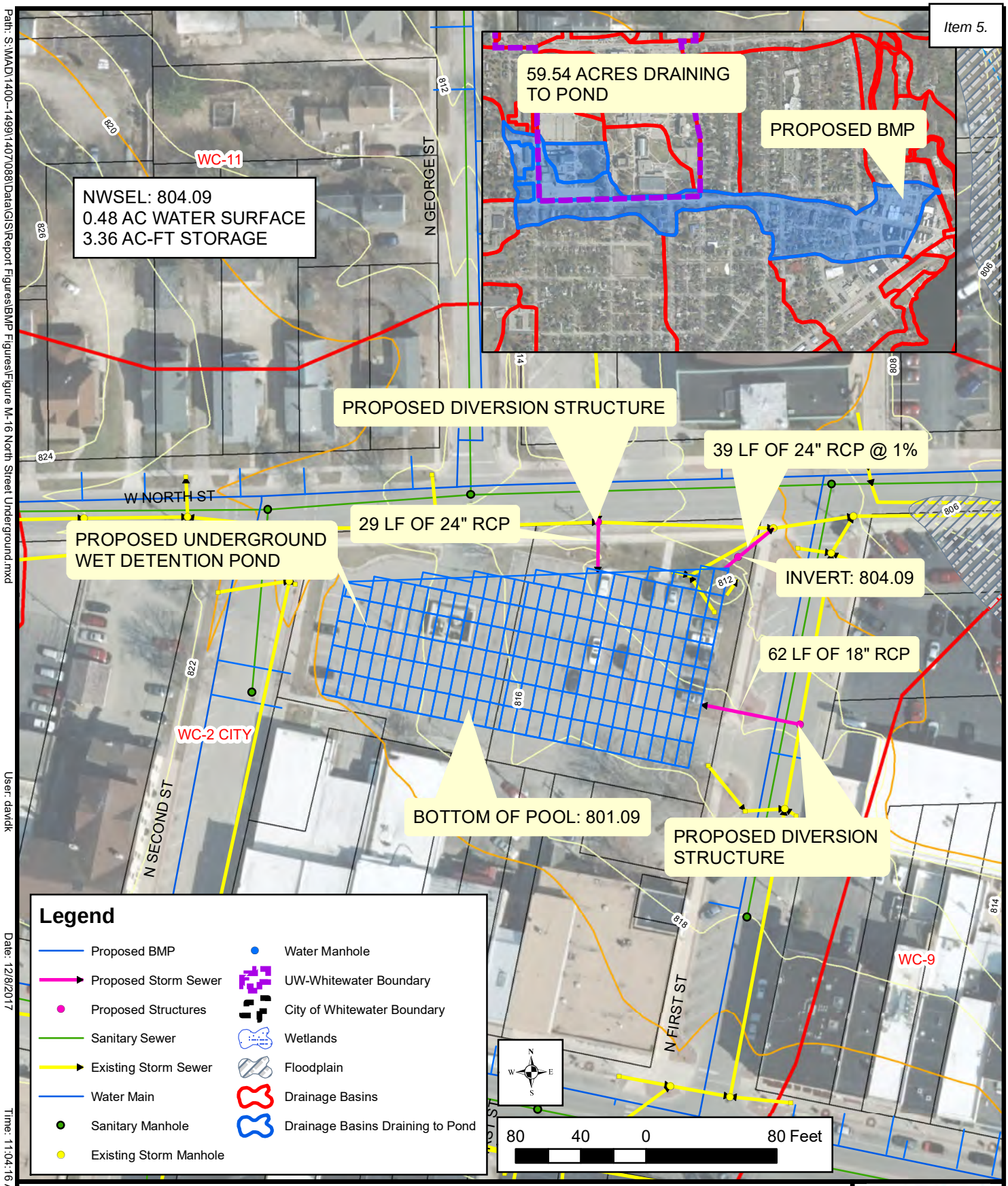
TMDL STORMWATER PLAN
CITY OF WHITEWATER
WALWORTH AND JEFFERSON COUNTIES, WISCONSIN

STRAND ASSOCIATES®

M-15
1407.088



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Date: 12/8/2017

Time: 11:04:16 AM

# NORTH STREET UNDERGROUND WET DETENTION POND (WC-21 CITY)

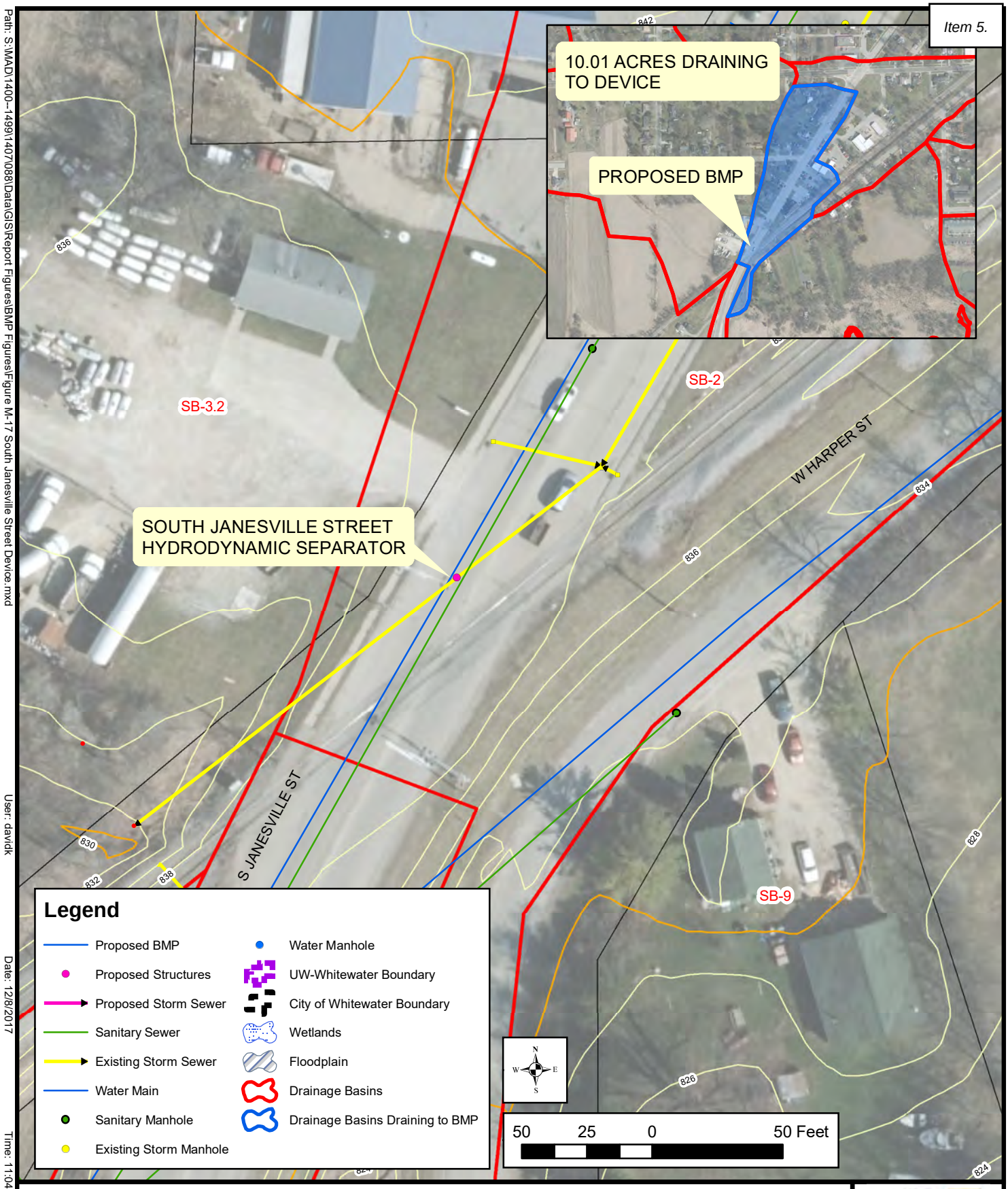
TMDL STORMWATER PLAN

CITY OF WHITEWATER

WALWORTH AND JEFFERSON COUNTIES, WISCONSIN

STRAND ASSOCIATES®

FIGURE M
1407.08




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User: davidk

Date: 12/8/2017

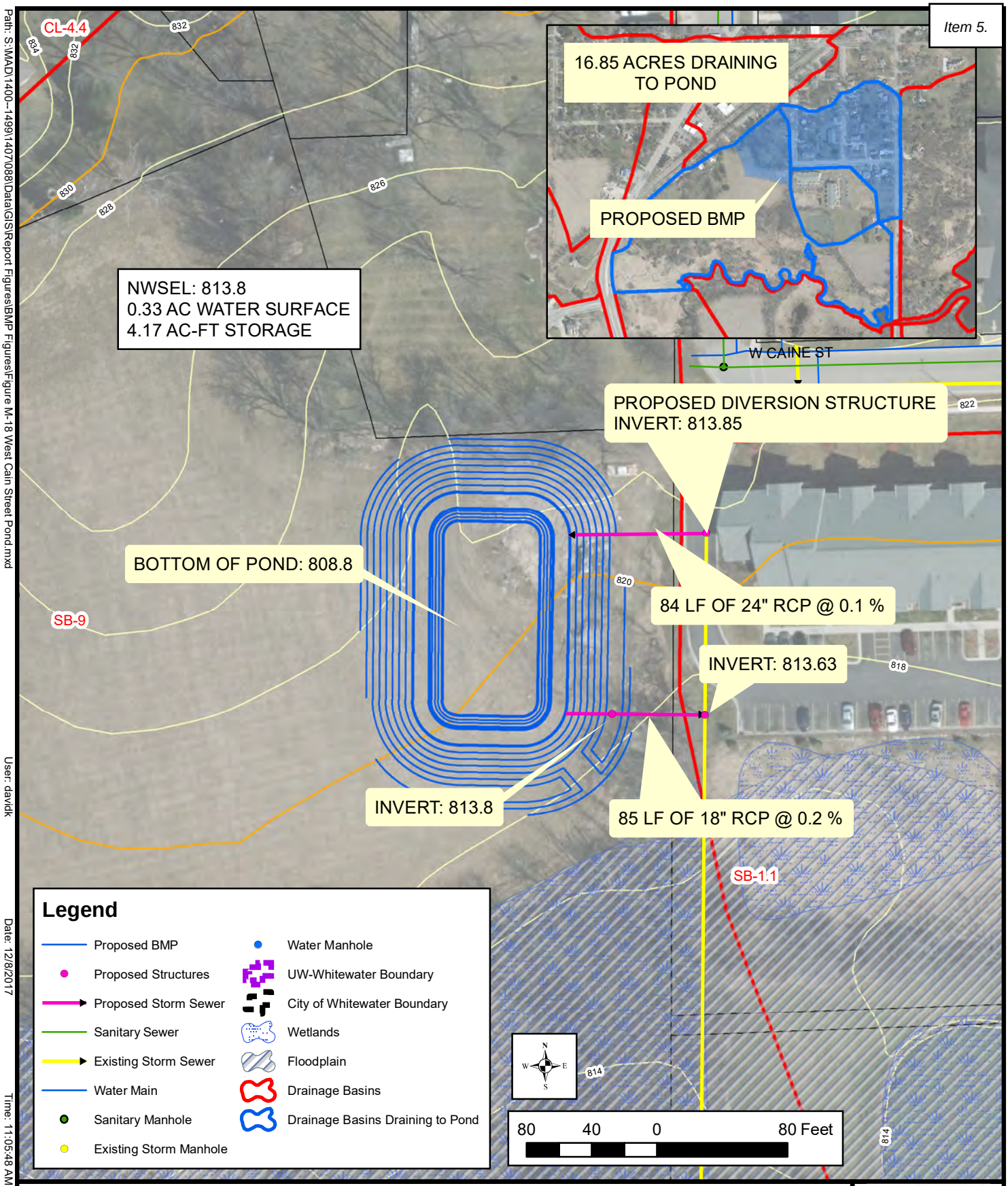
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# SOUTH JANESVILLE STREET HYDRODYNAMIC SEPARATOR (SB-2)

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

STRAND ASSOCIATES®

FIGURE M
1407.08




Path: S:\MAD\1400–1499\1407\088\Data\GIS\Report Figures\BMP Figures\Figure M-18 West Cain Street Pond.mxd

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Date: 12/8/2017

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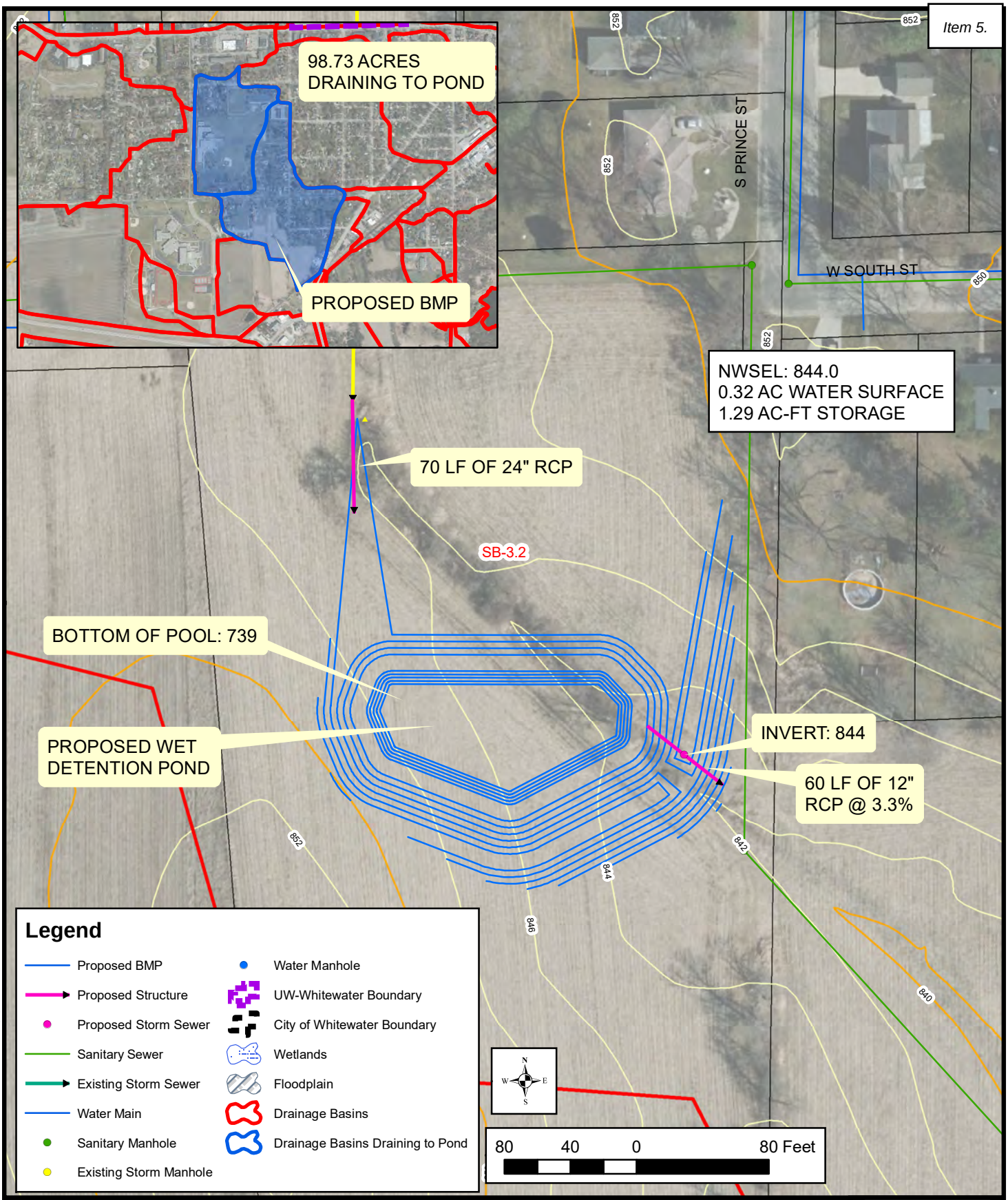
# WEST CAINE STREET WET DETENTION POND (SB-9)

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

STRAND ASSOCIATES®

FIGURE M
1407.08

Path: S:\MAD\1400–1499\1407\088\Data\GIS\Report Figures\BMP Figures\Figure M-19 West South Street Small Pond.mxd
User: davidk
Date: 12/8/2017
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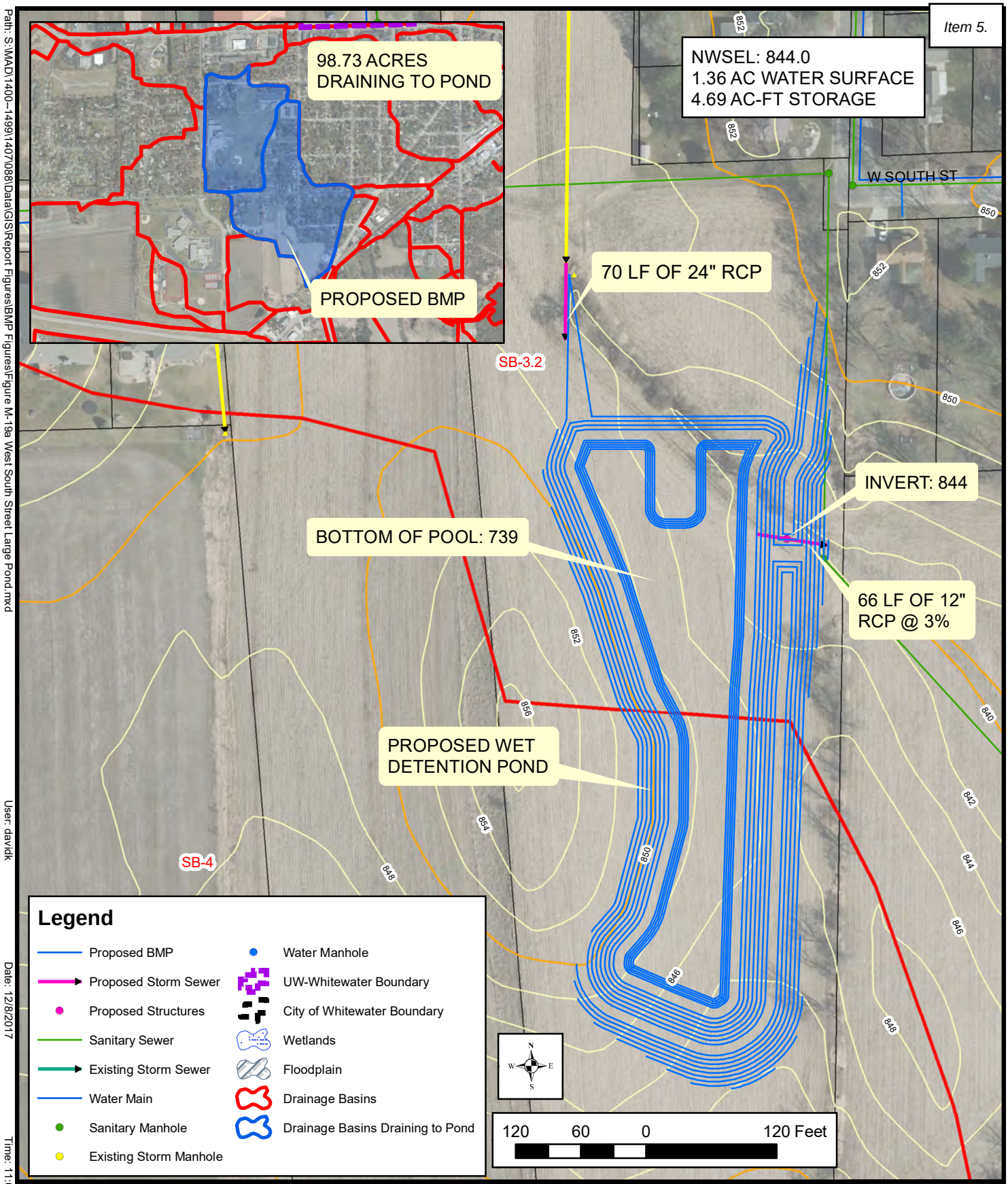



# WEST SOUTH STREET SMALL WET DETENTION POND (SB-3.2)

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

STRAND ASSOCIATES®

FIGURE M
1407.08




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User: davidk

Date: 12/8/2017

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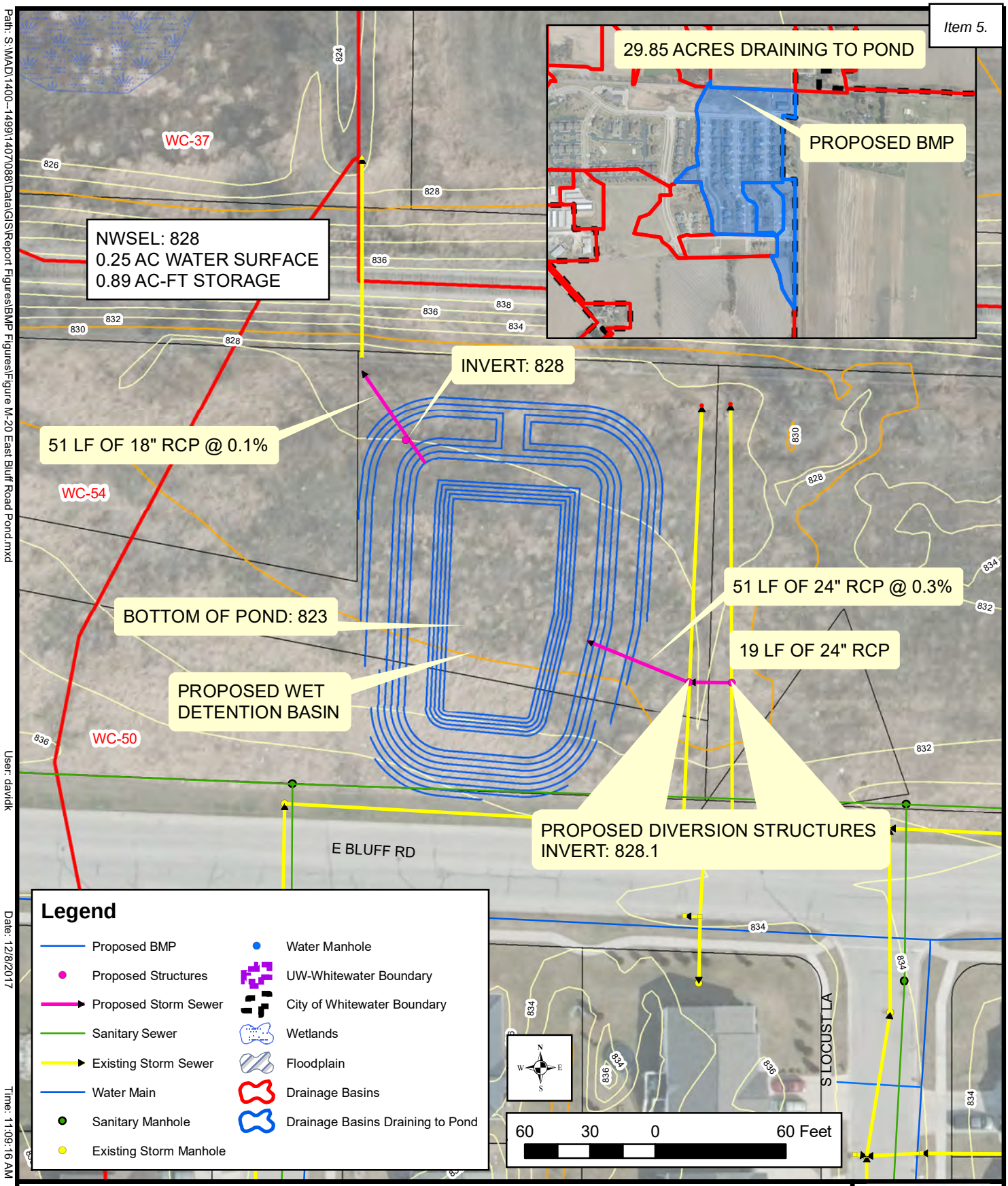
# WEST SOUTH STREET LARGE WET DETENTION POND (SB-3.2)

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

STRAND ASSOCIATES®

FIGURE M
1407.08

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User: davidk
Date: 12/8/2017
Time: 11:09:16 AM




EAST BLUFF ROAD WET DETENTION POND (WC-50)

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

STRAND ASSOCIATES®

FIGURE M
1407.08

# APPENDIX N
# CITY OPCCS

**Whitewater TMDL Stormwater Plan**
**City of Whitewater, Wisconsin**
**ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST: PLANNING-LEVEL**
**Mound Meadows Wet Detention Pond**

| ITEM NO. | DESCRIPTION | Quantity | Units | Unit Price | Total |
|---|---|---|---|---|---|
| | **BMP** | | | | |
| 1 | Mobilization (2.5% of Construction Cost) | 1 | LS | $6,800 | $6,800 |
| 2 | Construction Layout | 1 | LS | $2,500.00 | $2,500 |
| 3 | Clearing and Grubbing | 0.15 | ACRE | $8,000.00 | $1,200 |
| 4 | Traffic Control | 1 | LS | $2,500.00 | $2,500 |
| 5 | Dewatering | 1 | LS | $5,000.00 | $5,000 |
| 6 | Dust Control | 1 | EA | $500.00 | $500 |
| 7 | Stone Tracking Pad | 1 | EA | $2,900.00 | $2,900 |
| 8 | Inlet Protection | 1 | EA | $185.00 | $185 |
| 9 | Stone Weeper at Outfall | 1 | EA | $225.00 | $225 |
| 10 | Silt Fence | 200 | LF | $3.00 | $600 |
| 11 | Unclassified Excavation | 4,379 | CY | $30.00 | $131,370 |
| 12 | Clay Liner | 646 | CY | $27.00 | $17,448 |
| 13 | Clay Bedding Dike | 1 | EA | $450.00 | $450 |
| 14 | 21" RCP | 146 | LF | $75.00 | $10,950 |
| 15 | 24" RCP | 306 | LF | $80.00 | $24,480 |
| 16 | 36" RCP | 59 | LF | $115.00 | $6,785 |
| 17 | 21" RCP Apron Endwall with Grate and Cutoff Wall | 1 | EA | $2,675.00 | $2,675 |
| 18 | 24" RCP Apron Endwall with Grate and Cutoff Wall | 1 | EA | $2,850.00 | $2,850 |
| 19 | 36" RCP Apron Endwall with Grate and Cutoff Wall | 1 | EA | $3,700.00 | $3,700 |
| 20 | Outlet Control Structure (6-FT DIA) | 1 | LS | $4,000.00 | $4,000 |
| 21 | Diversion Structure (8-FT DIA) | 2 | EA | $7,000.00 | $14,000 |
| 22 | Storm Sewer Manhole (5-FT DIA) | 2 | EA | $2,700.00 | $5,400 |
| 23 | Rip Rap (Incoming Pipe, Outgoing Pipe, Outfall) | 33 | SY | $60.00 | $2,000 |
| 24 | 6-IN Salvaged Topsoil Placement 75% | 2,651 | SY | $2.50 | $6,628 |
| 25 | 6-IN Hauled-In Topsoil Placement 25% | 884 | SY | $5.00 | $4,419 |
| 26 | Erosion Control Mat - Class 2, Urban Type B | 3,535 | SY | $2.25 | $7,954 |
| 27 | Turf Reinforcement Mat System of Spillway (30 feet W x 30 feet L) | 100 | SY | $19.00 | $1,900 |
| 28 | Native Plugs at Water's Edge (2 per lf around pond perimeter) | 576 | EA | $7.00 | $4,032 |
| 29 | Wet Edge Seed Mix (Elevation 838 to 840) | 279 | SY | $2.75 | $766 |
| 30 | Low Mow Seed Mix w/Natives (840 to Limits of Disturbance) | 3,256 | SY | $1.75 | $5,699 |
| | | | | **Subtotal Project Cost** | **$279,900** |
| | | | | **Contingency and Technical Services Allowance (25%)** | **$69,975** |
| | | | | **Geotechnical Investigation** | **$5,000** |
| | | | | **Total Project Cost** | **$354,875** |

**Whitewater TMDL Stormwater Plan**
**City of Whitewater, Wisconsin**
**ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST: PLANNING-LEVEL**
**DLK/Main Street Wet Detention Pond**

| ITEM NO. | DESCRIPTION | Quantity | Units | Unit Price | Total |
|---|---|---|---|---|---|
| | **BMP** | | | | |
| 1 | Mobilization (2.5% of Construction Cost) | 1 | LS | $6,300 | $6,300 |
| 2 | Construction Layout | 1 | LS | $2,500.00 | $2,500 |
| 3 | Clearing and Grubbing | 0.15 | ACRE | $8,000.00 | $1,200 |
| 4 | Traffic Control | 1 | LS | $2,500.00 | $2,500 |
| 5 | Dewatering | 1 | LS | $5,000.00 | $5,000 |
| 6 | Dust Control | 1 | EA | $500.00 | $500 |
| 7 | Stone Tracking Pad | 1 | EA | $2,900.00 | $2,900 |
| 8 | Inlet Protection | 3 | EA | $185.00 | $555 |
| 9 | Stone Weeper at Outfall | 1 | EA | $225.00 | $225 |
| 10 | Silt Fence | 450 | LF | $3.00 | $1,350 |
| 11 | Unclassified Excavation | 1,655 | CY | $35.00 | $57,938 |
| 12 | Embankment Fill (Move and Recompact Excavated Material)) | 1,085 | CY | $5.00 | $5,425 |
| 13 | Clay Liner | 911 | CY | $30.00 | $27,326 |
| 14 | Clay Bedding Dike | 1 | EA | $450.00 | $450 |
| 15 | 15" PVC | 482 | LF | $120.00 | $57,840 |
| 16 | 12" RCP | 55 | LF | $60.00 | $3,300 |
| 17 | 30" RCP | 67 | LF | $90.00 | $6,030 |
| 18 | 12" RCP Apron Endwall with Grate and Cutoff Wall | 1 | EA | $2,000.00 | $2,000 |
| 19 | 30" RCP Apron Endwall with Grate and Cutoff Wall | 1 | EA | $3,200.00 | $3,200 |
| 20 | Outlet Control Structure (6-FT DIA) | 1 | LS | $4,000.00 | $4,000 |
| 21 | Diversion Structure (8-FT DIA) | 1 | EA | $7,000.00 | $7,000 |
| 22 | Sanitary Sewer Manhole (4-FT DIA) | 3 | EA | $2,900.00 | $8,700 |
| 23 | Rip Rap (Incoming Pipe, Outgoing Pipe, Outfall) | 22 | SY | $60.00 | $1,333 |
| 24 | 6-IN Salvaged Topsoil Placement 75% | 4,317 | SY | $2.50 | $10,791 |
| 25 | 6-IN Hauled-In Topsoil Placement 25% | 1,439 | SY | $5.00 | $7,194 |
| 26 | Erosion Control Mat - Class 2, Urban Type B | 5,755 | SY | $2.25 | $12,950 |
| 27 | Turf Reinforcement Mat System of Spillway (30 feet W x 30 feet L) | 100 | SY | $19.00 | $1,900 |
| 28 | Native Plugs at Water's Edge (2 per lf around pond perimeter) | 1,074 | EA | $7.00 | $7,518 |
| 29 | Wet Edge Seed Mix (Elevation 835 to 837) | 370 | SY | $2.75 | $1,018 |
| 30 | Low Mow Seed Mix w/Natives (837 to Limits of Disturbance) | 5,385 | SY | $1.75 | $9,424 |
| | | | **Subtotal Project Cost** | | **$258,400** |
| | | | **Contingency and Technical Services Allowance (25%)** | | **$64,600** |
| | | | **Geotechnical Investigation** | | **$5,000** |
| | | | | **Total Project Cost** | **$328,000** |

**Whitewater TMDL Stormwater Plan**
**City of Whitewater, Wisconsin**
**ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST: PLANNING-LEVEL**
**Carriage Lane Wet Detention Pond**

| ITEM NO. | DESCRIPTION | Quantity | Units | Unit Price | Total |
|---|---|---|---|---|---|
| | **BMP** | | | | |
| 1 | Mobilization (2.5% of Construction Cost) | 1 | LS | $10,600 | $10,600 |
| 2 | Construction Layout | 1 | LS | $2,500.00 | $2,500 |
| 3 | Clearing and Grubbing | 0.15 | ACRE | $8,000.00 | $1,200 |
| 4 | Traffic Control | 1 | LS | $2,500.00 | $2,500 |
| 5 | Dewatering | 1 | LS | $5,000.00 | $5,000 |
| 6 | Dust Control | 1 | EA | $500.00 | $500 |
| 7 | Stone Tracking Pad | 1 | EA | $2,900.00 | $2,900 |
| 8 | Inlet Protection | 3 | EA | $185.00 | $555 |
| 9 | Stone Weeper at Outfall | 1 | EA | $225.00 | $225 |
| 10 | Silt Fence | 600 | LF | $3.00 | $1,800 |
| 11 | Unclassified Excavation | 8,042 | CY | $25.00 | $201,050 |
| 12 | Embankment Fill (Move and Recompact Excavated Material)) | 1,485 | CY | $5.00 | $7,426 |
| 13 | Clay Liner | 3,017 | CY | $23.50 | $70,908 |
| 14 | Clay Bedding Dike | 1 | EA | $450.00 | $450 |
| 15 | 18" RCP | 79 | LF | $70.00 | $5,530 |
| 16 | 36" RCP | 70 | LF | $115.00 | $8,050 |
| 17 | 18" RCP Apron Endwall with Grate and Cutoff Wall | 1 | EA | $2,500.00 | $2,500 |
| 18 | 36" RCP Apron Endwall with Grate and Cutoff Wall | 1 | EA | $3,700.00 | $3,700 |
| 19 | Outlet Control Structure (6-FT DIA) | 1 | LS | $4,000.00 | $4,000 |
| 20 | Diversion Structure (8-FT DIA) | 1 | EA | $7,000.00 | $7,000 |
| 21 | Rip Rap (Incoming Pipe, Outgoing Pipe, Outfall) | 22 | SY | $60.00 | $1,333 |
| 22 | 6-IN Salvaged Topsoil Placement 75% | 8,365 | SY | $2.50 | $20,913 |
| 23 | 6-IN Hauled-In Topsoil Placement 25% | 2,788 | SY | $5.00 | $13,942 |
| 24 | Erosion Control Mat - Class 2, Urban Type B | 11,153 | SY | $2.25 | $25,095 |
| 25 | Turf Reinforcement Mat System of Spillway (30 feet W x 30 feet L) | 100 | SY | $19.00 | $1,900 |
| 26 | Native Plugs at Water's Edge (2 per lf around pond perimeter) | 1,576 | EA | $7.00 | $11,030 |
| 27 | Wet Edge Seed Mix (Elevation 838 to 840) | 723 | SY | $2.75 | $1,987 |
| 28 | Low Mow Seed Mix w/Natives (840 to Limits of Disturbance) | 10,431 | SY | $1.75 | $18,254 |
| | | **Subtotal Project Cost** | | | **$432,800** |
| | | **Contingency and Technical Services Allowance (25%)** | | | **$108,200** |
| | | **Geotechnical Investigation** | | | **$7,500** |
| | | | | **Total Project Cost** | **$548,500** |

**Whitewater TMDL Stormwater Plan**
**City of Whitewater, Wisconsin**
**ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST: PLANNING-LEVEL**
**Parking Lot 20 Underground Wet Detention Pond - Small**

| ITEM NO. | DESCRIPTION | Quantity | Units | Unit Price | Total |
|---|---|---|---|---|---|
| | **BMP** | | | | |
| 1 | Mobilization (2.5% of Construction Cost) | 1 | LS | $22,700 | $22,700 |
| 2 | Construction Layout | 1 | LS | $2,500.00 | $2,500 |
| 3 | Clearing and Grubbing | 0.15 | ACRE | $8,000.00 | $1,200 |
| 4 | Traffic Control | 1 | LS | $2,500.00 | $2,500 |
| 5 | Dewatering | 1 | LS | $5,000.00 | $5,000 |
| 6 | Dust Control | 1 | EA | $500.00 | $500 |
| 7 | Stone Tracking Pad | 1 | EA | $2,900.00 | $2,900 |
| 8 | Inlet Protection | 2 | EA | $185.00 | $370 |
| 9 | Silt Fence | 400 | LF | $3.00 | $1,200 |
| 10 | Unclassified Excavation (Off-site Disposal) | 6,326 | CY | $35.00 | $221,411 |
| 11 | Unclassified Excavation (On-site Reuse) | 3,196 | CY | $7.00 | $22,372 |
| 12 | Units (8'-6" Stormtrap Unit + Delivery + Joint Tape + Joint Wrap) | 1 | LS | $350,000.00 | $350,000 |
| 13 | Install Units | 60 | EA | $250.00 | $15,000 |
| 14 | Backfill (Around and To Top of Unit) | 1,555 | CY | $35.00 | $54,413 |
| 15 | Backfill - Compacted Insitu (Over Unit to Ground With Reused Material) | 3,196 | CY | $7.00 | $22,372 |
| 16 | Stone Beneath Units | 207 | CY | $35.00 | $7,245 |
| 17 | Liner | 1 | LS | $26,000.00 | $26,000 |
| 18 | 24" RCP | 129 | LF | $80.00 | $10,320 |
| 19 | Outlet Control Structure (6-FT DIA) | 1 | LS | $4,000.00 | $4,000 |
| 20 | Diversion Structure (8-FT DIA) | 1 | EA | $7,000.00 | $7,000 |
| 21 | Storm Sewer Manhole (6-FT DIA) | 1 | EA | $2,700.00 | $2,700 |
| 22 | Asphalt Removal | 1,992 | SY | $6.00 | $11,951 |
| 23 | Sawcut | 398 | LF | $4.00 | $1,593 |
| 24 | Asphalt | 478 | TON | $220.00 | $105,166 |
| 25 | Basecourse (assume 12") | 1,328 | TON | $22.00 | $29,213 |
| 26 | 6-IN Salvaged Topsoil Placement 75% | 140 | SY | $2.50 | $349 |
| 27 | 6-IN Hauled-In Topsoil Placement 25% | 47 | SY | $5.00 | $233 |
| 28 | Erosion Control Mat - Class 2, Urban Type B | 186 | SY | $2.25 | $419 |
| 29 | Low Mow Seed Mix w/Natives (Area not restored with pavement) | 186 | SY | $1.75 | $326 |
| | | | | **Subtotal Project Cost** | **$931,000** |
| | | | | **Contingency and Technical Services Allowance (25%)** | **$232,750** |
| | | | | **Geotechnical Investigation** | **$5,000** |
| | | | | **Total Project Cost** | **$1,168,750** |
| | | | 1% | **City Portion** | **$11,688** |
| | | | 99% | **UW Portion** | **$1,157,063** |

**Whitewater TMDL Stormwater Plan**
**City of Whitewater, Wisconsin**
**ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST: PLANNING-LEVEL**
**Parking Lot 20 Underground Wet Detention Pond - Large**

| ITEM NO. | DESCRIPTION | Quantity | Units | Unit Price | Total |
|---|---|---|---|---|---|
| | **BMP** | | | | |
| 1 | Mobilization (2.5% of Construction Cost) | 1 | LS | $40,700 | $40,700 |
| 2 | Construction Layout | 1 | LS | $2,500.00 | $2,500 |
| 3 | Clearing and Grubbing | 0.15 | ACRE | $8,000.00 | $1,200 |
| 4 | Traffic Control | 1 | LS | $2,500.00 | $2,500 |
| 5 | Dewatering | 1 | LS | $5,000.00 | $5,000 |
| 6 | Dust Control | 1 | EA | $500.00 | $500 |
| 7 | Stone Tracking Pad | 1 | EA | $2,900.00 | $2,900 |
| 8 | Inlet Protection | 2 | EA | $185.00 | $370 |
| 9 | Silt Fence | 490 | LF | $3.00 | $1,470 |
| 10 | Unclassified Excavation (Off-site Disposal) | 12,562 | CY | $25.00 | $314,053 |
| 11 | Unclassified Excavation (On-site Reuse) | 5,359 | CY | $7.00 | $37,512 |
| 12 | Units (8'-6" Stormtrap Unit + Delivery + Joint Tape + Joint Wrap) | 1 | LS | $750,000.00 | $750,000 |
| 13 | Install Units | 178 | EA | $250.00 | $44,500 |
| 14 | Backfill (Around and To Top of Unit) | 2,667 | CY | $35.00 | $93,331 |
| 15 | Backfill - Compacted Insitu (Over Unit to Ground With Reused Material) | 5,359 | CY | $7.00 | $37,512 |
| 16 | Sub Grade | 431 | CY | $35.00 | $15,085 |
| 17 | Liner | 1 | LS | $45,000.00 | $45,000 |
| 18 | 24" RCP | 102 | LF | $80.00 | $8,160 |
| 19 | Outlet Control Structure (6-FT DIA) | 1 | LS | $4,000.00 | $4,000 |
| 20 | Diversion Structure (8-FT DIA) | 1 | EA | $7,000.00 | $7,000 |
| 21 | Storm Sewer Manhole (6-FT DIA) | 1 | EA | $2,700.00 | $2,700 |
| 22 | Asphalt Removal | 2,947 | SY | $6.00 | $17,680 |
| 23 | Sawcut | 589 | LF | $4.00 | $2,357 |
| 24 | Asphalt | 707 | TON | $220.00 | $155,584 |
| 25 | Basecourse (assume 12") | 1,964 | TON | $22.00 | $43,218 |
| 26 | Sidewalk Removal | 458 | SY | $3.00 | $1,373 |
| 27 | Sidewalk Restoration | 458 | SY | $55.00 | $25,172 |
| 28 | 6-IN Salvaged Topsoil Placement 75% | 817 | SY | $2.50 | $2,041 |
| 29 | 6-IN Hauled-In Topsoil Placement 25% | 272 | SY | $5.00 | $1,361 |
| 30 | Erosion Control Mat - Class 2, Urban Type B | 1,089 | SY | $2.25 | $2,450 |
| 31 | Low Mow Seed Mix w/Natives (Area not restored with pavement) | 1,089 | SY | $1.75 | $1,905 |

| | | | |
|---|---|---|---|
| **Subtotal Project Cost** | | | **$1,669,100** |
| **Contingency and Technical Services Allowance (25%)** | | | **$417,275** |
| **Geotechnical Investigation** | | | **$7,500** |
| | | **Total Project Cost** | **$2,093,875** |
| | 1% | **City Portion** | **$20,939** |
| | 99% | **UW Portion** | **$2,072,936** |

**Whitewater TMDL Stormwater Plan**
**City of Whitewater, Wisconsin**
**ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST: PLANNING-LEVEL**
**Starin Road Underground Wet Detention Pond**

| ITEM NO. | DESCRIPTION | Quantity | Units | Unit Price | Total |
|---|---|---|---|---|---|
| | **BMP** | | | | |
| 1 | Mobilization (2.5% of Construction Cost) | 1 | LS | $35,200 | $35,200 |
| 2 | Construction Layout | 1 | LS | $2,500.00 | $2,500 |
| 3 | Clearing and Grubbing | 0.15 | ACRE | $8,000.00 | $1,200 |
| 4 | Traffic Control | 1 | LS | $2,500.00 | $2,500 |
| 5 | Dewatering | 1 | LS | $5,000.00 | $5,000 |
| 6 | Dust Control | 1 | EA | $500.00 | $500 |
| 7 | Stone Tracking Pad | 1 | EA | $2,900.00 | $2,900 |
| 8 | Inlet Protection | 2 | EA | $185.00 | $370 |
| 9 | Silt Fence | 490 | LF | $3.00 | $1,470 |
| 10 | Unclassified Excavation (Off-site Disposal) | 11,436 | CY | $25.00 | $285,891 |
| 11 | Unclassified Excavation (On-site Reuse) | 5,722 | CY | $7.00 | $40,056 |
| 12 | Units (8'-4" Stormtrap Unit + Delivery + Joint Tape + Joint Wrap) | 1 | LS | $769,479.00 | $769,479 |
| 13 | Install Units | 194 | EA | $250.00 | $48,500 |
| 14 | Backfill (Around and To Top of Unit) | 2,271 | CY | $35.00 | $79,485 |
| 15 | Backfill - Compacted Insitu (Over Unit to Ground With Reused Material) | 5,722 | CY | $7.00 | $40,056 |
| 16 | Sub Grade | 470 | CY | $35.00 | $16,450 |
| 17 | Liner | 1 | LS | $55,000.00 | $55,000 |
| 18 | 12" RCP | 40 | LF | $60.00 | $2,400 |
| 19 | 42" RCP | 40 | LF | $140.00 | $5,600 |
| 20 | Outlet Control Structure (6-FT DIA) | 1 | LS | $4,000.00 | $4,000 |
| 21 | Diversion Structure (8-FT DIA) | 1 | EA | $7,000.00 | $7,000 |
| 22 | Storm Sewer Manhole (6-FT DIA) | 1 | EA | $2,700.00 | $2,700 |
| 23 | 6-IN Salvaged Topsoil Placement 75% | 3,632 | SY | $2.50 | $9,079 |
| 24 | 6-IN Hauled-In Topsoil Placement 25% | 1,211 | SY | $5.00 | $6,053 |
| 25 | Erosion Control Mat - Class 2, Urban Type B | 4,842 | SY | $2.25 | $10,895 |
| 26 | Low Mow Seed Mix w/Natives (Area not restored with pavement) | 4,842 | SY | $1.75 | $8,474 |

| | | | |
|---|---|---|---|
| **Subtotal Project Cost** | | | **$1,442,800** |
| **Contingency and Technical Services Allowance (25%)** | | | **$360,700** |
| **Geotechnical Investigation** | | | **$7,500** |
| | | **Total Project Cost** | **$1,811,000** |
| 34% | | **City Portion** | **$622,924** |
| 66% | | **UW Portion** | **$1,188,076** |

**Whitewater TMDL Stormwater Plan**
**City of Whitewater, Wisconsin**
**ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST: PLANNING-LEVEL**
**Public Works Yard Hydrodynamic Device**

| ITEM NO. | DESCRIPTION | Quantity | Units | Unit Price | Total |
|---|---|---|---|---|---|
| | **BMP** | | | | |
| 1 | Mobilization (2.5% of Construction Cost) | 1 | LS | $800 | $800 |
| 2 | Construction Layout | 1 | LS | $1,500.00 | $1,500 |
| 3 | Clearing and Grubbing | 0.00 | ACRE | $8,000.00 | $0 |
| 4 | Traffic Control | 1 | LS | $0.00 | $0 |
| 5 | Dust Control | 1 | EA | $500.00 | $500 |
| 6 | Silt Fence | 100 | LF | $3.00 | $300 |
| 7 | Unclassified Excavation | 102 | CY | $35.00 | $3,575 |
| 8 | Stormceptor (STC-1200) | 1 | LS | $15,000.00 | $15,000 |
| 9 | Stormceptor (markup and installation-65% addition) | 0.65 | LS | $15,000.00 | $9,750 |
| 10 | Anti-Seep Collar | 1 | EA | $1,100.00 | $1,100 |
| 11 | Pipe Removal | 15 | LF | $22.00 | $330 |
| 12 | 12" RCP | 15 | LF | $60.00 | $900 |
| 13 | 6-IN Salvaged Topsoil Placement 75% | 19 | SY | $2.50 | $48 |
| 14 | 6-IN Hauled-In Topsoil Placement 25% | 6 | SY | $5.00 | $32 |
| 15 | Erosion Control Mat - Class 2, Urban Type B | 26 | SY | $2.25 | $58 |
| 16 | Low Mow Seed Mix w/Natives | 26 | SY | $1.75 | $45 |
| | | | | **Subtotal Project Cost** | **$33,900** |
| | | | | **Contingency and Technical Services Allowance (25%)** | **$8,475** |
| | | | | **Geotechnical Investigation** | **$2,500** |
| | | | | **Total Project Cost** | **$44,875** |

**Whitewater TMDL Stormwater Plan**
**City of Whitewater, Wisconsin**
**ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST: PLANNING-LEVEL**
**Armory Wet Detention Pond**

| ITEM NO. | DESCRIPTION | Quantity | Units | Unit Price | Total |
|---|---|---|---|---|---|
| | **BMP** | | | | |
| 1 | Clearing and Grubbing | 0.15 | ACRE | $8,000.00 | $1,200 |
| 2 | Dewatering | 1 | LS | $5,000.00 | $5,000 |
| 3 | Dust Control | 1 | EA | $500.00 | $500 |
| 4 | Stone Tracking Pad | 1 | EA | $2,900.00 | $2,900 |
| 5 | Inlet Protection | 6 | EA | $185.00 | $1,110 |
| 6 | Silt Fence | 1,021 | LF | $3.00 | $3,063 |
| 7 | Unclassified Excavation | 15,211 | CY | $10.00 | $152,110 |
| 8 | Clay Liner | 2,686 | CY | $15.00 | $40,295 |
| 9 | Clay Bedding Dike | 1 | EA | $450.00 | $450 |
| 10 | 24" RCP | 303 | LF | $80.00 | $24,240 |
| 11 | 36" RCP | 533 | LF | $112.00 | $59,696 |
| 12 | 24" RCP Apron Endwall with Grate and Cutoff Wall | 1 | EA | $2,850.00 | $2,850 |
| 13 | 36" RCP Apron Endwall with Grate and Cutoff Wall | 1 | EA | $3,700.00 | $3,700 |
| 14 | Outlet Control Structure (6-FT DIA) | 1 | LS | $4,000.00 | $4,000 |
| 15 | Diversion Structure (8-FT DIA) | 2 | EA | $7,000.00 | $14,000 |
| 16 | Storm Sewer Manhole (4-FT DIA) | 4 | EA | $2,700.00 | $10,800 |
| 17 | Rip Rap (Incoming Pipe, Outgoing Pipe, Outfall) | 22 | SY | $60.00 | $1,333 |
| 18 | 6-IN Salvaged Topsoil Placement 75% | 6,398 | SY | $2.50 | $15,995 |
| 19 | 6-IN Hauled-In Topsoil Placement 25% | 2,133 | SY | $5.00 | $10,663 |
| 20 | Erosion Control Mat - Class 2, Urban Type B | 8,531 | SY | $2.25 | $19,194 |
| 21 | Turf Reinforcement Mat System of Spillway (30 feet W x 30 feet L) | 100 | SY | $19.00 | $1,900 |
| 22 | Wet Edge Seed Mix (Elevation 805 to 807) | 590 | SY | $2.75 | $1,624 |
| 23 | Low Mow Seed Mix w/Natives (807 to Limits of Disturbance) | 7,940 | SY | $1.75 | $13,895 |

| | |
|---|---|
| **Subtotal Project Cost** | **$390,500** |
| **Contingency and Technical Services Allowance (25%)** | **$97,625** |
| **Geotechnical Investigation** | **$5,000** |
| **Total Project Cost** | **$493,125** |

| | |
|---|---|
| **grant amount** | **$416,500** |
| difference | $76,625 |

**Whitewater TMDL Stormwater Plan**
**City of Whitewater, Wisconsin**
**ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST: PLANNING-LEVEL**
**HUSCO Dry to Wet Detention Pond**

| ITEM NO. | DESCRIPTION | Quantity | Units | Unit Price | Total |
|---|---|---|---|---|---|
| | **BMP** | | | | |
| 1 | Mobilization (2.5% of Construction Cost) | 1 | LS | $8,500 | $8,500 |
| 2 | Construction Layout | 1 | LS | $2,500.00 | $2,500 |
| 3 | Clearing and Grubbing | 0.15 | ACRE | $8,000.00 | $1,200 |
| 4 | Traffic Control | 1 | LS | $2,500.00 | $2,500 |
| 5 | Dewatering | 1 | LS | $5,000.00 | $5,000 |
| 6 | Dust Control | 1 | EA | $500.00 | $500 |
| 7 | Stone Tracking Pad | 1 | EA | $2,900.00 | $2,900 |
| 8 | Stone Weeper at Outfall | 1 | EA | $225.00 | $225 |
| 9 | Silt Fence | 550 | LF | $3.00 | $1,650 |
| 10 | Unclassified Excavation | 7,484 | CY | $25.00 | $187,100 |
| 11 | Clay Liner | 2,402 | CY | $23.50 | $56,447 |
| 12 | Clay Bedding Dike | 1 | EA | $450.00 | $450 |
| 13 | 18" RCP | 94 | LF | $70.00 | $6,580 |
| 14 | 18" RCP Apron Endwall with Grate and Cutoff Wall | 1 | EA | $2,500.00 | $2,500 |
| 15 | Outlet Control Structure (6-FT DIA) | 1 | LS | $4,000.00 | $4,000 |
| 16 | Rip Rap (Incoming Pipe, Outgoing Pipe, Outfall) | 11 | SY | $60.00 | $667 |
| 17 | 6-IN Salvaged Topsoil Placement 75% | 5,784 | SY | $2.50 | $14,461 |
| 18 | 6-IN Hauled-In Topsoil Placement 25% | 1,928 | SY | $5.00 | $9,641 |
| 19 | Erosion Control Mat - Class 2, Urban Type B | 7,712 | SY | $2.25 | $17,353 |
| 20 | Turf Reinforcement Mat System of Spillway (30 feet W x 30 feet L) | 100 | SY | $19.00 | $1,900 |
| 21 | Native Plugs at Water's Edge (2 per lf around pond perimeter) | 1,214 | EA | $7.00 | $8,501 |
| 22 | Wet Edge Seed Mix (Elevation 806.24 to 808.24) | 562 | SY | $2.75 | $1,546 |
| 23 | Low Mow Seed Mix w/Natives (808.24 to Limits of Disturbance) | 7,150 | SY | $1.75 | $12,513 |
| | | **Subtotal Project Cost** | | | **$348,600** |
| | | **Contingency and Technical Services Allowance (25%)** | | | **$87,150** |
| | | **Geotechnical Investigation** | | | **$7,500** |
| | | | | **Total Project Cost** | **$443,250** |

**Whitewater TMDL Stormwater Plan**
**City of Whitewater, Wisconsin**
**ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST: PLANNING-LEVEL**
**Universal Boulevard Wet Detention Pond**

| ITEM NO. | DESCRIPTION | Quantity | Units | Unit Price | Total |
|---|---|---|---|---|---|
| | **BMP** | | | | |
| 1 | Mobilization (2.5% of Construction Cost) | 1 | LS | $8,900 | $8,900 |
| 2 | Construction Layout | 1 | LS | $2,500.00 | $2,500 |
| 3 | Clearing and Grubbing | 0.15 | ACRE | $8,000.00 | $1,200 |
| 4 | Traffic Control | 1 | LS | $2,500.00 | $2,500 |
| 5 | Dewatering | 1 | LS | $5,000.00 | $5,000 |
| 6 | Dust Control | 1 | EA | $500.00 | $500 |
| 7 | Stone Tracking Pad | 1 | EA | $2,900.00 | $2,900 |
| 8 | Inlet Protection | 1 | EA | $185.00 | $185 |
| 9 | Silt Fence | 800 | LF | $3.00 | $2,400 |
| 10 | Unclassified Excavation | 6,494 | CY | $35.00 | $227,290 |
| 11 | Clay Liner | 1,139 | CY | $30.00 | $34,183 |
| 12 | Clay Bedding Dike | 1 | EA | $450.00 | $450 |
| 13 | 18" RCP | 51 | LF | $70.00 | $3,570 |
| 14 | 24" RCP | 45 | LF | $80.00 | $3,600 |
| 15 | 18" RCP Apron Endwall with Grate and Cutoff Wall | 1 | EA | $2,500.00 | $2,500 |
| 16 | Outlet Control Structure (6-FT DIA) | 1 | LS | $4,000.00 | $4,000 |
| 17 | Diversion Structure (8-FT DIA) | 1 | EA | $7,000.00 | $7,000 |
| 18 | Storm Sewer Manhole (5-FT DIA) | 1 | EA | $2,700.00 | $2,700 |
| 19 | Rip Rap (Incoming Pipe, Outgoing Pipe, Outfall) | 11 | SY | $60.00 | $667 |
| 20 | 6-IN Salvaged Topsoil Placement 75% | 4,693 | SY | $2.50 | $11,733 |
| 21 | 6-IN Hauled-In Topsoil Placement 25% | 1,564 | SY | $5.00 | $7,822 |
| 22 | Erosion Control Mat - Class 2, Urban Type B | 6,257 | SY | $2.25 | $14,079 |
| 23 | Turf Reinforcement Mat System of Spillway (30 feet W x 30 feet L) | 100 | SY | $19.00 | $1,900 |
| 24 | Native Plugs at Water's Edge (2 per lf around pond perimeter) | 980 | EA | $7.00 | $6,860 |
| 25 | Wet Edge Seed Mix (Elevation 809 to 811) | 458 | SY | $2.75 | $1,259 |
| 26 | Low Mow Seed Mix w/Natives (811 to Limits of Disturbance) | 5,800 | SY | $1.75 | $10,150 |
| | | **Subtotal Project Cost** | | | **$365,800** |
| | | **Contingency and Technical Services Allowance (25%)** | | | **$91,450** |
| | | **Geotechnical Investigation** | | | **$5,000** |
| | | | | **Total Project Cost** | **$462,250** |

**Whitewater TMDL Stormwater Plan**
**City of Whitewater, Wisconsin**
**ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST: PLANNING-LEVEL**
**Commercial Avenue Wet Detention Pond**

| ITEM NO. | DESCRIPTION | Quantity | Units | Unit Price | Total |
|---|---|---|---|---|---|
| | **BMP** | | | | |
| 1 | Mobilization (2.5% of Construction Cost) | 1 | LS | $10,200 | $10,200 |
| 2 | Construction Layout | 1 | LS | $2,500.00 | $2,500 |
| 3 | Clearing and Grubbing | 0.15 | ACRE | $8,000.00 | $1,200 |
| 4 | Traffic Control | 1 | LS | $2,500.00 | $2,500 |
| 5 | Dewatering | 1 | LS | $5,000.00 | $5,000 |
| 6 | Dust Control | 1 | EA | $500.00 | $500 |
| 7 | Stone Tracking Pad | 1 | EA | $2,900.00 | $2,900 |
| 8 | Inlet Protection | 1 | EA | $185.00 | $185 |
| 9 | Silt Fence | 630 | LF | $3.00 | $1,890 |
| 10 | Unclassified Excavation | 3,203 | CY | $30.00 | $96,075 |
| 11 | Rock Excavation | 3,203 | CY | $50.00 | $160,125 |
| 12 | Embankment Fill (Move and Recompact Excavated Material)) | 96 | CY | $5.00 | $478 |
| 13 | Clay Liner | 1,724 | CY | $27.00 | $46,552 |
| 14 | Clay Bedding Dike | 1 | EA | $450.00 | $450 |
| 15 | 18" RCP | 34 | LF | $70.00 | $2,380 |
| 16 | 36" RCP | 91 | LF | $115.00 | $10,465 |
| 17 | 36" RCP Apron Endwall with Grate and Cutoff Wall | 1 | EA | $3,700.00 | $3,700 |
| 18 | Outlet Control Structure (6-FT DIA) | 1 | LS | $4,000.00 | $4,000 |
| 19 | Diversion Structure (8-FT DIA) | 1 | EA | $7,000.00 | $7,000 |
| 20 | Storm Sewer Manhole (5-FT DIA) | 1 | EA | $2,700.00 | $2,700 |
| 21 | Rip Rap (Incoming Pipe, Outgoing Pipe, Outfall) | 11 | SY | $60.00 | $667 |
| 22 | 6-IN Salvaged Topsoil Placement 75% | 4,952 | SY | $2.50 | $12,380 |
| 23 | 6-IN Hauled-In Topsoil Placement 25% | 1,651 | SY | $5.00 | $8,253 |
| 24 | Erosion Control Mat - Class 2, Urban Type B | 6,603 | SY | $2.25 | $14,856 |
| 25 | Turf Reinforcement Mat System of Spillway (30 feet W x 30 feet L) | 100 | SY | $19.00 | $1,900 |
| 26 | Native Plugs at Water's Edge (2 per lf around pond perimeter) | 1,068 | EA | $7.00 | $7,476 |
| 27 | Wet Edge Seed Mix (Elevation 815 to 817) | 497 | SY | $2.75 | $1,366 |
| 28 | Low Mow Seed Mix w/Natives (817 to Limits of Disturbance) | 6,106 | SY | $1.75 | $10,685 |
| | | **Subtotal Project Cost** | | | **$418,400** |
| | | **Contingency and Technical Services Allowance (25%)** | | | **$104,600** |
| | | **Geotechnical Investigation** | | | **$5,000** |
| | | | | **Total Project Cost** | **$528,000** |

**Whitewater TMDL Stormwater Plan**
**City of Whitewater, Wisconsin**
**ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST: PLANNING-LEVEL**
**East Cravath Street Wet Detention Pond**

| ITEM NO. | DESCRIPTION | Quantity | Units | Unit Price | Total |
|---|---|---|---|---|---|
| | **BMP** | | | | |
| 1 | Mobilization (2.5% of Construction Cost) | 1 | LS | $9,500 | $9,500 |
| 2 | Construction Layout | 1 | LS | $2,500.00 | $2,500 |
| 3 | Clearing and Grubbing | 0.15 | ACRE | $8,000.00 | $1,200 |
| 4 | Traffic Control | 1 | LS | $2,500.00 | $2,500 |
| 5 | Dewatering | 1 | LS | $5,000.00 | $5,000 |
| 6 | Dust Control | 1 | EA | $500.00 | $500 |
| 7 | Stone Tracking Pad | 1 | EA | $2,900.00 | $2,900 |
| 8 | Inlet Protection | 3 | EA | $185.00 | $555 |
| 9 | Stone Weeper at Outfall | 1 | EA | $225.00 | $225 |
| 10 | Silt Fence | 600 | LF | $3.00 | $1,800 |
| 11 | Unclassified Excavation | 7,846 | CY | $25.00 | $196,147 |
| 12 | Clay Liner | 2,695 | CY | $23.50 | $63,344 |
| 13 | Clay Bedding Dike | 1 | EA | $450.00 | $450 |
| 14 | 24" RCP | 80 | LF | $70.00 | $5,600 |
| 15 | 36" RCP | 99 | LF | $115.00 | $11,385 |
| 16 | 24" RCP Apron Endwall with Grate and Cutoff Wall | 1 | EA | $2,500.00 | $2,500 |
| 17 | 36" RCP Apron Endwall with Grate and Cutoff Wall | 1 | EA | $3,700.00 | $3,700 |
| 18 | Outlet Control Structure (6-FT DIA) | 1 | LS | $4,000.00 | $4,000 |
| 19 | Diversion Structure (8-FT DIA) | 1 | EA | $7,000.00 | $7,000 |
| 20 | Rip Rap (Incoming Pipe, Outgoing Pipe, Outfall) | 22 | SY | $60.00 | $1,333 |
| 21 | 6-IN Salvaged Topsoil Placement 75% | 6,094 | SY | $2.50 | $15,236 |
| 22 | 6-IN Hauled-In Topsoil Placement 25% | 2,031 | SY | $5.00 | $10,157 |
| 23 | Erosion Control Mat - Class 2, Urban Type B | 8,126 | SY | $2.25 | $18,283 |
| 24 | Turf Reinforcement Mat System of Spillway (30 feet W x 30 feet L) | 100 | SY | $19.00 | $1,900 |
| 25 | Native Plugs at Water's Edge (2 per lf around pond perimeter) | 1,249 | EA | $7.00 | $8,744 |
| 26 | Wet Edge Seed Mix (Elevation 822 to 824) | 577 | SY | $2.75 | $1,586 |
| 27 | Low Mow Seed Mix w/Natives (825 to Limits of Disturbance) | 7,549 | SY | $1.75 | $13,211 |
| | | **Subtotal Project Cost** | | | **$391,300** |
| | | **Contingency and Technical Services Allowance (25%)** | | | **$97,825** |
| | | **Geotechnical Investigation** | | | **$7,500** |
| | | | | **Total Project Cost** | **$496,625** |

**Whitewater TMDL Stormwater Plan**
**City of Whitewater, Wisconsin**
**ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST: PLANNING-LEVEL**
**East Chicago Wet Detention Pond**

| ITEM NO. | DESCRIPTION | Quantity | Units | Unit Price | Total |
|---|---|---|---|---|---|
| | **BMP** | | | | |
| 1 | Mobilization (2.5% of Construction Cost) | 1 | LS | $4,200 | $4,200 |
| 2 | Construction Layout | 1 | LS | $2,500.00 | $2,500 |
| 3 | Clearing and Grubbing | 0.15 | ACRE | $8,000.00 | $1,200 |
| 4 | Traffic Control | 1 | LS | $2,500.00 | $2,500 |
| 5 | Dewatering | 1 | LS | $5,000.00 | $5,000 |
| 6 | Dust Control | 1 | EA | $500.00 | $500 |
| 7 | Stone Tracking Pad | 1 | EA | $2,900.00 | $2,900 |
| 8 | Inlet Protection | 2 | EA | $185.00 | $370 |
| 9 | Stone Weeper at Outfall | 1 | EA | $225.00 | $225 |
| 10 | Silt Fence | 500 | LF | $3.00 | $1,500 |
| 11 | Unclassified Excavation | 421 | CY | $35.00 | $14,727 |
| 12 | Rock Excavation | 421 | CY | $50.00 | $21,039 |
| 13 | Embankment Fill (Move and Recompact Excavated Material)) | 220 | CY | $5.00 | $1,098 |
| 14 | Clay Liner | 694 | CY | $30.00 | $20,807 |
| 15 | Clay Bedding Dike | 1 | EA | $450.00 | $450 |
| 16 | 12" RCP | 56 | LF | $60.00 | $3,360 |
| 17 | 24" RCP | 457 | LF | $80.00 | $36,560 |
| 18 | 12" RCP Apron Endwall with Grate and Cutoff Wall | 2 | EA | $2,000.00 | $4,000 |
| 19 | 24" RCP Apron Endwall with Grate and Cutoff Wall | 1 | EA | $2,850.00 | $2,850 |
| 20 | Outlet Control Structure (6-FT DIA) | 1 | LS | $4,000.00 | $4,000 |
| 21 | Diversion Structure (8-FT DIA) | 1 | EA | $7,000.00 | $7,000 |
| 22 | Storm Sewer Manhole (5-FT DIA) | 1 | EA | $2,700.00 | $2,700 |
| 23 | Rip Rap (Incoming Pipe, Outgoing Pipe, Outfall) | 33 | SY | $60.00 | $2,000 |
| 24 | 6-IN Salvaged Topsoil Placement 75% | 2,370 | SY | $2.50 | $5,924 |
| 25 | 6-IN Hauled-In Topsoil Placement 25% | 790 | SY | $5.00 | $3,950 |
| 26 | Erosion Control Mat - Class 2, Urban Type B | 3,160 | SY | $2.25 | $7,109 |
| 27 | Turf Reinforcement Mat System of Spillway (30 feet W x 30 feet L) | 100 | SY | $19.00 | $1,900 |
| 28 | Native Plugs at Water's Edge (2 per lf around pond perimeter) | 694 | EA | $7.00 | $4,858 |
| 29 | Wet Edge Seed Mix (Elevation 823 to 825) | 160 | SY | $2.75 | $439 |
| 30 | Low Mow Seed Mix w/Natives (825 to Limits of Disturbance) | 3,000 | SY | $1.75 | $5,250 |
| | | | | **Subtotal Project Cost** | **$170,900** |
| | | | | **Contingency and Technical Services Allowance (25%)** | **$42,725** |
| | | | | **Geotechnical Investigation** | **$5,000** |
| | | | | **Total Project Cost** | **$218,625** |

**Whitewater TMDL Stormwater Plan**
**City of Whitewater, Wisconsin**
**ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST: PLANNING-LEVEL**
**East Main Street Wet Detention Pond**

| ITEM NO. | DESCRIPTION | Quantity | Units | Unit Price | Total |
|---|---|---|---|---|---|
| | **BMP** | | | | |
| 1 | Mobilization (2.5% of Construction Cost) | 1 | LS | $10,400 | $10,400 |
| 2 | Construction Layout | 1 | LS | $2,500.00 | $2,500 |
| 3 | Clearing and Grubbing | 0.15 | ACRE | $8,000.00 | $1,200 |
| 4 | Traffic Control | 1 | LS | $2,500.00 | $2,500 |
| 5 | Dewatering | 1 | LS | $5,000.00 | $5,000 |
| 6 | Dust Control | 1 | EA | $500.00 | $500 |
| 7 | Stone Tracking Pad | 1 | EA | $2,900.00 | $2,900 |
| 8 | Stone Weeper at Outfall | 1 | EA | $225.00 | $225 |
| 9 | Silt Fence | 600 | LF | $3.00 | $1,800 |
| 10 | Unclassified Excavation | 2,549 | CY | $25.00 | $63,737 |
| 11 | Rock Excavation | 2,549 | CY | $50.00 | $127,474 |
| 12 | Embankment Fill (Move and Recompact Excavated Material)) | 1,298 | CY | $5.00 | $6,491 |
| 13 | Clay Liner | 2,435 | CY | $23.50 | $57,230 |
| 14 | Clay Bedding Dike | 1 | EA | $450.00 | $450 |
| 15 | 18" RCP | 73 | LF | $70.00 | $5,110 |
| 16 | 36" RCP | 337 | LF | $115.00 | $38,755 |
| 17 | 18" RCP Apron Endwall with Grate and Cutoff Wall | 1 | EA | $2,500.00 | $2,500 |
| 18 | 36" RCP Apron Endwall with Grate and Cutoff Wall | 1 | EA | $3,700.00 | $3,700 |
| 19 | Outlet Control Structure (6-FT DIA) | 1 | LS | $4,000.00 | $4,000 |
| 20 | Diversion Structure (8-FT DIA) | 1 | EA | $7,000.00 | $7,000 |
| 21 | Storm Sewer Manhole (5-FT DIA) | 1 | EA | $2,700.00 | $2,700 |
| 22 | Rip Rap (Incoming Pipe, Outgoing Pipe, Outfall) | 22 | SY | $60.00 | $1,333 |
| 23 | 6-IN Salvaged Topsoil Placement 75% | 6,970 | SY | $2.50 | $17,426 |
| 24 | 6-IN Hauled-In Topsoil Placement 25% | 2,323 | SY | $5.00 | $11,617 |
| 25 | Erosion Control Mat - Class 2, Urban Type B | 9,294 | SY | $2.25 | $20,911 |
| 26 | Turf Reinforcement Mat System of Spillway (30 feet W x 30 feet L) | 100 | SY | $19.00 | $1,900 |
| 27 | Native Plugs at Water's Edge (2 per lf around pond perimeter) | 1,259 | EA | $7.00 | $8,813 |
| 28 | Wet Edge Seed Mix (Elevation 823 to 825) | 582 | SY | $2.75 | $1,600 |
| 29 | Low Mow Seed Mix w/Natives (825 to Limits of Disturbance) | 8,712 | SY | $1.75 | $15,246 |
| | | | | **Subtotal Project Cost** | **$425,000** |
| | | | | **Contingency and Technical Services Allowance (25%)** | **$106,250** |
| | | | | **Geotechnical Investigation** | **$7,500** |
| | | | | **Total Project Cost** | **$538,750** |

**Whitewater TMDL Stormwater Plan**
**City of Whitewater, Wisconsin**
**ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST: PLANNING-LEVEL**
**Cravath Park Hydrodynamic Separator**

| ITEM NO. | DESCRIPTION | Quantity | Units | Unit Price | Total |
|---|---|---|---|---|---|
| | **BMP** | | | | |
| 1 | Mobilization (2.5% of Construction Cost) | 1 | LS | $900 | $900 |
| 2 | Construction Layout | 1 | LS | $1,500.00 | $1,500 |
| 3 | Clearing and Grubbing | 0.15 | ACRE | $8,000.00 | $1,200 |
| 4 | Traffic Control | 1 | LS | $1,500.00 | $1,500 |
| 5 | Dust Control | 1 | EA | $500.00 | $500 |
| 6 | Silt Fence | 100 | LF | $3.00 | $300 |
| 7 | Unclassified Excavation | 102 | CY | $35.00 | $3,575 |
| 8 | Stormceptor (STC-1200) | 1 | LS | $15,000.00 | $15,000 |
| 9 | Stormceptor (markup and installation-65% addition) | 0.65 | LS | $15,000.00 | $9,750 |
| 10 | Anti-Seep Collar | 1 | EA | $1,100.00 | $1,100 |
| 11 | Pipe Removal | 15 | LF | $22.00 | $330 |
| 12 | 12" RCP | 15 | LF | $60.00 | $900 |
| 13 | 6-IN Salvaged Topsoil Placement 75% | 19 | SY | $2.50 | $48 |
| 14 | 6-IN Hauled-In Topsoil Placement 25% | 6 | SY | $5.00 | $32 |
| 15 | Erosion Control Mat - Class 2, Urban Type B | 26 | SY | $2.25 | $58 |
| 16 | Low Mow Seed Mix w/Natives | 26 | SY | $1.75 | $45 |
| | | **Subtotal Project Cost** | | | **$36,700** |
| | | **Contingency and Technical Services Allowance (25%)** | | | **$9,175** |
| | | **Geotechnical Investigation** | | | **$2,500** |
| | | | | **Total Project Cost** | **$48,375** |

**Whitewater TMDL Stormwater Plan**
**City of Whitewater, Wisconsin**
**ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST: PLANNING-LEVEL**
**South Wisconsin Street Hydrodynamic Separator**

| ITEM NO. | DESCRIPTION | Quantity | Units | Unit Price | Total |
|---|---|---|---|---|---|
| | **BMP** | | | | |
| 1 | Mobilization (2.5% of Construction Cost) | 1 | LS | $900 | $900 |
| 2 | Construction Layout | 1 | LS | $1,500.00 | $1,500 |
| 3 | Clearing and Grubbing | 0.15 | ACRE | $8,000.00 | $1,200 |
| 4 | Traffic Control | 1 | LS | $1,500.00 | $1,500 |
| 5 | Dust Control | 1 | EA | $500.00 | $500 |
| 6 | Silt Fence | 100 | LF | $3.00 | $300 |
| 7 | Unclassified Excavation | 102 | CY | $35.00 | $3,575 |
| 8 | Stormceptor (STC-1200) | 1 | LS | $15,000.00 | $15,000 |
| 9 | Stormceptor (markup and installation-65% addition) | 0.65 | LS | $15,000.00 | $9,750 |
| 10 | Anti-Seep Collar | 1 | EA | $1,100.00 | $1,100 |
| 11 | Pipe Removal | 15 | LF | $22.00 | $330 |
| 12 | 15" RCP | 15 | LF | $65.00 | $975 |
| 13 | Asphalt Removal | 26 | SY | $6.00 | $154 |
| 14 | Asphalt Sawcut | 46 | LF | $4.00 | $184 |
| 15 | Asphalt | 6 | TON | $220.00 | $1,320 |
| 16 | Basecourse (Assume 12") | 17 | TON | $22.00 | $374 |
| | | **Subtotal Project Cost** | | | **$38,700** |
| | | **Contingency and Technical Services Allowance (25%)** | | | **$9,675** |
| | | **Geotechnical Investigation** | | | **$2,500** |
| | | | | **Total Project Cost** | **$50,875** |

**Whitewater TMDL Stormwater Plan**
**City of Whitewater, Wisconsin**
**ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST: PLANNING-LEVEL**
**East Milwaukee Street Hydrodynamic Separator**

| ITEM NO. | DESCRIPTION | Quantity | Units | Unit Price | Total |
|---|---|---|---|---|---|
| | **BMP** | | | | |
| 1 | Mobilization (2.5% of Construction Cost) | 1 | LS | $1,500 | $1,500 |
| 2 | Construction Layout | 1 | LS | $1,500.00 | $1,500 |
| 3 | Clearing and Grubbing | 0.15 | ACRE | $8,000.00 | $1,200 |
| 4 | Traffic Control | 1 | LS | $1,500.00 | $1,500 |
| 5 | Dust Control | 1 | EA | $500.00 | $500 |
| 6 | Silt Fence | 100 | LF | $3.00 | $300 |
| 7 | Unclassified Excavation | 210 | CY | $35.00 | $7,365 |
| 8 | Stormceptor (STC-4800) | 1 | LS | $27,500.00 | $27,500 |
| 9 | Stormceptor (markup and installation-65% addition) | 0.65 | LS | $27,500.00 | $17,875 |
| 10 | Anti-Seep Collar | 1 | EA | $1,100.00 | $1,100 |
| 11 | Pipe Removal | 15 | LF | $22.00 | $330 |
| 12 | 24" RCP | 15 | LF | $80.00 | $1,200 |
| 13 | 6-IN Salvaged Topsoil Placement 75% | 28 | SY | $2.50 | $71 |
| 14 | 6-IN Hauled-In Topsoil Placement 25% | 9 | SY | $5.00 | $47 |
| 15 | Erosion Control Mat - Class 2, Urban Type B | 38 | SY | $2.25 | $85 |
| 16 | Low Mow Seed Mix w/Natives | 38 | SY | $1.75 | $66 |
| | | **Subtotal Project Cost** | | | **$62,100** |
| | | **Contingency and Technical Services Allowance (25%)** | | | **$15,525** |
| | | **Geotechnical Investigation** | | | **$2,500** |
| | | | | **Total Project Cost** | **$80,125** |

**Whitewater TMDL Stormwater Plan**
**City of Whitewater, Wisconsin**
**ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST: PLANNING-LEVEL**
**East Main Street Hydrodynamic Separator**

| ITEM NO. | DESCRIPTION | Quantity | Units | Unit Price | Total |
|---|---|---|---|---|---|
| | **BMP** | | | | |
| 1 | Mobilization (2.5% of Construction Cost) | 1 | LS | $2,700 | $2,700 |
| 2 | Construction Layout | 1 | LS | $1,500.00 | $1,500 |
| 3 | Clearing and Grubbing | 0.15 | ACRE | $8,000.00 | $1,200 |
| 4 | Traffic Control | 1 | LS | $1,500.00 | $1,500 |
| 5 | Dust Control | 1 | EA | $500.00 | $500 |
| 6 | Silt Fence | 100 | LF | $3.00 | $300 |
| 7 | Unclassified Excavation | 468 | CY | $35.00 | $16,390 |
| 8 | Stormceptor (STC-11000) | 1 | LS | $47,500.00 | $47,500 |
| 9 | Stormceptor (markup and installation-65% addition) | 0.65 | LS | $47,500.00 | $30,875 |
| 10 | Anti-Seep Collar | 1 | EA | $1,100.00 | $1,100 |
| 11 | Pipe Removal | 15 | LF | $22.00 | $330 |
| 12 | 24" RCP | 15 | LF | $80.00 | $1,200 |
| 13 | Pavement Removal | 83 | SY | $6.00 | $501 |
| 14 | Sawcut | 150 | LF | $4.00 | $601 |
| 15 | Concrete Restoration | 83 | SY | $60.00 | $5,007 |
| | | | | **Subtotal Project Cost** | **$111,200** |
| | | | | **Contingency and Technical Services Allowance (25%)** | **$27,800** |
| | | | | **Geotechnical Investigation** | **$2,500** |
| | | | | **Total Project Cost** | **$141,500** |

**Whitewater TMDL Stormwater Plan**
**City of Whitewater, Wisconsin**
**ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST: PLANNING-LEVEL**
**East North Street Hydrodynamic Separator**

| ITEM NO. | DESCRIPTION | Quantity | Units | Unit Price | Total |
|---|---|---|---|---|---|
| | **BMP** | | | | |
| 1 | Mobilization (2.5% of Construction Cost) | 1 | LS | $1,200 | $1,200 |
| 2 | Construction Layout | 1 | LS | $1,500.00 | $1,500 |
| 3 | Clearing and Grubbing | 0.15 | ACRE | $8,000.00 | $1,200 |
| 4 | Traffic Control | 1 | LS | $1,500.00 | $1,500 |
| 5 | Dust Control | 1 | EA | $500.00 | $500 |
| 6 | Silt Fence | 100 | LF | $3.00 | $300 |
| 7 | Unclassified Excavation | 141 | CY | $35.00 | $4,951 |
| 8 | Stormceptor (STC-2400) | 1 | LS | $19,500.00 | $19,500 |
| 9 | Stormceptor (markup and installation-65% addition) | 0.65 | LS | $19,500.00 | $12,675 |
| 10 | Anti-Seep Collar | 1 | EA | $1,100.00 | $1,100 |
| 11 | Pipe Removal | 15 | LF | $22.00 | $330 |
| 12 | 21" RCP | 15 | LF | $75.00 | $1,125 |
| 13 | Pavement Removal | 31 | SY | $6.00 | $184 |
| 14 | Sawcut | 150 | LF | $4.00 | $601 |
| 15 | Concrete Restoration | 31 | SY | $60.00 | $1,841 |
| | | | | **Subtotal Project Cost** | **$48,500** |
| | | | | **Contingency and Technical Services Allowance (25%)** | **$12,125** |
| | | | | **Geotechnical Investigation** | **$2,500** |
| | | | | **Total Project Cost** | **$63,125** |

**Whitewater TMDL Stormwater Plan**
**City of Whitewater, Wisconsin**
**ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST: PLANNING-LEVEL**
**West Main Street Hydrodynamic Separator**

| ITEM NO. | DESCRIPTION | Quantity | Units | Unit Price | Total |
|---|---|---|---|---|---|
| | **BMP** | | | | |
| 1 | Mobilization (2.5% of Construction Cost) | 1 | LS | $1,600 | $1,600 |
| 2 | Construction Layout | 1 | LS | $1,500.00 | $1,500 |
| 3 | Clearing and Grubbing | 0.15 | ACRE | $8,000.00 | $1,200 |
| 4 | Traffic Control | 1 | LS | $1,500.00 | $1,500 |
| 5 | Dust Control | 1 | EA | $500.00 | $500 |
| 6 | Silt Fence | 100 | LF | $3.00 | $300 |
| 7 | Unclassified Excavation | 210 | CY | $35.00 | $7,365 |
| 8 | Stormceptor (STC-4800) | 1 | LS | $27,500.00 | $27,500 |
| 9 | Stormceptor (markup and installation-65% addition) | 0.65 | LS | $27,500.00 | $17,875 |
| 10 | Anti-Seep Collar | 1 | EA | $1,100.00 | $1,100 |
| 11 | Pipe Removal | 15 | LF | $22.00 | $330 |
| 12 | 18" RCP | 15 | LF | $70.00 | $1,050 |
| 13 | Pavement Removal | 38 | SY | $6.00 | $227 |
| 14 | Sawcut | 8 | LF | $4.00 | $30 |
| 15 | Concrete Restoration | 38 | SY | $60.00 | $2,273 |
| | | | | **Subtotal Project Cost** | **$64,300** |
| | | | | **Contingency and Technical Services Allowance (25%)** | **$16,075** |
| | | | | **Geotechnical Investigation** | **$2,500** |
| | | | | **Total Project Cost** | **$82,875** |

**Whitewater TMDL Stormwater Plan**
**City of Whitewater, Wisconsin**
**ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST: PLANNING-LEVEL**
**West North Street Underground Wet Detention Pond**

| ITEM NO. | DESCRIPTION | Quantity | Units | Unit Price | Total |
|---|---|---|---|---|---|
| | **BMP** | | | | |
| 1 | Mobilization (2.5% of Construction Cost) | 1 | LS | $43,200 | $43,200 |
| 2 | Construction Layout | 1 | LS | $1,500.00 | $1,500 |
| 3 | Clearing and Grubbing | 0.15 | ACRE | $8,000.00 | $1,200 |
| 4 | Traffic Control | 1 | LS | $1,500.00 | $1,500 |
| 5 | Dewatering | 1 | LS | $5,000.00 | $5,000 |
| 6 | Dust Control | 1 | EA | $500.00 | $500 |
| 7 | Stone Tracking Pad | 1 | EA | $2,900.00 | $2,900 |
| 8 | Inlet Protection | 2 | EA | $185.00 | $370 |
| 9 | Silt Fence | 490 | LF | $3.00 | $1,470 |
| 10 | Unclassified Excavation (Off-site Disposal) | 11,715 | CY | $30.00 | $351,453 |
| 11 | Unclassified Excavation (On-site Reuse) | 3,191 | CY | $7.00 | $22,336 |
| 12 | Units (8'-6" Stormtrap Unit + Delivery + Joint Tape + Joint Wrap) | 1 | LS | $737,961.50 | $737,962 |
| 13 | Install Units | 181 | EA | $250.00 | $45,250 |
| 14 | Backfill (Around and To Top of Unit) | 1,791 | CY | $35.00 | $62,680 |
| 15 | Backfill - Compacted Insitu (Over Unit to Ground With Reused Material) | 3,191 | CY | $7.00 | $22,336 |
| 16 | Sub Grade | 542 | CY | $35.00 | $18,970 |
| 17 | Liner | 1 | LS | $150,000.00 | $150,000 |
| 18 | 18" RCP | 62 | LF | $70.00 | $4,340 |
| 19 | 24" RCP | 68 | LF | $80.00 | $5,440 |
| 20 | Outlet Control Structure (6-FT DIA) | 1 | LS | $4,000.00 | $4,000 |
| 21 | Diversion Structure (8-FT DIA) | 1 | EA | $7,000.00 | $7,000 |
| 22 | Storm Sewer Manhole (6-FT DIA) | 2 | EA | $2,700.00 | $5,400 |
| 23 | Asphalt Removal | 3,112 | SY | $6.00 | $18,669 |
| 24 | Sawcut | 622 | LF | $4.00 | $2,489 |
| 25 | Asphalt | 747 | TON | $220.00 | $164,290 |
| 26 | Basecourse (assume 12") | 2,074 | TON | $22.00 | $45,636 |
| 27 | Curb and Gutter Removal | 1,041 | LF | $6.00 | $6,246 |
| 28 | Curb and Gutter Restoration, 24-inch | 1,041 | LF | $30.00 | $31,230 |
| 29 | Sidewalk Removal | 37 | SY | $3.00 | $110 |
| 30 | Sidewalk Restoration | 37 | SY | $55.00 | $2,009 |
| 31 | 6-IN Salvaged Topsoil Placement 75% | 734 | SY | $2.50 | $1,836 |
| 32 | 6-IN Hauled-In Topsoil Placement 25% | 245 | SY | $5.00 | $1,224 |
| 33 | Erosion Control Mat - Class 2, Urban Type B | 979 | SY | $2.25 | $2,203 |
| 34 | Low Mow Seed Mix w/Natives (Area not restored with pavement) | 979 | SY | $1.75 | $1,713 |

| | | | |
|---|---|---|---|
| **Subtotal Project Cost** | | | **$1,772,500** |
| **Contingency and Technical Services Allowance (25%)** | | | **$443,125** |
| **Geotechnical Investigation** | | | **$6,000** |
| | | **Total Project Cost** | **$2,221,625** |
| | 75% | **City Portion** | **$1,677,190** |
| | 25% | **UW Portion** | **$544,435** |

**Whitewater TMDL Stormwater Plan**
**City of Whitewater, Wisconsin**
**ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST: PLANNING-LEVEL**
**South Janesville Street Hydrodynamic Separator**

| ITEM NO. | DESCRIPTION | Quantity | Units | Unit Price | Total |
|---|---|---|---|---|---|
| | **BMP** | | | | |
| 1 | Mobilization (2.5% of Construction Cost) | 1 | LS | $1,600 | $1,600 |
| 2 | Construction Layout | 1 | LS | $1,500.00 | $1,500 |
| 3 | Clearing and Grubbing | 0.15 | ACRE | $8,000.00 | $1,200 |
| 4 | Traffic Control | 1 | LS | $1,500.00 | $1,500 |
| 5 | Dust Control | 1 | EA | $500.00 | $500 |
| 6 | Silt Fence | 100 | LF | $3.00 | $300 |
| 7 | Unclassified Excavation | 210 | CY | $35.00 | $7,365 |
| 8 | Stormceptor (STC-4800) | 1 | LS | $27,500.00 | $27,500 |
| 9 | Stormceptor (markup and installation-65% addition) | 0.65 | LS | $27,500.00 | $17,875 |
| 10 | Anti-Seep Collar | 1 | EA | $1,100.00 | $1,100 |
| 11 | Pipe Removal | 15 | LF | $22.00 | $330 |
| 12 | 21" RCP | 15 | LF | $75.00 | $1,125 |
| 13 | Pavement Removal | 38 | SY | $6.00 | $227 |
| 14 | Sawcut | 8 | LF | $4.00 | $30 |
| 15 | Concrete Restoration | 38 | SY | $60.00 | $2,273 |
| | | | | **Subtotal Project Cost** | **$64,400** |
| | | | | **Contingency and Technical Services Allowance (25%)** | **$16,100** |
| | | | | **Geotechnical Investigation** | **$2,500** |
| | | | | **Total Project Cost** | **$83,000** |

**Whitewater TMDL Stormwater Plan**
**City of Whitewater, Wisconsin**
**ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST: PLANNING-LEVEL**
**West Caine Street Wet Detention Pond**

| ITEM NO. | DESCRIPTION | Quantity | Units | Unit Price | Total |
|---|---|---|---|---|---|
| | **BMP** | | | | |
| 1 | Mobilization (2.5% of Construction Cost) | 1 | LS | $9,700 | $9,700 |
| 2 | Construction Layout | 1 | LS | $2,500.00 | $2,500 |
| 3 | Clearing and Grubbing | 0.15 | ACRE | $8,000.00 | $1,200 |
| 4 | Traffic Control | 1 | LS | $2,500.00 | $2,500 |
| 5 | Dewatering | 1 | LS | $5,000.00 | $5,000 |
| 6 | Dust Control | 1 | EA | $500.00 | $500 |
| 7 | Stone Tracking Pad | 1 | EA | $2,900.00 | $2,900 |
| 8 | Inlet Protection | 2 | EA | $185.00 | $370 |
| 9 | Silt Fence | 490 | LF | $3.00 | $1,470 |
| 10 | Unclassified Excavation | 8,385 | CY | $30.00 | $251,550 |
| 11 | Clay Liner | 1,445 | CY | $27.00 | $39,011 |
| 12 | Clay Bedding Dike | 1 | EA | $450.00 | $450 |
| 13 | 18" RCP | 84 | LF | $70.00 | $5,880 |
| 14 | 24" RCP | 85 | LF | $80.00 | $6,800 |
| 15 | 18" RCP Apron Endwall with Grate and Cutoff Wall | 1 | EA | $2,500.00 | $2,500 |
| 16 | Outlet Control Structure (6-FT DIA) | 1 | LS | $4,000.00 | $4,000 |
| 17 | Diversion Structure (8-FT DIA) | 1 | EA | $7,000.00 | $7,000 |
| 18 | Storm Sewer Manhole (5-FT DIA) | 1 | EA | $2,700.00 | $2,700 |
| 19 | Rip Rap (Incoming Pipe, Outgoing Pipe, Outfall) | 11 | SY | $60.00 | $667 |
| 20 | 6-IN Salvaged Topsoil Placement 75% | 4,378 | SY | $2.50 | $10,944 |
| 21 | 6-IN Hauled-In Topsoil Placement 25% | 1,459 | SY | $5.00 | $7,296 |
| 22 | Erosion Control Mat - Class 2, Urban Type B | 5,837 | SY | $2.25 | $13,133 |
| 23 | Turf Reinforcement Mat System of Spillway (30 feet W x 30 feet L) | 100 | SY | $19.00 | $1,900 |
| 24 | Native Plugs at Water's Edge (2 per lf around pond perimeter) | 900 | EA | $7.00 | $6,300 |
| 25 | Wet Edge Seed Mix (Elevation 813.8 to 815.8) | 889 | SY | $2.75 | $2,444 |
| 26 | Low Mow Seed Mix w/Natives (813.8 to Limits of Disturbance) | 4,948 | SY | $1.75 | $8,659 |
| | | **Subtotal Project Cost** | | | **$397,400** |
| | | **Contingency and Technical Services Allowance (25%)** | | | **$99,350** |
| | | **Geotechnical Investigation** | | | **$5,000** |
| | | | | **Total Project Cost** | **$501,750** |

**Whitewater TMDL Stormwater Plan**
**City of Whitewater, Wisconsin**
**ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST: PLANNING-LEVEL**
**West South Street Small Wet Detention Pond**

| ITEM NO. | DESCRIPTION | Quantity | Units | Unit Price | Total |
|---|---|---|---|---|---|
| | **BMP** | | | | |
| 1 | Clearing and Grubbing | 0.15 | ACRE | $8,000.00 | $1,200 |
| 2 | Dewatering | 1 | LS | $3,000.00 | $3,000 |
| 3 | Stone Tracking Pad | 1 | EA | $2,900.00 | $2,900 |
| 4 | Stone Weeper at Outfall | 1 | EA | $225.00 | $225 |
| 5 | Silt Fence | 600 | LF | $3.00 | $1,800 |
| 6 | Unclassified Excavation | 4,216 | CY | $20.00 | $84,320 |
| 7 | Embankment Fill (Move and Recompact Excavated Material)) | 1,186 | CY | $5.00 | $5,928 |
| 8 | Clay Liner | 1,470 | CY | $25.00 | $36,742 |
| 9 | Clay Bedding Dike | 1 | EA | $450.00 | $450 |
| 10 | 12" RCP | 60 | LF | $70.00 | $4,200 |
| 11 | 24" RCP | 70 | LF | $115.00 | $8,050 |
| 12 | 12" RCP Apron Endwall with Grate and Cutoff Wall | 1 | EA | $2,500.00 | $2,500 |
| 13 | 24" RCP Apron Endwall with Grate and Cutoff Wall | 1 | EA | $3,700.00 | $3,700 |
| 14 | Outlet Control Structure (6-FT DIA) | 1 | LS | $4,000.00 | $4,000 |
| 15 | Diversion Structure (8-FT DIA) | 1 | EA | $7,000.00 | $7,000 |
| 16 | Storm Sewer Manhole (5-FT DIA) | 1 | EA | $2,700.00 | $2,700 |
| 17 | Rip Rap (Incoming Pipe, Outgoing Pipe, Outfall) | 33 | SY | $60.00 | $2,000 |
| 18 | 6-IN Salvaged Topsoil Placement 75% | 4,250 | SY | $2.50 | $10,626 |
| 19 | 6-IN Hauled-In Topsoil Placement 25% | 1,417 | SY | $5.00 | $7,084 |
| 20 | Erosion Control Mat - Class 2, Urban Type B | 5,667 | SY | $2.25 | $12,751 |
| 21 | Turf Reinforcement Mat System of Spillway (30 feet W x 30 feet L) | 100 | SY | $19.00 | $1,900 |
| 22 | Wet Edge Seed Mix (Elevation 823 to 825) | 434 | SY | $2.75 | $1,193 |
| 23 | Low Mow Seed Mix w/Natives (825 to Limits of Disturbance) | 5,233 | SY | $1.75 | $9,158 |
| | | | | **Subtotal Project Cost** | **$213,400** |
| | | | | **Contingency and Technical Services Allowance (25%)** | **$53,350** |
| | | | | **Geotechnical Investigation** | **$5,000** |
| | | | | **Total Project Cost** | **$271,750** |

**Whitewater TMDL Stormwater Plan**
**City of Whitewater, Wisconsin**
**ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST: PLANNING-LEVEL**
**West South Street Large Wet Detention Pond**

| ITEM NO. | DESCRIPTION | Quantity | Units | Unit Price | Total |
|---|---|---|---|---|---|
| | **BMP** | | | | |
| 1 | Mobilization (2.5% of Construction Cost) | 1 | LS | $17,200 | $17,200 |
| 2 | Construction Layout | 1 | LS | $2,500.00 | $2,500 |
| 3 | Clearing and Grubbing | 0.15 | ACRE | $8,000.00 | $1,200 |
| 4 | Traffic Control | 1 | LS | $2,500.00 | $2,500 |
| 5 | Dewatering | 1 | LS | $5,000.00 | $5,000 |
| 6 | Dust Control | 1 | EA | $500.00 | $500 |
| 7 | Stone Tracking Pad | 1 | EA | $2,900.00 | $2,900 |
| 8 | Stone Weeper at Outfall | 1 | EA | $225.00 | $225 |
| 9 | Silt Fence | 600 | LF | $3.00 | $1,800 |
| 10 | Unclassified Excavation | 19,429 | CY | $20.00 | $388,585 |
| 11 | Embankment Fill (Move and Recompact Excavated Material)) | 3,825 | CY | $5.00 | $19,127 |
| 12 | Clay Liner | 5,744 | CY | $20.00 | $114,879 |
| 13 | Clay Bedding Dike | 1 | EA | $450.00 | $450 |
| 14 | 12" RCP | 66 | LF | $70.00 | $4,620 |
| 15 | 24" RCP | 70 | LF | $115.00 | $8,050 |
| 16 | 12" RCP Apron Endwall with Grate and Cutoff Wall | 1 | EA | $2,500.00 | $2,500 |
| 17 | 24" RCP Apron Endwall with Grate and Cutoff Wall | 1 | EA | $3,700.00 | $3,700 |
| 18 | Outlet Control Structure (6-FT DIA) | 1 | LS | $4,000.00 | $4,000 |
| 19 | Diversion Structure (8-FT DIA) | 1 | EA | $7,000.00 | $7,000 |
| 20 | Storm Sewer Manhole (5-FT DIA) | 1 | EA | $2,700.00 | $2,700 |
| 21 | Rip Rap (Incoming Pipe, Outgoing Pipe, Outfall) | 33 | SY | $60.00 | $2,000 |
| 22 | 6-IN Salvaged Topsoil Placement 75% | 9,736 | SY | $2.50 | $24,341 |
| 23 | 6-IN Hauled-In Topsoil Placement 25% | 3,245 | SY | $5.00 | $16,227 |
| 24 | Erosion Control Mat - Class 2, Urban Type B | 12,982 | SY | $2.25 | $29,209 |
| 25 | Turf Reinforcement Mat System of Spillway (30 feet W x 30 feet L) | 100 | SY | $19.00 | $1,900 |
| 26 | Native Plugs at Water's Edge (2 per lf around pond perimeter) | 2,744 | EA | $7.00 | $19,208 |
| 27 | Wet Edge Seed Mix (Elevation 823 to 825) | 1,242 | SY | $2.75 | $3,416 |
| 28 | Low Mow Seed Mix w/Natives (825 to Limits of Disturbance) | 11,740 | SY | $1.75 | $20,545 |
| | | **Subtotal Project Cost** | | | **$706,300** |
| | | **Contingency and Technical Services Allowance (25%)** | | | **$176,575** |
| | | **Geotechnical Investigation** | | | **$7,500** |
| | | | | **Total Project Cost** | **$890,375** |

**Whitewater TMDL Stormwater Plan**
**City of Whitewater, Wisconsin**
**ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST: PLANNING-LEVEL**
**East Bluff Road Wet Detention Pond**

| ITEM NO. | DESCRIPTION | Quantity | Units | Unit Price | Total |
|---|---|---|---|---|---|
| | **BMP** | | | | |
| 1 | Mobilization (2.5% of Construction Cost) | 1 | LS | $5,600 | $5,600 |
| 2 | Construction Layout | 1 | LS | $2,500.00 | $2,500 |
| 3 | Clearing and Grubbing | 0.15 | ACRE | $8,000.00 | $1,200 |
| 4 | Traffic Control | 1 | LS | $2,500.00 | $2,500 |
| 5 | Dewatering | 1 | LS | $5,000.00 | $5,000 |
| 6 | Dust Control | 1 | EA | $500.00 | $500 |
| 7 | Stone Tracking Pad | 1 | EA | $2,900.00 | $2,900 |
| 8 | Inlet Protection | 3 | EA | $185.00 | $555 |
| 9 | Stone Weeper at Outfall | 1 | EA | $225.00 | $225 |
| 10 | Silt Fence | 300 | LF | $3.00 | $900 |
| 11 | Unclassified Excavation | 3,031 | CY | $35.00 | $106,068 |
| 12 | Clay Liner | 1,092 | CY | $30.00 | $32,751 |
| 13 | Clay Bedding Dike | 1 | EA | $450.00 | $450 |
| 14 | 18" RCP | 51 | LF | $70.00 | $3,570 |
| 15 | 24" RCP | 51 | LF | $80.00 | $4,080 |
| 16 | 18" RCP Apron Endwall with Grate and Cutoff Wall | 1 | EA | $2,500.00 | $2,500 |
| 17 | 24" RCP Apron Endwall with Grate and Cutoff Wall | 1 | EA | $2,850.00 | $2,850 |
| 18 | Outlet Control Structure (6-FT DIA) | 1 | LS | $4,000.00 | $4,000 |
| 19 | Diversion Structure (8-FT DIA) | 2 | EA | $7,000.00 | $14,000 |
| 20 | Rip Rap (Incoming Pipe, Outgoing Pipe, Outfall) | 22 | SY | $60.00 | $1,333 |
| 21 | 6-IN Salvaged Topsoil Placement 75% | 3,151 | SY | $2.50 | $7,878 |
| 22 | 6-IN Hauled-In Topsoil Placement 25% | 1,050 | SY | $5.00 | $5,252 |
| 23 | Erosion Control Mat - Class 2, Urban Type B | 4,202 | SY | $2.25 | $9,454 |
| 24 | Turf Reinforcement Mat System of Spillway (30 feet W x 30 feet L) | 100 | SY | $19.00 | $1,900 |
| 25 | Native Plugs at Water's Edge (2 per lf around pond perimeter) | 810 | EA | $7.00 | $5,670 |
| 26 | Wet Edge Seed Mix (Elevation 828 to 830) | 283 | SY | $2.75 | $777 |
| 27 | Low Mow Seed Mix w/Natives (830 to Limits of Disturbance) | 3,919 | SY | $1.75 | $6,858 |
| | | **Subtotal Project Cost** | | | **$231,300** |
| | | **Contingency and Technical Services Allowance (25%)** | | | **$57,825** |
| | | **Geotechnical Investigation** | | | **$5,000** |
| | | | | **Total Project Cost** | **$294,125** |

**Whitewater TMDL Stormwater Plan**
**City of Whitewater, Wisconsin**
**ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST: PLANNING-LEVEL**
**Traffic-Calming Bioretention Bumpout**

| ITEM NO. | DESCRIPTION | Quantity | Units | Unit Price | Total |
|---|---|---|---|---|---|
| | **BMP** | | | | |
| 1 | Traffic-Calming Bioretention Bumpout (Single Intersection) | 1 | EA | $146,000 | $146,000 |
| | | | | **Subtotal Project Cost** | **$146,000** |
| | | | | **Contingency and Technical Services Allowance (25%)** | **$36,500** |
| | | | | **Geotechnical Investigation** | **$7,500** |
| | | | | **Total Project Cost** | **$190,000** |

**Whitewater TMDL Stormwater Plan**
**City of Whitewater, Wisconsin**
**ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST: PLANNING-LEVEL**

**Alt.1**

| ITEM NO. | DESCRIPTION | Quantity | Units | Unit Price | Total |
|---|---|---|---|---|---|
| | **City and UWW: Twice Per Month (Mechanical)** | | | | |
| 1 | Wages & Salaries/Permanent | 1 | LS | $20,056 | $20,056 |
| 2 | Fuel Expenses | 1 | LS | $2,886 | $2,886 |
| 3 | Equipement Parts/Supplies | 1 | LS | $7,215 | $7,215 |
| 4 | Depreciation Expense (Depreciation Ended in 2014) | 1 | LS | $0 | $0 |
| | **Total Annual Cost** | | | | $30,157 |

**Alt.2**

| ITEM NO. | DESCRIPTION | Quantity | Units | Unit Price | Total |
|---|---|---|---|---|---|
| | **City and UWW: Twice Per Month (Vacuum)** | | | | |
| 1 | Wages & Salaries/Permanent | 1 | LS | $20,056 | $20,056 |
| 2 | Fuel Expenses | 1 | LS | $2,886 | $2,886 |
| 3 | Equipement Parts/Supplies | 1 | LS | $7,215 | $7,215 |
| 4 | Additional Maintenance Expense for Vacuum Sweeper (20% Higher) | 1 | LS | $1,443 | $1,443 |
| | **Total Annual Cost** | | | | $31,600 |

**Existing Conditions**

| ITEM NO. | DESCRIPTION | Quantity | Units | Unit Price | Total |
|---|---|---|---|---|---|
| | **City: Twice Per Month; UWW: Twice Per Year (Mechanical)** | | | 2016 Budget | |
| 1 | Wages & Salaries/Permanent | 1 | LS | $19,457 | $19,457 |
| 2 | Fuel Expenses | 1 | LS | $2,800 | $2,800 |
| 3 | Equipement Parts/Supplies | 1 | LS | $7,000.00 | $7,000 |
| 4 | Depreciation Expense (Depreciation Ended in 2014) | 1 | LS | $0.00 | $0 |
| | **Total Annual Cost** | | | | $29,257 |

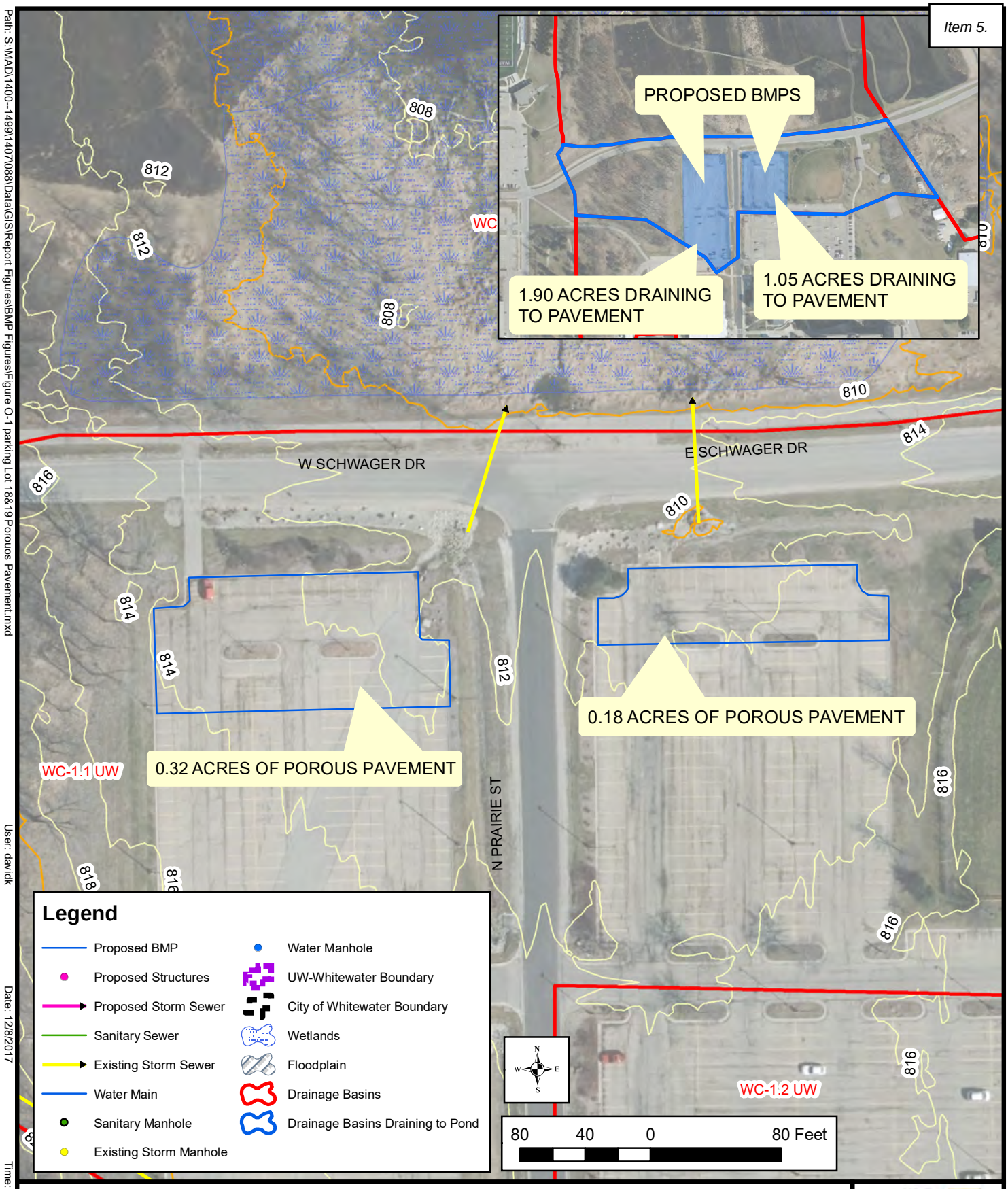
Note: City Stormwater Utility Budget Appears to Have Ended the Depreciation of the Existing Mechanical Sweeper in 2014. Assume replacement in 5 years

**Whitewater TMDL Stormwater Plan**
**City of Whitewater, Wisconsin**
**ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST: PLANNING-LEVEL**
**Chemical Treatment of Wet Ponds**

| ITEM NO. | DESCRIPTION | Quantity | Units | Unit Price | Total | Comments |
|---|---|---|---|---|---|---|
| **BMP** | | | | | | |
| | | | | | | |
| 1 | Chemical Treatment At Ann Street Wet Detention Basin | 78.8 | lb TP removed | $4,562 | $359,384 | 2017 Total Cost |
| 1 | Chemical Treatment At Ann Street Wet Detention Basin | 1,576 | lb TP removed | $591 | $931,056 | 20-Year NPW Cost |
| | | | | | | |
| 2 | Chemical Treatment At Innovation Center Wet Pond | 10.8 | lb TP removed | $4,562 | $49,359 | 2017 Total Cost |
| 2 | Chemical Treatment At Innovation Center Wet Pond | 216 | lb TP removed | $591 | $127,875 | 20-Year NPW Cost |

# APPENDIX O
# UWW ALTERNATIVE BMP FIGURES

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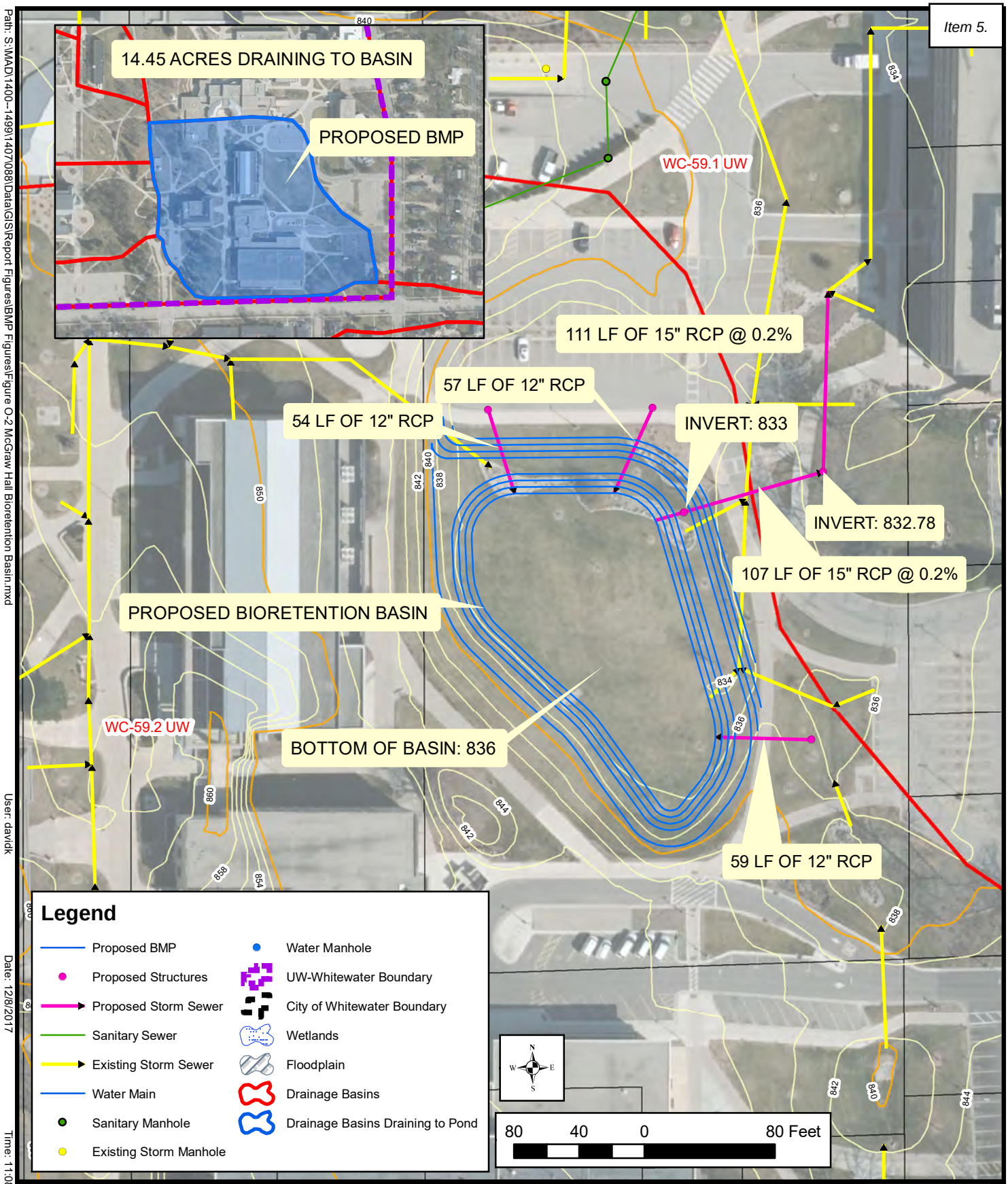

# PARKING LOT 18 & 19 POROUS PAVEMENT (WC-1.1 UW)

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

STRAND ASSOCIATES®

FIGURE 1407.08 409

Path: S:\MAD\1400–1499\1407\088\Data\GIS\Report Figures\BMP Figures\Figure O-2 McGraw Hall Bioretention Basin.mxd
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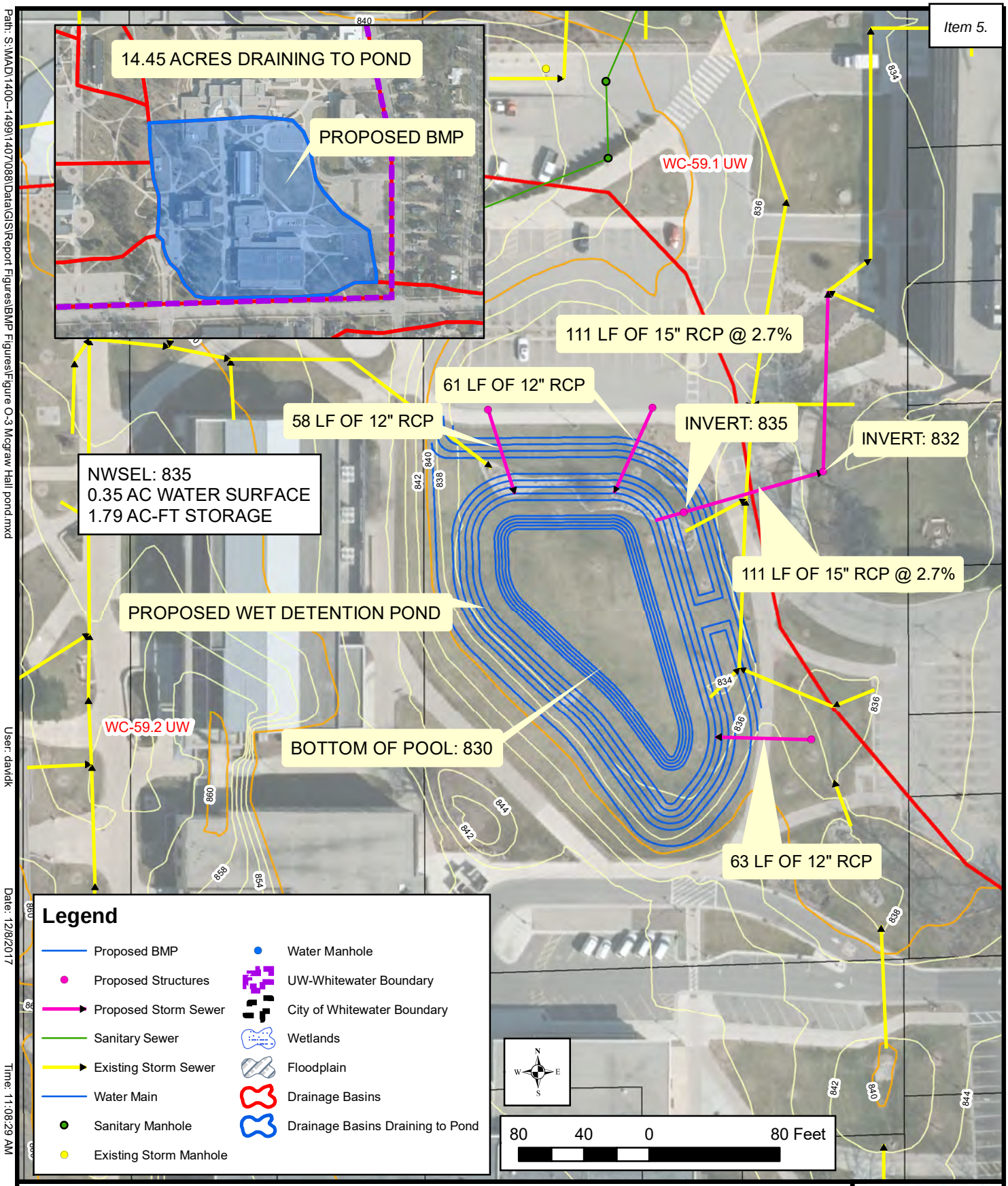



# MCGRAW HALL BIORETENTION BASIN (WC-59.2 UW)

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

STRAND ASSOCIATES®

FIGURE 1407.08 410




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Date: 12/8/2017

Time: 11:08:29 AM

# MCGRAW HALL WET DETENTION POND (WC-59.2 UW)

TMDL STORMWATER PLAN
CITY OF WHITEWATER
WALWORTH AND JEFFERSON COUNTIES

STRAND ASSOCIATES®

FIGURE 1407.08 411

# APPENDIX P
# UWW OPCCS

**Whitewater TMDL Stormwater Plan**
**City of Whitewater, Wisconsin**
**ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST: PLANNING-LEVEL**
**McGraw Hall Wet Detention Pond**

| ITEM NO. | DESCRIPTION | Quantity | Units | Unit Price | Total |
|---|---|---|---|---|---|
| | **BMP** | | | | |
| 1 | Mobilization (2.5% of Construction Cost) | 1 | LS | $6,600 | $6,600 |
| 2 | Construction Layout | 1 | LS | $2,500.00 | $2,500 |
| 3 | Clearing and Grubbing | 0.15 | ACRE | $8,000.00 | $1,200 |
| 4 | Traffic Control | 1 | LS | $2,500.00 | $2,500 |
| 5 | Dewatering | 1 | LS | $5,000.00 | $5,000 |
| 6 | Dust Control | 1 | EA | $500.00 | $500 |
| 7 | Stone Tracking Pad | 1 | EA | $2,900.00 | $2,900 |
| 8 | Inlet Protection | 3 | EA | $185.00 | $555 |
| 9 | Silt Fence | 744 | LF | $3.00 | $2,232 |
| 10 | Unclassified Excavation | 3,491 | CY | $30.00 | $104,730 |
| 11 | Embankment Fill (Move and Recompact Excavated Material)) | 8 | CY | $5.00 | $42 |
| 12 | Clay Liner | 1,581 | CY | $27.00 | $42,687 |
| 13 | Clay Bedding Dike | 1 | EA | $450.00 | $450 |
| 14 | 12" RCP | 182 | LF | $60.00 | $10,920 |
| 15 | 15" RCP | 222 | LF | $65.00 | $14,430 |
| 16 | 12" RCP Apron Endwall with Grate and Cutoff Wall | 1 | EA | $2,000.00 | $2,000 |
| 17 | 15" RCP Apron Endwall with Grate and Cutoff Wall | 1 | EA | $2,300.00 | $2,300 |
| 18 | 2'x3' Storm Sewer Inlet | 3 | EA | $2,000.00 | $6,000 |
| 19 | Outlet Control Structure (6-FT DIA) | 1 | LS | $4,000.00 | $4,000 |
| 20 | Storm Sewer Manhole (5-FT DIA) | 1 | EA | $2,700.00 | $2,700 |
| 21 | Rip Rap (Incoming Pipe, Outgoing Pipe, Outfall) | 33 | SY | $60.00 | $2,000 |
| 22 | 6-IN Salvaged Topsoil Placement 75% | 4,689 | SY | $2.50 | $11,723 |
| 23 | 6-IN Hauled-In Topsoil Placement 25% | 1,563 | SY | $5.00 | $7,815 |
| 24 | Erosion Control Mat - Class 2, Urban Type B | 6,252 | SY | $2.25 | $14,067 |
| 25 | Turf Reinforcement Mat System of Spillway (30 feet W x 30 feet L) | 100 | SY | $19.00 | $1,900 |
| 26 | Native Plugs at Water's Edge (2 per lf around pond perimeter) | 1,034 | EA | $7.00 | $7,238 |
| 27 | Wet Edge Seed Mix (Elevation 835 to 837) | 482 | SY | $2.75 | $1,326 |
| 28 | Low Mow Seed Mix w/Natives (837 to Limits of Disturbance) | 5,770 | SY | $1.75 | $10,098 |
| | | **Subtotal Project Cost** | | | **$270,400** |
| | | **Contingency and Technical Services Allowance (25%)** | | | **$67,600** |
| | | **Geotechnical Investigation** | | | **$5,000** |
| | | | | **Total Project Cost** | **$343,000** |

**Whitewater TMDL Stormwater Plan**
**City of Whitewater, Wisconsin**
**ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST: PLANNING-LEVEL**
**McGraw Hall Bioretention Basin**

| ITEM NO. | DESCRIPTION | Quantity | Units | Unit Price | Total |
|---|---|---|---|---|---|
| | **BMP** | | | | |
| 1 | Mobilization (2.5% of construction cost) | 1 | LS | $13,495.00 | $13,495 |
| 2 | Construction Layout | 1 | LS | $2,500.00 | $2,500 |
| 3 | Clearing and Grubbing | 1 | LS | $1,000.00 | $1,000 |
| 4 | Traffic Control | 1 | LS | $1,000.00 | $1,000 |
| 5 | Dewatering | 1 | LS | $2,500.00 | $2,500 |
| 6 | Dust Control | 1 | LS | $500.00 | $500 |
| 7 | Stone Tracking Pad | 1 | EA | $2,900.00 | $2,900 |
| 8 | Inlet Protection | 1 | EA | $185.00 | $185 |
| 9 | Stone Weeper at Outfall | 1 | EA | $225.00 | $225 |
| 10 | Silt Fence | 744 | LF | $3.00 | $2,232 |
| 11 | Unclassified Excavation | 1,923 | CY | $30.00 | $57,690 |
| 12 | Bioretention Section (Plugs, Mulch, Engineered Soil, No. 57 Stone, 6" Underdrain) | 15,065 | SF | $17.00 | $256,105 |
| 13 | Clay Bedding Dike | 1 | EA | $450.00 | $450 |
| 14 | 12" RCP | 170 | LF | $60.00 | $10,200 |
| 15 | 15" RCP | 218 | LF | $65.00 | $14,170 |
| 16 | Bioretention (engineered soil) | 1,674 | SY | $15.00 | $25,108 |
| 17 | Outlet Control Structure | 1 | LS | $4,000.00 | $4,000 |
| 18 | Storm Sewer Manhole | 1 | EA | $2,400.00 | $2,400 |
| 19 | Storm Sewer Inlet | 3 | EA | $2,000.00 | $6,000 |
| 20 | Rip Rap (3 inlets) | 33 | SY | $60.00 | $2,000 |
| 21 | 6-IN Salvaged Topsoil Placement 100% | 4,578 | SY | $2.50 | $11,445 |
| 22 | Erosion Control Mat - Class I, Urban Type A | 4,578 | SY | $1.25 | $5,723 |
| 23 | No Mow Seed Mix | 4,578 | SY | $1.75 | $8,012 |
| 24 | 3-Year Maintenance of Native Vegetation | 0.35 | AC | $23,000.00 | $7,954 |
| | | | | **Subtotal Project Cost** | **$437,800** |
| | | | | **Contingency and Technical Services Allowance (25%)** | **$109,450** |
| | | | | **Geotechnical Investigation** | **$7,500** |
| | | | | **Total Project Cost** | **$554,750** |

**Whitewater TMDL Stormwater Plan**
**City of Whitewater, Wisconsin**
**ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST: PLANNING-LEVEL**
**Parking Lots 18 and 19 Porous Pavement**

| ITEM NO. | DESCRIPTION | Quantity | Units | Unit Price | Total |
|---|---|---|---|---|---|
| | **BMP** | | | | |
| 1 | Mobilization (2.5% of Construction Cost) | 1 | LS | $8,300 | $8,300 |
| 2 | Construction Layout | 1 | LS | $2,500.00 | $2,500 |
| 3 | Traffic Control | 1 | LS | $2,500.00 | $2,500 |
| 4 | Dewatering | 1 | LS | $2,500.00 | $2,500 |
| 5 | Dust Control | 1 | LS | $500.00 | $500 |
| 6 | Stone Tracking Pad | 1 | EA | $2,900.00 | $2,900 |
| 7 | Inlet Protection | 3 | EA | $185.00 | $555 |
| 8 | Silt Fence | 100 | LF | $3.00 | $300 |
| 9 | Outlet Control Structure | 2 | EA | $2,500.00 | $5,000 |
| 10 | Unclassified Excavation | 1,192 | CY | $35.00 | $41,728 |
| 11 | Porous Concrete (6" Depth) | 2,384 | SY | $84.00 | $200,293 |
| 12 | Aggregate Storage Layer (12") | 795 | CY | $60.00 | $47,689 |
| 13 | Geotextile | 2,384 | SY | $3.50 | $8,346 |
| 14 | Underdrain | 716 | LF | $18.00 | $12,888 |
| 15 | Cleanout | 8 | EA | $360.00 | $2,880 |
| | | | | **Subtotal Project Cost** | **$338,900** |
| | | | | **Contingency and Technical Services Allowance (25%)** | **$84,725** |
| | | | | **Geotechnical Investigation** | **$7,500** |
| | | | | **Total Project Cost** | **$431,125** |

**Whitewater TMDL Stormwater Plan**
**City of Whitewater, Wisconsin**
**ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST: PLANNING-LEVEL**
**Traffic-Calming Bioretention Bumpout**

| ITEM NO. | DESCRIPTION | Quantity | Units | Unit Price | Total |
|---|---|---|---|---|---|
| | **BMP** | | | | |
| 1 | Traffic-Calming Bioretention Bumpout (Single Intersection) | 1 | EA | $146,000 | $146,000 |
| | | | | **Subtotal Project Cost** | **$146,000** |
| | | | | **Contingency and Technical Services Allowance (25%)** | **$36,500** |
| | | | | **Geotechnical Investigation** | **$7,500** |
| | | | | **Total Project Cost** | **$190,000** |

# APPENDIX Q
# ORDINANCE CHANGES AND SWU RATE ADJUSTMENTS

STRAND ASSOCIATES®

Strand Associates
910 West Wingra Drive
Madison, WI 53715
(P) 608-251-4843
(F) 608-251-8655

April 1, 2014

Mr. Cameron Clapper, City Manager
City of Whitewater
312 West Whitewater Street
Whitewater, WI 53190

Re: Stormwater Ordinance Revisions and Stormwater Utility Rate Adjustment

Dear Cameron,

Based on discussions during our January 29, 2014, stormwater management meeting, City of Whitewater (City) staff requested a summary of recommendations that pertain to potential stormwater ordinance revisions and potential stormwater utility (SWU) rate adjustments. The following letter provides a summary of these recommendations.

**Potential Stormwater Ordinance Revisions**

Postconstruction stormwater management requirements for land development in the City is currently regulated by Chapter 16.16 of the City's Code of Ordinances. The threshold for providing permanent on-site stormwater management measures (e.g, detention basins, bioretention basins) for land development projects is currently set at 1 acre of land disturbance, regardless of how much additional impervious surface area is introduced. This applicability threshold is consistent with the Wisconsin Department of Natural Resources (WDNR) stormwater rules.

Additionally, the City's current construction site erosion control requirements for land development is regulated by Chapter 16.17 of the City Code of Ordinances and the applicability threshold for land development projects is also set at 1 acre of land disturbance (also consistent with current WDNR rules).

City staff have voiced concern over multiple recent land development projects that involved land disturbance less than 1 acre and the potential cumulative effect these developments may be having on the City's stormwater system. We have compiled a list of current stormwater management and construction site erosion control applicability thresholds for several area communities for a basis of comparison (refer to Table 1).

| Community | Erosion Control | Stormwater Management |
|---|---|---|
| Whitewater | >1-acre land disturbance (WDNR Std.) | >1-acre land disturbance (WDNR Std.) |
| Jefferson | • >1-acre land disturbance<br>• Land disturbance on slopes >10%<br>• 1,000 CY of excavation/filling<br>• 200 linear feet of ditch disturbance<br>• New road > 200 feet<br>• Developments w/subdiv. or condo plat | • 1-acre land disturbance<br>• Developments w/subdiv. or condo plat<br>• Redevelopment > 4,000 sf |
| Fort Atkinson | >1-acre land disturbance (WDNR Std.) | >1-acre land disturbance (WDNR Std.) |
| Watertown | >1-acre land disturbance (WDNR Std.) | >1-acre land disturbance (WDNR Std.) |
| Lake Mills | • >10,000 sf additional impervious area<br>• Net impervious area >20% of the total area of the site | • >10,000 sf additional impervious area<br>• Net impervious area >20% of the total area of the site |
| Stoughton (Dane Co. req.) | >Land disturbance >4,000 SF | >20,000 sf impervious surface |
| Walworth Co. | • Utility replacement >300 LF<br>• >4,000 sf land disturbance<br>• >400 CY excavation<br>• Any grading within 1,000 feet of lake or within 300 feet of stream | • Subdivision plat<br>• CSM resulting in >0.5 ac. impervious area<br>• New or private road serving >5 lots<br>• >1-acre land disturbance |

**Table 1 Summary of Erosion Control and Stormwater Management Ordinance Thresholds**

Typically, the applicability threshold for construction site erosion control requirements is much less than postconstruction stormwater management requirement thresholds. For example, Walworth County, Dane County, and Delavan each have erosion control applicability standards set at 4,000 square feet (SF) of land disturbance that we feel is reasonable.

For stormwater management requirements, we feel it is appropriate to establish thresholds that are based on both land disturbance and additional impervious surface. The Walworth County and Dane County thresholds for stormwater management are both set at 20,000 SF (0.5 acre). The threshold for the City of Lake Mills is set at 10,000 SF of additional impervious surface or impervious surface greater than 20 percent of the total area of the site. A reasonable stormwater management threshold for consideration is 10,000 SF of additional impervious surface and 20,000 SF of land disturbance. Language should be provided that states the 10,000 SF of additional impervious surface shall be considered cumulatively for common plans of development. Overall applicability recommendations are provided in Table 2.

| Erosion Control | Stormwater Management |
|---|---|
| >4,000 SF land disturbance | >20,000 SF land disturbance<br>>10,000 SF impervious surface (cumulative for common plans of development) |

**Table 2 Recommended Erosion Control and Stormwater Management Ordinance Thresholds**

City staff have also requested a review of the City's Zoning code (Title 19) with respect to setting appropriate impervious area limits for the following residential zoning districts:

R-1–One-family residence district (Title 19.15)
R-2–One- and two-family residence district (Title 19.18)
R-3–Multifamily residence district (Title 19.21)

Language in Titles 19.15 and 19.18 stipulates a maximum lot coverage of 30 percent for zoning districts R-1 and R-2, respectively. It is assumed that lot coverage was intended to include all impervious surface on the lot, including sidewalks, driveways, and buildings. However, lot coverage is not specifically defined in the code. The only other reference to lot coverage in the zoning code is in Title 19.27.070 (community business district) where maximum building lot coverage is stated to be 50 percent. For this reason, the definition of lot coverage in Titles 19.15 and 19.18 has similarly been interpreted as building lot coverage, not impervious area lot coverage as was likely originally intended. It is therefore recommended that the language in Titles 19.15 and 19.18 be clarified as a maximum "impervious area lot coverage" of 30 percent instead of just lot coverage.

Similar concerns exist for adequate impervious area controls for zoning district R-3 (multifamily), which requires 350 square feet of usable open space for each dwelling unit for two or more dwelling units. While this policy may provide greater percentages of green space for large dwelling unit developments, it likely results in very small percentages for smaller dwelling unit developments. It may be more appropriate to establish a maximum "impervious area lot coverage" policy that is in place for the R-1 and R-2 zoning districts. To help facilitate selection of appropriate maximum impervious area coverage percentages, we have provided impervious area percentages from several recent multifamily developments; see Table 3. It is our understanding the City planner is currently working with the City of Oshkosh to amend its stormwater ordinance to restrict maximum impervious area coverage for R-3 zoning areas to 60 percent unless otherwise approved by City staff and the planning commission.

| Development | Total Lot Area (SF) | Impervious Area (SF) | Impervious Area Percentage |
|---|---|---|---|
| 165 North Tratt Street | 35,500 | 16,275 | 46% |
| Prince Street Development | 87,569 | 50,004 | 57% |
| The Element | 74,705 | 45,738 | 61% |

**Table 3 Percent Impervious Areas for Recent Multifamily Developments**

City staff have also suggested investigating implementation of a policy that allows developments to pay the City a "fee-in-lieu" of providing on-site postconstruction stormwater management. Fee-in-lieu of policies are currently in place in the City of Lake Mills and the City of Madison where the fees are based on land acquisition and construction cost estimates (an example of a fee calculation spreadsheet is attached). Revenue generated from these fees typically must be used to construct regional stormwater facilities that receive stormwater runoff from developments where the fee is collected and would be allowed at the sole discretion of the City.

**Potential SWU Rate Adjustments**

Stormwater utility (SWU) service charges in the City are based on Equivalent Runoff Units (ERUs). One ERU equals the average impervious area on a typical single-family residential property. In the City, one ERU is equivalent to 3,850 square feet of impervious area. The City has implemented a tiered SWU rate structure for single-family residential properties as follows:

- Residential lot size <5,445 SF = 0.7 ERU.
- Residential lot size >5,445 SF and < 21,781 SF = 1.0 ERU.
- Residential lot size >21,781 SF = 1.2 ERU.

The fee for nonresidential parcels is based on the number of ERUs. The number of ERUs is determined by dividing the total estimated impervious area on the parcel by the typical residential impervious area. For instance, the measured impervious area at a fast food restaurant in the City is 46,200 SF, so it has 12 ERUs (46,200 SF ÷ 3,850 SF).

The current SWU rate for the City is set at $4.75 per ERU per month and was last adjusted in March 2013. Applying the total customer base for the SWU (including applying SWU credits), approximately $378,000 of revenue is generated annually. This revenue primarily funds services related to stormwater system operation and maintenance (i.e., street sweeping, leaf and brush collection, lake weed control, and storm sewer or detention basin maintenance), administrative costs (SWU billing, SWU administration, and the National Pollutant Discharge Elimination System (NPDES) permit compliance and fees). Limited remaining revenue is used for stormwater capital improvements and planning.

When the SWU was originally adopted in 2008, it was anticipated that SWU rates would need to steadily increase to meet the NPDES stormwater permit requirements. The most significant cost related to the NPDES permit compliance was meeting the 40 percent City-wide Total Suspended Solids (TSS) requirement. It was estimated in the 2007 SWU Feasibility Study Report that the monthly SWU rate in the City would need to increase to $5.39/ERU by 2014 to comply with the NPDES permit requirements. However in 2011, the state (according to Wisconsin Act 32) lowered the TSS reduction requirement from 40 to 20 percent for NPDES-permitted communities, including the City. Because the City's current TSS reduction exceeds the minimum 20 percent reduction requirement, the immediate need to reduce TSS levels in the City has been lessened.

However, the City must also consider future TSS reductions that will arise from compliance with the Rock River Total Maximum Daily Load (TMDL) that was adopted in September 2012. Based on review of the TMDL report, the City will ultimately need to increase its TSS reduction up to 41 percent, which is very close to the original 40 percent NPDES permit requirement. A TMDL

compliance schedule has not yet been defined, however, based on discussions with WDNR staff, it is anticipated that communities will be given 15 to 20 years to meet the TMDL requirements.

The City has continued to be proactive in obtaining stormwater grants to help finance stormwater capital improvement projects that are needed to comply with the Rock River TMDL. However, these grants still require a 50 percent local cost share, so additional revenue likely will need to be generated by the SWU moving forward in order to properly fund the City's future stormwater program. Note that grant funds are also available for activities related to compliance with the Rock River TMDL, including long-range capital improvement planning and evaluation of various funding mechanisms.

Based on a review of SWUs currently in place in the State of Wisconsin, the average monthly SWU rate is $4.85/ERU (2.1 percent higher than the City's current SWU rate). Of these SWUs, 45 communities are covered by NPDES municipal stormwater permits (including the City). The average monthly SWU rate for these permitted communities is $5.53/ERU (16.4 percent higher than the City's current SWU rate). Please refer to the attached listing of Wisconsin SWUs published by the American Public Works Association. We have also compiled a listing of current SWU rates for other cities in Wisconsin with state universities (refer to Table 4).

| Community | SWU Rate ($/ERU/Month |
|---|---|
| Eau Claire | $6.92 |
| LaCrosse | $4.49 |
| Menomonie | $3.00 |
| Oshkosh | $8.97 |
| River Falls | $3.14 |
| Stevens Point | $4.92 |
| Superior | $5.90 |
| | |
| **Average** | **$5.34** |

**Table 4 SWU Rates for Wisconsin Communities with State Universities**

A one-time SWU rate increase to match the current averages for permitted communities in Wisconsin may be an initial step to allow the City to continue to fund stormwater capital improvement projects to help comply with future stormwater permit requirements. A more detailed SWU Rate study could be conducted that would better identify costs for forecasted stormwater capital projects and associated debt service payments, operation and maintenance costs, and SWU administration. Figure 1 depicts potential SWU rate adjustments and the resulting impacts to annual SWU revenue generated.

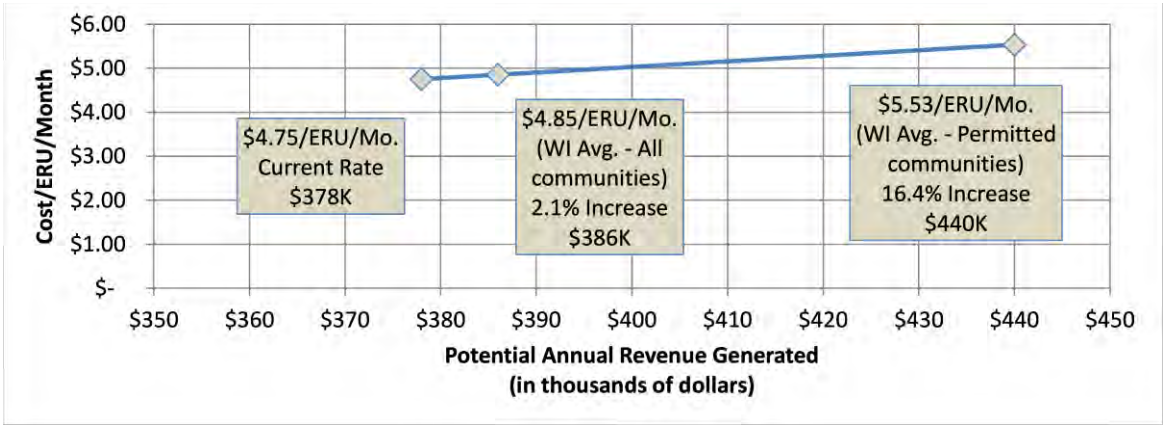



**Figure 1 SWU Rate and Annual Revenue Adjustment Options**

Please call us with any questions.

Sincerely,

STRAND ASSOCIATES, INC.®

Mark K. Shubak, P.E.

Mark A. Fisher, P.E.

Enclosures

Fee in lieu of on-site stormwater management practices.

A fee in lieu of on-site stormwater management practices may be requested by the applicant, but will only be allowed at the sole discretion of the City. If the chooses to waive all or part of the minimum on-site stormwater management requirements, the applicant shall be required to pay a fee in an amount determined in negotiation with the City of Whitewater and approved by the Common Council. The purpose of the fee is to fund alternative municipal stormwater management measures to offset the environmental and flooding impacts of waiving the requirements. In determining the fee for land development and land redevelopment projects, the City shall consider an equitable distribution of the cost needed for land, engineering design, and construction of stormwater management practices. All such fees collected shall be placed in a designated fund to be used exclusively for the City stormwater management practices to be constructed.

# Fee-in-Lieu Calculation of Providing On-Site Detention

SITE: EXAMPLE SITE

DATE: XX/XX/XXXX

**DETENTION VOLUME REQUIRED**

| | | |
|---|---|---|
| Volume Required (Supporting Calcs. Req'd) | 3.00 | acre-feet |

**LAND AREA REQUIRED**

| | | |
|---|---|---|
| Required Land Area $\left(\sqrt{(VolReq/2)}+10\right)^2$ | 1.620 | acres |
| Land Value (Per City Assessor's Office) | $10,000 | per acre |
| Value of Required Land Area | | **$16,197** |

**CONSTRUCTION COSTS**

EXCAVATION AND GRADING (Det. Vol. Required) + [(vol. Req./2)x(min. 4' depth)]

| | | | | |
|---|---|---|---|---|
| 14520 | CY @ | $4.00 | per CY | **$58,080** |

RESTORATION AND SEEDING

| | | | | |
|---|---|---|---|---|
| 7839 | SY @ | $1.50 | per SY | **$11,759** |

OUTLET CONTROL STRUCTURE

| | | | | |
|---|---|---|---|---|
| 1 | LUMP SUM | $5,000.00 | EA | **$5,000** |

| | |
|---|---|
| TOTAL CONSTRUCTION COSTS | **$74,839** |
| TOTAL FEE-IN-LIEU COST | **$91,035** |

*CONSTRUCTION COST TABLE (UNIT PRICES BASED ON STORAGE REQ'D)*

| *STORAGE REQUIRED (AC-FT)* | *< 0.11* | *0.11 TO 1.0* | *> 1.0* |
|---|---|---|---|
| *EXCAVATION AND GRADING* | *$5.00* | *$4.50* | *$4.00* |
| *RESTORATION AND SEEDING* | *$2.00* | *$1.75* | *$1.50* |
| *OUTLET CONTROL STRUCTURE* | *$3,000.00* | *$4,000.00* | *$5,000.00* |

# WI Stormwater User Charge System Information

**Representative Wisconsin Communities**

*Stormwater user charge information changes often! Contact individual communities to confirm accuracy.*

*November 20, 2013*

| | Name of Community or Stormwater District | Population | Created | ERU Size (sf) | Annual $/ERU or 1 fam home | Credit Policy? Y/ N | Credit Policy? Max Amount | Comments/ Web site addresses |
|---|---|---|---|---|---|---|---|---|
| 1 | **Allouez** (Village) | 15,443 | 2006 | 3,330 | $ 84.00 | | | www.villageofallouez.com |
| 2 | **Appleton** (City) | 73,243 | 1995 | 2,368 | $ 155.00 | Y | 77% | www.appleton.org |
| 3 | **Ashwaubenon** (Village) | 16,973 | 2012 | 3,316 | $ 50.00 | Y | 50% | www.Ashwaubenon.com |
| 4 | **Baraboo** (City) | 11,952 | 2005 | 2,379 | $ 49.24 | N | | www.cityofbaraboo.com |
| 5 | **Barron** (City) | 3,250 | 2005 | 10,850 | $ 24.00 | Y | 75% | www.barronwi.us |
| 6 | **Beaver Dam** (City) | 14,983 | 2008 | 2,637 | $ 48.61 | Y | 33% | www.cityofbeaverdam.com |
| 7 | **Bellevue** (Village) | 14,386 | 2002 | 3,221 | $ 48.00 | Y | 100% | www.bellevue-wi.com |
| 8 | **Beloit** (City) | 36,913 | 2006 | 3,347 | $ 36.00 | | | beloit.govoffice3.com/ |
| 9 | **Brown Deer** (Village) | 11,895 | 2004 | 3,257 | $ 91.80 | N | | www.browndeerwi.org |
| 10 | **Butler** (Village) | 1,885 | 1999 | 3,032 | $ 66.00 | | | www.butlerwi.gov/ |
| 11 | **Chetek** (City) | 2,180 | 2005 | | $ 27.00 | Y | | www.chetek.net |
| 12 | **Chippewa Falls** (City) | 13,374 | 2005 | | $ 36.00 | | | www.ci.chippewa-falls.wi.us |
| 13 | **Cudahy** (City) | 18,430 | 2001 | 2,700 | $ 60.00 | Y | $2/ ERU | www.ci.cudahy.wi.us |
| 14 | **De Forest** (Village) | 7,400 | 2005 | 2,900 | $ 60.00 | | | www.vi.deforest.wi.us/ |
| 15 | **Delafield** (City) | 7,820 | 2004 | 1,000 | $ 29.00 | | | www.cityofdelafield.com/ |
| 16 | **De Pere** (City) | 24,060 | 2003 | | $ 62.00 | | | www.de-pere.org/ |
| 17 | **Eau Claire** (City) | 66,623 | 1997 | 3,000 | $ 83.00 | Y | 100% | www.ci.eau-claire.wi.us |
| 18 | **Elm Grove** (Village) | 6,250 | 2004 | 6,235 | $ 65.50 | | | www.elmgrovewi.org |
| 19 | **Fitchburg** (City) - Urban | 25,260 | 2002 | 3,700 | $ 78.00 | Y | 50% | www.fitchburgwi.gov |
| 20 | **Fitchburg** (City) - Rural | 4,000 | 2002 | 3,700 | $ 38.84 | Y | 50% | www.fitchburgwi.gov |
| 21 | **Fox Point** (Village) | 6,816 | 2009 | 2,988 | $ 126.72 | | | http://www.vil.fox-point.wi.us/ |
| 22 | **Fort Atkinson** (City) | 12,407 | 2009 | 3,096 | $ 33.84 | | | http://www.fortatkinsonwi.net/ |
| 23 | **Garner's Creek** (watershed) | | 1998 | 3,623 | $ 96.00 | Y | 85% | http://www.garnerscreekutility.org/ |
| 24 | **Glendale** (City) | 13,400 | 1996 | 3,200 | $ 42.00 | N | ‡ | www.glendale-wi.org |
| 25 | **Grand Chute** (Town) | 21,288 | 1997 | 3,283 | $ 99.84 | Y | 85% | www.grandchute.net |
| 26 | **Grantsburg** (Village) | 1,397 | 2004 | | $ 18.00 | Y | 75% | www.grantsburgwi.com |
| 27 | **Green Bay** (City) | 105,809 | 2004 | 3,000 | $ 63.76 | Y | 67% | www.ci.green-bay.wi.us |
| 28 | **Greendale** (Village) | 14,410 | 2004 | 3,941 | $ 78.00 | Y | 50% | www.greendale.org |
| 29 | **Greenfield** (City) | 35,476 | 2009 | 3,630 | $ 49.80 | | | http://www.ci.greenfield.wi.us/ |
| 30 | **Greenville** (Town) | 10,602 | 1999 | 4,510 | $ 65.00 | Y | 85% | www.townofgreenville.com |
| 31 | **Hales Corners** (Village) | 7,665 | 2008 | 3,952 | $ 9.00 | | | http://www.halescorners.org/ |
| 32 | **Harrison** (Town of) | 5,800 | 1998 | | $ 96.00 | | | www.townofharrison.org |
| 33 | **Hobart** (Village of) | 5,834 | 2007 | 4,000 | $ 72.00 | Y | 50% | www.hobart-wi.org/ |
| 34 | **Holmen** (Village of) | 7,176 | 2007 | 3,550 | $ 44.00 | Y | 50% | www.holmenwi.com |
| 35 | **Howard** (Village) | 15,774 | 2005 | 3,301 | $ 44.00 | | | www.villageofhoward.com |
| 36 | **Janesville** (City) | 63,479 | 2003 | 3,200 | $ 39.76 | Y | 65% | www.ci.janesville.wi.us |
| 37 | **Kenosha** (City) | 99,738 | 2007 | 2,477 | $ 60.00 | Y | | www.kenosha.org |
| 38 | **Lake Delton** (Village) | 2,975 | 1993 | 1,685 | $ 18.00 | Y | 100% | www.lakedelton.org |
| 39 | **Lancaster** (City) | 4,033 | 2008 | 2,400 | $ 24.00 | Y | | www.lancasterwisconsin.com |
| 40 | **Lisbon** (Town) | 9,359 | 2007 | 6,642 | $ 40.00 | Y | 50% | www.townoflisbonwi.com |
| 41 | **Little Chute** (Village) | 10,830 | 1998 | 2,752 | $ 96.00 | N | | www.littlechutewi.org |
| 42 | **Madison** (City) | 236,901 | 2001 | Lot Area | $ 55.00 | Y | 50% | www.cityofmadison.com |
| 43 | **McFarland** (Village) | 6,416 | 2007 | 3,456 | $ 46.85 | | | www.mcfarland.wi.us |
| 44 | **Menomine** (City of) | 15,318 | 2008 | 3,000 | $ 36.00 | Y | 20% | www.menomonie-wi.gov/ |
| 45 | **Milton** (City of) | 5,667 | 2009 | | $ 55.13 | | | http://www.ci.milton.wi.us/ |
| 46 | **Milwaukee** (City) | 597,867 | 2006 | 1,610 | $ 64.52 | Y | 60% | http://city.milwaukee.gov/mpw |
| 47 | **Monona** (City) | 8,000 | 2004 | NA * | $ 60.00 | Y | 65% | www.monona.wi.us |
| 48 | **Monroe** (City) | 10,600 | 2006 | 2,728 | $ 60.00 | | | www.cityofmonroe.org |
| 49 | **Neenah** (City) | 24,600 | 2003 | 3,138 | $ 84.00 | Y | 66% | www.ci.neenah.wi.us |

# WI Stormwater User Charge System Information

**Representative Wisconsin Communities**

*Stormwater user charge information changes often! Contact individual communities to confirm accuracy.*

*November 20, 2013*

| | Name of Community or Stormwater District | Population | Created | ERU Size (sf) | Annual $/ERU or 1 fam home | Credit Policy? Y/ N | Credit Policy? Max Amount | Comments/ Web site addresses |
|---|---|---|---|---|---|---|---|---|
| 50 | **New Berlin** (City) | 39,669 | 2001 | 4,000 | $ 60.00 | N | | www.newberlin.org |
| 51 | **New Richmond** (City) | 7,726 | 2004 | 12,632 | $ 28.68 | Y | 75% | www.ci.new-richmond.wi.us |
| 52 | **N. Fond du Lac** (Village) | 4,557 | 2007 | 3,123 | $ 56.00 | Y | | www.nfdl.org |
| 53 | **Oak Creek** (City) | 28,456 | 2003 | 3,300 | $ 27.50 | | | http://www.oakcreekwi.org/ |
| **54** | **Onalaska** (City) | 17,900 | 2009 | 3,888 | $ 59.64 | Y | 40% | www.cityofonalaska.com |
| 55 | **Onalaska** (Town) | 5,600 | 2005 | 3,709 | $ 24.00 | | | www.co.la-crosse.wi.us/townofonalaska |
| **56** | **Oshkosh** (City) | 66,344 | 2003 | 2,817 | $ 107.68 | Y | 75% | www.ci.oshkosh.wi.us |
| **57** | **Pewaukee** (City) | 11,783 | 2010 | 5,339 | $ 120.00 | Y | | www.cityofpewaukee.us |
| 58 | **Pleasant Prairie** (Village) | 18,000 | 2006 | | $ 15.00 | | | www.pleasantprairieonline.com/ |
| 59 | **Poynette** (Village) | 2,563 | 2006 | 3,550 | $ 50.00 | | | www.poynette-wi.gov/ |
| 60 | **Racine (**City) | 78,853 | 2004 | 2,844 | $ 72.30 | Y | 40% | www.cityofracine.org |
| 61 | **Raymond** (Town) | 3,516 | 2008 | $0.0036/sf imp area | | N | | www.raymondtownof.com |
| 62 | **Reedsburg** (City of) | 8,594 | 2008 | 3,024 | $ 46.00 | Y | 50% | www.reedsburgwi.gov |
| **63** | **River Falls** (City) | 14,889 | 1998 | NA * | $ 37.68 | Y | 100% | www.rfcity.org |
| **64** | **Rochester** (Village) | 3,682 | 2011 | 4,500 | $ 73.00 | Y | 50% | http://rochsterwi.us.index.asp |
| 65 | **Salem** (Town) | 9,871 | 2009 | 6,352 | $ 60.00 | Y | 50% | www.townofsalem.net |
| 66 | **Sheboygan** (City) | 50,792 | 2001 | 2,215 | $ 36.00 | Y | | www.ci.sheboygan.wi.us |
| 67 | **Shorewood Hills** (Village) | 1,732 | 2007 | 2,941 | | | | www.shorewood-hills.org |
| 68 | **Slinger** (Village) | 3,901 | 2007 | 4,300 | $ 40.00 | Y | | www.slinger-wi-usa.org/ |
| 69 | **St. Francis** (Village) | 9,373 | 2001 | 2,500 | $ 48.00 | | | www.ci.stfrancis.wi.gov/ |
| 70 | **Sun Prairie** (City) | 24,464 | 2003 | 3,468 | $ 72.00 | Y | 65% | www.cityofsunprairie.com/ |
| 71 | **Superior** (City) | 27,370 | 2007 | 1,907 | $ 70.80 | Y | TBD | www.ci.superior.wi.us/ |
| 72 | **Sussex** (Village) | 9,687 | 2005 | | $ 60.00 | | | www.village.sussex.wi.us/ |
| **73** | **Union Grove** (Village) | 4,884 | 2009 | 4,000 | $ 86.83 | Y | 50% | www.uniongrove.net |
| 74 | **Vernon** (Town) | 7,455 | 2008 | 6,904 | $ 32.00 | Y | 50% | www.townofvernon.org/ |
| 75 | **Verona** (City) | 7,052 | 2009 | 2,842 | $ 53.06 | | | http://www.ci.verona.wi.us/ |
| 76 | **Washburn** (City) | 2,300 | 2005 | | $ 48.00 | | | www.cityofwashburn.org/ |
| 77 | **Watertown** (City) | 23,163 | 2005 | 2,900 | $ 76.00 | | | www.cityofwatertown.org/ |
| **78** | **Waupun** (City) | 10,720 | 2005 | 3,204 | $ 96.00 | | | www.cityofwaupun.org/ |
| **79** | **Wauwatosa** (City) | 46,629 | 1999 | 2,174 | $ 67.28 | Y | 100% | www.wauwatosa.net/ |
| **80** | **West Allis** (City) | 60,300 | 1997 | 1,827 | $ 77.16 | Y | 56% | www.ci.west-allis.wi.us/ |
| **81** | **West Milwaukee** (Village) | 4,142 | 1998 | 1,956 | $ 36.00 | Y | 50% | www.westmilwaukee.org/ |
| 82 | **Weston** (Village) | 12,736 | 2004 | 3,338 | $ 47.78 | Y | 68% | www.westonwisconsin.org/ |

*Information presented here is dependent on your input! Please send updates to* jmmazanec@gmail.com

**Reverse numbers** *indicate entries updated or confirmed within 365 days of the date of this publication.*

# APPENDIX R
# APWA STORMWATER UTILITY CHART 2016

# WI Stormwater User Charge System Information

## Representative Wisconsin Communities

*Stormwater user charge information changes often! Contact individual communities to confirm accuracy.*

*March 4, 2016*

| | Name of Community or Stormwater District | Population (2013) | Created | ERU Size (sf) | Annual $/ERU or 1 fam home | Credit Policy? Y/N | Credit Policy? Max Amount | Web site addresses |
|---|---|---|---|---|---|---|---|---|
| 1 | **Allouez** (Village) | 13,967 | 2004 | 3,663 | $ 87.00 | N | | www.villageofallouez.com |
| 2 | **Altoona** (City) | 7,056 | 2007 | | $ 36.00 | Y | 75% | www.ci.altoona.wi.us |
| 3 | **Antigo** (City) | 8,004 | 2010 | 3,069 | $ 42.24 | Y | 50% | www.antigo-city.org |
| 4 | **Appleton** (City) | 73,596 | 1995 | 2,368 | $ 155.00 | Y | 73% | www.appleton.org |
| 5 | **Ashwaubenon** (Village) | 17,116 | 2012 | 3,316 | $ 50.00 | Y | 50% | www.Ashwaubenon.com |
| 6 | **Baraboo** (City) | 12,100 | 2005 | 2,379 | $ 49.24 | N | | www.cityofbaraboo.com |
| 7 | **Barron** (City) | 3,371 | 2006 | 10,850 | $ 24.00 | Y | 75% | www.barronwi.us |
| 8 | **Bayside** (Village) | 4,418 | 2009 | 5,269 | $ 154.00 | N | | www.bayside-wi.gov |
| 9 | **Beaver Dam** (City) | 16,345 | 2008 | 2,637 | $ 48.61 | Y | 33% | www.cityofbeaverdam.com |
| 10 | **Belleville** (Village) | 2,426 | 2010 | 2,800 | $ 50.04 | Y | 50% | www.bellevillewi.org |
| 11 | **Bellevue** (Village) | 14,964 | 2002 | 3,221 | $ 48.00 | Y | 100% | www.bellevue-wi.com |
| 12 | **Beloit** (City) | 36,888 | 2006 | 3,347 | $ 42.00 | Y | 90% | www.beloitwi.gov |
| 13 | **Brookfield** (Town) | 6,390 | 2003 | 3,681 | $ 81.60 | Y | Undfnd | www.townofbrookfield.com |
| 14 | **Brown Deer** (Village) | 12,102 | 2004 | 3,257 | $ 106.08 | Y | Undfnd | www.browndeerwi.org |
| 15 | **Butler** (Village) | 1,838 | 1999 | 3,032 | $ 66.00 | Y | Undfnd | www.butlerwi.gov |
| 16 | **Caledonia** (Village) | 24,737 | 2013 | 5,230 | $ 65.25 | Y | 50% | www.caledoniawi.com |
| 17 | **Cambridge** (Village) | 1,498 | 2005 | 43,560 | $ 28.00 | N | | www.ci.cambridge.wi.us |
| 18 | **Chetek** (City) | 2,210 | 2006 | 15,246 | $ 27.00 | Y | 75% | www.chetek.net |
| 19 | **Chippewa Falls** (City) | 13,718 | 2005 | | $ 36.00 | Y | 75% | www.ci.chippewa-falls.wi.us |
| 20 | **Cudahy** (City) | 18,340 | 2001 | 2,700 | $ 83.00 | Y | Undfnd | www.ci.cudahy.wi.us |
| 21 | **De Forest** (Village) | 9,372 | 2005 | 2,900 | $ 60.00 | N | | www.vi.deforest.wi.us |
| 22 | **De Pere** (City) | 24,359 | 2005 | 3,861 | $ 67.00 | Y | 60% | www.de-pere.org |
| 23 | **Delafield** (City) | 7,159 | 2004 | 1,000 | $ 29.00 | Y | Undfnd | www.cityofdelafield.com |
| 24 | **Denmark** (Village) | 2,169 | 2006 | 3,500 | $ 48.00 | N | | www.denmark-wi.org |
| 25 | **Durand** (City) | 1,878 | 2010 | 3,300 | $ 48.00 | Y | 20% | www.durand-wi.com |
| 26 | **Eau Claire** (City) | 67,545 | 1996 | 3,000 | $ 86.00 | Y | 89% | www.ci.eau-claire.wi.us |
| 27 | **Elm Grove** (Village) | 5,949 | 2004 | 6,235 | $ 122.80 | N | | www.elmgrovewi.org |
| 28 | **Fitchburg** (City) - Rural | 4,000 | 2002 | 3,700 | $ 38.83 | Y | 50% | www.fitchburgwi.gov |
| 29 | **Fitchburg** (City) - Urban | 25,260 | 2002 | 3,700 | $ 78.00 | Y | 50% | www.fitchburgwi.gov |
| 30 | **Fort Atkinson** (City) | 12,482 | 2009 | 3,096 | $ 33.84 | Y | 50% | www.fortatkinsonwi.net |
| 31 | **Fox Point** (Village) | 6,698 | 2009 | 2,988 | $ 126.72 | Y | 60% | www.vil.fox-point.wi.us |
| 32 | **Garner's Crk** (watershed) | 20,922 | 1998 | 3,623 | $ 96.00 | Y | 85% | www.garnerscreekutility.org |
| 33 | **Glendale** (City) | 12,920 | 1996 | 3,200 | $ 54.00 | Y | Undfnd | www.glendale-wi.org |
| 34 | **Grand Chute** (Town) | 21,288 | 1997 | 3,283 | $ 99.84 | Y | 85% | www.grandchute.net |
| 35 | **Grantsburg** (Village) | 1,317 | 2004 | | $ 24.00 | Y | 75% | www.grantsburgwi.com |
| 36 | **Green Bay** (City) | 104,779 | 2004 | 3,000 | $ 70.47 | Y | 67% | www.ci.green-bay.wi.us |
| 37 | **Greendale** (Village) | 14,340 | 2004 | 3,941 | $ 79.60 | Y | 50% | www.greendale.org |
| 38 | **Greenfield** (City) | 37,159 | 2009 | 3,630 | $ 49.80 | Y | 66% | www.ci.greenfield.wi.us |
| 39 | **Greenville** (Town) | 10,602 | 1999 | 4,510 | $ 65.00 | Y | 85% | www.townofgreenville.com |
| 40 | **Hales Corners** (Village) | 7,757 | 2008 | 3,952 | $ 14.00 | N | | www.halescorners.org |
| 41 | **Harrison** (Town of) | 5,800 | 1998 | | $ 96.00 | | | www.townofharrison.org |

# WI Stormwater User Charge System Information

## Representative Wisconsin Communities

*Stormwater user charge information changes often! Contact individual communities to confirm accuracy.*

*March 4, 2016*

| | Name of Community or Stormwater District | Population (2013) | Created | ERU Size (sf) | Annual $/ERU or 1 fam home | Credit Policy? Y/N | Credit Policy? Max Amount | Web site addresses |
|---|---|---|---|---|---|---|---|---|
| 42 | **Hobart** (Village of) | 7,365 | 2007 | 4,000 | $ 72.00 | Y | 50% | www.hobart-wi.org |
| 43 | **Holmen** (Village of) | 9,423 | 2007 | 3,550 | $ 49.00 | Y | 50% | www.holmenwi.com |
| 44 | **Howard** (Village) | 18,671 | 2005 | 3,301 | $ 52.00 | Y | 67% | www.villageofhoward.com |
| 45 | **Hudson** (City) | 13,179 | 2012 | 2,890 | $ 30.00 | Y | 90% | www.ci.hudson.wi.us |
| 46 | **Janesville** (City) | 63,820 | 2003 | 3,200 | $ 39.64 | Y | 85% | www.ci.janesville.wi.us |
| 47 | **Jefferson** (City) | 7,984 | 2008 | 3,220 | $ 40.00 | Y | 100% | www.jeffersonwis.com |
| 48 | **Kaukauna** (City) | 15,725 | 2009 | 2,944 | $ 66.00 | Y | 50% | www.cityofkaukauna.com |
| 49 | **Kenosha** (City) | 99,889 | 2006 | 2,477 | $ 80.04 | Y | 44% | www.kenosha.org |
| 50 | **Kimberly** (Village) | 6,641 | 2007 | 3,350 | $ 110.00 | N | | www.vokimberly.org |
| 51 | **La Crosse** (City) | 51,522 | 2012 | 2,841 | $ 53.92 | Y | 80% | www.cityoflacrosse.org |
| 52 | **Lake Delton** (Village) | 2,934 | 1993 | 1,685 | $ 18.00 | Y | Undfnd | www.lakedelton.org |
| 53 | **Lancaster** (City) | 3,809 | 2008 | 3,400 | $ 24.00 | Y | 50% | www.lancasterwisconsin.com |
| 54 | **Lawrence** (Town) | 4,284 | 2012 | 1,000 | $ 60.00 | Y | 60% | www.townoflawrence.org |
| 55 | **Ledgeview** (Town) | 6,555 | 2010 | 5,800 | $ 34.20 | Y | 50% | www.ledgeviewwisconsin.com |
| 56 | **Lisbon** (Town) | 10,157 | 2006 | 6,642 | $ 48.00 | Y | 50% | www.townoflisbonwi.com |
| 57 | **Little Chute** (Village) | 10,491 | 1999 | 2,762 | $ 84.00 | N | | www.littlechutewi.org |
| 58 | **Madison** (City) | 243,344 | 2001 | Lot Area | $ 86.46 | Y | Undfnd | www.cityofmadison.com |
| 59 | **Marinette** (City) | 10,930 | 2010 | 3,105 | $ 49.00 | N | | www.marinette.wi.us |
| 60 | **McFarland** (Village) | 8,108 | 2007 | 3,456 | $ 84.72 | Y | 60% | www.mcfarland.wi.us |
| 61 | **Menasha** (City) | 17,588 | 2008 | 2,980 | $ 75.00 | Y | Undfnd | www.cityofmenasha-wi.gov |
| 62 | **Menasha** (Town) | 18,498 | 2009 | 4,177 | $ 100.00 | Y | 80% | www.town-menasha.com |
| 63 | **Menomonie** (City) | 16,156 | 2008 | 3,000 | $ 36.00 | Y | 20% | www.menomonie-wi.gov |
| 64 | **Middleton** (City) | 18,411 | 2015 | 2,880 | $ 14.80 | Y | 60% | www.ci.middleton.wi.us |
| 65 | **Milton** (City of) | 5,564 | 2009 | 4,081 | $ 62.88 | Y | 50% | http://www.ci.milton.wi.us |
| 66 | **Milwaukee** (City) | 599,164 | 2006 | 1,610 | $ 67.76 | Y | 60% | http://city.milwaukee.gov/mpw |
| 67 | **Monona** (City) | 7,745 | 2004 | NA * | $ 60.00 | Y | 35% | www.monona.wi.us |
| 68 | **Monroe** (City) | 10,832 | 2007 | 2,728 | $ 60.00 | Y | 50% | www.cityofmonroe.org |
| 69 | **Mount Pleasant** (Village) | 26,224 | 2007 | 3,000 | $ 55.00 | N | | www.mtpleasantwi.gov |
| 70 | **Mukwonago** (30 cust's) | | 2006 | 3,000 | $ 10.31 | N | | www.villageofmukwonago.com |
| 71 | **Neenah** (City) | 25,892 | 2003 | 3,138 | $ 84.00 | Y | 68% | www.ci.neenah.wi.us |
| 72 | **Neenah** (Town) | 3,475 | 2008 | 4,040 | $ 75.00 | Y | Undfnd | www.townofneenah.com |
| 73 | **New Berlin** (City) | 39,834 | 2001 | 4,000 | $ 60.00 | N | | www.newberlin.org |
| 74 | **New Glarus** (Village) | 2,160 | 2009 | 3,000 | $ 58.20 | Y | 100% | www.newglarusvillage.com |
| 75 | **New Richmond** (City) | 8,610 | 2005 | 13,000 | $ 35.28 | Y | 75% | www.ci.new-richmond.wi.us |
| 76 | **N Fond du Lac** (Village) | 5,042 | 2007 | 3,123 | $ 56.00 | Y | 70% | www.nfdl.org |
| 77 | **Oak Creek** (City) | 35,008 | 2003 | 3,300 | $ 29.00 | Y | Undfnd | www.oakcreekwi.org |
| 78 | **Onalaska** (City) | 18,312 | 2010 | 3,888 | $ 59.63 | Y | 50% | www.cityofonalaska.com |
| 79 | **Onalaska** (Town) | 5,882 | 2005 | 3,709 | $ 24.00 | Y | Undfnd | www.co.la-crosse.wi.us/townofonala |
| 80 | **Oshkosh** (City) | 66,778 | 2003 | 2,817 | $ 122.92 | Y | 75% | www.ci.oshkosh.wi.us |
| 81 | **Palmyra** (Village) | 1,783 | 2000 | 3,387 | $ 117.24 | Y | 50% | www.villageofpalmyra.com |
| 82 | **Pewaukee** (City) | 13,827 | 2010 | 5,339 | $ 120.00 | Y | 40% | www.cityofpewaukee.us |

# WI Stormwater User Charge System Information

## Representative Wisconsin Communities

*Stormwater user charge information changes often! Contact individual communities to confirm accuracy.*

*March 4, 2016*

| | Name of Community or Stormwater District | Population (2013) | Created | ERU Size (sf) | Annual $/ERU or 1 fam home | Credit Policy? Y/N | Credit Policy? Max Amount | Web site addresses |
|---|---|---|---|---|---|---|---|---|
| 83 | **Pleasant Prairie** (Village) | 20,173 | 2006 | TR-55 M | $ 36.00 | Y | 30% | www.pleasantprairieonline.com |
| 84 | **Poynette** (Village) | 2,513 | 2006 | 3,550 | $ 60.00 | Y | 50% | www.poynette-wi.gov |
| 85 | **Prairie du Sac** (Village) | 4,188 | 2002 | 43,560 | (1) | N | | www.prairiedusac.net |
| 86 | **Racine (**City) | 78,199 | 2004 | 2,844 | $ 83.01 | Y | 45% | www.cityofracine.org |
| 87 | **Raymond** (Town) | 3,909 | 2008 | $0.0036/sf | (2) | Y | 50% | www.raymondtownof.com |
| 88 | **Reedsburg** (City of) | 9,532 | 2009 | 3,024 | $ 46.80 | Y | 50% | www.reedsburgwi.gov |
| 89 | **Rhinelander** (City) | 7,557 | 2013 | 3,305 | $ 39.00 | Y | 100% | http://rhinelandercityhall.org |
| 90 | **Rice Lake** (City) | 8,339 | 2010 | 3,701 | $ 57.72 | N | | www.ci.rice-lake.wi.us |
| 91 | **River Falls** (City) | 15,209 | 1998 | NA * | $ 37.68 | Y | 100% | www.rfcity.org |
| 92 | **Rochester** (Village) | 3,693 | 2011 | 4,500 | $ 63.20 | Y | 50% | www.rochsterwi.us.index.asp |
| 93 | **Salem** (Town) | 12,056 | 2008 | 6,352 | $ 60.00 | Y | 50% | www.townofsalem.net |
| 94 | **Scott** (Town) | 3,545 | 2010 | 4,250 | $ 45.00 | Y | 50% | |
| 95 | **Shorewood Hills** (Village) | 1,799 | 2007 | 2,941 | $ 110.00 | Y | Undfnd | www.shorewood-hills.org |
| 96 | **Silver Lake** (Village) | 2,420 | 2008 | 3,870 | $ 94.00 | N | | www.villageofsilverlakewi.com |
| 97 | **Slinger** (Village) | 5,141 | 2007 | 4,300 | $ 47.70 | Y | 50% | www.slinger-wi-usa.org |
| 98 | **South Milwaukee** (City) | 21,239 | 2007 | 2,964 | $ 72.00 | Y | 50% | http://smwi.org |
| 99 | **St. Francis** (Village) | 9,546 | 2001 | 2,500 | $ 48.00 | Y | Undfnd | www.ci.stfrancis.wi.gov |
| 100 | **Stevens Point** (City) | 26,670 | 2013 | 3,364 | $ 59.08 | Y | 60% | http://stevenspoint.com |
| 101 | **Stoughton** (City) | 12,945 | 2012 | 3,105 | $ 51.55 | Y | 50% | www.ci.stoughton.wi.us |
| 102 | **Sun Prairie** (City) | 30,871 | 2003 | 3,468 | $ 90.00 | Y | 65% | www.cityofsunprairie.com |
| 103 | **Superior** (City) | 26,869 | 2004 | 2,933 | $ 70.80 | Y | 85% | www.ci.superior.wi.us |
| 104 | **Sussex** (Village) | 10,695 | 2006 | 3,897 | $ 60.00 | Y | 49% | www.village.sussex.wi.us |
| 105 | **Two Rivers** (City) | 11,525 | 2014 | 3,015 | $ 34.56 | Y | 60% | www.two-rivers.org |
| 106 | **Union Grove** (Village) | 4,884 | 2010 | 4,000 | $ 21.83 | Y | 50% | www.uniongrove.net |
| 107 | **Vernon** (Town) | 7,502 | 2007 | 6,904 | $ 13.00 | Y | 50% | www.townofvernon.org |
| 108 | **Verona** (City) | 11,775 | 2011 | 2,842 | $ 53.06 | Y | 58% | www.ci.verona.wi.us |
| 109 | **Washburn** (City) | 2,098 | 2005 | Lot Area | $ 63.00 | Y | 75% | www.cityofwashburn.org |
| 110 | **Watertown** (City) | 23,929 | 2005 | 2,900 | $ 81.24 | Y | 60% | www.cityofwatertown.org |
| 111 | **Waupun** (City) | 11,330 | 2005 | 3,204 | $ 96.00 | Y | 75% | www.cityofwaupun.org |
| 112 | **Wauwatosa** (City) | 47,134 | 2000 | 2,174 | $ 78.60 | Y | 54% | www.wauwatosa.net |
| 113 | **West Allis** (City) | 60,697 | 1997 | 1,827 | $ 77.16 | Y | 50% | www.ci.west-allis.wi.us |
| 114 | **West Milwaukee** (Village) | 4,215 | 1998 | 1,956 | $ 36.00 | Y | 50% | www.westmilwaukee.org |
| 115 | **West Salem** (Village) | 4,980 | 2007 | 2,400 | $ 18.00 | Y | Undfnd | www.westsalemwi.com |
| 116 | **Weston** (Village) | 14,934 | 2004 | 3,338 | $ 48.00 | Y | 68% | www.westonwi.gov |
| 117 | **Whitefish Bay** (Village) | 14,125 | 2013 | 3,045 | $ 100.00 | Y | 100% | www.wfbvillage.org |
| 118 | **Whitewater** (City) | 14,732 | 2007 | 3,875 | $ 57.00 | Y | 50% | www.whitewater-wi.gov |
| 119 | **Wind Point** (Village) | 1,717 | 2008 | 3,857 | $ 35.20 | N | | http://windpointwi.us |
| 120 | **Wisconsin Rapids** (City) | 18,039 | 2009 | 2,620 | $ 90.00 | Y | 50% | www.wirapids.org |

*Information presented here is dependent on your input! Please send updates to* jmmazanec@gmail.com

*Notes: (1) $43.47 per acre of impervious land; (2) $12.50 for 3,500 sf of impervious area*

Special thanks to Steve Kemna/ WI PSC for contributing substantial updated information in 2015!

# For more location information please visit www.strand.com

## Office Locations

Brenham, Texas | 979.836.7937

Cincinnati, Ohio | 513.861.5600

Columbus, Indiana | 812.372.9911

Columbus, Ohio | 614.835.0460

Indianapolis, Indiana | 317.423.0935

Joliet, Illinois | 815.744.4200

Lexington, Kentucky | 859.225.8500

Louisville, Kentucky | 502.583.7020

Madison, Wisconsin* | 608.251.4843

Milwaukee, Wisconsin | 414.271.0771

Phoenix, Arizona | 602.437.3733

*Corporate Headquarters

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