



# **AGENDA OF THE IMPROVEMENT AND SERVICES COMMITTEE**

**WEDNESDAY, OCTOBER 11, 2023, 5:00 PM**  
**Immediately following Parks Committee.**

**In person at City Hall, Room 207**  
**Virtual attendance also available via Zoom.**

**A. Zoom Meeting Information.**

**I. Join Zoom Meeting Online:**

<https://us02web.zoom.us/j/82206544400?pwd=NDdIbm5zNUhBWW9XRUVU5ck1zMjZ2QT09>

Or call in by phone: +1 312 626 6799

Meeting ID: 822 0654 4400

Passcode: 635662

If you wish to speak at this public meeting or leave a comment, please fill out the online [Comment Form](#) prior to the meeting. More detailed [Zoom Instructions](#) can be found online.

**B. Roll Call.**

**C. Approval of the Agenda.**

**D. Approval of Minutes.**

**E. Regular Business.**

- I.** Consideration with possible action on request by Ald. Brunette, on behalf of residents on Country Club Road, regarding the plan to include sidewalks on the upcoming Country Club Road reconstruction project (held over from the August 16, 2023 Improvement and Services meeting).
- 2.** Consideration with possible action on a request by Department of Public Works to contract with Morbark to repair the tub grinder in the amount of \$36,799.10.
- 3.** Consideration with possible action on request by Department of Public Works for the City

of Green Bay's Total Maximum Daily Load Implementation Plan for submittal to the Wisconsin Department of Natural Resources (WDNR) and request to WDNR to renew the Municipal Separate Storm Sewer System Permit.

4. Consideration with possible action on request by Department of Public Works to award the East River Flood Mitigation Solutions Study to Emmons & Olivier Resources.
5. Consideration with possible action on request by Department of Public Works to make changes to Chapter 32 (Solid Waste) ordinance.
6. Report of actions taken by the Department of Public Works.

- I. Granting of Licenses

- I. Sidewalk Builder

- a. Rok Concrete LLC

2. Tree & Brush Trimmer

- a.

#### **F. Informational.**

1. Director's Report on recent activities of the Public Works Department.
2. The next Improvement & Services Committee meeting is scheduled for October 25, 2023.

#### **G. Public Hearings.**

#### **H. Adjournment.**

- 1) THIS MEETING IS RECORDED: THE VIDEO OF THIS MEETING AND MINUTES ARE AVAILABLE ONLINE AT [www.greenbaywi.gov](http://www.greenbaywi.gov)
- 2) ACCESSIBILITY: Any person wishing to attend who requires special accommodation because of a disability, should contact the City Safety Manager at 920-448-3125 at least 48 hours before the scheduled meeting time so that arrangements can be made.
- 3) QUORUM: Please take notice that a majority or quorum of the Common Council will attend this Improvement and Services Committee meeting and will constitute a meeting of the Common Council for purposes of discussion and information gathering relative to this agenda.
- 4) REPRESENTATION: The party requesting the communication, or their representative, should be present at this meeting.





## Report to the Improvement and Service Committee of the City of Green Bay

### MEETING DATE

October 11, 2023

### PREPARED BY

### AGENDA ITEM # E.1

Consideration with possible action on request by Ald. Brunette, on behalf of residents on Country Club Road, regarding the plan to include sidewalks on the upcoming Country Club Road reconstruction project (held over from the August 16, 2023 Improvement and Services meeting).

### BACKGROUND

Country Club Road from West Mason Street to Indian Hill Road was last reconstructed in 1985. The pavement is in poor condition and is in need of reconstruction. To this end, DPW staff applied to the Brown County Plan Commission and Wisconsin Department of Transportation (WisDOT) to have this project included in the State Transportation Improvement Program for Local Projects. The project was selected for funding, and in June 2020, Common Council approved a State/Municipal Agreement (SMA) between the City and WisDOT for the reconstruction of Country Club Road.

As part of the SMA, the City agrees to follow State and Federal design criteria. Both the State of Wisconsin and Federal Highway Administration (FHWA) require the design of complete streets for local roads. Complete streets requires the installation of bicycle and pedestrian accommodations as part of the road reconstruction. Sidewalks have been included to the extent practicable along this design segment.

If the City were to offer a pavement design that did not include sidewalks, WisDOT will reject the design, rendering the project ineligible for federal funding. This would amount to the loss of more than \$4 million in federal funding to the City of Green Bay. Additionally, with the way these federal funds are distributed by WisDOT, it is highly unlikely that there are any other projects in the Brown County Metropolitan Planning Organization (MPO) boundary that could utilize the funds made available during the 2025 program cycle. These funds would be moved from Brown County to other areas of the state. It is highly unlikely that this project could be reconsidered, and a decision like this could jeopardize the City's ability to receive similar funding in the future for other projects.

### RECOMMENDATION

To receive and place on file the request by Ald. Brunette, on behalf of residents on Country Club Road, regarding the plan to include sidewalks on the upcoming Country Club Road reconstruction project.

### FISCAL IMPACT

### ATTACHMENTS

- I. Ald. Brunette Request for Country Club Road Sidewalks

**From:** [noreply@civicplus.com](mailto:noreply@civicplus.com)  
**To:** [Celestine Jeffreys](#); [Eric Genrich](#); [Amaad Rivera](#)  
**Subject:** Online Form Submittal: Alders' Petitions and Communications  
**Date:** Tuesday, August 1, 2023 8:32:30 PM

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## Alders' Petitions and Communications

|                       |                                                                                                                           |
|-----------------------|---------------------------------------------------------------------------------------------------------------------------|
| Name                  | Jesse Brunette                                                                                                            |
| Committee Name        | Improvement and Services Committee                                                                                        |
| Text of Communication | For discussion with possible action on the plan to include sidewalks on County Club as part of the upcoming road project. |

Email not displaying correctly? [View it in your browser.](#)



Report to the  
**Improvement and Service Committee  
of the City of Green Bay**

**MEETING DATE**

October 11, 2023

**PREPARED BY**

**AGENDA ITEM # E.2**

Consideration with possible action on a request by Department of Public Works to contract with Morbark to repair the tub grinder in the amount of \$36,799.10.

**BACKGROUND**

The City of Green Bay operates two yard waste processing centers. Compostable materials both collected by city crews and that dropped at the yard waste centers by residents is fed through a large tub grinder to reduce the size of the yard waste, and especially to break down larger woody waste, enabling proper composting. This tub grinder, critical to operation of the facilities, uses a hammer mill inside a drum to pulverize the waste. Over time, the hammers, bearings, and moving parts inside the tub grinder wear out due to normal wear and tear. The hammer mill is experiencing vibration and excessive movement of the moving parts after approximately 6,000 hours of operation and is in need of replacement.

**RECOMMENDATION**

Approve the request to replace the hammermill and associated wearing parts.

**FISCAL IMPACT**

Cost of these repairs will come from the DPW Equipment Repair Fund.

**ATTACHMENTS**

None



Report to the  
**Improvement and Service Committee**  
of the City of Green Bay

**MEETING DATE**

October 11, 2023

**PREPARED BY****AGENDA ITEM # E.3**

Consideration with possible action on request by Department of Public Works for the City of Green Bay's Total Maximum Daily Load Implementation Plan for submittal to the Wisconsin Department of Natural Resources (WDNR) and request to WDNR to renew the Municipal Separate Storm Sewer System Permit.

**BACKGROUND**

Every five years, the City is required to update the City's TMDL Implementation Plan and request renewal of the MS4 permit related to stormwater discharges. Because the City is located within the Lower Fox River Basin and Lower Green Bay drainage areas, the City is required to move towards meeting total suspended solids (TSS) and total phosphorus (TP) total maximum daily load (TMDL) requirements. The City previously conducted modeling and TMDL planning in 2014 and 2018 to demonstrate progress towards meeting these requirements. An update to the TMDL Implementation Plan was recently completed by Brown and Caldwell. The report is required to be submitted to WDNR by October 31, 2023.

**RECOMMENDATION**

To allow the Director of Public Works to submit the TMDL Implementation Plan update to WDNR, along with a request to renew the MS4 permit at the end of the permit term. These actions are required to be completed by October 31, 2023 to remain in compliance with the current MS4 permit.

**FISCAL IMPACT**

No additional impacts are associated with this TMDL Implementation Plan. The City will continue to conduct stormwater management program activities and plan for capital improvement projects within the regular budget process for the Stormwater Utility.

**ATTACHMENTS**

1. 2023 TMDL Implementation Plan Memo to IS (003)
2. Green Bay TMDL Final Report\_Complete Document



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**TO:** Improvement & Services Committee  
Steve Grenier – Director of Public Works

**FROM:** Valerie Joosten – Utility Manager

**DATE:** October 4, 2023

**RE:** Total Maximum Daily Load Implementation Plan and Municipal Separate Storm Sewer System Permit Renewal Summary

**CC:** James Brunette – Assistant Director of Public Works

The City of Green Bay's (City) stormwater discharge quality is regulated under a Wisconsin Department of Natural Resources (WDNR) Municipal Separate Storm Sewer System (MS4) permit. The permit requires the City to conduct various stormwater management program elements geared towards reducing stormwater pollution from its existing storm sewer system discharges.

Because the City is located within the Lower Fox River Basin and Lower Green Bay drainage areas, the City is required to move towards meeting total suspended solids (TSS) and total phosphorus (TP) total maximum daily load (TMDL) requirements. The City previously conducted modeling and TMDL planning in 2014 and 2018 to demonstrate progress towards meeting these requirements. An update to the TMDL Implementation Plan is required every 5 years, at the end of the MS4 permit term, and must be submitted to WDNR by October 31, 2023. The City contracted with Brown and Caldwell to complete the modeling and plan update for submittal to WDNR. A copy of the plan is attached.

The results of the analysis conducted by Brown and Caldwell show that the City continues to make progress towards the required TSS and TP pollutant reduction requirements. Management measures evaluated include street cleaning, grass swales, regional stormwater management practices, and other practices throughout the City, including the impact of private stormwater management practices. The implementation plan also outlines proposed practices over the next five years that will achieve measurable improvement towards meeting the TMDL goals.

### **Action Requested**

The Public Works Department requests the Improvement & Service Committee and Common Council to allow the Director of Public Works to submit the TMDL Implementation Plan update to WDNR, along with a request to renew the MS4 permit at the end of the permit term. These actions are required to be completed by October 31, 2023 to remain in compliance with the current MS4 permit.

# Green Bay TMDL Report

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Prepared for  
City of Green Bay, Wisconsin  
October 2, 2023

# Green Bay: TMDL Report

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Prepared for  
City of Green Bay, Wisconsin  
October 2, 2023



250 East Wisconsin Avenue, Suite 1600  
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## List of Abbreviations

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|           |                                           |
|-----------|-------------------------------------------|
| ac        | acre                                      |
| BC        | Brown and Caldwell                        |
| CIP       | capital improvement plan                  |
| City      | City of Green Bay                         |
| FRPC      | Fox River Papermaking Corridor            |
| ft        | foot/feet                                 |
| GIS       | geographic information system             |
| GSI       | Green Stormwater Infrastructure           |
| lbs       | pounds                                    |
| MS4       | Municipal Separate Storm Sewer System     |
| NEW Water | Green Bay Metropolitan Sewerage District  |
| O&M       | Operations and maintenance                |
| SCM       | stormwater control measure                |
| SMP       | stormwater management practice            |
| TMDL      | total maximum daily load                  |
| TP        | total phosphorus                          |
| TSS       | total suspended solids                    |
| WAC       | Wisconsin Administrative Code             |
| WisDOT    | Wisconsin Department of Transportation    |
| WLA       | waste load allocations                    |
| WDNR      | Wisconsin Department of Natural Resources |
| yr        | year                                      |



# Executive Summary

## Introduction and Purpose of this Plan

The City of Green Bay's (City) stormwater discharge quality is regulated under a Wisconsin Department of Natural Resources (WDNR) Municipal Separate Storm Sewer System (MS4) permit. The permit was originally issued in 2006 and was most recently reissued in 2019 (WI-S050075-3). The permit requires the City to conduct various stormwater management program elements geared towards reducing stormwater pollution from its existing storm sewer system discharges. Further details on the MS4 permit and regulatory drivers can be found in Section 1.

Stormwater quality management planning allows the City to assess compliance with specific numeric requirements of the permit and to identify implementation measures to move towards full compliance. Specifically, the City is obligated to move towards meeting total suspended solids (TSS) and total phosphorus (TP) total maximum daily load (TMDL) requirements for areas of the City that discharge within the seven reachsheds (waterway drainage areas) of the Lower Fox River Basin and Lower Green Bay TMDL (approved by EPA March 2012).

The City has conducted TMDL planning in 2014 and 2018. Since the completion of the 2018 Plan, the City and private development have implemented numerous additional stormwater management practices (SMPs). In addition, the MS4 permit requires the City to update the WinSLAMM modeling and TMDL implementation plan for submittal to the WDNR by October 31, 2023, per section A.6.3 of the MS4 permit. The purpose of this project is to incorporate practices installed since the 2018 plan, assess compliance with the TMDL, update potential alternatives, and develop a TMDL implementation plan with a focus on the next permit period.

## Stormwater Management Plan Analysis Methodology

This study recalculated the no-controls stormwater pollutant loads throughout the City using the WinSLAMM (Source Loading and Management Model for Windows) version 10.5.0 computer model, representing runoff conditions as if it was completely unmanaged by the City. Next, the impact of existing non-structural and structural stormwater management measures on discharge stormwater quality (with-controls) was calculated throughout the City.

Management measures evaluated include street cleaning, grass swales, regional SMPs, and other practices throughout the City, including the impact of private SMPs. Results are shown on a reachshed basis to allow comparison to the Lower Fox River and Lower Green Bay TMDL reductions. Details on the no-controls and with-controls evaluations are in Section 2 of this report.

Following the no-controls and with-controls analyses, the variety of potential stormwater management measures that were identified in prior planning efforts were updated and expanded on to develop a current list of potential future management measures for consideration. Potential future alternative stormwater practices are detailed in Section 3.

## Summary of Results and Conclusions

### Current Progress Towards TMDL Compliance

The results of the analysis can be seen in Table ES-1 which shows that the City continues to make progress towards the required TMDL reachshed TSS and TP pollutant reduction requirements. As described in Section 4.2, the City believes that it is currently meeting stormwater permit requirements.

### Alternatives and Implementation Plan

Following the evaluation of potential practices, Brown and Caldwell and City staff worked together to select components for implementation. The implementation plan includes a mix of items that provide measurable improvement towards meeting the TMDL goals, such as new wet detention ponds and the incorporation of future green stormwater infrastructure projects as listed in Table 4-1. It also includes some that do not provide numeric improvement but are instrumental in continuing the success of the City's overall plan, such as completing ongoing and future stormwater management planning efforts as listed in Table 4-2. Full implementation plan tables are located in Appendix C, and Section 4 provides details on the selected implementation plan components.

Table ES-1. With Controls Pollutant Loading Results

| TMDL Reachshed     | Analyzed Area (ac) | TSS                        |                                            |                                  |                             |                                      | TP                        |                                       |                                  |                             |                                     |
|--------------------|--------------------|----------------------------|--------------------------------------------|----------------------------------|-----------------------------|--------------------------------------|---------------------------|---------------------------------------|----------------------------------|-----------------------------|-------------------------------------|
|                    |                    | No Controls Load (tons/yr) | With Controls TSS Load Reduction (tons/yr) | With Controls Load Reduction (%) | TMDL Required Reduction (%) | Remaining Reduction Needed (tons/yr) | No Controls Load (lbs/yr) | With Controls Load Reduction (lbs/yr) | With Controls Load Reduction (%) | TMDL Required Reduction (%) | Remaining Reduction Needed (lbs/yr) |
| Baird Creek        | 4,468              | 437                        | 161                                        | 36.7%                            | 52.0%                       | 67                                   | 2,963                     | 887                                   | 29.9%                            | 40.5%                       | 314                                 |
| Bower Creek        | 40                 | 1.4                        | 0.8                                        | 57.4%                            | 52.0%                       | -0.1                                 | 13.0                      | 5.1                                   | 39.0%                            | 40.5%                       | 0.2                                 |
| Duck Creek         |                    |                            |                                            |                                  |                             |                                      |                           |                                       |                                  |                             |                                     |
| Green Bay proper   | 902                | 115                        | 27                                         | 23.1%                            | 52.0%                       | 33                                   | 726                       | 105                                   | 14.5%                            | 40.5%                       | 189                                 |
| Oneida Reservation | 3,072              | 337                        | 87                                         | 25.8%                            | 52.0%                       | 88                                   | 2,030                     | 372                                   | 18.3%                            | 40.5%                       | 450                                 |
| Dutchman Creek     |                    |                            |                                            |                                  |                             |                                      |                           |                                       |                                  |                             |                                     |
| Green Bay proper   | 4                  | 0.09                       | 0.03                                       | 36.4%                            | 52.0%                       | 0.01                                 | 0.59                      | 0.15                                  | 25.2%                            | 40.5%                       | 0.09                                |
| Oneida Reservation | 662                | 51                         | 12                                         | 23.2%                            | 52.0%                       | 15                                   | 361                       | 54                                    | 14.9%                            | 40.5%                       | 93                                  |
| East River         | 3,193              | 491                        | 188                                        | 38.2%                            | 52.0%                       | 68                                   | 2,742                     | 730                                   | 26.6%                            | 40.5%                       | 381                                 |
| Lower Fox River    | 4,878              | 698                        | 201                                        | 28.8%                            | 70.4%                       | 291                                  | 3,965                     | 790                                   | 19.9%                            | 40.5%                       | 815                                 |
| Lower Green Bay    | 4,180              | 472                        | 123                                        | 26.0%                            | 52.0%                       | 123                                  | 2,946                     | 499                                   | 16.9%                            | 40.5%                       | 694                                 |
| <b>Totals</b>      | <b>21,400</b>      | <b>2,603</b>               | <b>798</b>                                 | <b>30.6%</b>                     |                             | <b>684</b>                           | <b>15,747</b>             | <b>3,442</b>                          | <b>21.9%</b>                     |                             | <b>2,936</b>                        |

## Section 1

# Project Background and Goals

## 1.1 Introduction

City of Green Bay (City) stormwater discharge quality is regulated by Wisconsin Department of Natural Resources (WDNR) Municipal Separate Storm Sewer System (MS4) Permit WI-S050075-3. This permit was originally issued in 2006 and is operating under the third iteration of that permit which was reissued with an effective date of May 1, 2019 and expires on April 30, 2024. The permit requires the City to conduct various stormwater management programs including reducing stormwater pollution originating from its existing storm sewer system.

In March 2012 the U.S. Environmental Protection Agency (EPA) approved the document: Total Maximum Daily Load and Watershed Management Plan for Total Phosphorus and Total Suspended Solids in the Lower Fox River Basin and Lower Green Bay (Cadmus 2012). The Lower Fox River and Lower Green Bay total maximum daily load (TMDL) report specifies waste load allocations (WLAs) for each reachshed (i.e., the watershed to an identified segment of a stream, river, or other water body as defined in the 2012 TMDL document) within the City.

In October 2014 the City completed the City of Green Bay Citywide Stormwater Management Plan (AECOM 2014). That plan reviewed the City's progress at meeting the revised Chapter NR 151.13 Wisconsin Administrative Code (WAC) standards and the new Lower Fox River and Lower Green Bay TMDL WLAs. The 2014 plan documented the City's stormwater pollution loads and the reduction achieved with the City's stormwater management practices in place at the time and noted that an evaluation of additional stormwater management practices needed to provide further reductions would be completed in the next stormwater planning effort.

The City Wide 2018 SLAMM Analysis (Brown and Caldwell 2018) updated the City of Green Bay Citywide Stormwater Management Plan, building upon data generated during the 2014 effort and incorporated new guidance and model updates released since that time. The plan re-evaluated the NR 151 Developed Urban Area Performance Standards for Pollution Reduction which focused on total suspended solids (TSS) reduction requirements, and TMDL TSS and total phosphorus (TP) reductions. That report also completed an evaluation of potential stormwater management practices that could be incorporated to further reduce TSS and TP discharges and established an implementation schedule.

Since the completion of the 2018 Plan, the City and private development have implemented additional stormwater management practices. In addition, the City's permit requires the City to update the WinSLAMM modeling and TMDL implementation plan for submittal to the WDNR by October 31, 2023, per section A.6.3 of the MS4 permit. This project will incorporate practices installed since the 2018 plan, assess compliance with the TMDL, update potential alternatives, and develop a TMDL implementation plan with a focus on the next permit period. The methodology used, analytical approach, results, and implementation plan are documented in this report.

## 1.2 TMDL and Pollution Reduction Targets

WDNR finalized the Lower Fox River and Lower Green Bay TMDL (collectively referred to as simply, TMDL) in March 2012, and EPA approved it in May 2012 (Cadmus 2012). The document specifies pollution reduction targets for TSS and TP from the basin reachsheds. The City has 7 reachsheds within the TMDL project area; thus, the City has 14 different goals to meet (7 reachsheds, each with 1 TSS and 1 TP target), instead of 1 general goal for the NR 151 TSS reduction target.

The TMDL states that every TMDL reachshed within Green Bay has a target reduction of 40.0 percent TSS and 30.0 percent TP, except for the Lower Fox River reachshed with a 65.2 percent TSS reduction target and the same 30.0 percent TP, from the TMDL baseline conditions (Cadmus 2012).

As described in the City's 2018 Plan, the actual reduction targets (relative to no-controls conditions) are greater than those listed in the TMDL and TSS and TP reductions from the no-controls conditions are noted in Table A.2 in the current WPDES permit (See Appendix B Supplemental Project Information for a copy of the permit in effect during the development of this Plan document). Additionally, as noted in the permit, due to the regionalization of the Green Bay Packaging facility with the Green Bay Metropolitan Sewerage District (NEW Water), the City was able to purchase TSS credits related to that regionalization effort. The City of Green Bay's TSS reduction from no-controls for the main stem of the Lower Fox River reachshed was reduced from 72 percent to 70.4 percent (see further discussion in Section 2.3.1 in this report). Table 1-1 provides the reduction targets for each reachshed relative to the TMDL no-controls condition. See Figure 1-1 for a graphical image of the 2023 TMDL Reachsheds. (Note that all figures developed for this report are included in Appendix A.)

| <b>TMDL Reachshed</b> | <b>TSS Load Reduction<br/>(tons/year)</b> | <b>TP Load Reduction<sup>1</sup><br/>(lbs/year)</b> |
|-----------------------|-------------------------------------------|-----------------------------------------------------|
| Baird Creek           | 52.0%                                     | 40.5%                                               |
| Bower Creek           | 52.0%                                     | 40.5%                                               |
| Duck Creek            | 52.0%                                     | 40.5%                                               |
| Green Bay proper      | 52.0%                                     | 40.5%                                               |
| Oneida Reservation    | 52.0%                                     | 40.5%                                               |
| Dutchman Creek        | 52.0%                                     | 40.5%                                               |
| Green Bay proper      | 52.0%                                     | 40.5%                                               |
| Oneida Reservation    | 52.0%                                     | 40.5%                                               |
| East River            | 52.0%                                     | 40.5%                                               |
| Lower Fox River       | 70.2%                                     | 40.5%                                               |
| Lower Green Bay       | 52.0%                                     | 40.5%                                               |

<sup>1</sup> Reduction for TP is shown in the WPDES permit on Table A2 as 41%, which is rounded up from the calculated 40.5% based on TMDL Report values and the calculation approach noted in the permit.



## Section 2

# Stormwater Pollution Analysis and Evaluation

## 2.1 Methodology

The project setting and broader methodology for applying the WinSLAMM model to evaluate TMDL pollutant loadings under no-controls and with-controls is described in detail in the 2018 Plan. No review or update of loads or reductions for the NR151 Developed Urban Area Performance Standard are required going forward now that the City is under TMDL reduction goals. This plan update was completed following the same general approach and methodology as documented in that plan and following current WDNR guidance documents. Any changes in approach or data utilized to develop no-controls and with-controls loadings are described in this report.

## 2.2 No-Controls Conditions Analysis and Results

The no-controls condition was updated as part of this study for the various TMDL reachsheds. Updated information included the following:

- Permitted Area
  - Brown and Caldwell (BC) conducted a review and update to the existing municipal city limits – minor differences were noted in the City limits between the 2018 Plan and this update. The differences in boundary were located within the Bay of Green Bay and have no material impact on the results of this study.
- Oneida Nation
  - The City of Green Bay has an Intergovernmental Agreement with the Oneida Nation that was executed in 2021 for a period through December 21, 2030, and which also automatically renews for successive five-year terms. The agreement outlines resource sharing and cost mitigation for a variety of services including environmental protection and stormwater management. During a conversation with WDNR (Chris Linskens) on June 14, 2023, it was noted that there were no current changes to the situation related to the overlay of the Oneida Reservation with the City of Green Bay. This plan continues to report the areas and loads related to the City of Green Bay Proper and the overlapping area within the Oneida Reservation for the two impacted reachsheds separately in case the City's stormwater management planning requires this distinction due to any future agreement or regulation between the two entities.
- Excluded Areas
  - BC also updated the various areas that are allowed or required for exclusion following current WDNR guidance.
    - Excluded areas associated with agricultural land areas were generally reduced due to development.
    - Permitted industrial areas were identified based on retrieving the current list of permitted industrial sites from the WDNR website as of May 23, 2023, and in

coordination with mapping and data managed by City staff as part of WPDES annual reporting. The applicability of this list for use in this update was confirmed during the aforementioned conversation with WDNR.

- Other entities including the University of Wisconsin – Green Bay, Wisconsin DOT, and Brown County, operate under their own WPDES stormwater management permits and were excluded from the City’s analysis consistent with the 2018 Plan and WDNR guidance as described in the following paragraphs.
  - The University of Wisconsin – Green Bay campus is located in a geographically separated area from the City and is delineated as a separate drainage area/basin in the City’s graphic information system (GIS).
  - Excluded areas related to Brown County were based on a review of the 1982-1991 Brown County Highway Jurisdictional Study, Brown County published mapping, a review of WisDOT mapping showing current Brown County highways (see Appendix B) and coordination with Brown County Staff and a review of their identified MS4 permitted areas within the City limits.
  - Areas of responsibility associated with the Wisconsin Department of Transportation (WisDOT) were identified based on a review of the WisDOT Connecting Highways map for the City of Green Bay. Connecting highways identified in red are the responsibility of the City. Other highways and the Interstate System shown in darker gray are the responsibility of WisDOT and were excluded from this study (see Appendix B).

It is important to note that some parcels or areas have more than one potential category for exclusion from this study and therefore, the summarized excluded areas aggregated in this report may differ in quantity for any individual excluded area type listed in the 2018 Plan (excluded area acreages were not reported in the 2014 Plan). Additionally, the extent of excluded areas has increased from the 2018 Plan based on the review and discussions noted above during this planning effort. The excluded areas and associated acreages are summarized in Table 2-1 by category selected for exclusion for this study and are shown graphically on Figure 2-1.

| Table 2-1. TMDL Excluded Areas |                        |                         |              |
|--------------------------------|------------------------|-------------------------|--------------|
| Excluded Area Category         | City of Green Bay (ac) | Oneida Reservation (ac) | Total (ac)   |
| Agriculture                    | 3,566                  | 67                      | 3,633        |
| County                         | 165                    | 40                      | 205          |
| Industrial Permitted           | 712                    | 120                     | 832          |
| Open Water                     | 714                    | 31                      | 745          |
| Riparian                       | 1,183                  | --                      | 1,183        |
| UW Green Bay                   | 659                    | --                      | 659          |
| WisDOT                         | 784                    | 61                      | 846          |
| <b>Totals</b>                  | <b>7,783</b>           | <b>320</b>              | <b>8,102</b> |

- City Basins, TMDL Reachshed Boundaries and Analyzed Area
  - City basins and their associated TMDL reachshed boundaries and resulting analyzed area were adjusted in several locations due to new storm sewers associated with development, routine public works projects, or for other reasons, to better define the current drainage areas within each of the various reachsheds. The changes reflect information provide to BC by the City in May 2023. As presented earlier, Figure 1-1 shows the resulting reachshed boundaries and Figure 2-2 shows the resulting 2023 TMDL Analyzed Area following the removal of the aforementioned excluded areas. The areas analyzed for TSS and TP loadings and reductions in this study by reachshed are listed in Table 2-4, presented later in this section.
- Soils Designation
  - BC retrieved the most current soils classifications for the study area from the USDA-NRCS website in May 2023. Those soils classifications were reviewed and where necessary assigned appropriate WinSLAMM soil types based on texture (sandy, silty, clayey) as described in Section 2.6 of the 2018 report. Figure 2-3 shows the WinSLAMM Soil Types utilized for this study and the percentage of soil area by category for the analyzed area is summarized in Table 2-2.

| Table 2-2. WinSLAMM Soil Types    |                                       |                                     |
|-----------------------------------|---------------------------------------|-------------------------------------|
| Soil Hydrologic Group (USDA/NRCS) | Texture/Designated WinSLAMM Soil Type | 2023 Analyzed Area Percent Coverage |
| A                                 | Sandy                                 | 10%                                 |
| B                                 | Silty                                 | 6%                                  |
| C or D                            | Clayey                                | 85%                                 |

- Land Use
  - Land use changes were generally only made associated with areas of new development where agricultural lands have developed since the 2018 study, or where, in review of re-development area information, it was felt that a change in land use designation was needed to better align with the current type of development. A city-wide review and update or re-confirmation of land use was not conducted and for the most part, the same land use designations were maintained from the 2018 Plan. Figure 2-4 shows the WinSLAMM Land Use Categories for this study which are also summarized in Table 2-3.

The resulting geodatabase covering the entire TMDL analyzed area for this study with information related to soils, land use and TMDL reachsheds was analyzed using WinSLAMM to update the No-controls Pollutant loading Results for TSS and TP as summarized in Table 2-4 by reachshed. This establishes the updated conditions and starting point for the City relative to the required TMDL reductions.

| <b>Table 2-3. WinSLAMM Land Use Categories</b> |                       |
|------------------------------------------------|-----------------------|
| <b>WinSLAMM Land Use Category</b>              | <b>2023 Area (ac)</b> |
| Commercial                                     | 1,932                 |
| High Traffic Urban                             | 394                   |
| Industrial                                     | 1,879                 |
| Institutional                                  | 1,166                 |
| Other Urban                                    | 4,798                 |
| Residential                                    | 11,231                |
| <b>Total</b>                                   | <b>21,401</b>         |

| <b>Table 2-4. No-Controls Pollutant Loading Results</b> |                           |                             |                           |
|---------------------------------------------------------|---------------------------|-----------------------------|---------------------------|
| <b>TMDL Reachshed</b>                                   | <b>Analyzed Area (ac)</b> | <b>TSS Load (tons/year)</b> | <b>TP Load (lbs/year)</b> |
| Baird Creek                                             | 4,469                     | 438                         | 2,964                     |
| Bower Creek                                             | 40                        | 1.4                         | 13                        |
| Duck Creek                                              |                           |                             |                           |
| Green Bay proper                                        | 902                       | 115                         | 726                       |
| Oneida Reservation                                      | 3,072                     | 337                         | 2,030                     |
| Dutchman Creek                                          |                           |                             |                           |
| Green Bay proper                                        | 4                         | 0.1                         | 0.6                       |
| Oneida Reservation                                      | 662                       | 51                          | 361                       |
| East River                                              | 3,193                     | 491                         | 2,742                     |
| Lower Fox River                                         | 4,878                     | 698                         | 3,965                     |
| Lower Green Bay                                         | 4,180                     | 472                         | 2,946                     |
| <b>Totals</b>                                           | <b>21,401</b>             | <b>2,603</b>                | <b>15,747</b>             |

## 2.3 With-Controls Conditions Analysis and Results

### 2.3.1 Green Bay Packaging TSS Credit

As part of the expansion of Green Bay Packaging's paper mill facility at 1601 North Quincy Street, direct discharges to the Fox River were removed with the development of a new Reclaimed Water System and treatment by NEW Water (Green Bay Metropolitan Sewerage District). As part of a Tripartite Agreement between NEW Water, the City of Green Bay and Green Bay Packaging, the City of Green Bay purchased the rights to the 108,259 pounds (~54.13 tons) of annual TSS credits realized as part of the new project. The cost of the credit purchase is \$3.00 per pound per month and is increased annually on first of the year following the TMDL WLA transfer. The first monthly charge is  $\$3.00 \times 108,259 / 12 = \$27,065$  (\$324,780/year). Using the August 2020 Agreement

date as a start date, 3 percent inflation over 3 years is a 1.093 multiplier, so the 2023 cost would be  $\sim \$354,985 / 54.13 \text{ tons} = \sim \$6,558 / \text{ton of TSS removed}$ .

Exhibit B of the Agreement discusses the TMDL WLA calculation, which is also presented as a footnote on page 47 of the WDNR's updated WPDES permit WI-S050075-3 to reflect the purchased credit. The credit results in a new TSS percent Reduction from No-Controls of 70.4 percent (from 72 percent) for the City of Green Bay for the Lower Fox River reachshed as presented on Table A2 of the WPDES permit.

### 2.3.2 Street Cleaning

Street cleaning was represented in the model as an intensive spring-cleaning program, utilizing four mechanical (broom) and five high efficiency (regenerative air) cleaners, with one piece of each equipment considered back-up equipment, which is consistent with how the program was modeled in the 2018 plan. This approach is modeled in WinSLAMM with weekly cleaning from March 30 through May 10 (6 weeks/times), and then every two weeks thereafter (14 times) until November 25 (approximately Thanksgiving). This equates to a total number of annual cleaning rotations throughout the City of 20 times.

The City noted that under their current program, the City starts street cleaning usually mid-March or early April and continually sweep the City through Thanksgiving or until the weather doesn't allow, which matches the season in WinSLAMM. All streets in the City are cleaned approximately 20 times (rounds) during the year as part of this program (which also matches the number of annual cleaning rotations/events in WinSLAMM).

The City's program also conducts 4 to 6 rounds of cleaning in alleys, depending on available time and need, which is not analyzed in WinSLAMM or available for direct load reduction based on current WDNR modeling guidance. Typically, spring and fall yard waste street cleaning rotations are not included in the 20 rounds mentioned. Those are part of the fall leaf collection and vary highly depending on how much yard waste is out. Any illicit spills are cleaned up as needed and not included in routine cleaning efforts.

Additionally, at the beginning of the street cleaning season, streets (primary and residential streets) are cleaned curb to curb to make sure the entire street surface is cleaned following winter. After that the program returns to standard cleaning along gutter lines only, unless leaves, spills, etc. warrant sweeping the entire street.

Figure 2-5 shows the areas in the City that are cleaned under this program. The resulting effectiveness of the City's street cleaning program on the individual reachsheds is summarized in Table 2-5.

It is important to note that as these tables are presented in the report, there may be stormwater management practices that overlap in treating a particular geographic area. In the resulting with-controls pollutant reduction summary presented later in this section, the highest reducing stormwater management practice is selected and accounted for in the resulting reachshed reductions. For this reason, the reductions shown in the individual practices discussed in this section cannot be added up to create a resulting reachshed or City-wide reduction.

**Table 2-5. Street Cleaning Pollutant Loading Results**

| TMDL Reachshed     | Street Cleaning Treatment Area (ac) | TSS                                      |                                                   | TP                                      |                                                   |
|--------------------|-------------------------------------|------------------------------------------|---------------------------------------------------|-----------------------------------------|---------------------------------------------------|
|                    |                                     | Street Cleaning Load Reduction (tons/yr) | Street Cleaning Reachshed Load Reduction Impact % | Street Cleaning Load Reduction (lbs/yr) | Street Cleaning Reachshed Load Reduction Impact % |
| Baird Creek        | 4,358                               | 89                                       | 20.3%                                             | 367                                     | 12.4%                                             |
| Bower Creek        | 40                                  | 0.4                                      | 27.3%                                             | 1.6                                     | 12.4%                                             |
| Duck Creek         |                                     |                                          |                                                   |                                         |                                                   |
| Green Bay proper   | 902                                 | 26                                       | 22.4%                                             | 99                                      | 13.7%                                             |
| Oneida Reservation | 2,939                               | 62                                       | 18.5%                                             | 235                                     | 11.6%                                             |
| Dutchman Creek     |                                     |                                          |                                                   |                                         |                                                   |
| Green Bay proper   | 3.9                                 | 0.03                                     | 36.4%                                             | 0.15                                    | 25.2%                                             |
| Oneida Reservation | 661                                 | 11                                       | 22.4%                                             | 51                                      | 14.2%                                             |
| East River         | 3,139                               | 91                                       | 18.5%                                             | 332                                     | 12.1%                                             |
| Lower Fox River    | 4,751                               | 137                                      | 19.6%                                             | 498                                     | 12.6%                                             |
| Lower Green Bay    | 4,162                               | 97                                       | 20.6%                                             | 368                                     | 12.5%                                             |
| <b>Totals</b>      | <b>20,956</b>                       | <b>514</b>                               |                                                   | <b>1,953</b>                            |                                                   |

### 2.3.3 Grassed Swales

A limited number of City roadways have swale drainage systems, which were modeled in the 2018 Plan. Infiltration rates were based on swale location in the City aligned with infiltration testing done in 2013 by AECOM (see Appendix C of the 2018 Plan for details on the swale testing program analysis), which determined that based on the field testing program, on average swales on the west side of Green Bay had higher infiltration rates (5.49 inches per hour) and swales on the east side had lower infiltration rates (0.21 inches per hour).

In 2019, the City added grassed swales in the median as part of the Webster Avenue reconstruction from approximately Radisson Street south to Harvey Street. A WinSLAMM model was developed by BC to represent the stormwater quality benefits of these swales new swales. The grass swales along Webster Avenue treat 6 acres and reduce both TSS and TP by approximately 97 percent due to the high amount of infiltration associated with these swales. Model results for the new Webster Avenue grass swale model are summarized in the WinSLAMM Modeling Log in Appendix B. Additionally, some areas of the City have undergone urbanization. The resulting areas associated with grass swale drainage are shown on Figure 2-5. The result of these changes and the effectiveness of grasses swales on the City's TMDL reachsheds are summarized in Table 2-6. All WinSLAMM models developed as a part of this study are part of the electronic deliverables provided to the City.

**Table 2-6. Grass Swale Pollutant Loading Results**

| TMDL Reachshed     | Grass Swale Treatment Area (ac) | TSS                                  |                                               | TP                                  |                                               |
|--------------------|---------------------------------|--------------------------------------|-----------------------------------------------|-------------------------------------|-----------------------------------------------|
|                    |                                 | Grass Swale Load Reduction (tons/yr) | Grass Swale Reachshed Load Reduction Impact % | Grass Swale Load Reduction (lbs/yr) | Grass Swale Reachshed Load Reduction Impact % |
| Baird Creek        | 111                             | 8.8                                  | 2.0%                                          | 60                                  | 2.0%                                          |
| Bower Creek        | -                               | -                                    | -                                             | -                                   | -                                             |
| Duck Creek         |                                 |                                      |                                               |                                     |                                               |
| Green Bay proper   | -                               | -                                    | -                                             | -                                   | -                                             |
| Oneida Reservation | 133                             | 6.1                                  | 1.8%                                          | 49                                  | 2.4%                                          |
| Dutchman Creek     |                                 |                                      |                                               |                                     |                                               |
| Green Bay proper   | -                               | -                                    | -                                             | -                                   | -                                             |
| Oneida Reservation | 1.3                             | 0.03                                 | 0.1%                                          | 0                                   | 0.1%                                          |
| East River         | 55                              | 5.9                                  | 1.2%                                          | 37                                  | 1.4%                                          |
| Lower Fox River    | 127                             | 9.3                                  | 1.3%                                          | 71                                  | 1.8%                                          |
| Lower Green Bay    | 18                              | 1.2                                  | 0.2%                                          | 7                                   | 0.2%                                          |
| <b>Totals</b>      | <b>445</b>                      | <b>31</b>                            |                                               | <b>225</b>                          |                                               |

### 2.3.4 Stormwater Lift Stations

As noted in the 2018 Plan, the City has a number of stormwater lift stations. Drainage areas that are tributary to these lift stations and contain structures with a sump depth greater than 1.0 foot can be included for their stormwater pollutant reduction benefits by modeling them in the same manner that catch basins are modeled in WinSLAMM.

Since the 2018 study, the City abandoned the lift station at 120 East Mason Street (at Adams Street) in 2020 and relocated the lift station at 511 South Broadway to the Shipyard site in 2019.

The City also constructed five new lift stations, four of which have a sump structure of sufficient depth to be included in this analysis. The treatment areas also benefit from the street cleaning practice currently employed by the City as described in Section 2.3.2 previously. Sump depths range from 0.5 ft to 3.0 ft, with the Museum Place lift station having the smallest sump depth of 0.5 ft and was omitted from water quality modeling due to the insufficient sump depth (less than 1.0 ft). Treated areas range from 23.6 acres to 378 acres and model results indicate that TSS reductions range from 6.22 percent to 29.72 percent (without street cleaning).

Of the four lift station models, the Mather Street lift station model had the smallest sump depth (1.4 ft) and the lowest TSS reduction (without street cleaning). After incorporating street cleaning into the lift station models, overall TSS reductions ranged from 17.7 percent to 36.9 percent, with the Mather Street lift station having very a significant (75 percent) increase in TSS reduction as compared to no street cleaning. Model results show that street cleaning effectively increases the TSS and TP reduction for stormwater lift stations. Details on the five models, including treatment areas, TSS and TP reductions, are included in the City Practices WinSLAMM Modeling Log table included in Appendix B.



All models were run with both a 3-year cleaning frequency and annual cleaning frequency. The lift station manufacturers' O&M manuals noted that periodic cleaning would occur every 3 years, with additional cleaning performed if needed. Since annual cleaning is considered a more typical frequency, both frequencies were modeled for comparison. Three out of the four models did not show any change in TSS reduction with the annual cleaning frequency. The Mather Street lift station was the only case where this change resulted in an increase in TSS reduction as compared to a 3-year cleaning frequency.

Figure 2-6 shows the location of current stormwater lift stations with stormwater quality sump and their associated drainage areas, which are summarized in Table 2-7.

| Table 2-7. Lift Station Pollutant Loading Results |                                  |                                       |                                                |                                      |                                                |
|---------------------------------------------------|----------------------------------|---------------------------------------|------------------------------------------------|--------------------------------------|------------------------------------------------|
| TMDL Reachshed                                    | Lift Station Treatment Area (ac) | TSS                                   |                                                | TP                                   |                                                |
|                                                   |                                  | Lift Station Load Reduction (tons/yr) | Lift Station Reachshed Load Reduction Impact % | Lift Station Load Reduction (lbs/yr) | Lift Station Reachshed Load Reduction Impact % |
| Baird Creek                                       | -                                | -                                     | -                                              | -                                    | -                                              |
| Bower Creek                                       | -                                | -                                     | -                                              | -                                    | -                                              |
| Duck Creek                                        |                                  |                                       |                                                |                                      |                                                |
| Green Bay proper                                  | -                                | -                                     | -                                              | -                                    | -                                              |
| Oneida Reservation                                | -                                | -                                     | -                                              | -                                    | -                                              |
| Dutchman Creek                                    |                                  |                                       |                                                |                                      |                                                |
| Green Bay proper                                  | -                                | -                                     | -                                              | -                                    | -                                              |
| Oneida Reservation                                | -                                | -                                     | -                                              | -                                    | -                                              |
| East River                                        | 199                              | 10                                    | 1.9%                                           | 40                                   | 1.4%                                           |
| Lower Fox River                                   | 2,438                            | 84                                    | 12.1%                                          | 360                                  | 9.1%                                           |
| Lower Green Bay                                   | 24                               | 1                                     | 0.2%                                           | 4                                    | 0.1%                                           |
| <b>Totals</b>                                     | <b>2,662</b>                     | <b>95</b>                             |                                                | <b>403</b>                           |                                                |

### 2.3.5 Wet Detention Ponds

Two wet detention ponds were constructed by the City since the 2018 Plan analysis was completed, the Fox River Papermaking Corridor (FRPC) Pond (AKA Wolf Pack Pond) and Superior Road Pond. These two new City SMPs were added to a table of other existing City SMPs from prior planning efforts and included in this evaluation as shown in Appendix B. Each is described in the following paragraphs.

#### Fox River Papermaking Corridor (FRPC) Pond

The Fox River Papermaking Corridor (FRPC) pond, located on Angie Avenue, was constructed in 2019 to treat stormwater runoff from the Green Bay Packaging Mill Site on Quincy Street. This pond was identified in the 2018 study as potential future stormwater control measure (SCM) ID 72. Per the Stormwater Management Report (OMNNI Associates, March 15, 2019), the pond was also sized to



treat future development by NEW Water on undeveloped property east and south of their current site. BC reviewed the report, drawings and WinSLAMM modeling provided by the City associated with the pond. The model and report matched the provided drawings. The pond and drainage area was re-evaluated in 2021 to include drainage from the McDonald Lumber Yard Company site per an update to the original study (Robert E. Lee & Associates, February 11, 2021). BC developed a drainage basin boundary for the pond and applied the TSS and TP reductions reported in the model of 81.69 percent and 56.31 percent respectively to the no-controls loads associated with the delineated drainage area of 173.9 acres. These reductions include the additive impact of other existing stormwater quality practices in the drainage area as modeled.

The future efficiency of the pond is projected to reduce slightly with the increased loading as areas develop, but the overall tons of TSS and pounds of TP removed will be significantly higher. Future development and associated pond efficiency and load reductions were not included in this analysis and would need to be updated as appropriate.

### **Superior Road Pond**

The Superior Road Storm Water Pond is located on the City's east side along Superior Road, just north of Sitka Street. Record drawings were compared to the design drawings and WinSLAMM model files provided by the City. A modification was made to the model to adjust the initial stage in the model to match the normal water level, but the remaining information (pond geometry, orifices, drainage area, land use) appeared reasonable and were left as provided. BC delineated the drainage area, 62.5 acres, in the project GIS for the constructed facility and applied TSS and TP reductions of 82.61 percent and 58.37 percent respectively to the no-controls loads.

The treatment area of these two new ponds is included in Figure 2-7 City Stormwater Management Practices. The impact of these new wet detention ponds is also included in Table 2-8 City SMP Pollutant Loading Results which shows the combined impact of all City owned SMPs on each reachshed. These two individual practices are also summarized in the City Practices WinSLAMM Modeling Log table included in Appendix B.

**Table 2-8. City SMP Pollutant Loading Results**

| <b>TMDL Reachshed</b> | <b>City SMP Treatment Area (ac)</b> | <b>City SMP TSS Load Reduction (tons/yr)</b> | <b>City SMP TSS Reachshed Load Reduction Impact %</b> | <b>City SMP TP Load Reduction (lbs/yr)</b> | <b>City SMP TP Reachshed Load Reduction Impact %</b> |
|-----------------------|-------------------------------------|----------------------------------------------|-------------------------------------------------------|--------------------------------------------|------------------------------------------------------|
| Baird Creek           | 884                                 | 69                                           | 15.8%                                                 | 486                                        | 16.4%                                                |
| Bower Creek           | -                                   | -                                            | -                                                     | -                                          | -                                                    |
| Duck Creek            |                                     |                                              |                                                       |                                            |                                                      |
| Green Bay proper      | -                                   | -                                            | -                                                     | -                                          | -                                                    |
| Oneida Reservation    | 52                                  | 4                                            | 1.1%                                                  | 25                                         | 1.2%                                                 |
| Dutchman Creek        |                                     |                                              |                                                       |                                            |                                                      |
| Green Bay proper      | -                                   | -                                            | -                                                     | -                                          | -                                                    |
| Oneida Reservation    | 12                                  | 0.4                                          | 0.9%                                                  | 2                                          | 0.5%                                                 |
| East River            | 499                                 | 64                                           | 13.0%                                                 | 253                                        | 9.2%                                                 |
| Lower Fox River       | 138                                 | 24                                           | 3.4%                                                  | 65                                         | 1.6%                                                 |
| Lower Green Bay       | 349                                 | 29                                           | 6.1%                                                  | 141                                        | 4.8%                                                 |
| <b>Totals</b>         | <b>1,934</b>                        | <b>190</b>                                   |                                                       | <b>971</b>                                 |                                                      |

### 2.3.6 Green Stormwater Infrastructure

The City has a variety of green stormwater infrastructure practices throughout the City to provide volume and pollutant reduction. The Eliza Street permeable pavement project (“Pavement 5-22 Eliza Street Reconstruction”) is located in the central part of the City in the Fox River reachshed and spans from S. Monroe Avenue on the east to the Fox River on the west. The project installed permeable paver blocks with a stone storage/treatment base. The City provided an existing WinSLAMM model which was reviewed in comparison to the design drawings. Modifications were made to the model which included adjusting the permeable pavement surface area to match the design drawings and utilizing the same five-year rainfall model file used for this overall citywide planning project so that the model results could be appropriately incorporated into the pollutant load reductions. BC delineated the drainage area in the project GIS for the constructed facility and applied TSS and TP reductions of 75.68 percent and 63.76 percent respectively to the no-controls loads associated with the delineated drainage area of 1.15 acres.

The treatment area of the Eliza Street project is included in Figure 2-7 City Stormwater Management Practices. The impact of the Eliza Street project is also included in Table 2-8 City SMP Pollutant Loading Results which shows the combined impact of all City owned SMPs on each reachshed. The Eliza Street Model results are also summarized in the City Practices WinSLAMM Modeling Log and City Practices tables included in Appendix B.

### 2.3.7 Leaf Management

The WDNR finalized leaf management program that was in draft form during the 2018 Plan. Under WDNR guidance, there are conditions that define the area that is eligible for leaf management credit. To be eligible, the area must have a residential land use, curb and gutter streets, a high level of tree canopy, and not be treated by a higher performing downstream structural SMP (such as a wet pond).

To determine whether there is a high level of tree canopy, there are two options provided by the WDNR as follows:

- Option A: An average of one or more medium to large canopy trees located between the sidewalk and the curb for every 80 linear feet of curb.
- Option B: An average of 40 percent or greater leaf canopy over the pavement, or 45 percent tree canopy or greater over the right-of-way determined using leaf-on aerial photography.

The analysis was conducted using Option A, utilizing the City of Green Bay GIS tree dataset (MS Access database). This dataset represents trees within City property which includes the right-of-way and parks areas. The dataset includes various attributes regarding trees, including the tree diameter. It was assumed that a diameter at breast height of 12-inches or greater equated to a medium to large trees. In conjunction with the tree data, the City's street centerline GIS file and property data was utilized. The address in the tree database was georeferenced to the City parcel data. The street centerline file was clipped to areas meeting the land use and street section criteria. The number of medium or large trees along each segment (intersection to intersection) was then tallied up in the project GIS. The length of the street segment was then multiplied by two to account for curb and gutter on both sides of the street. This length was divided by the count of trees along each segment to calculate the average medium or large tree spacing. If the tree spacing was less than 80-feet the segment was identified as eligible. Figure 2-8 shows the areas within the City that meet these criteria.

The resulting areas were compared to other available sources to see if the identified areas were reasonable. The following items were considered:

1. Google street view was utilized to spot check residential areas throughout the City. It was generally observed that the images in street view correlated with the tree dataset.
2. The WDNR community tree canopy mapping application (<https://dnr.wisconsin.gov/topic/urbanforests/ufia/plan-treecanopy>) was reviewed. This mapping data showed a city-wide tree canopy of 32.9 percent for the City as a whole. The data could be further reviewed at a detailed level. The "Block" level view (see tree canopy image below), shows considerable variability in tree canopy depending on location within the City. Areas along the Fox River and with agricultural land use have understandably the lowest tree canopy density.



In addition to the criteria regarding areas that are eligible for leaf management credit, the WDNR guidance document established leaf management programmatic criteria. The following section describes the requirements of the WDNR guidance document and how the City's program compares:

1. WDNR Criteria #1: The municipality has an ordinance prohibiting residents from placement of leaves in the street.
  - a. Based on a review of information published to direct citizen actions for leaf management, the City's Municipal Code prohibits the placement of leaves in the street. (Source Public Works Press Releases "News Flash" published 10/4/2022 to 11/25/2022 and City website (archived) on Fall Leaf Collection posted October 4, 2022.)
2. WDNR Criteria #2: The municipality has a policy that leaves are placed by residents on the street terrace and collected at a specified frequency and timing. As part of the collection, the leaves are collected by loading them into an enclosed vehicle without being left in the street overnight.
  - a. City Facebook posts and local news press releases state that leaves should be placed on the terrace and provide additional information regarding leaf pickup program details.
3. WDNR Criteria #3: If on street parking densities are greater than "light", there is an ordinance or enforceable policy to restrict parking during leaf collection and street cleaning.
  - a. Within residential areas of the City, the parking densities are light.
4. WDNR Criteria #4: The leaf collection program starts no later than October 1 each year. The guidance document should be consulted for further information regarding when street cleaning and bulk collection activities associated with street cleaning begins.
  - a. The 2022 Press Release identifies a start date of October 24, 2022, for the start of the leaf collection program; however, in other years the leaf collection program has begun in early October.
  - b. The announced 2022 start date is later than the October 1 date indicated by WDNR guidance. The leaf accumulation conditions in the street will need to be monitored, and collection and street cleaning activities may need to begin earlier than conducted by the City in 2022. The WDNR guidance document will be utilized by staff to coordinate timing of leaf management pickup start date based on leaf fall to the extent practicable.
  - c. In 2023, the City selected an earlier start date of October 8 to align more closely with the WDNR guidance document. The City will continue to evaluate the leaf collection start date to balance program efficiencies with the intent of the guidance.
5. WDNR Criteria #5: The leaf collection program occurs three to four times throughout October and November.
  - a. Per City staff, the 2022 City leaf collection ran for five weeks (through November 25, 2022).
  - b. It is believed that the City complies with this criteria as the adequate number of collection cycles is completed. It is possible that the City's program may need to be begin sooner and be extended to the end of November to meet the requirements.

With meeting the criteria above, there are two levels of TP reduction that can be achieved by leaf management activities under the current guidance document. These levels are described as follows:

1. Numeric Credit Option #1: Within 24-hours of leaf collection the streets within the collection area are cleaned with either a mechanical or high-efficiency street cleaner. A 17 percent TP reduction credit is achieved under this option.
  - a. Based on communication with City staff during the development of this plan, it was noted that streets are cleaned within 24 hours of leaf pickup, and usually the same day. Sweeping equipment is a mix of mechanical and regenerative air cleaners. Based on the

considerations noted above, a 17 percent TP reduction for eligible areas is believed to be appropriate for the City.

2. Numeric Credit Option #2: Weekly street cleaning occurs with high efficiency street cleaners in addition to the loose-leaf collection. A 25 percent TP reduction credit is achieved under this option.
  - a. Currently, the City does not feel it has the staffing resources to implement a weekly street cleaning program and also lacks enough regenerative air cleaners to conduct this level of sweeping, therefore would not be eligible for Credit Option #2 at this time.

The impact of the City's leaf management program on each reachshed, assuming a maximum 17 percent TP reduction for eligible areas is included in Table 2-9.

| <b>Table 2-9. Leaf Management Pollutant Loading Results</b> |                                           |                                                   |                                                             |
|-------------------------------------------------------------|-------------------------------------------|---------------------------------------------------|-------------------------------------------------------------|
| <b>TMDL Reachshed</b>                                       | <b>Leaf Management Eligible Area (ac)</b> | <b>Leaf Management TP Load Reduction (lbs/yr)</b> | <b>Leaf Management TP Reachshed Load Reduction Impact %</b> |
| Baird Creek                                                 | 299                                       | 40                                                | 1.4%                                                        |
| Bower Creek                                                 | -                                         | -                                                 | -                                                           |
| Duck Creek                                                  |                                           |                                                   |                                                             |
| Green Bay proper                                            | 104                                       | 14                                                | 2.0%                                                        |
| Oneida Reservation                                          | 125                                       | 16                                                | 0.8%                                                        |
| Dutchman Creek                                              |                                           |                                                   |                                                             |
| Green Bay proper                                            | -                                         | -                                                 | -                                                           |
| Oneida Reservation                                          | 54                                        | 7                                                 | 1.9%                                                        |
| East River                                                  | 239                                       | 34                                                | 1.2%                                                        |
| Lower Fox River                                             | 275                                       | 40                                                | 1.0%                                                        |
| Lower Green Bay                                             | 211                                       | 30                                                | 1.0%                                                        |
| <b>Totals</b>                                               | <b>1,306</b>                              | <b>182</b>                                        |                                                             |

### 2.3.8 Private SMPs

Privately owned SMPs can include a variety of devices such as biofilters, catch basins, porous pavement, proprietary settling/filtering devices, and water quality (wet detention) ponds. SMP treatment areas can range from less than an acre to multiple acres. The 2018 Plan included some private sites in the analysis. A list of private sites included in the 2018 Plan analysis is included in Appendix B.

As part of this project, City staff inventoried approximately 150 locations/project sites by reviewing their permitting/plan review files to create a private development dataset by year from 2017 (01-2017 Kwik Trip site) to mid-2023 (2023-5 Rogan's Shoes site), spanning the years past the prior plan pollutant evaluation cutoff date. The City also collected information on approximately 225 sites



prior to 2017. Pre-2017 sites were not reviewed for inclusion in the analysis as part of this plan. This was an extensive effort by the City to research project files to identify, and then provide details to BC for use and application in this SWMP. Data collected included permit number, parcel number(s), notes, address, SMP type(s) incorporated at the site, cumulative TSS and TP removals (percentages), SMP treatment area, dates of as-built/engineering certification/maintenance plan(s) recording where available, and other details.

Some sites included multiple SMPs on site in a single submittal, and some sites had multiple related submittals and practices installed. Some sites were listed multiple times in the dataset. Those sites were noted to the City which provide additional information to guide how, or if, those sites were included in the analysis. The detailed listing of private site from 01-2017 through 2023-5 included in the analysis and their associated TSS and TP load reductions can be found in Appendix B.

BC appended the city collected data to include the full parcel(s) area, checked parcel area vs reported treatment area, and calculated the applied TSS and TP values to be used. The treatment site area was also compared to the site development parcel(s) area to create a SMP treatment area to parcel area ratio which was used to create an applied TSS and TP value for use in this analysis to not overestimate pollutant reductions for the site. The adjustment in treatment reduction for the development was applied in lieu of creating individual SMP treatment (tributary) areas and breaking up individual parcels due to the inefficiency of this exercise.

Each site was flagged either as being incorporated into this 2023 plan or not, with a reason if not incorporated. A site that lacked key information (either SMP treatment area or TSS reduction) was not included in the analysis. Sites that lacked reported TP information had estimated TP reductions estimated based on WDNR rules-of-thumb (40 percent TSS reduction = 27 percent TP reduction for eligible practices). In a few cases, the maximum pollutant reduction associated with a site was modified from the reported information beyond just being due to the calculated SMP treatment to parcel area ratio. This was typically due to WDNR guidance limitations associated with TP for some practices (biofiltration/porous pavement). Only sites that did not include the necessary data to quantify the effectiveness of the SMP were not included in the analysis. An annotated spreadsheet based on the original information provided by the City was also returned as part of the deliverables from this project, including sites prior to 2017 that could be included in future updates.

Some sites lack as built and a recorded maintenance agreement confirmation. The City is making an effort to obtain these features on all new approved and constructed projects and some past projects where practical. Sites that lack a recorded maintenance agreement are being included in the analysis. The reason for this is that the City's post-construction stormwater management ordinance, primarily Sec. 16-85(J) gives the City specific authority to conduct the maintenance work and bill it back to the property owner if needed. Language from the ordinance is as follows:

“(j) When the Director of Public Works determines that a permittee has failed to follow practices set forth in the stormwater management plan submitted and approved pursuant to Section 16-82, or has failed to comply with schedules set forth in said stormwater management plan, the Director of Public Works or a party designated by the Director of Public Works may enter upon the land and perform the work or other operations necessary to bring the condition of said lands into conformance with requirements of the approved plan. The Director of Public Works shall keep a detailed accounting of the costs and expenses of performing this work. These costs and expenses shall be deducted from any performance or maintenance bond posted pursuant to Section 16-82(d). Where such a bond has not been established, or where such a bond is insufficient to cover these costs, the costs and expenses shall be entered on the tax roll as a special charge against the property and

collected with any other taxes levied thereon for the year in which the work is completed.”

The cumulative impact of private sites included in the prior plan and permit sites 01-2017 to 2023-5 added in this plan on the with-controls analysis to reduce TSS and TP loadings in the City and their cumulative impact on individual reachsheds is shown on Table 2-10. Figure 2-9 displays the geographic location of the various parcels with private SMPs that were included. Of the sites inventoried and reviewed as part of this study, 12 lacked key details and are not currently represented in this report the potential impact of these sites cannot be quantified at this time (see Appendix B). In the future, if the missing information can be identified, those sites can also be added to the next update.

| Table 2-10. Private SMP Pollutant Loading Results |                     |                                      |                                               |                                     |                                              |
|---------------------------------------------------|---------------------|--------------------------------------|-----------------------------------------------|-------------------------------------|----------------------------------------------|
| TMDL Reachshed                                    | Treatment Area (ac) | TSS                                  |                                               | TP                                  |                                              |
|                                                   |                     | Private SMP Load Reduction (tons/yr) | Private SMP Reachshed Load Reduction Impact % | Private SMP Load Reduction (lbs/yr) | Private SMP Reachshed Load Reduction Impact% |
| Baird Creek                                       | 255                 | 18.9                                 | 4.3%                                          | 73.1                                | 2.5%                                         |
| Bower Creek                                       | 24                  | 0.6                                  | 46.0%                                         | 4.4                                 | 33.9%                                        |
| Duck Creek                                        |                     |                                      |                                               |                                     |                                              |
| Green Bay proper                                  | 37                  | 1.3                                  | 1.1%                                          | 4.1                                 | 0.6%                                         |
| Oneida Reservation                                | 226                 | 21.0                                 | 6.1%                                          | 82.5                                | 4.0%                                         |
| Dutchman Creek                                    |                     |                                      |                                               |                                     |                                              |
| Green Bay proper                                  | 0                   | 0.0                                  | 0.0%                                          | 0.0                                 | 0.0%                                         |
| Oneida Reservation                                | 5                   | 0.4                                  | 0.8%                                          | 1.7                                 | 0.5%                                         |
| East River                                        | 355                 | 53.8                                 | 10.9%                                         | 186.5                               | 6.8%                                         |
| Lower Fox River                                   | 301                 | 25.0                                 | 3.5%                                          | 66.8                                | 1.7%                                         |
| Lower Green Bay                                   | 231                 | 6.4                                  | 1.4%                                          | 19.7                                | 0.7%                                         |
| <b>Totals</b>                                     | <b>1434</b>         | <b>127.5</b>                         |                                               | <b>438.7</b>                        |                                              |

### 2.3.9 Summary of With-Controls Management Conditions

The cumulative impact of the various stormwater management measures being employed by the City as analyzed in this plan are summarized by reachshed and citywide in Table 2-11. While Table 2-11 includes Citywide totals, the individual reachsheds have TMDL reduction targets and there is no overall citywide reduction required. As noted previously, it is also important to remember that in some instances, existing stormwater management practices may overlap in treating a particular geographic area. In those instances, the highest pollutant reducing stormwater management practice was selected and accounted for in the resulting reachshed reductions.

The results indicate that while the City has achieved the required TMDL TSS reduction target for Bower Creek, additional efforts are required to achieve the target TP reduction requirement for Bower Creek and the TSS and TP targets for all other reachsheds in the City. Due to the numerous

changes made as a part of this stormwater management plan update, comparison to the 2018 report on a reachshed basis is not recommended. Also, as indicated earlier in this section, while there is no citywide reduction requirement goal, reviewing the results on a citywide level showed improvements in reducing TSS and TP compared to the 2018 Plan by approximately 2 percent and 2.5 percent respectively showing that the City has continued to make progress overall on reducing stormwater pollution. Section 3 will discuss potential future stormwater quality practices to continue to move towards the TMDL reduction targets.

Figures 2-10 and 2-11 display no-controls and with-controls loading rates for TSS within the various City drainage basins. Figures 2-12 and 2-13 display no-controls and with-controls loading rates for TP. These figures provide a visual representation of loading rates in the City before and after evaluating existing SMPs and the with-controls figures can provide an indication of which basins still produce higher loading rates. Where feasible, basins with higher loading rates should be targeted for future SMPs as this may provide a more cost-effective reduction impact on loadings. Figure 2-14 shows the Remaining TSS and TP Load Reduction Needed for each reachshed.



Table 2-11. With Controls Pollutant Loading Results

| TMDL Reachshed     | Analyzed Area (ac) | TSS                        |                                            |                                  |                             |                                      | TP                        |                                       |                                  |                             |                                     |
|--------------------|--------------------|----------------------------|--------------------------------------------|----------------------------------|-----------------------------|--------------------------------------|---------------------------|---------------------------------------|----------------------------------|-----------------------------|-------------------------------------|
|                    |                    | No Controls Load (tons/yr) | With Controls TSS Load Reduction (tons/yr) | With Controls Load Reduction (%) | TMDL Required Reduction (%) | Remaining Reduction Needed (tons/yr) | No Controls Load (lbs/yr) | With Controls Load Reduction (lbs/yr) | With Controls Load Reduction (%) | TMDL Required Reduction (%) | Remaining Reduction Needed (lbs/yr) |
| Baird Creek        | 4,468              | 437                        | 161                                        | 36.7%                            | 52.0%                       | 67                                   | 2,963                     | 887                                   | 29.9%                            | 40.5%                       | 314                                 |
| Bower Creek        | 40                 | 1.4                        | 0.8                                        | 57.4%                            | 52.0%                       | -0.1                                 | 13.0                      | 5.1                                   | 39.0%                            | 40.5%                       | 0.2                                 |
| Duck Creek         |                    |                            |                                            |                                  |                             |                                      |                           |                                       |                                  |                             |                                     |
| Green Bay proper   | 902                | 115                        | 27                                         | 23.1%                            | 52.0%                       | 33                                   | 726                       | 105                                   | 14.5%                            | 40.5%                       | 189                                 |
| Oneida Reservation | 3,072              | 337                        | 87                                         | 25.8%                            | 52.0%                       | 88                                   | 2,030                     | 372                                   | 18.3%                            | 40.5%                       | 450                                 |
| Dutchman Creek     |                    |                            |                                            |                                  |                             |                                      |                           |                                       |                                  |                             |                                     |
| Green Bay proper   | 4                  | 0.09                       | 0.03                                       | 36.4%                            | 52.0%                       | 0.01                                 | 0.59                      | 0.15                                  | 25.2%                            | 40.5%                       | 0.09                                |
| Oneida Reservation | 662                | 51                         | 12                                         | 23.2%                            | 52.0%                       | 15                                   | 361                       | 54                                    | 14.9%                            | 40.5%                       | 93                                  |
| East River         | 3,193              | 491                        | 188                                        | 38.2%                            | 52.0%                       | 68                                   | 2,742                     | 730                                   | 26.6%                            | 40.5%                       | 381                                 |
| Lower Fox River    | 4,878              | 698                        | 201                                        | 28.8%                            | 70.4%                       | 291                                  | 3,965                     | 790                                   | 19.9%                            | 40.5%                       | 815                                 |
| Lower Green Bay    | 4,180              | 472                        | 123                                        | 26.0%                            | 52.0%                       | 123                                  | 2,946                     | 499                                   | 16.9%                            | 40.5%                       | 694                                 |
| <b>Totals</b>      | <b>21,400</b>      | <b>2,603</b>               | <b>798</b>                                 | <b>30.6%</b>                     |                             | <b>684</b>                           | <b>15,747</b>             | <b>3,442</b>                          | <b>21.9%</b>                     |                             | <b>2,936</b>                        |

## Section 3

# Future Potential Practices Evaluation

Prior studies identified several potential alternatives to improve stormwater discharge quality from the City of Green Bay within the various TMDL reachsheds. The latest list of potential projects reported in the 2018 Plan was updated and new projects were evaluated as a part of this study. As the City continues to develop various City-wide or area focused stormwater management plans, additional practices will be identified and incorporated into future TMDL implementation plans as they are available. Additionally, during the development of this plan, potential practices were discussed that were not an element of this plan but have been identified for consideration in future planning efforts. These various potential ways to continue to improve stormwater quality are described in the following paragraphs.

### 3.1 2018 Potential SMP Alternatives Updates

The list of potential future alternatives developed under the 2018 Plan was reviewed with the City and updated. Several projects were removed from the list either because they have been completed since the prior plan, are in the process of design or construction, or determined to be not feasible. Table 3-1 lists those projects and the reason for removal.

| Table 3-1. Potential SMPs Completed, In Process, or Not Feasible |            |                   |                                        |                                                                                                 |
|------------------------------------------------------------------|------------|-------------------|----------------------------------------|-------------------------------------------------------------------------------------------------|
| SMP ID                                                           | City Basin | SMP Type          | Geographic Location                    | Note                                                                                            |
| Completed Projects                                               |            |                   |                                        |                                                                                                 |
| 72                                                               | 581B, 581C | Wet Pond          | Angie Ave & Bay Beach Rd               | AKA Fox River Papermaking Corridor (FRPC) or Wolf Pack Pond - see Section 2.3.5 of this report) |
| 101                                                              | 162, 581D  | Grass Swales      | N Webster Avenue                       | See Section 2.3.3 of this report                                                                |
| Projects in Design or Construction                               |            |                   |                                        |                                                                                                 |
| 102                                                              | 106        | Dry Storage Basin | Seymour Park East (AKA Seymour Park 2) | Project modified from underground storage to dry detention pond                                 |
| 103                                                              | 106        | Wet Pond          | Seymour Park West (AKA Seymour Park 1) | Project modified from underground storage to wet detention pond                                 |

| Table 3-1. Potential SMPs Completed, In Process, or Not Feasible |                  |                     |                                             |                                                                                               |
|------------------------------------------------------------------|------------------|---------------------|---------------------------------------------|-----------------------------------------------------------------------------------------------|
| SMP ID                                                           | City Basin       | SMP Type            | Geographic Location                         | Note                                                                                          |
| Projects Determined Not Feasible                                 |                  |                     |                                             |                                                                                               |
| 48                                                               | 101              | Underground Storage | Augusta St. Park/ Park Shop                 | Identified as highly unlikely to occur, high capital cost, low-cost effectiveness             |
| 59                                                               | 962B, 962C, 962D | Underground Storage | Dousman St btw N Military Ave & N. Fisk St. | Identified as not feasible, high capital cost, low-cost effectiveness                         |
| 109                                                              | 975              | Underground Storage | Walmart                                     | Identified as unrealistic, high capital cost, low-cost effectiveness                          |
| 112                                                              | 235N, 235O, 235Q | Wet Pond            | Bader Street and East Main Street           | Property taken for proposed Habitat for Humanity Development and Ricky Lane extension project |

The remaining projects were updated as follows:

- treatment areas and pollutant loads and removals were modified based on the updated modeling
- integrated and updated capital cost to 2023 dollars using new unit pricing based on inflation and/or recent City bid tabs following a review by City staff (see Appendix B for unit cost information)
- added TSS and TP removal cost effectiveness information to aid the City in reviewing and prioritizing potential practices.
- In some cases, additional details on the potential project have been added by the City

The updated list of potential projects remaining from the prior studies is summarized in Table 3-2. It should be noted that SMP ID 104 has an existing pond associated with it (P&G Mitigation Pond) but is not included in the evaluation at this time due to a need to complete a WinSLAMM model for the site. This should be done in the future to take credit for existing TSS and TP reductions, regardless of potential future retrofit opportunities. Full project details on each potential SMP are included in Appendix B.

**Table 3-2. Potential Stormwater Management Practices Alternatives Summary**

| SMP ID          | TMDL Subbasin   | Practice                                              | Areas                |                      | TSS                            |                       | TP                             |                       | Capital Cost Estimate | Cost Effectiveness | Cost Effectiveness |
|-----------------|-----------------|-------------------------------------------------------|----------------------|----------------------|--------------------------------|-----------------------|--------------------------------|-----------------------|-----------------------|--------------------|--------------------|
|                 |                 |                                                       | Drainage Area to SMP | Analyzed Area to SMP | SMP Incremental Load Reduction | SMP Percent Reduction | SMP Incremental Load Reduction | SMP Percent Reduction |                       |                    |                    |
|                 |                 |                                                       | (ac)                 | (ac)                 | (tons/yr)                      | (%)                   | (lbs/yr)                       | (%)                   |                       |                    |                    |
| From 2007 Study |                 |                                                       |                      |                      |                                |                       |                                |                       |                       |                    |                    |
| 5               | Lower Fox River | Wet Pond                                              | 84.0                 | 84.0                 | 8.4                            | 80%                   | 32.2                           | 59%                   | \$4,077,500           | \$486,505          | \$126,590          |
| 55              | East River      | Wet Pond                                              | 154.3                | 154.3                | 12.0                           | 81%                   | 62.6                           | 62%                   | \$1,419,400           | \$118,508          | \$22,681           |
| From 2018 Study |                 |                                                       |                      |                      |                                |                       |                                |                       |                       |                    |                    |
| 104             | East River      | Wet Pond                                              | 229.5                | 229.5                | 8.5                            | 80%                   | 14.3                           | 59%                   | \$1,901,800           | \$224,328          | \$132,869          |
| 107             | East River      | Stream Restoration                                    | 524.4                | 524.4                | 7.2                            | 40%                   | 47.7                           | 30%                   | \$1,276,300           | \$178,106          | \$26,779           |
| 108             | Lower Fox River | Lift Station, Wet Pond, Coagulant Treatment           | 1,316.8              | 1,315.0              | 73.4                           | 90%                   | 471.5                          | 85%                   | \$5,907,500           | \$80,447           | \$12,529           |
| 111             | Baird Creek     | Underground Storage                                   | 35.0                 | 35.0                 | 4.9                            | 80%                   | 18.2                           | 68%                   | \$18,710,200          | \$3,846,639        | \$1,027,518        |
| 113             | East River      | Coagulant Addition                                    | 386.5                | 386.5                | 7.5                            | 90%                   | 89.6                           | 85%                   | \$2,438,500           | \$325,798          | \$27,205           |
| 114             | Baird Creek     | Coagulant Addition                                    | 378.5                | 378.5                | 3.4                            | 90%                   | 43.1                           | 85%                   | \$2,361,400           | \$699,271          | \$54,747           |
| 115             | Lower Fox River | Lift Station, Wet Ponds, Bioretention                 | 69.0                 | 30.6                 | 2.6                            | 80%                   | 10.7                           | 66%                   | \$31,125,800          | \$11,801,867       | \$2,908,133        |
| 116             | Lower Fox River | Underground Storage                                   | 105.4                | 105.4                | 6.4                            | 71%                   | 32.2                           | 53%                   | \$10,725,600          | \$1,667,191        | \$333,167          |
| From 2023 Study |                 |                                                       |                      |                      |                                |                       |                                |                       |                       |                    |                    |
| 201             | Lower Fox River | Lift Station Upgrade and Stormwater Quality Structure | 85.6                 | 85.6                 | 0.7                            | 27%                   | 3.0                            | 17%                   | \$363,980             | \$530,758          | \$119,736          |
| 202             | Lower Green Bay | New Lift Station and Stormwater Quality Structure     | 586.6                | 568.3                | 3.2                            | 26%                   | 15.3                           | 17%                   | \$611,681             | \$193,486          | \$40,038           |
| 203             | Baird Creek     | Wet Pond                                              | 568.2                | 567.4                | 23.6                           | 60%                   | 123.9                          | 44%                   | \$1,046,600           | \$44,420           | \$8,447            |

## 3.2 New Potential Alternatives Evaluated

Following the updates noted in the previous section, new alternatives were appended to Table 3-2. These potential alternatives were developed as a part of this study based on discussion with the City at a project update meeting in August 2023. New potential alternative projects include:

- SMP ID 201 – Stormwater Sump added to upgraded existing 7<sup>th</sup> and Broadway Lift Station (Lower Fox River reachshed)
- SMP ID 202 – Underground Sump/Detention at new Gray Street Lift Station (Lower Green Bay reachshed)
- SMP ID 203 – Wet Pond at Van Beek Road/Auto Plaza Drive/Manitowoc Road area (Baird Creek reachshed)

BC delineated drainage areas to each of the new potential alternatives, constructed WinSLAMM models to estimate pollutant loads and treatment, estimated capital cost and resulting cost effectiveness. These details were incorporated into Table 3-2 and the updated table was then shared with the City for review to aid in selecting candidate projects for implementation in the next permit cycle. Figure 3-1 Potential Future SMP Locations and Drainage Areas shows the tributary drainage area to, and location of, potential SMPs listed in Table 3-2. Figure 3-2 shows the Remaining TSS and TP Load Reduction Needed after SMP Implementation if all of the projects noted in Table 3-2 were constructed. The figure shows that even if the City could implement all potential SMPs, the TMDL targets would not be fully achieved. Selected projects for implementation in the next permit cycle are identified in Section 4.

Additional sites that were discussed with the City at the August update meeting include potential partnerships with development sites near the JBS facility on Lime Kiln Road and an open wooded area near Wiggins Way and Scottwood Drive that is available for purchase and in the vicinity of future development. The existing land use associated with these potential sites was not considered to be extensive based on a review of existing development and drainage patterns in the area and were not evaluated in detail at this time.

Following the August update meeting, additional potential locations were identified by BC for potential future consideration. The identified sites are as follows:

- 135-acre drainage area in City Basin 435E adjacent to Brown County Mental Health property Veterans Manor on St. Anthony Drive as a potential wet detention site (no wetlands or indicator soils were present on the property based on a review of the WDNR Surface Water Data Viewer) – City staff noted that a developer is currently planning a Veterans' Village ("tiny homes") in this area. The City will explore the feasibility of developing a regional pond at this location in conjunction with this project and the potential to incorporate other basin areas. If feasible, the project will be added to the TMDL plan.
- 875-acre drainage area associated with City Basin series 957 and 962 with a potential wet detention site located in Perkins Park (wetland indicator soils are present on the property based on a review of the WDNR Surface Water Data Viewer) – City staff noted that further discussions would be needed with the Parks Department. This site was also identified as a good location for green stormwater infrastructure in the GSI Plan under development.

### 3.3 Incorporation of Ongoing and Future Stormwater Plans

The City is currently completing a City-wide Green Stormwater Infrastructure (GSI) Plan and is preparing to begin the East River Flood Solutions Study. These and other stormwater management planning projects will provide added insight into stormwater challenges either on a city-wide or watershed basis and will be incorporated into future TMDL plans as recommendations are available and projects are scheduled or completed.

#### 3.3.1 Green Stormwater Infrastructure (GSI) Plan

The City has contracted with Aqualis (formerly Stormwater Solutions Engineering, LLC) to prepare a Citywide Green Stormwater Infrastructure (GSI) Plan. That plan is anticipated to be completed in 2023. While the completed plan was not available at the time of this report, the report will identify 20-25 potential City owned locations to implement green stormwater infrastructure in the future. The City is evaluating and refining the identified sites as the plan progresses. Once the plan is completed, the City will evaluate sites identified in the plan and select sites for inclusion into future capital improvement plans and account for them in future TMDL plan updates as they are implemented. The City will also work with owners of identified private sites to share study information and encourage implementation. Private sites may be eligible for submitting for an Innovative Stormwater Improvements Grant (see 3.3.2).

#### 3.3.2 Innovative Stormwater Improvements Grants ARPA Project

The City has developed a grant program utilizing ARPA funding to encourage innovative and sustainable stormwater management improvements that will catalyze economic development and demonstrate measurable environmental and social impacts to multiple categories, including improvement of stormwater quality (TSS and TP reductions). The program asks for a minimum of 1:1 owner to grant funding ratio and must have projects obligated by the end of 2024. City funding is up to \$920,000. The impact of this program is not currently quantifiable, but at the conclusion of the program, the City will identify projects that had a positive stormwater quality impact and incorporate the various reachshed benefits in the next plan update.

#### 3.3.3 East River Flood Solutions Study

The East River Flood Solutions Study request for proposal was issued in August of 2023. An estimated completion date by the end of 2024 is assumed for the purposes of showing this project on the implementation plan. The study will focus on the East River Watershed (reachshed) from the southern City border at McCormick Street west of Lime Kiln Road to the confluence of the Fox River. While the focus of the study is related to flood management, multi-purpose facilities that incorporate stormwater quality benefits will be considered and incorporated where practical. A deliverable of this project is a 90% project design, which will be used to secure grant or other funding. If appropriate, the selected project may be added to the TMDL plan once funding is secured or the project is implemented.

#### 3.3.4 Bay Beach Stormwater Management Plan

The City is in the process of developing the Bay Beach Storm Water Management Plan for the entire Bay Beach site (Lower Fox River reachshed). The draft plan includes the installation of various SMPs (wet ponds, detention/infiltration basins, rain gardens) as shown on Exhibit 10 Proposed Best management Practices Alternatives, dated February 2023 from that plan. Some elements of that plan are included in the City's current CIP as noted in Section 4. As that plan and associated designs are completed, they will be included in future updates of this Citywide TMDL plan.

## 3.4 Potential Future Practices to Consider

This plan constitutes an important update to the evaluation and understanding of the City's position with respect to improving stormwater runoff quality in comparison to TMDL reduction goals. However, there are additional stormwater quality reductions that remain unquantified at this time that could be evaluated in the future to provide further information on the City's efforts to improving stormwater runoff quality. Those potential future practices to consider are described in the following paragraphs.

### 3.4.1 Catch Basin Cleaning

During the kickoff meeting for this project, the impact of catch basin cleaning in combination with street cleaning was discussed. Due to limitations in some prior versions of WinSLAMM, WDNR guidance did not allow the combination of these two practices because they treat very similar pollutant particle sizes, and the model was not designed to adequately model the two practices together in series. This has changed in more recent versions of the model and the two practices can now be modeled together without concern for overestimating the pollutant reductions. Incremental benefits of a combined analysis vary by the amount of tributary drainage area, catch basin cleaning program, depth of sump, catch basin size, land use, and other factors including the effectiveness of the existing street cleaning program. This evaluation could have an impact on reachsheds throughout the City. Because the City's current street cleaning program is quite effective, it is recommended that the City conduct a pilot study of one or more areas in the City to determine if the incremental benefits of incorporating the catch basin cleaning program and street cleaning program in the WinSLAMM model exercise is worth the time and cost to collect the information and develop the models.

Data needed to conduct this evaluation would include:

1. GIS information on catch basins including distinguishing catch basins from inlets (structures need to have 1-foot of sump depth to be considered for credit).
2. Size and depth of sump.
3. Would need to define a treatment area draining to a particular group of catch basins.
4. Incorporate street cleaning details.
5. Add catch basin cleaning frequency (can be modified in WinSLAMM to look at different scenarios).

The catch basin and street cleaning can be run/analyzed separately and in series to see the resulting increase of modeling the two together to see if the incremental increase that can be realized is worth the effort. Typically catch basins are cleaned annually or every 2 years (sometimes more or less frequently). Selecting an area (or multiple areas with differing land uses and perhaps catch basin characteristics (if there are reasonably distinguishable differences) can guide the City to locations to use for a pilot study.

### 3.4.2 Rain Barrels

The City initiated a rain barrel project in 2022, distributing 500 rain barrels to residential homeowners, with an additional 440 rain barrels distributed in 2023. As of the date of this plan, the City had not yet conducted any follow-up inspections to evaluate the anticipated use and availability of those rain barrels to have a positive impact on volume and pollutant reduction. On June 14, 2023, BC staff had a discussion with WDNR Water Resources Engineer, Chris Linskens, to discuss the City's program and potential applicability towards providing stormwater pollutant reduction.



The discussion generally centered around this being challenging to incorporate and have a minimal return for the City. Roof areas are relatively clean and so load reductions would be smaller. Understanding if the rain barrel was drained and ready to accept roof runoff would be a factor. A rain barrel program can be a great public education tool and does have some runoff quantity and quality benefits but may be challenging to quantify from the standpoint of impact. Mr. Linskens was not aware of any community has currently tried to utilize a program like this to calculate and take credit for stormwater quality improvements. He indicated that, perhaps if a community was very close to their goal and it was felt this would be an important element to put them over the target, it might be more worthwhile to try to incorporate.

A potential approach to determine rain barrel availability and impact to the City's program would be to do a ground survey of the rain barrels, quantify which were connected, which were drained, and do some modeling to estimate the collective impact of those theoretically in use. As this would be a single survey of availability, future additional 'surveys' may be needed to re-verify availability, which may be work than it is worth. If the City decides to proceed with this, further discussion with WDNR for acceptability would be needed. Regardless, the City's current program can be identified in a narrative format as a non-quantified element of the City's program.

### **3.4.3 Redevelopment and Ordinance Updates**

The impact of future redevelopment was not evaluated in this plan. However, redevelopment has been shown to have a positive impact on improving stormwater quality. In 2022, the City amended Chapters 16, 42, and 44 of the municipal code to broaden applicability of green stormwater infrastructure in the City, with the intent of increasing use for stormwater quantity capture and quality improvement. The City's post construction stormwater management ordinance (Chapter 16-81(f)) currently requires a 40 percent TSS reduction for sites under 5 acres in the Urban Service District (although the ordinance does allow the City to require more rigorous reductions for development sites 5 acres and larger). The ordinance does not have a requirement for TP reduction. Many communities are updating their ordinances to increase TSS and TP reduction requirements, many of which are using the TMDL reachshed reduction targets. It is recommended that this be explored in next permit cycle or updated plan. The use of historical redevelopment rates (based on city plan reviews) to project potential future redevelopment acreage can be used with the current and potential future TSS and TP reduction rates to evaluate the impact of redevelopment which can then be factored into the City's plan.

### **3.4.4 Incorporate Additional Private Sites**

This plan only included private sites from 01-2017 to 2023-5 and a few select sites from prior to 2017 that were in the prior plan (see Appendix B for detailed tables on private sites). As part of this project, the City identified 225 sited prior to 2017 that were not reviewed for potential inclusion in this plan. The City should review that list against the small number of sites included in the analysis already for pre-2017 locations and incorporate the additional sites that have appropriate details into a future plan update. All future private sites completed after the 2023-5 site included in this plan should also be included.



## Section 4

# Implementation Plan and Permit Compliance

Under the MS4 General Permit, Section 1.5 describes the requirements for compliance with “approved TMDLs”. For the City of Green Bay, this requirement is driven by the Lower Fox River and Lower Green Bay TMDL and related permit requirements. One of the permit requirements is the development of an implementation plan if the stormwater pollution analysis shows that the current pollution control level is not meeting the pollutant reduction requirements for each reachshed in the MS4. The permit states that the implementation plan schedule may extend beyond the expiration date of the current permit, and no ultimate implementation deadline is specified. The analysis conducted in Section 2 of this report concludes that the City’s existing management practices do not fully achieve the TSS or TP reduction targets for all reachsheds and, therefore, the City must develop an implementation plan.

The TSS and TP pollutant reduction targets were developed through monitoring and modeling during the TMDL development process. The WDNR recognizes that, although the reduction targets are the best estimate of needed pollution loading levels, there is no certainty as to how the impaired receiving waters will respond to the changes in pollution loads. The impaired waters may achieve the desired water quality conditions with less pollution load control, or, conversely, the desired water quality conditions may require more pollution control than indicated.

This report presents a variety of actions that the City is currently taking and potential future stormwater management practices that the City could implement to move towards compliance with the TMDL reduction target. The WDNR requires that MS4 permittees show continued progress towards achieving the pollution reduction targets. Brown and Caldwell and City staff worked together to select the components included in the implementation plan. This section discusses components that have been included in the detailed implementation plan located in Appendix C. This report section also reviews current WPDES permit requirements and the City’s status of compliance.

## 4.1 Implementation Plan

As previously stated, the current MS4 permit does not require the City to set a firm deadline for when the pollution reduction targets will be met. The permit language states that the City must “make progress toward achieving compliance”. This plan provides a clear approach to “make progress toward achieving compliance”. The detailed implementation plan tables located in this section and in Appendix C, provide a schedule for implementation of the recommendations and the corresponding impact on pollutant loadings to the various reachsheds. Where applicable, the impacted area associated with a specific practice being implemented is noted. The schedule was developed to be achievable within the technologies currently available and with an eye on cost effectiveness of practices and approaches overall. General details of the implementation plan components are described in the following sections.

#### 4.1.1 Structural Practices Recommendations

The City currently has many regional SMPs located throughout the various reachsheds that provide reliable and proven stormwater treatment. The City is continuing to provide routine inspection and maintenance of those practices to ensure their long-term operability and impact on reducing TSS and TP loads.

Multiple potential structural measures were identified in previous planning studies and were updated and expanded in this study as discussed in Section 3 and shown on Table 3-2. Table 4-1 identifies structural practices that have been selected for implementation through the next permit cycle. These represent projects that are currently funded or are proposed for inclusion in the City's CIP. These practices will be further evaluated for their specific feasibility by City staff and consultants and as needed, designed, and scheduled for construction. Some of these projects are already under way. The project year shown represents the anticipated completion date of the project and the timing that the project can be considered for inclusion in the City's TMDL reachshed pollutant reductions as shown in Appendix C. Progress on project implementation will be reported to the WDNR as part of the routine MS4 annual reporting process. The timing and impact of each project will also be tracked and documented in future plan updates.

**Table 4-1. Structural Project Recommendations**

| Project Name (SMP ID if Available)               | TMDL Reachshed  | SMP Type                                              | Drainage Area (ac) | TSS Reduction (tons/yr) | TP Reduction (lbs/yr) | Implementation Year |
|--------------------------------------------------|-----------------|-------------------------------------------------------|--------------------|-------------------------|-----------------------|---------------------|
| Shipyards Redevelopment                          | Lower Fox River | Bioretention - Stormwater Cells                       | 8.11               | 0.14                    | 1.31                  | 2023                |
| Seymour Park East (102) <sup>1</sup>             | Lower Fox River | Dry Detention                                         | 8.80               | TBD <sup>1</sup>        | TBD <sup>1</sup>      | 2023                |
| Seymour Park West (103) <sup>2</sup>             | Lower Fox River | Wet Detention                                         | 177                | 12.29                   | 62.6                  | 2024                |
| Baird Creek ARPA Projects                        | Baird Creek     | Erosion Control/Streambank Stabilization Projects     | N/A <sup>3</sup>   | N/A <sup>3</sup>        | N/A <sup>3</sup>      | 2023-2024           |
| 7th and Broadway LS (201)                        | Lower Fox River | Lift Station Upgrade and Stormwater Quality Structure | 85.6               | 0.70                    | 3.00                  | 2024-2025           |
| Auto Plaza Drive (203)                           | Baird Creek     | Wet Detention                                         | 568.2              | 23.60                   | 123.90                | 2024-2025           |
| Bay Beach SMPs Amusement Park (115) <sup>4</sup> | Lower Fox River | Wet Detention, Lift Station, and Outfall Improvements | 41.57              | 2.97                    | 12.22                 | 2023-2027           |
| Gray Street LS (202)                             | Lower Green Bay | New Lift Station and Stormwater Quality Structure     | 586.6              | 3.20                    | 15.30                 | 2025-2027           |

<sup>1</sup> Project has changed from original plan, updated WinSLAMM TSS/TP evaluation and pending WDNR guidance required.

<sup>2</sup> Project has changed from original plan, WinSLAMM TSS/TP pond reduction percentages are from McMahon model (using a 5-year rainfall), loads applied to BC no-controls data, but should be updated following completion of project using proper standard land use data and pond as-built information.

<sup>3</sup> Streambank projects improve stormwater quality but cannot be directly modeled in WinSLAMM.

<sup>4</sup> Bay Beach SMPs include X-20 and X-21 project per Table 2 in McMahon April 2022 SWMP. TP not reported, estimated from Table 3-2

### 4.1.2 Non-structural Recommendations

In addition to the various structural components of the implementation plan described Section 4.1.1 that provide measurable progress towards meeting the various TMDL reachshed goals, there are numerous other items identified in this plan that do not provide direct quantifiable/measurable progress toward stormwater goals. Table 4-2 lists implementation plan components that are important to continuing to identify future projects and pollutant reduction measures but are not in themselves directly quantifiable in their contribution towards improving stormwater quality. Some of these projects are already underway.

**Table 4-2. Non-Structural Project Recommendations**

| Activity/Project                                                | TMDL Reachshed  | Implementation Year | Item Description/Notes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-----------------------------------------------------------------|-----------------|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Residential Green Stormwater Infrastructure Revolving Loan Fund | All             | On-going            | Continue to promote and implement the ongoing GSI revolving loan fund for residential properties for low interest 10-year loans to establish various types of green infrastructure.                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Green Stormwater Infrastructure (GSI) Plan                      | All             | 2023                | Planning Report to identify locations for potential Green Infrastructure implementation - use identified locations for CIP or private stormwater management planning purposes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Innovative Stormwater Grants ARPA Project                       | All             | 2024                | Partially fund projects that encourage innovative and sustainable stormwater management improvements.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Bay Beach Stormwater Management Plan                            | Lower Fox River | 2024                | Planning Report to identify various SMPs at Bay Beach - incorporate identified locations into CIP per plan.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| East River Flood Solutions Study                                | East River      | 2024                | Planning Report to evaluate stormwater flooding and quality solutions - incorporate identified locations into CIP per plan.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Redevelopment Impact and Ordinance Review                       | All             | 2025                | Evaluation of the impact of redevelopment on TSS and TP reductions in future years, and the potential to have an increased impact through increasing TSS and TP reductions in the City's post construction stormwater management ordinance.                                                                                                                                                                                                                                                                                                                                                                                                        |
| Catch Basin Cleaning Evaluation                                 | All             | 2026                | The broader impact of catch basin cleaning was not included in this plan update. Conduct a pilot study to select a few sites throughout the City and develop WinSLAMM models with street cleaning to evaluate the added benefit of including catch basin cleaning in the analysis.                                                                                                                                                                                                                                                                                                                                                                 |
| Incorporating Private SMPs Prior to 10-2017 and after 2023-5    | All             | 2028                | The City identified approximately 225 private SMP sites that were installed prior to 2017 (earlier than the date included in the scope of this project). Include additional sites prior to 01-2017 that are not currently included and sites later than 2023-5 in the next TMDL Plan update.                                                                                                                                                                                                                                                                                                                                                       |
| TMDL Plan Update                                                | All             | 2028                | Update the Citywide TMDL plan for the following items/areas: <ul style="list-style-type: none"> <li>• New City installed SMPs (include evaluation of SMP 102 – after new WDNR dry pond guidance is out, and SMP 103 – update modeling based on as-built drawing and proper land use information and rainfall) and incorporate other model or data updates as needed to assess progress.</li> <li>• SMP 104 – model based on existing current conditions</li> <li>• expanded private sites prior to 01-2017 and after 2023-5</li> <li>• redevelopment estimated impacts.</li> <li>• catch basin cleaning (if pilot study shows promise).</li> </ul> |

## 4.2 Compliance with WPDES Permit Requirements

The City of Green Bay contributes stormwater runoff to reachsheds associated with the Lower Fox River and Lower Green Bay TMDL which was approved by the EPA in 2012. As such, the City is subject to the permit requirements in Appendix A of the WPDES permit for a TMDL approved prior to May 1, 2014. As the City is not in compliance with TMDL reduction requirement, the City is seeking compliance over multiple permit terms. Requirements associated with reporting documentation under this permit are included in permit section A.6.3. Final Documentation (see pages 42-44 of the WPDES Permit in Appendix B for detailed descriptions). The City believes that it complies with all permit requirements at this time and presents the following summary of information by permit item:

- A.6.3.a. An updated storm sewer system map
  - (1) (2) As part of this report, the City has identified the current municipal boundary and TMDL reachshed boundaries within the municipal limits as shown on Figure 1-1. The total area of each reachshed within the municipal limits is the sum of the areas listed in Tables 2-1 TMDL Excluded Areas and 2-4 No-Controls Pollutant Loading Results.
  - (3) The MS4 drainage boundary (analyzed area) is shown on Figure 2-2 and the MS4 drainage area (analyzed area) associated with each reachshed are listed in Table 2-4 (and other tables throughout this report). Figure 2-1 displays areas by exclusion type that were determined not to be part of the City's MS4 (analyzed area) and are listed in Table 2-1. Details on the various excluded areas are included in Section 2 of this report.
- A.6.3.b. Tabular summary of pollutants of concern (TSS and TP) by reachshed
  - (1) TMDL reachshed TSS and TP reduction requirements are listed in Table 1-1.
  - (2) Modeled no-controls loads by reachshed are listed in Table 2-4.
  - (3) (4) Modeled with-controls loads by reachshed and percent reduction achieved with existing stormwater management practices (controls) are listed in Table 2-11.
  - (5) Existing stormwater management measures, area treated in acres, and pollutant load reduction efficiency are detailed in Section 2 of this report by practice type. Practices included in the with-controls analysis are either fully under City authority for ownership, operation, and maintenance (swales, street cleaning, leaf management, public SMPs) or are private practices that were included, and that the City has provided evidence through their post-construction stormwater management ordinance that they have the authority necessary to ensure the long-term maintenance of each practice included.
- A.6.3c. Implementation Plan Information
  - (1) This item requires a list of management measures and options, and an implementation schedule that over the next permit term achieves, to the maximum extent practicable, an additional 20 percent reduction in sediment or TSS and an additional 10 percent reduction in TP applied to the difference measured from loading conditions at the end of the current permit to the total reductions required for each reachshed (assessed as shown in the example calculation provided on page 40 of the permit).
    - Potential structural management measures with quantifiable impact on TSS and TP load reductions are listed in Table 3-2. Additional potential measures that are not quantifiable or that will lead to additional quantifiable measures are discussed in Section 3.
    - An assessment of TSS and TP reductions associated with implementation plan items for the next permit term is presented in Appendix C following the implementation plans for

the City's various TMDL reachsheds. The assessment findings are summarized as follows:

- TSS Assessment
  - TSS load reduction required for the next permit term is an additional 137 tons/year over current reductions.
  - The City currently has projects identified to remove approximately 43 tons/year, meaning that there is a projected shortfall of approximately 94 tons/year in meeting this goal.
  - However, due to larger prior TSS reductions, the City is projected to only have a cumulative shortfall of approximately 9 tons/year.
- TP Assessment
  - TP load reduction required for the next permit term is an additional 294 lbs/year over current reductions.
  - The City currently has projects identified to remove approximately 217 lbs/year, meaning that there is a projected shortfall of approximately 77 lbs/year in meeting this goal.
  - However, due to larger prior TP reductions, the City is projected to have a cumulative excess of approximately 603 lbs/year.
- (2) The City will continue to explore and expand on potential stormwater management measures that are presented in Table 3-2 as discussed in Section 3 to continue to move towards potential compliance. Figure 3-2 shows the status of TMDL compliance for TSS and TP reductions if all the currently identified potential management measures in Table 3-2 were implemented. Based on current and projected projects in the next permit cycle and potential management measures identified in Table 3-2, the City will not achieve compliance with all TMDL reachsheds. For this reason, the City will continue to explore additional future management measures to consider and implement.
- (3) The City has identified an implementation plan as presented in Section 4.1 and in Appendix C of this report through the next permit term. As the City nears the end of the next permit term, it will conduct an updated assessment of compliance and expand on the potential stormwater management measures available as recommended through ongoing and future planning efforts.
- (4) A cost effectiveness assessment for recommendations and future potential structural practices is included in Table 3-2.

### 4.3 Implementation Plan Limitations

In development of this report and the resulting implementation plan, there are several qualifications or limitations that should be understood and are listed in the following items:

- **Regional SMP TSS and TP reductions.** The pollutant reductions associated with regional SMPs were based on WinSLAMM modeling where available from this or prior studies. TSS and TP reductions will need to be verified for each implemented project based on the final design of the practice and the reachshed impacts updated.
- **Identified SMP implementation feasibility.** The planning team and prior planning project teams made an effort to consider potential hurdles and opportunities to the implementation of the various practices evaluated. All practices were discussed, evaluated, and identified for implementation with the support of City staff and are believed to be physically implementable.

Preliminary engineering will be needed to further evaluate the specifics of each project including detailed environmental evaluation and permitting as needed and the projects will need to be included in the City's CIP.

- **Enhanced TP reductions through coagulant treatment.** Some future potential practices consider the use of enhanced TP reductions through use of a chemical coagulant. Performance and cost associated with enhanced TP treatment as an augmented practice to wet detention ponds has not been evaluated in detail. The WDNR is currently developing technical guidance that could reduce some of the unknowns with applying this technology. Furthermore, it is recommended that additional research into this practice be conducted including pilot testing of stormwater samples and coagulants prior to project design to further define feasibility and costs associated with construction, annual treatment and disposal.
- **Dry Pond and Enhanced Filtration WDNR Guidance.** The WDNR is in the process of developing two new guidance documents. One for dry ponds to provide requirements for the facility and to take pollutant removal credit, and a second for enhanced filtration devices (sand filters or the like) with additives such as iron aggregate to improve capture and removal of dissolved nutrients. The dry pond guidance will be needed for the City to assess pollutant removal performance of Seymour Park East (SMP ID 102).
- **Financial.** Cost estimates were developed from a number of sources including City provided studies, labor costs, equipment costs, bid tables, and outside sources. Project costs are presented in 2023 dollars. Market volatility and other factors can impact the actual rate of inflation.

## Section 5

# Project Limitations

This document was prepared solely for the City of Green Bay (City) in accordance with professional standards at the time the services were performed and in accordance with the contract between the City and Brown and Caldwell dated April 25, 2023. This document is governed by the specific scope of work authorized by the City; it is not intended to be relied upon by any other party except for regulatory authorities contemplated by the scope of work. We have relied on information or instructions provided by the City and other parties and, unless otherwise expressly indicated, have made no independent investigation as to the validity, completeness, or accuracy of such information.

The main purpose of this document is to help the City meet the federal and state regulatory program requirements for stormwater pollution reduction. Flooding issues related to stormwater conveyance system capacity, or the Lower Fox River and Lower Green Bay flood elevations, were not the focus of this document and are not addressed in this report.

This document is a planning level study. Information used to develop the results and recommendations were based on available data sources. The plan provides City decision makers a sound basis for proceeding with a stormwater management program to meet federal and state stormwater pollution regulations. It is important to note however, that the recommended structural stormwater pollution management measures will require significant additional engineering and design and possible federal/state permitting, before implementation. Factors or site conditions discovered during the engineering and design phase of a project may result in modifications in the scale, scope, costs, or ultimate feasibility of the project.



## Section 6

# References

- AECOM. 2014. *City of Green Bay Citywide Stormwater Management Plan*, October, prepared for the City of Green Bay.
- Brown and Caldwell. 2018. *City Wide 2018 SLAMM Analysis*, November, prepared for the City of Green Bay.
- Cadmus. 2012. *Total Maximum Daily Load and Watershed Management Plan for Total Phosphorus and Total Suspended Solids in the Lower Fox River Basin and Lower Green Bay*, March, prepared for the Wisconsin Department of Natural Resources, Oneida Tribe of Indians of Wisconsin, and the U.S. Environmental Protection Agency.
- WDNR 2019. *General Permit to Discharge Under the Wisconsin Pollutant Discharge Elimination System WPDES Permit No. WI-S050075-3*, Permit Modification Date December 7, 2021; February 10, 2022, correction.
- WDNR 2019. *TMDL Guidance for MS4 Permits: Planning, Implementation, and Modeling Guidance*, October, EGAD Number: 3800-2014-04 / WT-19-0009-C.
- WDNR 2019. *TMDL Guidance for MS4 Permits: Planning, Implementation, and Modeling Guidance, Addendum A (Percent Reduction)*, September, EGAD Number: 3800-2015-13 / WT-19-0012-C.
- WDNR. 2020. *Modeling Post-Construction Storm Water Management Treatment*, February, EGAD Number: 3800-2020-01 / WT-19-0023.
- WDNR 2022. *Municipal Phosphorus Reduction Credit for Leaf Management Programs*, February, EGAD Number: 3800-2022-01.

## Appendix A: Figures

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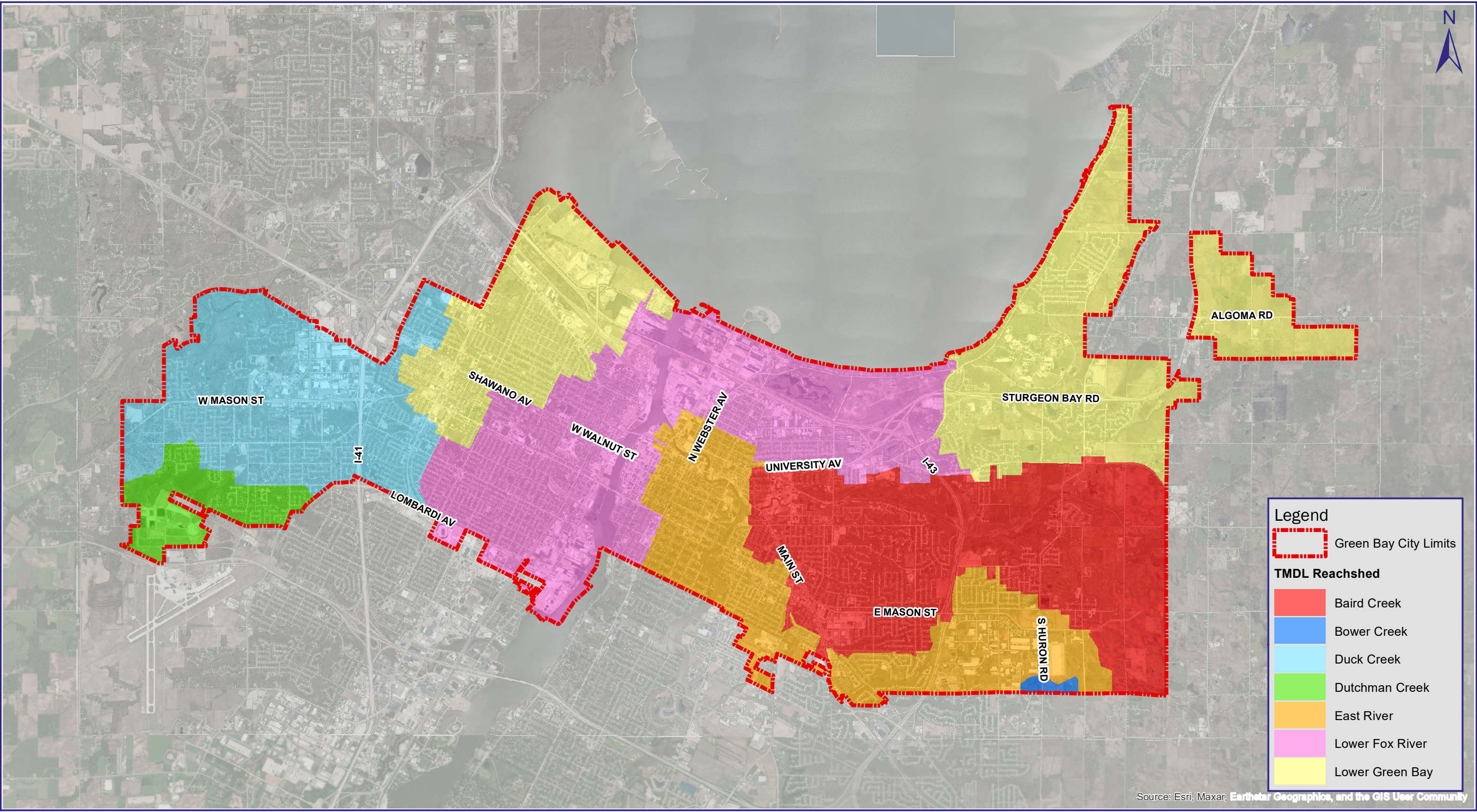
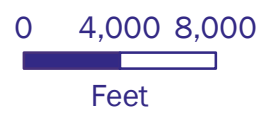


Figure 1-1  
TMDL Reachsheds  
Green Bay Stormwater Management Plan Update





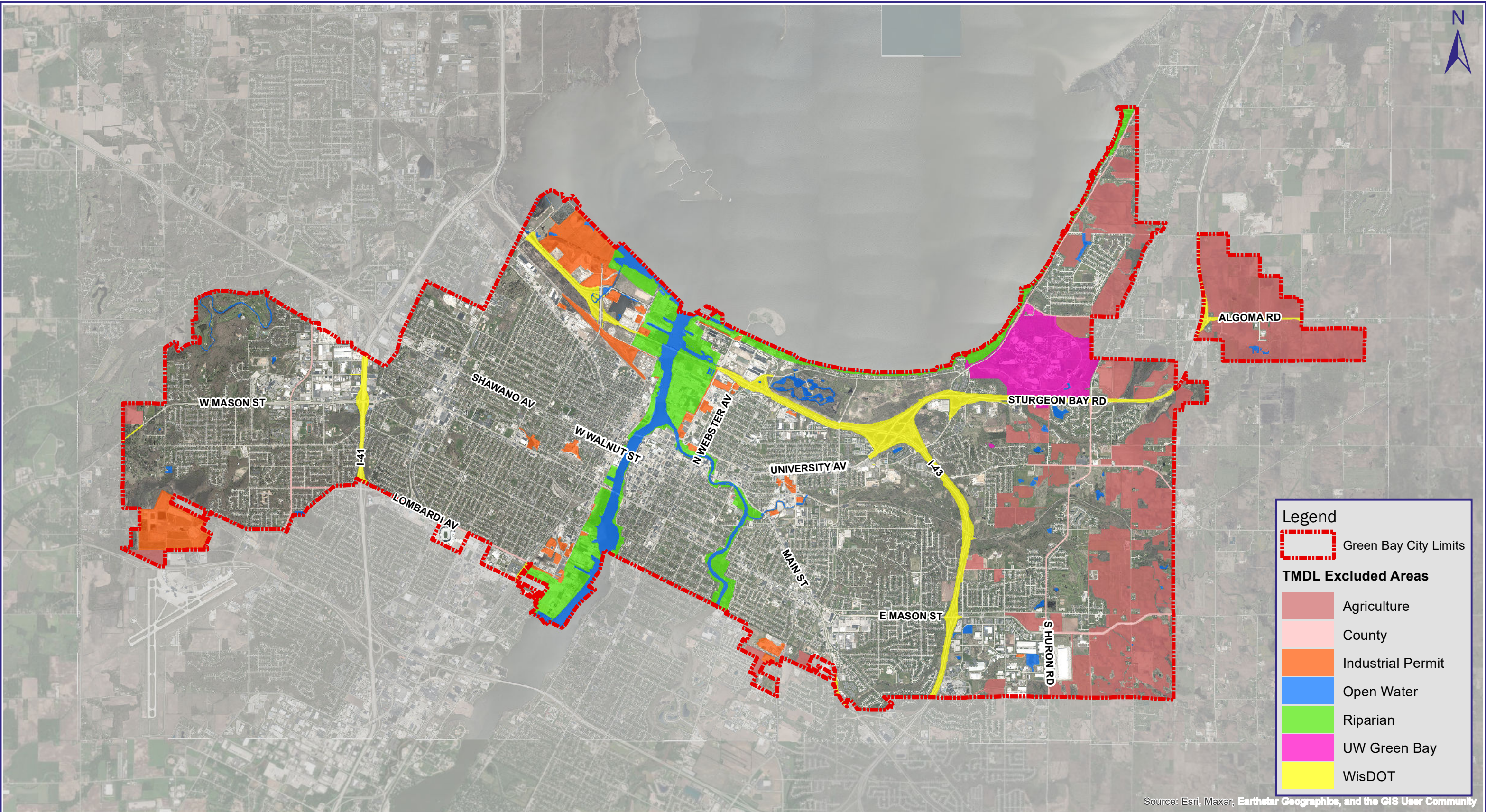
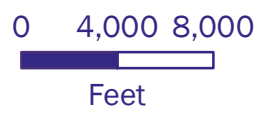


Figure 2-1  
TMDL Excluded Areas  
Green Bay Stormwater Management Plan Update





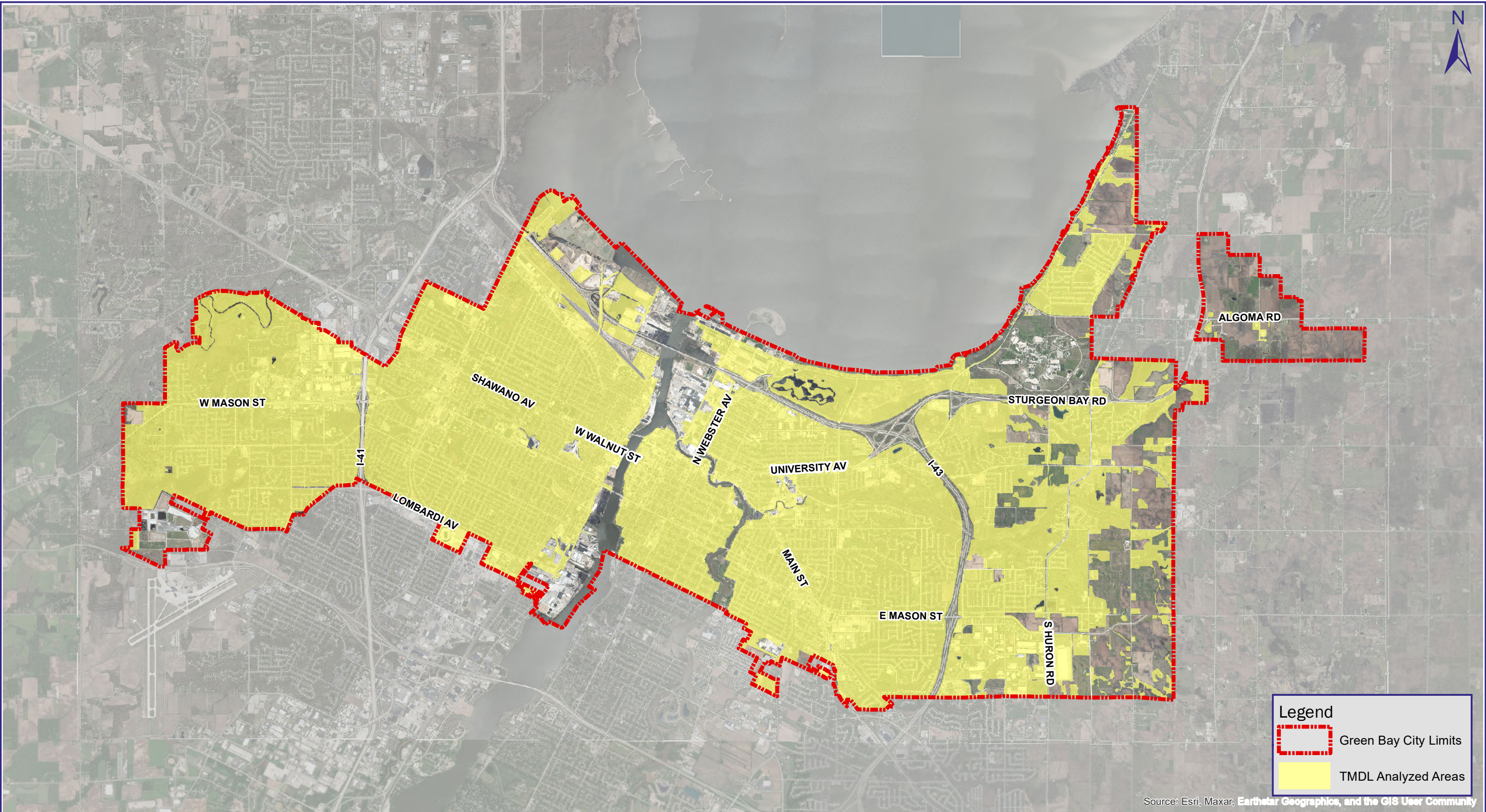
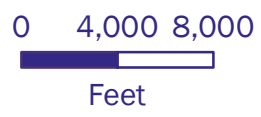


Figure 2-2  
TMDL Analyzed Areas  
Green Bay Stormwater Management Plan Update





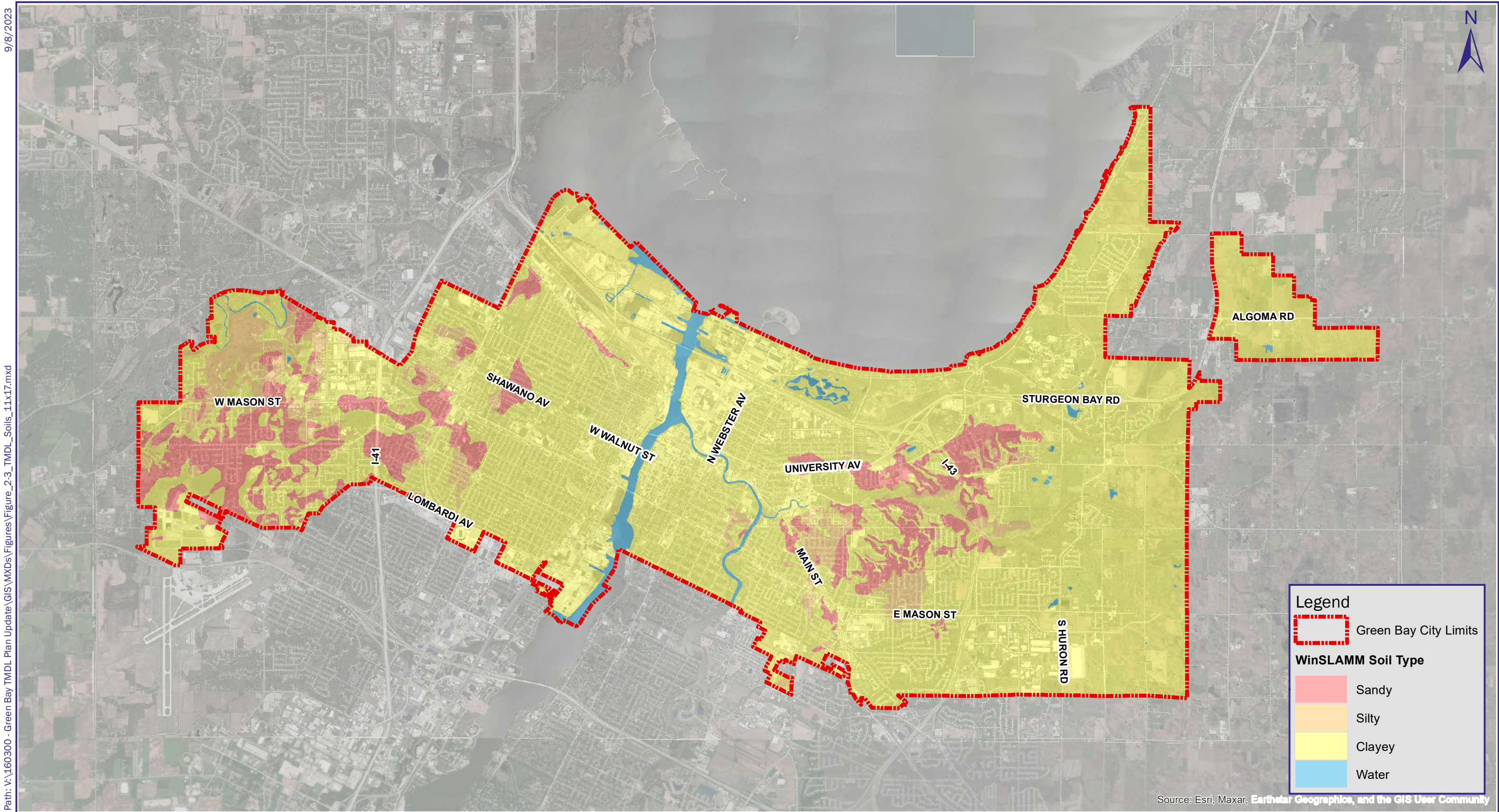
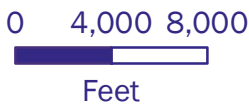


Figure 2-3  
WinSLAMM Soil Types  
Green Bay Stormwater Management Plan Update





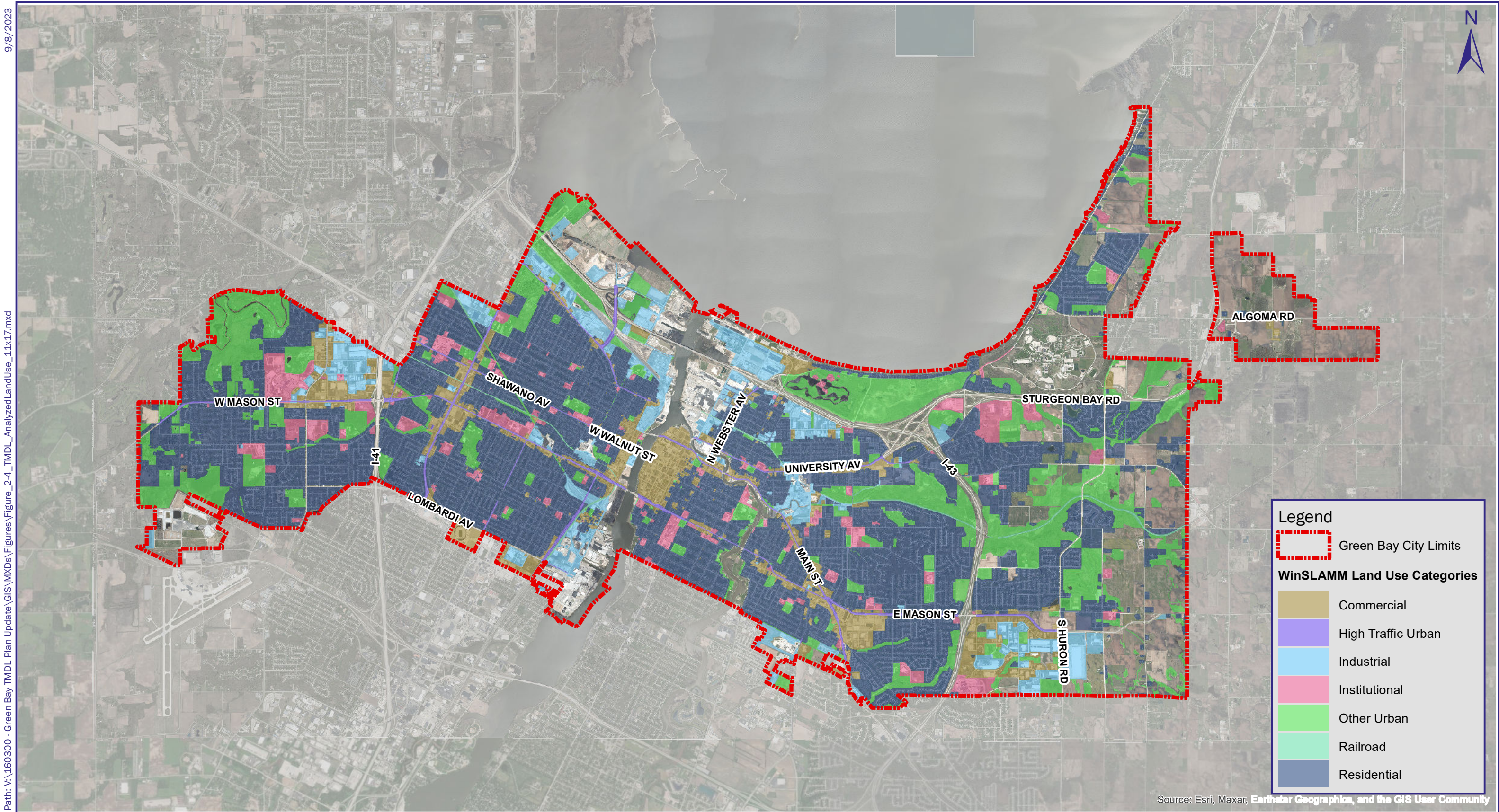
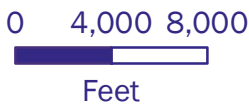
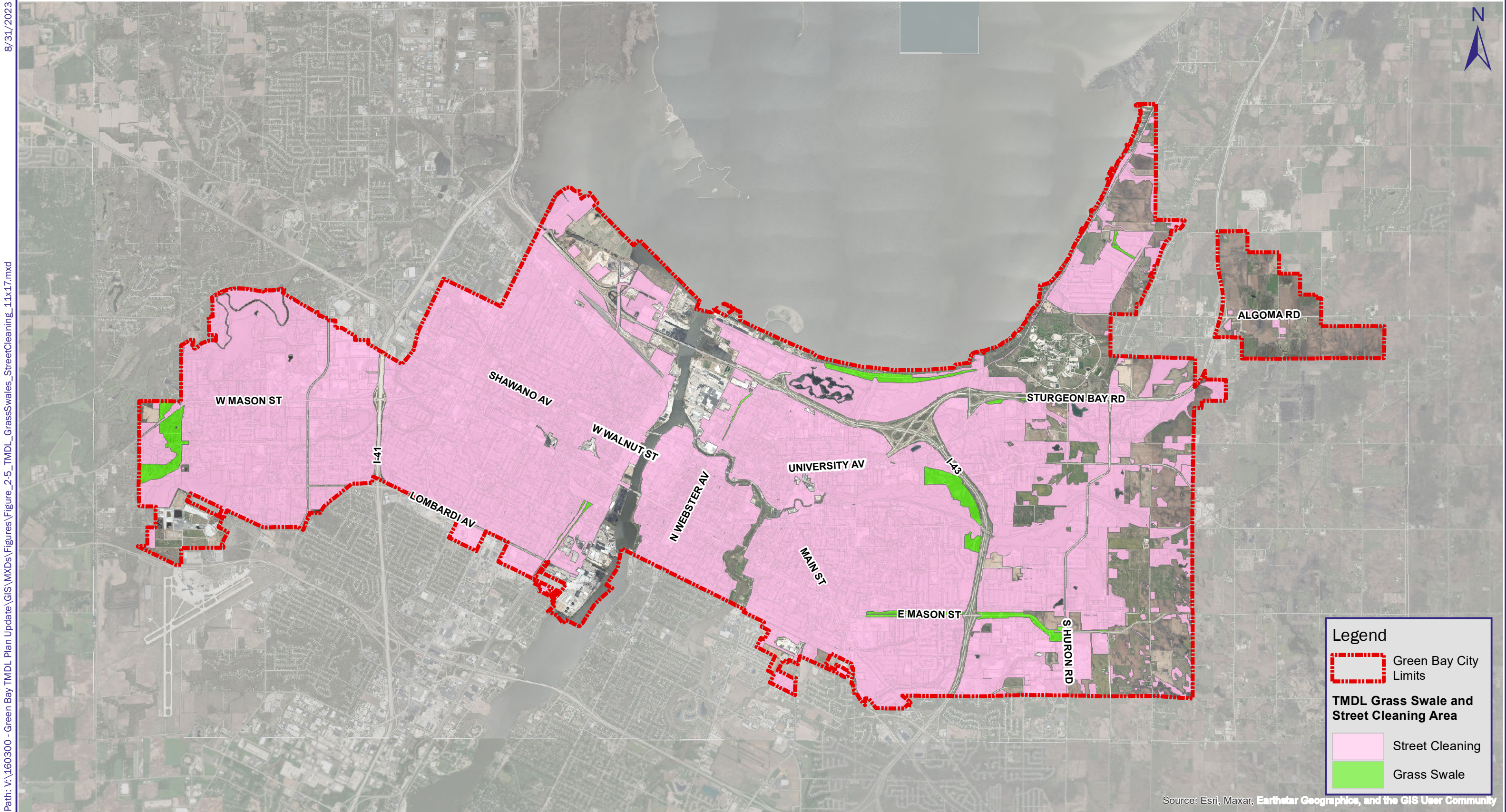


Figure 2-4  
WinSLAMM Land Use Category  
Green Bay Stormwater Management Plan Update







**Figure 2-5**  
**Grass Swale and Street Cleaning Treatment Areas**  
**Green Bay Stormwater Management Plan Update**



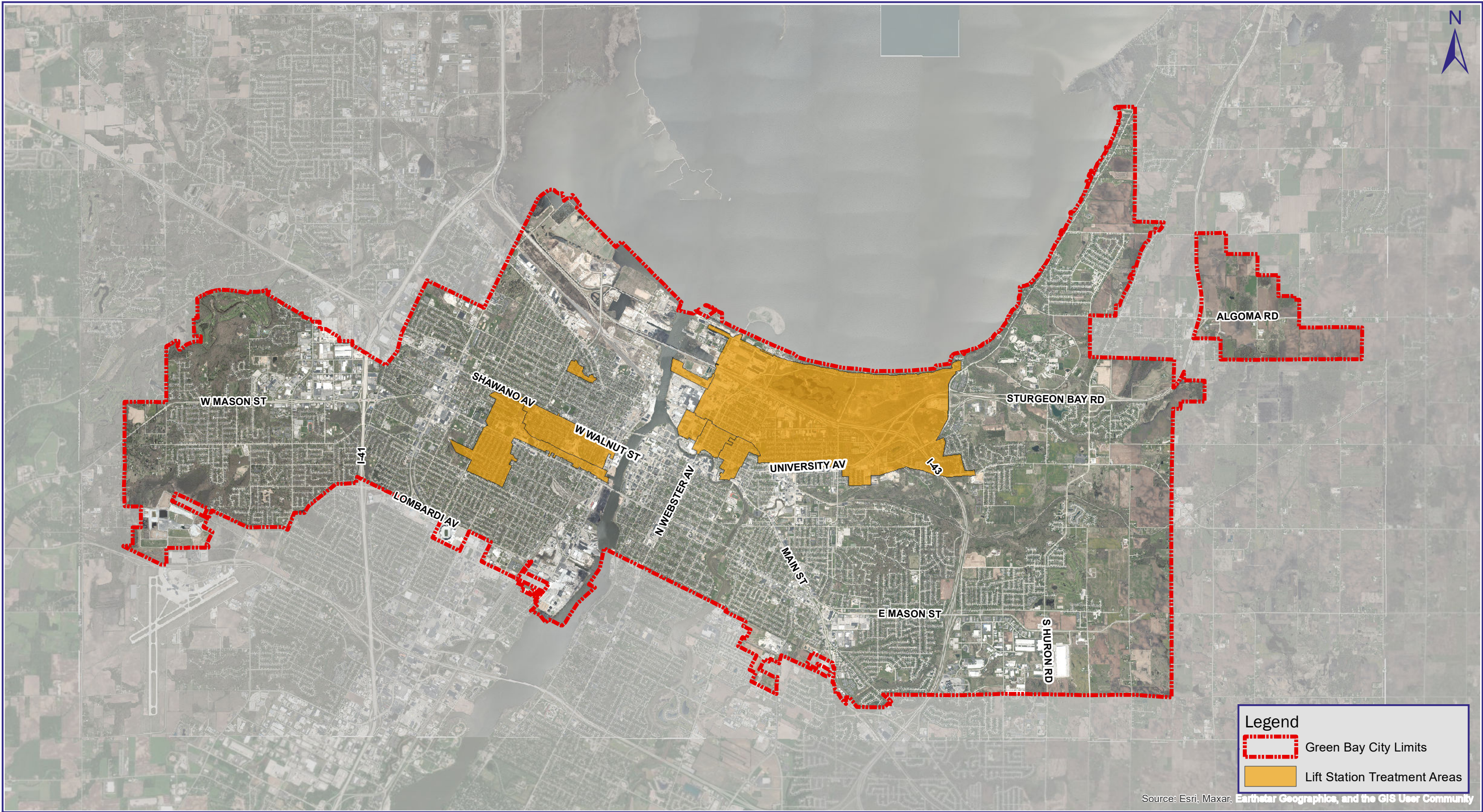
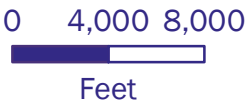


Figure 2-6  
Lift Station Treatment Areas  
Green Bay Stormwater Management Plan Update





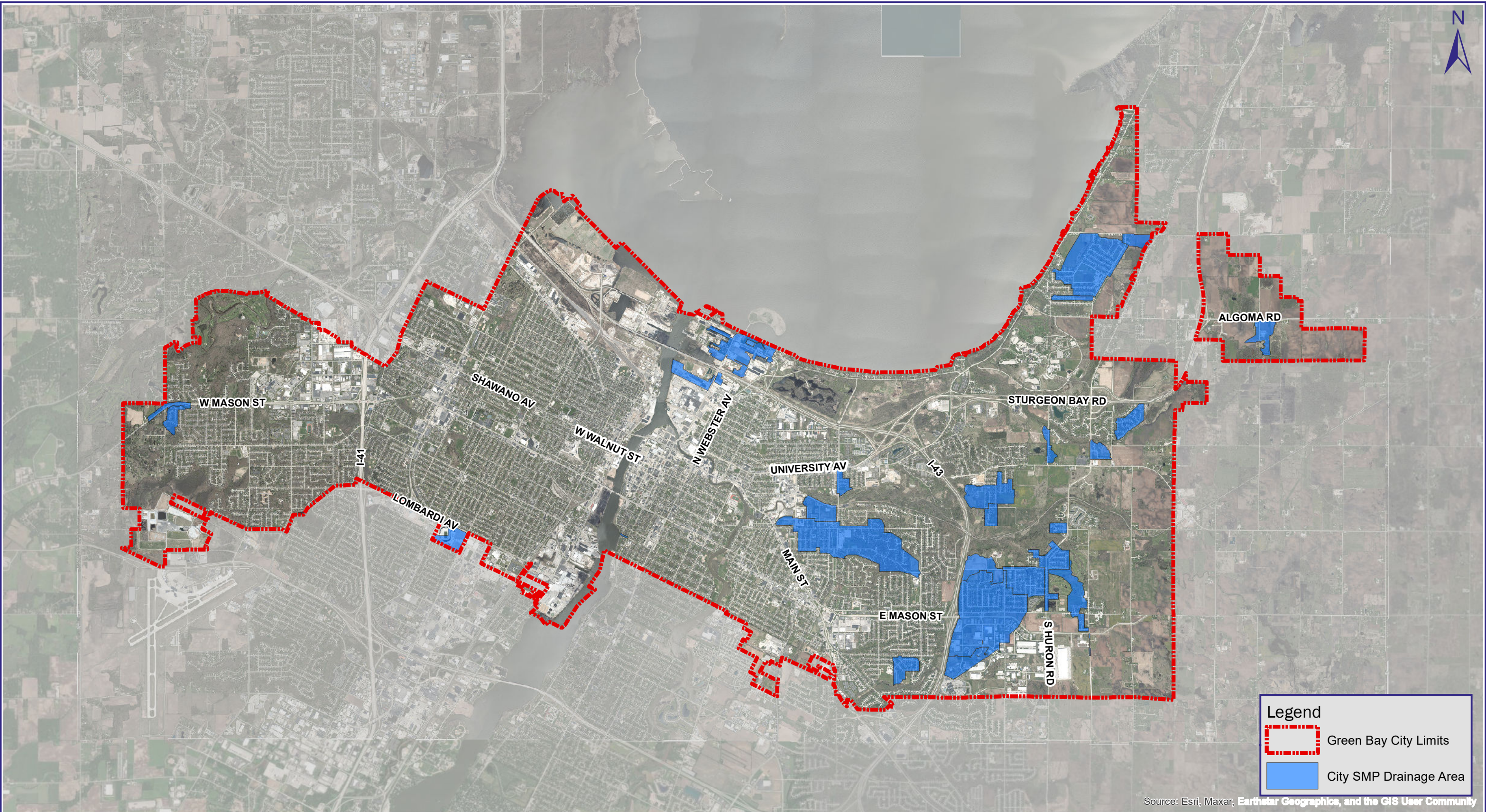
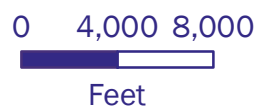


Figure 2-7  
City Stormwater Management Practices  
Green Bay Stormwater Management Plan Update







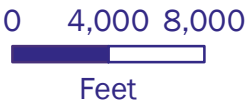
**Legend**

- Green Bay City Limits
- Leaf Management Eligible Areas

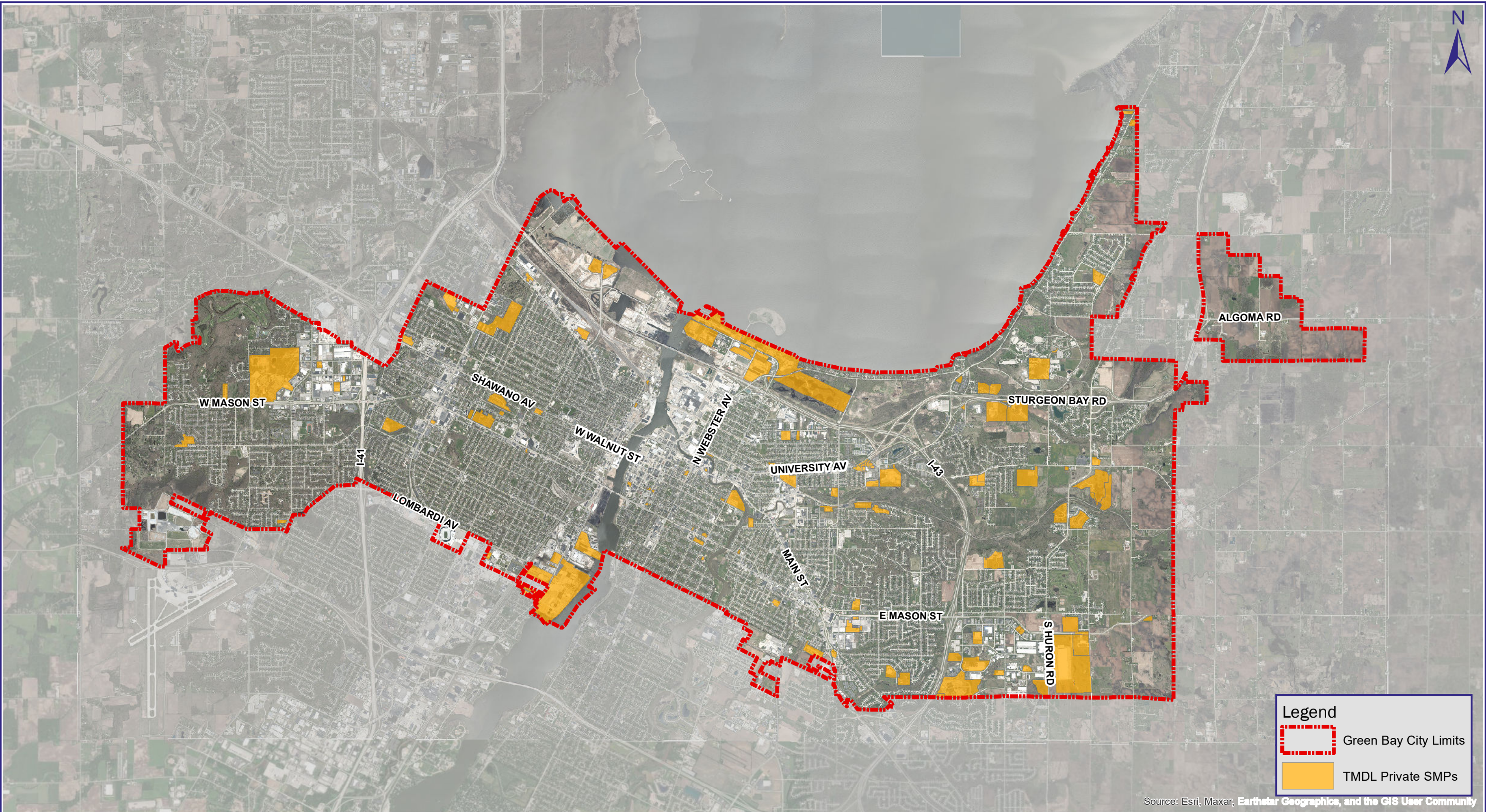
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



**Figure 2-8**  
**Areas Eligible for Leaf Management Credit**  
**Green Bay Stormwater Management Plan Update**







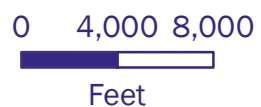
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Legend

Green Bay City Limits

TMDL Private SMPs

Figure 2-9  
Private Stormwater Management Practices  
Green Bay Stormwater Management Plan Update





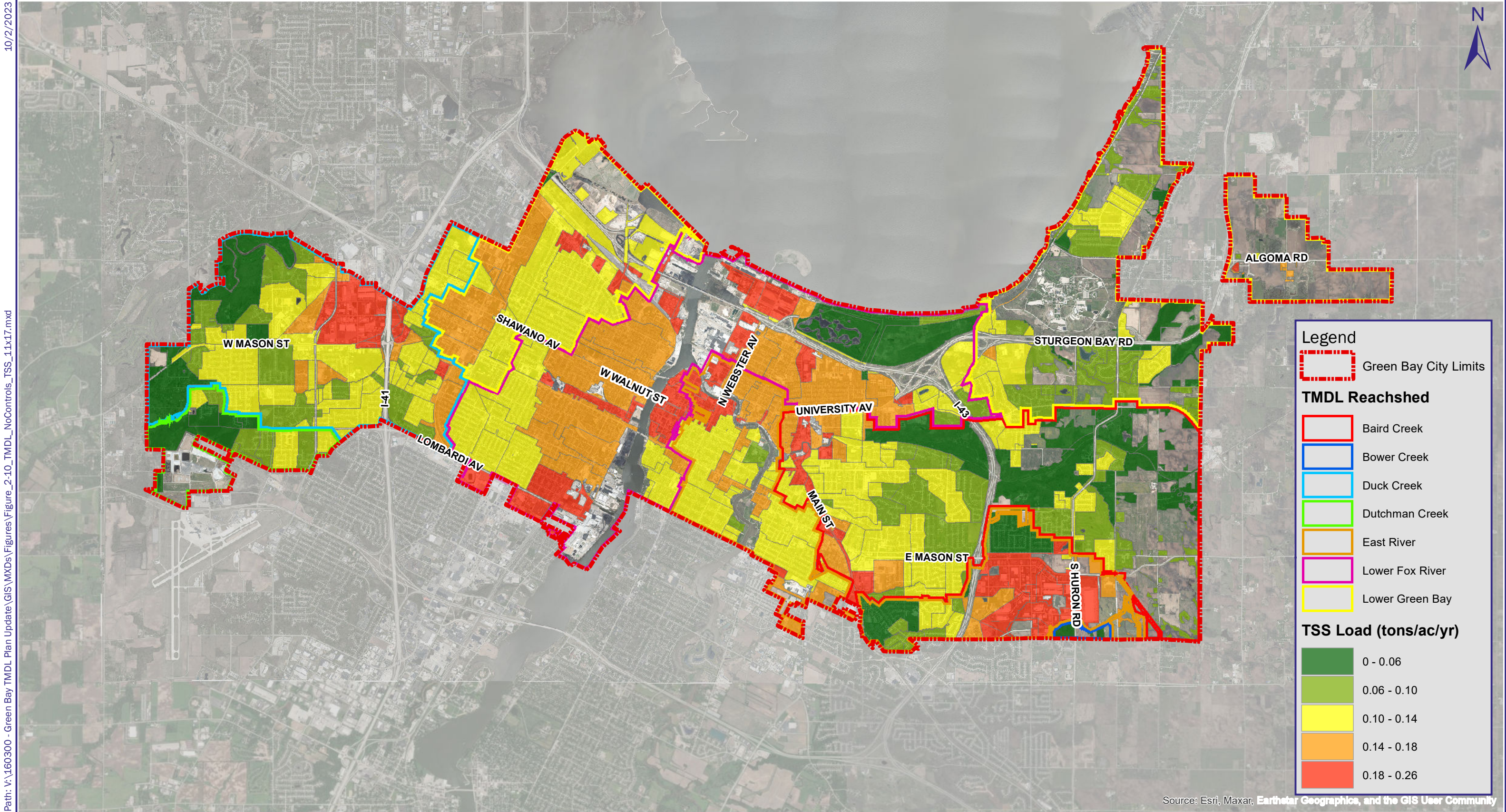


Figure 2-10  
No Controls TMDL TSS Loading  
Green Bay Stormwater Management Plan Update



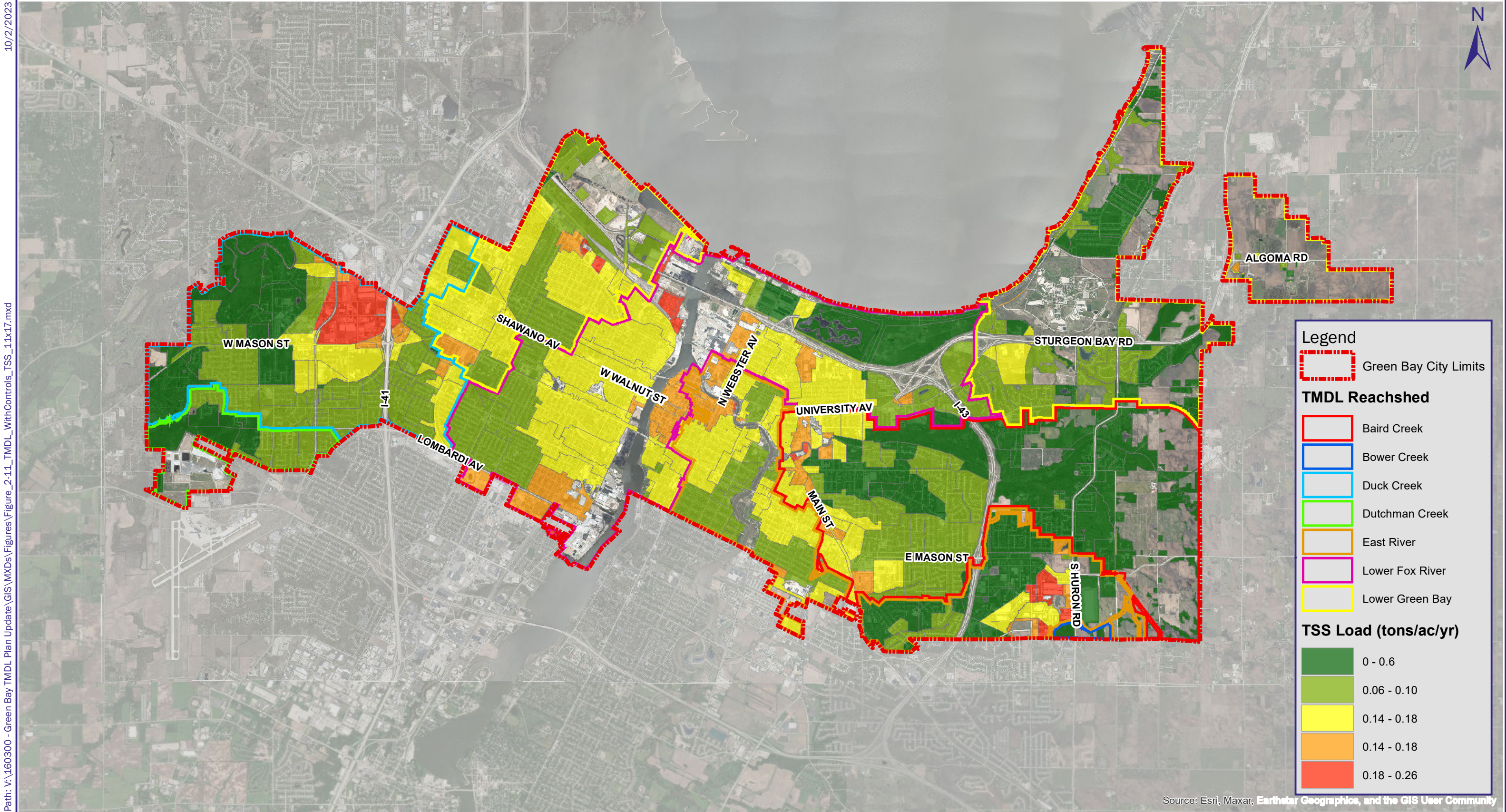
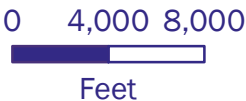


Figure 2-11  
With Controls TMDL TSS Loading  
Green Bay Stormwater Management Plan Update





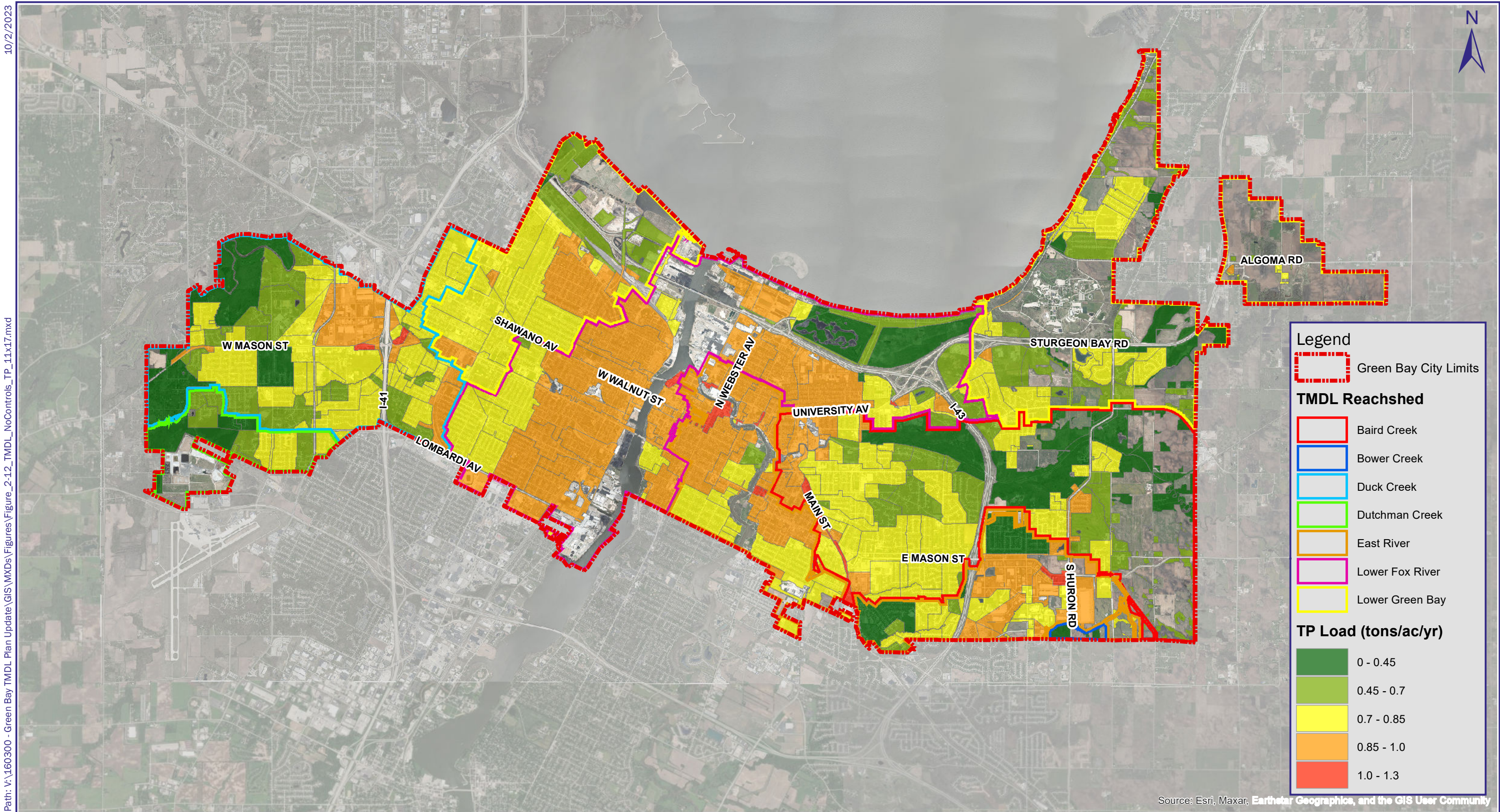
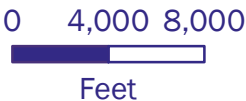


Figure 2-12  
No Controls TMDL TP Loading  
Green Bay Stormwater Management Plan Update





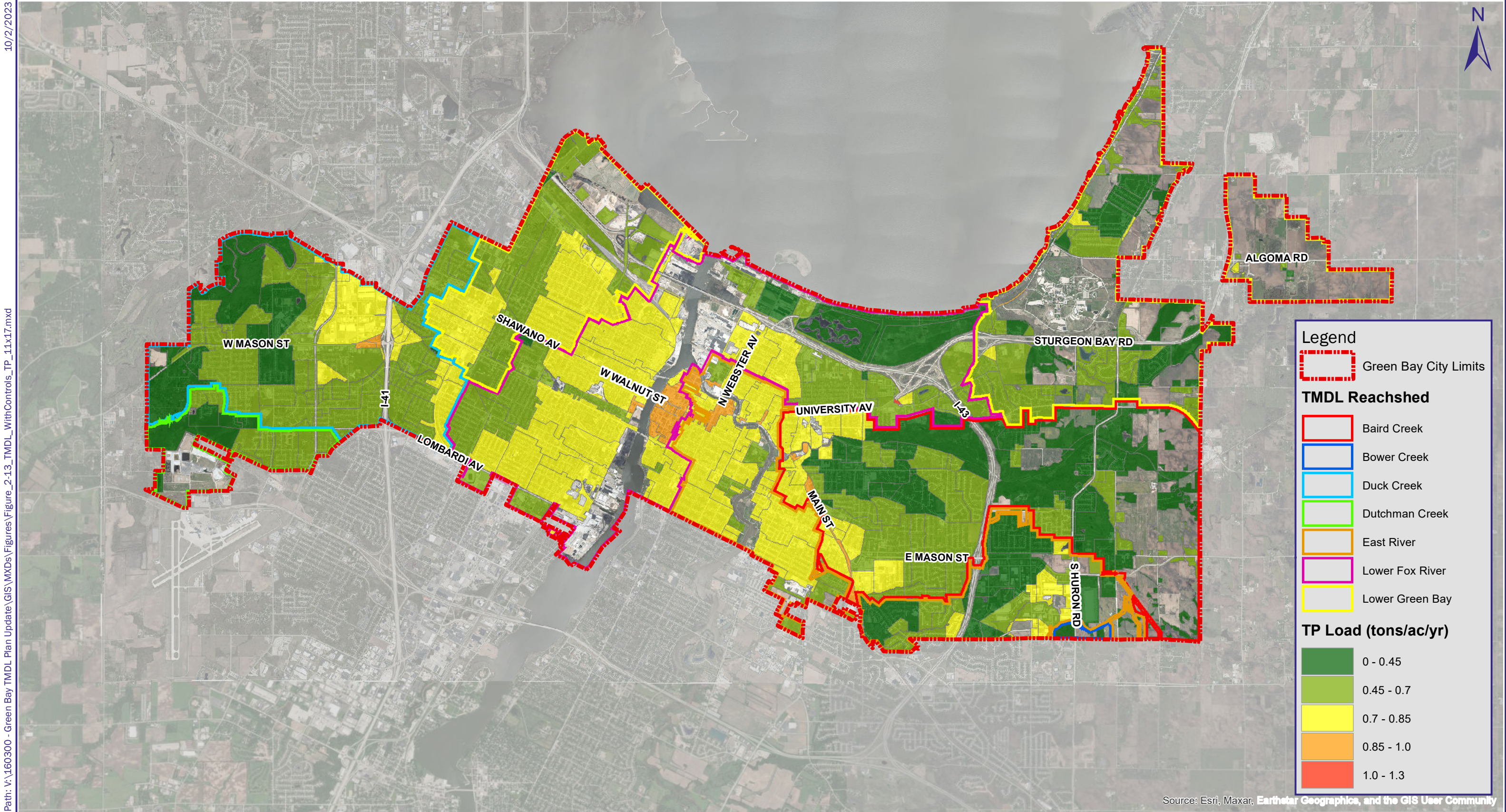
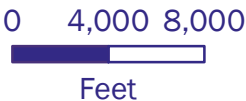


Figure 2-13  
With Controls TMDL TP Loading  
Green Bay Stormwater Management Plan Update





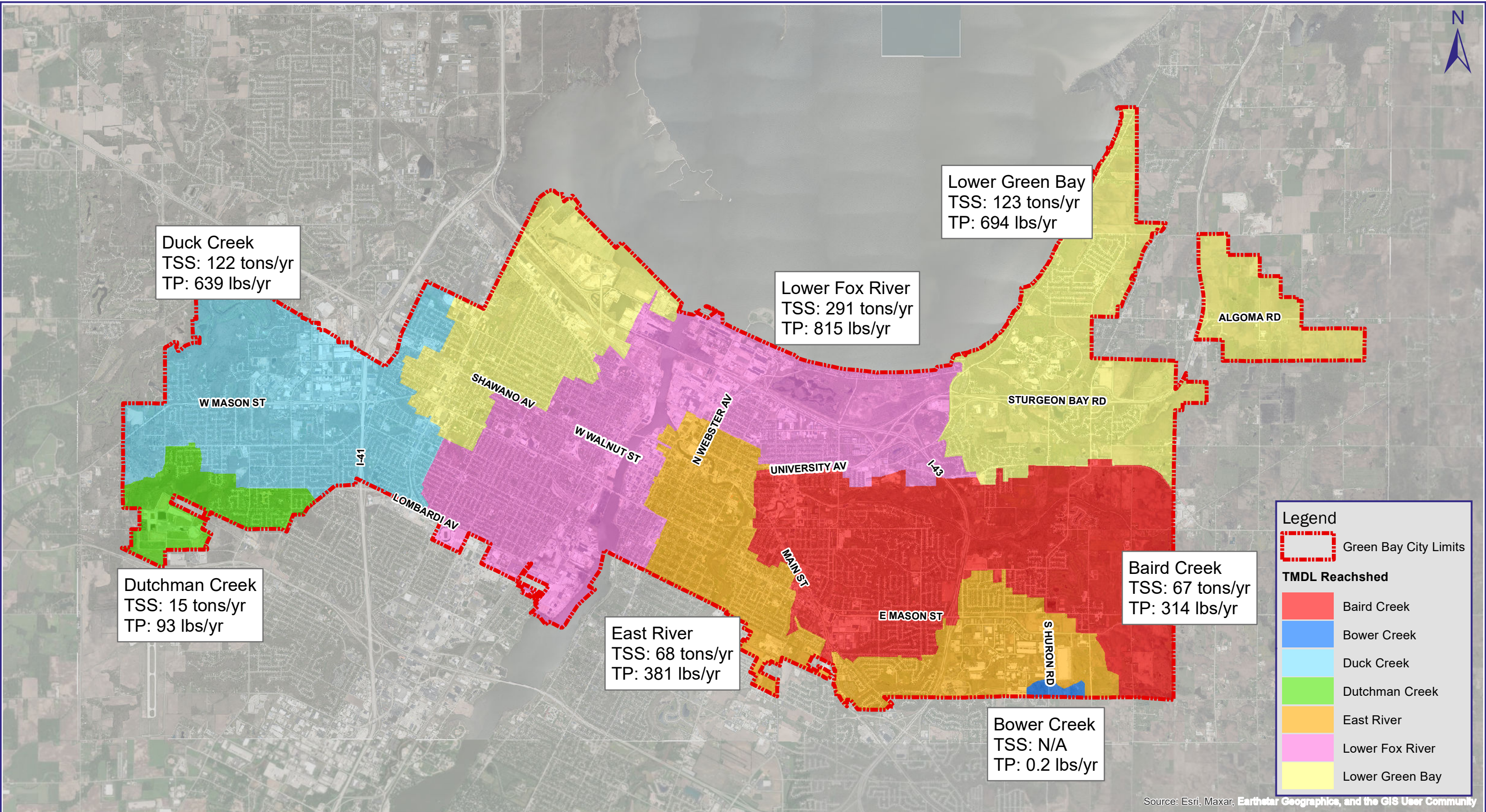


Figure 2-14  
Remaining TSS and TP Load Reduction Needed  
Green Bay Stormwater Management Plan Update





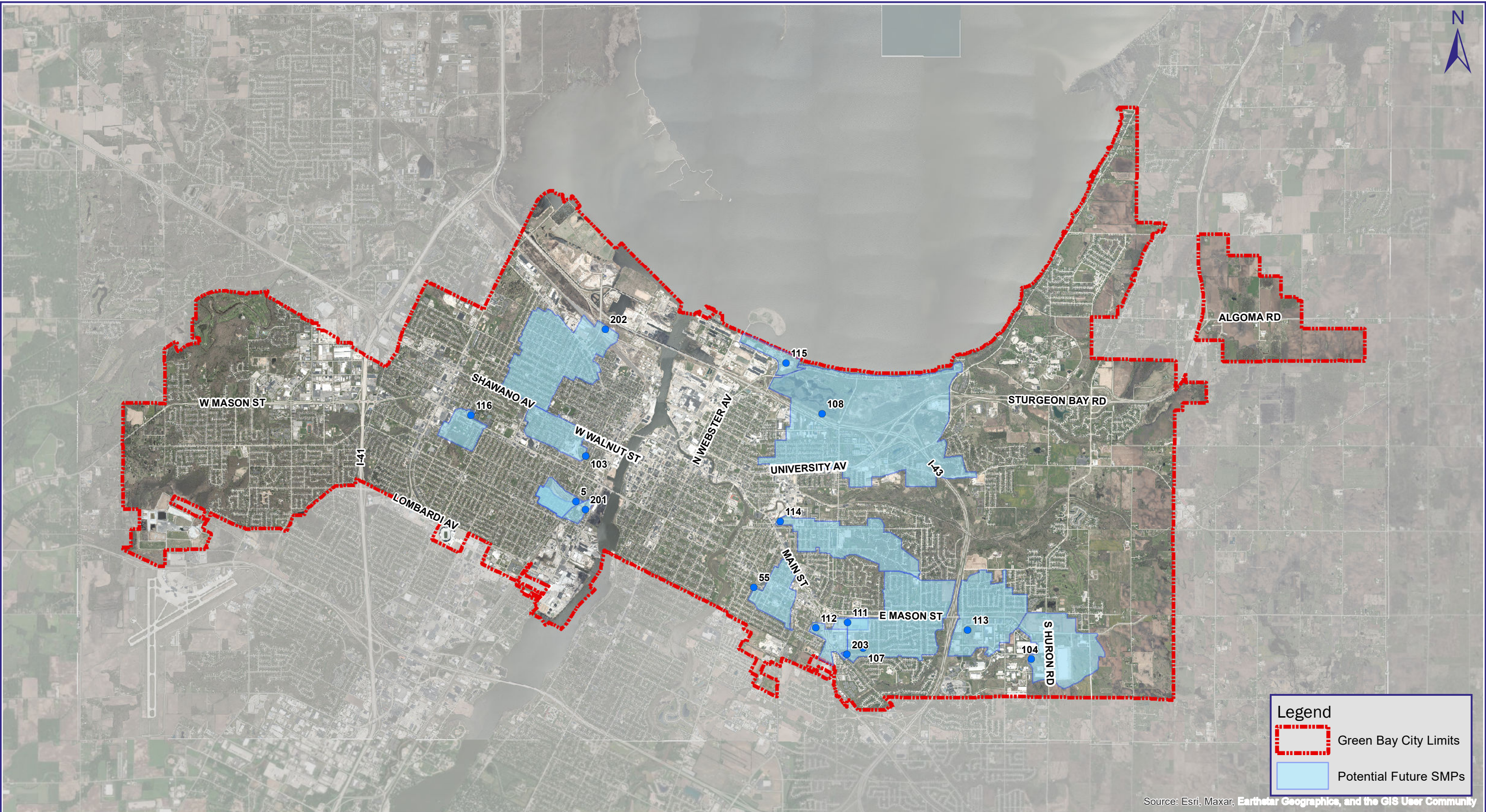
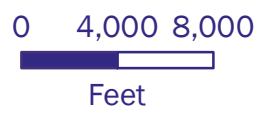
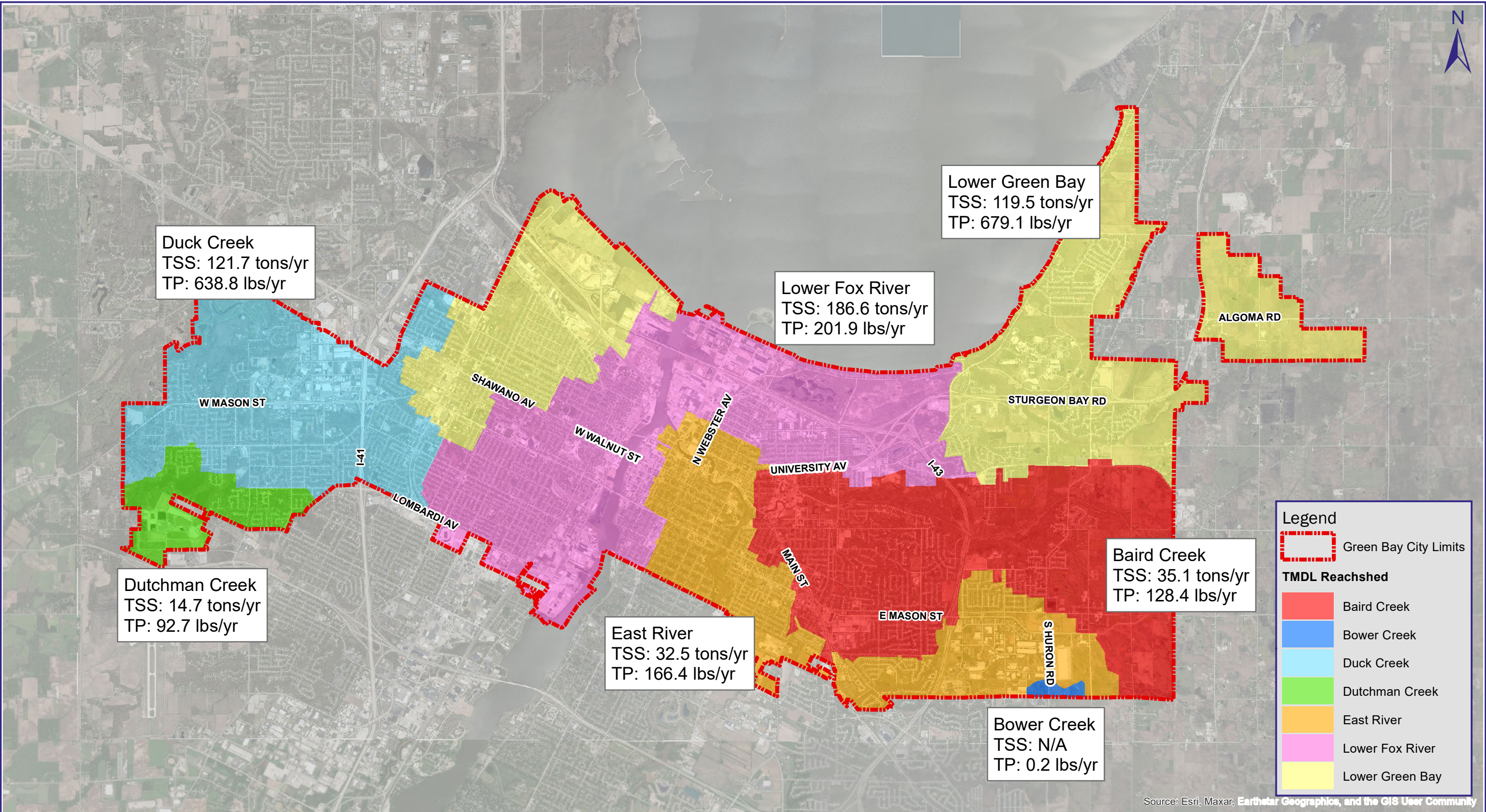


Figure 3-1  
Potential Future SMP Locations and Drainage Areas  
Green Bay Stormwater Management Plan Update







**Figure 3-2**  
**Remaining TSS and TP Load Reduction Needed After Potential SMP Implementation**  
**Green Bay Stormwater Management Plan Update**



## **Appendix B: Supplemental Information**

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B2 - WisDOT Brown County Map

B3 - Green Bay Connecting Highways Map

B4 - Green Bay County Highway Exclusions

B5 - City SMPs Summary

B6 - Private SMP Summary Pre-2017

B7 - Private SMP Summary 01-2017 to 2023-5

B8 - WinSLAMM Model Log (2018-2022 practices)

B9 - 2023 Unit Costs for SMP Estimates

B10 - Expanded Alternatives Evaluation Matrix



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

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

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

**MUNICIPAL SEPARATE STORM SEWER SYSTEM**

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

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

State of Wisconsin Department of Natural Resources  
For the Secretary

By

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

February 10, 2022

\_\_\_\_\_  
Date Permit Signed

**PERMIT EFFECTIVE DATE:** May 1, 2019

**EXPIRATION DATE:** April 30, 2024

**PERMIT MODIFICATION DATE:** December 7, 2021; February 10, 2022, correction



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

**1. APPLICABILITY CRITERIA**

**1.1 Permitted Area**

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

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

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

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

**1.2 Authorized Discharges**

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

**1.3 Water Quality Standards**

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

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

**1.4 Outstanding and Exceptional Resource Waters**

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



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

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

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

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

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

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

## **1.5 Impaired Waterbodies and Total Maximum Daily Load Requirements**

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

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

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

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

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

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

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

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

#### **1.6 Wetlands**

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

#### **1.7 Endangered and Threatened Resources**

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

#### **1.8 Historic Property**

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

#### **1.9 General Storm Water Discharge Limitations**

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



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

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

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

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

### **1.10 Obtaining Permit Coverage**

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

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

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

### **1.11 Transfers**

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

### **1.12 Exclusions**

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

#### **1.12.1 Combined Sewer and Sanitary Sewer Systems**

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

#### **1.12.2 Agricultural Facilities and Practices**

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

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

**1.12.3 Other Excluded Discharges**

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

**1.12.4 Indian Country**

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

**1.12.5 Non-MS4 Discharge**

Storm water discharges that do not enter an MS4.

**1.13 Compliance with Permit Requirements**

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



## 2. PERMIT CONDITIONS

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

### 2.1 Public Education and Outreach

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

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

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

**Table 1: Public Education and Outreach Topic Areas and Descriptions**

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

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

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

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

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

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

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



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

## **2.2 Public Involvement and Participation**

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

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

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

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

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

## **2.3 Illicit Discharge Detection and Elimination (IDDE)**

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

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

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

**b.** Identify non-storm water discharges or flows that are not considered illicit discharges. Categories of non-storm water discharges that are not considered illicit discharges include water line flushing, landscape irrigation, diverted stream flows, uncontaminated groundwater infiltration, uncontaminated pumped groundwater, discharges from potable water sources, foundation drains, air conditioning condensation, irrigation water, lawn watering, individual residential car washing, flows from riparian habitats

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

c. Establish inspection and enforcement authority.

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

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

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

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

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

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

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

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



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

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

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

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

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

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

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

**h.** Documentation of the following information:

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

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

**(3)** Dates of discovery of all illicit discharges.

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

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

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

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

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

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

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

## **2.4 Construction Site Pollutant Control**

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

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

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

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

[https://dnr.wi.gov/topic/stormwater/standards/const\\_standards.html](https://dnr.wi.gov/topic/stormwater/standards/const_standards.html)



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

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

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

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

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

e. Inspection and enforcement authority.

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

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

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

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

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

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

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

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

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

**Table 3: Construction Site Inspection Frequency**

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

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

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

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

## **2.5 Post-Construction Storm Water Management**

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

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



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

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

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

[https://dnr.wi.gov/topic/stormwater/standards/postconst\\_standards.html](https://dnr.wi.gov/topic/stormwater/standards/postconst_standards.html)

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

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

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

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

g. Inspection and enforcement authority.

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

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

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

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

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

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

## **2.6 Pollution Prevention**

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

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

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

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



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

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

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

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

**a.** SWPPPs shall include the following information:

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

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

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

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

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

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

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

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

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

**(6) Spills prevention and response standard operating procedures.**

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

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

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

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

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

**2.6.5 Collection services/Storm sewer system maintenance activities.**

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

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

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



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

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

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

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

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

**Note:** The Department has developed "Interim Municipal Phosphorus Reduction Credit for Leaf Management Programs" guidance to assist permitted MS4s on creditable phosphorus reduction through leaf collection and management. The guidance document may be found on the Department's Internet site at: [https://dnr.wi.gov/topic/stormwater/standards/ms4\\_modeling.html](https://dnr.wi.gov/topic/stormwater/standards/ms4_modeling.html)

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

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

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

c. The amount of deicing product used per month.

d. A description of the type of equipment used.

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

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

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

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

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

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

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

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

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

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

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

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



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

## **2.7 Storm Water Quality Management**

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

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

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

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

**Note:** The total suspended solids reduction requirement applies to storm water runoff from areas of urban land use and is not applicable to agricultural or rural land uses and associated roads. Additional MS4 modeling guidance for modeling the total suspended solids control is available on the Department's Internet site at: [https://dnr.wi.gov/topic/stormwater/standards/ms4\\_modeling.html](https://dnr.wi.gov/topic/stormwater/standards/ms4_modeling.html). The permittee may elect to meet the applicable total suspended solids standard above on a watershed or regional basis by working with other permittees to provide regional treatment that collectively meets the standard.

## **2.8 Storm Sewer System Map**

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

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

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

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

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

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

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

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

**2.8.8** Identification of streets.

## **2.9 Annual Report**

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

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

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

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

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



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

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

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

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

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

## **2.10 Cooperation**

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

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

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

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

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

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

#### **2.11 Amendments**

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

#### **2.12 Reapplication for Permit Coverage**

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



### 3. COMPLIANCE SCHEDULE

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

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

#### 3.1 Impaired Waterbodies and Total Maximum Daily Loads

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

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

#### 3.2 Public Outreach and Education

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

#### 3.3 Public Involvement and Participation

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

#### 3.4 Illicit Discharge Detection and Elimination

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

#### 3.5 Construction Site Pollutant Control

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

#### 3.6 Post-Construction Storm Water Management

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

### **3.7 Pollution Prevention**

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

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

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

### **3.8 Storm Water Quality Management**

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

### **3.9 Storm Sewer System Map**

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

### **3.10 Annual Report**

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



**Table 4: Compliance Schedule for Permit Requirements**

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

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



#### 4. GENERAL CONDITIONS

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

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

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

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

#### 4.4 Noncompliance

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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



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

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

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

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

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

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

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

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

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

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

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

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

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

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



## 5. DEFINITIONS USED IN THIS PERMIT

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

### **A.1 Applicability and Structure of Appendix.**

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

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

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

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

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

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

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

### **A.2 Full TMDL Compliance.**

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



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

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

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

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

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

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

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

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

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

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

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

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

- a.** A level of reduction that achieves at least 20% of the remaining reduction needed beyond the current 20% TSS reduction required under s. NR 151.13 (2)(b)1.b., Wis. Adm. Code, to achieve full compliance in sediment or TSS.
- b.** A level of reduction that achieves at least 10% of the remaining reduction needed beyond 15% TP reduction to achieve full compliance in TP.

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

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

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

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



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

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

**Determine Calculated Wasteload Allocation**

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

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

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

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

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

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

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

**Load reduction at the end of permit term**

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

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

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

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

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

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

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

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

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

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

The guidance is available from the Department's Internet site at:  
[https://dnr.wi.gov/topic/stormwater/standards/ms4\\_modeling.html](https://dnr.wi.gov/topic/stormwater/standards/ms4_modeling.html)

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

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

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

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

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

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

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



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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



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

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

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

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

**Note:** % TSS reduction from No Controls =  $20 + [0.80 \times (\% \text{ TSS Control Lower Fox TMDL Report})]$   
 % TP reduction from No Controls =  $15 + [0.85 \times (\% \text{ TP Control Lower Fox TMDL Report})]$

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

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

| Waterbody Name | County               | WBIC    | MS4 TP % Reduction from No Controls |
|----------------|----------------------|---------|-------------------------------------|
| Lake St. Croix | St. Croix,<br>Pierce | 2601500 | 46.0                                |

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

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

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



## **Appendix B: MS4 Permittees Subject to Milwaukee River Basin TMDL**

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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



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

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

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

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

[https://dnr.wi.gov/topic/stormwater/standards/ms4\\_modeling.html](https://dnr.wi.gov/topic/stormwater/standards/ms4_modeling.html), and is available to assist a permittee with complying with the requirements of section B.4.

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

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

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

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

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

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

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

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

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

**Note:** The Department's "Interim Municipal Phosphorus Reduction Credit for Leaf Management Programs" guidance document includes recommendations on how the permittee's municipal leaf collection program should be designed and implemented. The guidance is available from the Department's Internet site at:  
[https://dnr.wi.gov/topic/stormwater/standards/ms4\\_modeling.html](https://dnr.wi.gov/topic/stormwater/standards/ms4_modeling.html)

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

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

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

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

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

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

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

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

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

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

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

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



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

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

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

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

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

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

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

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

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

**Kinnickinnic River Basin:**

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

**Menomonee River Basin:**

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

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

**Milwaukee River Basin:**

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



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

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

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

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

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

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

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

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

### **C.2 Full TMDL Compliance.**

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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



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

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

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

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

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

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

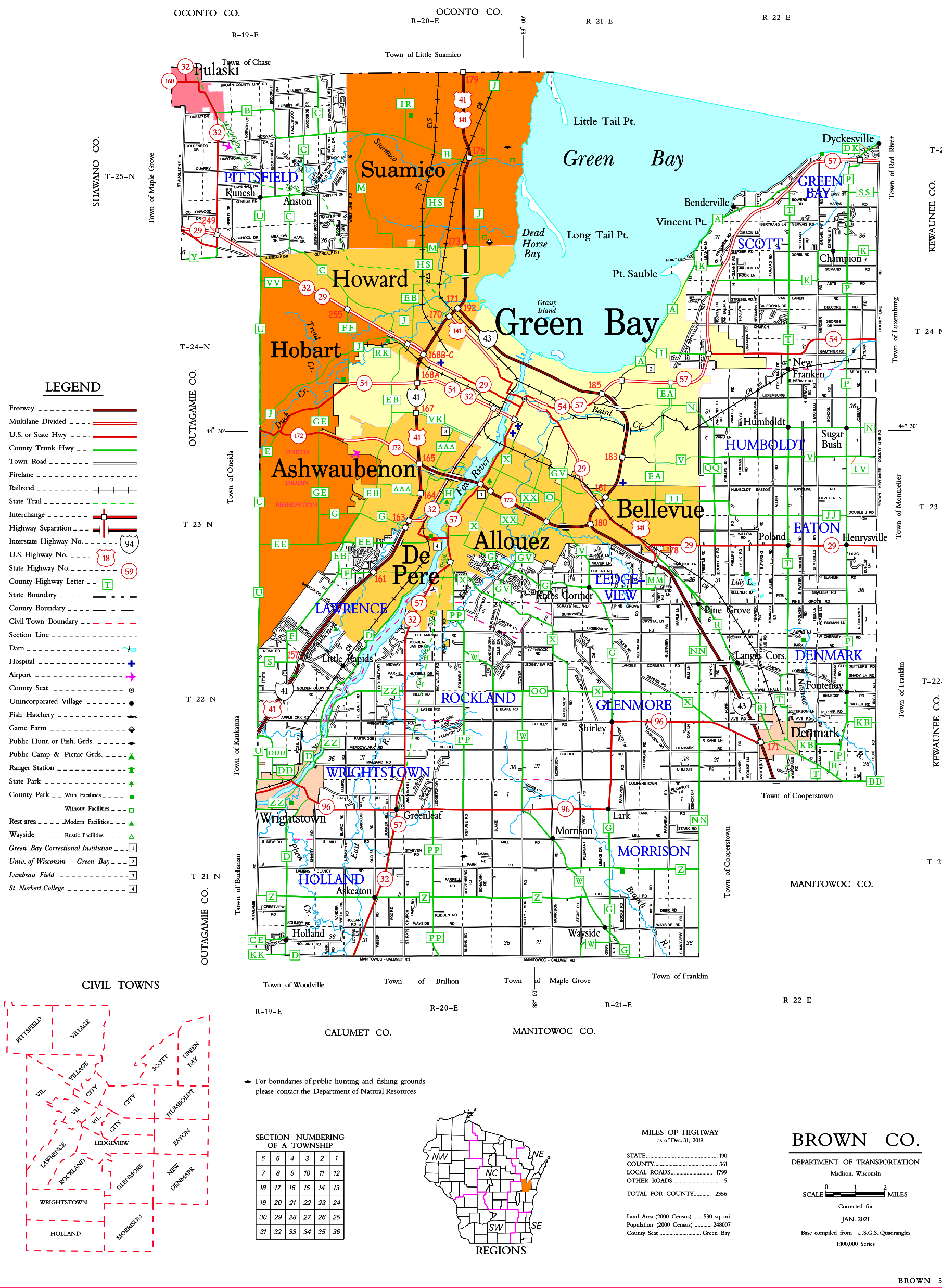
**Note:** The reductions stipulated under C.4.3.b are interim compliance targets set as a planning target for the next permit term. Future permit reduction targets may taper off or vary between municipalities based on individual plans as it is expected that municipalities will rely more on reductions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

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

**Note:** The Department has developed the guidance document “TMDL Guidance for MS4 Permits: Planning, Implementation, and Modeling Guidance.” The guidance is available on the Department’s Internet site: [https://dnr.wi.gov/topic/stormwater/standards/ms4\\_modeling.html](https://dnr.wi.gov/topic/stormwater/standards/ms4_modeling.html), and is available to assist a permittee with complying with the requirements of section C.4.

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

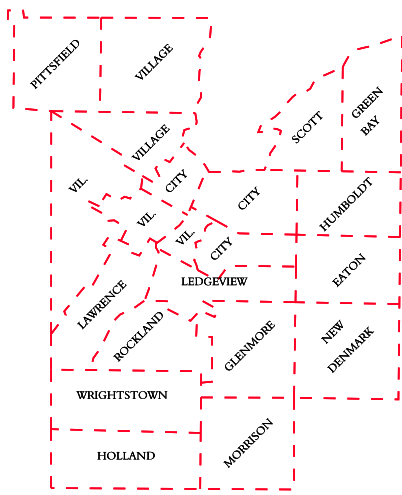
**C.5 Annual Reporting.** For requirements outlined under sections C.3 and C.4 the permittee shall include a description and the status of progress toward implementing the identified actions and activities in their MS4 annual reports due by March 31 of each year.



LEGEND

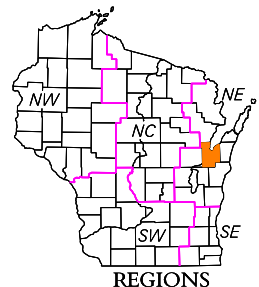
- Freeway
- Multilane Divided
- U.S. or State Hwy
- County Trunk Hwy
- Town Road
- Firelane
- Railroad
- State Trail
- Interchange
- Highway Separation
- Interstate Highway No.
- U.S. Highway No.
- State Highway No.
- County Highway Letter
- State Boundary
- County Boundary
- Civil Town Boundary
- Section Line
- Dam
- Hospital
- Airport
- County Seat
- Unincorporated Village
- Fish Hatchery
- Game Farm
- Public Hunt. or Fish. Grds.
- Public Camp & Picnic Grds.
- Ranger Station
- State Park
- County Park
- Rest area
- Wayside
- Green Bay Correctional Institution
- Univ. of Wisconsin - Green Bay
- Lambeau Field
- St. Norbert College

CIVIL TOWNS



SECTION NUMBERING OF A TOWNSHIP

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



MILES OF HIGHWAY as of Dec. 31, 2019

|                  |      |
|------------------|------|
| STATE            | 190  |
| COUNTY           | 361  |
| LOCAL ROADS      | 1799 |
| OTHER ROADS      | 5    |
| TOTAL FOR COUNTY | 2356 |

**BROWN CO.**

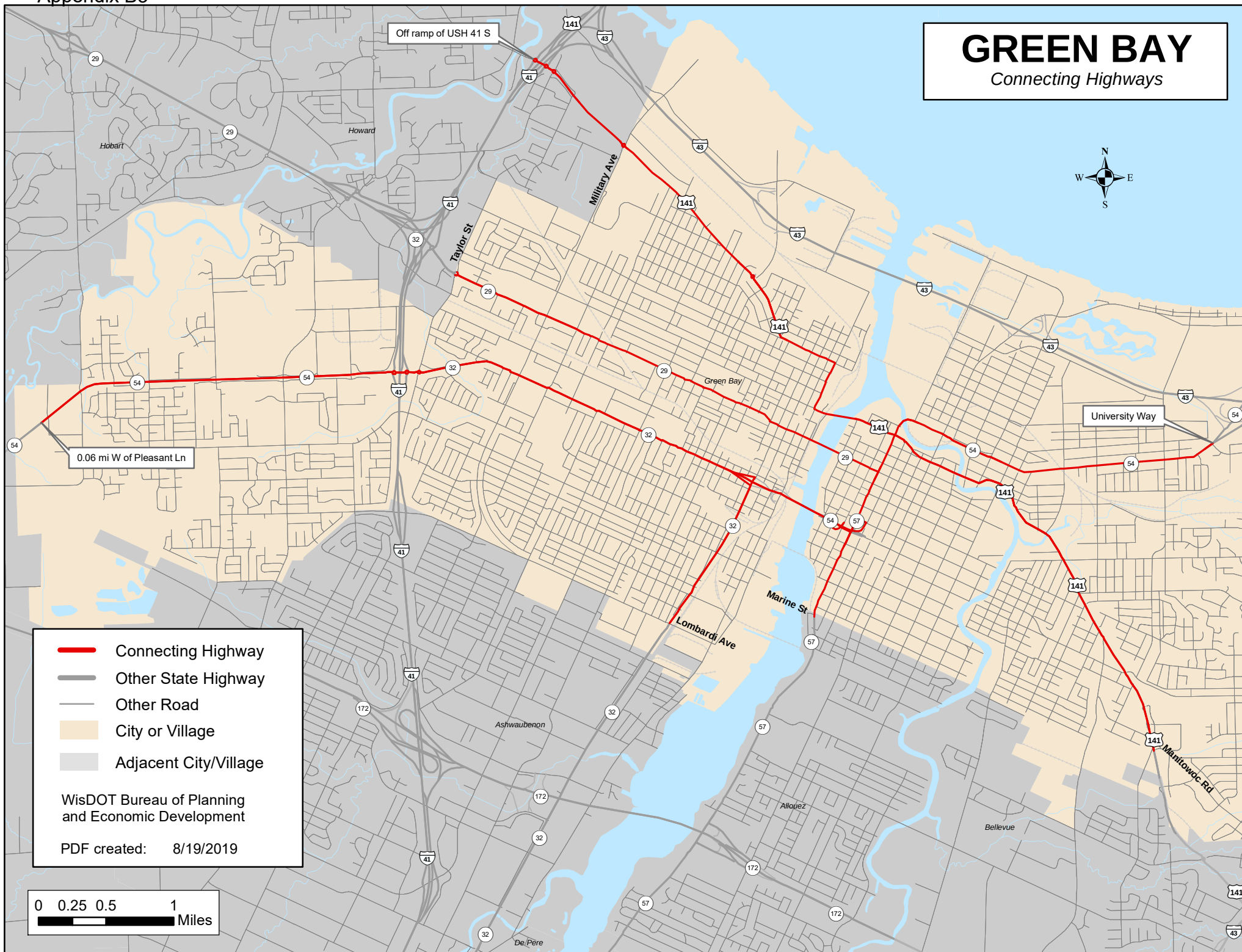
DEPARTMENT OF TRANSPORTATION  
Madison, Wisconsin

SCALE 0 1 2 MILES

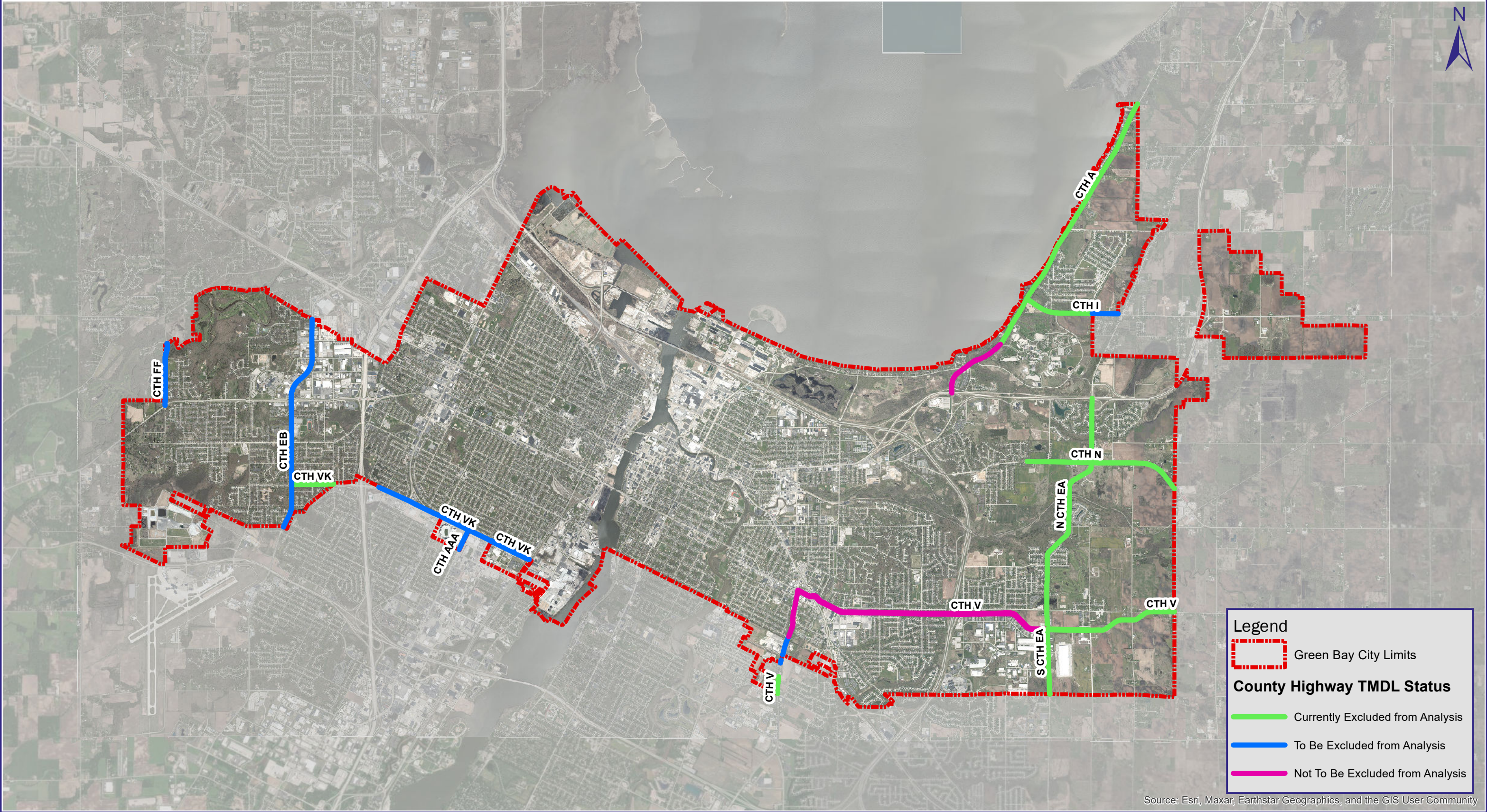
Corrected for  
JAN. 2021

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









TMDL County Highways  
Green Bay Stormwater Management Plan Update





**Appendix B5**  
**Public SMP Summary**

| Site Name                         | TSS Reduction (tons) | TP Reduction (lbs) |
|-----------------------------------|----------------------|--------------------|
| BairdCreekPreserves_no_9-10       | 3.33                 | 17.23              |
| BarinaCreek_no_22                 | 15.37                | 78.59              |
| BastenPond_no33                   | 0.70                 | 2.96               |
| Bay Beach Pervious Pavement       | 0.05                 | 0.21               |
| BergerPond_no34                   | 1.79                 | 32.12              |
| BrownCoParkPond_no18              | 0.74                 | 3.73               |
| BS1K-2_GIS ID 1282                | 0.12                 | 0.60               |
| CDS-1_GIS ID 862                  | 0.44                 | 1.94               |
| CDS-2_GIS ID 9875                 | 0.07                 | 0.29               |
| Christa McAuliffe Pond            | 5.75                 | 31.75              |
| EatonHeightsPond_no19             | 2.20                 | 10.37              |
| Eliza St Permeable Pavers         | 0.08                 | 0.37               |
| Erie Rd CB Group                  | 0.00                 | 0.01               |
| ExcaliburPond_no21                | 1.57                 | 8.63               |
| F-1_GIS ID 11041                  | 0.02                 | 0.07               |
| FRPC_Pond/Wolf_Pack_Pond          | 18.39                | 44.92              |
| HuronSitkaPond_no7                | 6.68                 | 44.21              |
| HW-2_GIS ID 11047                 | 0.07                 | 0.17               |
| HW-3_GIS ID 11049                 | 0.06                 | 0.14               |
| I-43 Business Pond South          | 9.79                 | 31.19              |
| I-43 Business Ponds North         | 50.24                | 200.48             |
| JuzaShorewoodPond_no23            | 0.70                 | 3.40               |
| Lambeau Field Underground Storage | 5.24                 | 18.93              |
| LarscheidPond_no35                | 5.15                 | 27.71              |
| McKenziePond_no31                 | 1.41                 | 7.74               |
| MillsPond_no39                    | 34.13                | 266.64             |
| Mossy Oak Pond                    | 7.26                 | 36.80              |
| RoyalWoodsPond_no8                | 1.62                 | 8.99               |
| S5Pond_no24                       | 2.07                 | 5.09               |
| SC-1_GIS ID 10188                 | 0.00                 | 0.02               |
| SC-2_GIS ID 10185                 | 0.07                 | 0.32               |
| SC-3_GIS ID 10085                 | 0.66                 | 3.28               |
| SummerPlace_no30                  | 2.32                 | 17.90              |
| Superior Pond                     | 1.31                 | 8.75               |
| VOR-1_GIS ID 5537                 | 0.17                 | 0.81               |
| VOR-4_GIS ID 11048                | 0.04                 | 0.11               |
| WestMasonPond_no29                | 1.31                 | 6.68               |
| WilderPond_no37                   | 3.58                 | 18.44              |
| WoodsToHuronSitkaPond_no7         | 5.16                 | 29.88              |
| <b>Total</b>                      | <b>189.7</b>         | <b>971.5</b>       |



**Appendix B6****Private SMP Summary - Pre-2017**

| Site Name                      | TSS Reduction (tons) | TP Reduction (lbs) |
|--------------------------------|----------------------|--------------------|
| BairdCreekPonds_no12-15        | 1.63                 | 9.08               |
| BairdCreekPreserves_no_11      | 2.03                 | 10.48              |
| Fest Foods Biopond 1           | 0.14                 | 0.50               |
| Fest Foods Biopond 2           | 0.03                 | 0.10               |
| Fest Foods Biopond 3           | 0.12                 | 0.44               |
| Fest Foods CB Group 1          | 0.09                 | 0.33               |
| Fest Foods CB Group 2          | 0.29                 | 1.09               |
| Fest Foods UG System 1         | 0.22                 | 0.78               |
| MackinawPond_no28              | 0.66                 | 4.01               |
| MahonCreek1stAdditionPond_no41 | 0.71                 | 2.32               |
| MahonCreekEstatesPond_no20     | 0.60                 | 3.23               |
| MajesticHeights_no17           | 0.74                 | 3.85               |
| P&GPond_no4-5                  | 19.57                | 64.47              |
| PlattenPlacePond_no27          | 1.12                 | 5.47               |
| Sand Ridge Park South          | 1.19                 | 6.71               |
| StoneGarden_no16               | 0.88                 | 6.79               |
| StoneGarden_no16_South         | 0.24                 | 1.18               |
| <b>Total</b>                   | <b>30.2</b>          | <b>120.8</b>       |

Appendix B7

Private SMP Summary - 01-2017 to 2023-05

| Site Name                                             | Permit Number(s)          | TSS Reduction (tons) | TP Reduction (lbs) |
|-------------------------------------------------------|---------------------------|----------------------|--------------------|
| American Food                                         | 04-2017                   | 0.12                 | 0.33               |
| Animal House Addition                                 | 25-2017                   | 0.46                 | 0.00               |
| Auto Gallery                                          | 14-2017                   | 0.07                 | 0.30               |
| Bellin Health Parking Lot                             | 19-2017                   | 0.06                 | 0.17               |
| Dental City                                           | 16-2017                   | 0.99                 | 2.92               |
| Dunkin Donuts                                         | 28-2017                   | 0.02                 | 0.00               |
| East HS Athletic Facility                             | 07-2017                   | 0.17                 | 0.63               |
| El Tapatio Bakery                                     | 12-2017                   | 0.08                 | 0.22               |
| Habitat for Humanity                                  | 24-2017                   | 0.16                 | 1.16               |
| Kwik Trip                                             | 01-2017                   | 0.26                 | 0.00               |
| Multipond America                                     | 15-2017                   | 0.40                 | 0.00               |
| Taqueria El Local                                     | 22-2017                   | 0.02                 | 0.15               |
| Tower Clock Surgery Center                            | 08-2017                   | 0.13                 | 0.37               |
| Twin Homes/Habitat for Humanity                       | 09-2017                   | 0.06                 | 0.27               |
| WG&R Parking Lot Addition                             | 26-2017                   | 1.90                 | 4.80               |
| Wisconsin Building Supply                             | 18-2017                   | 0.12                 | 0.00               |
| Baird Crossing Condos                                 | 22-2018, 05-2017          | 1.18                 | 7.08               |
| Baird Elementary School                               | 07-2018                   | 1.01                 | 4.18               |
| Bay Beach Big Wheel                                   | 27-2018                   | 0.07                 | 0.26               |
| Bay Industries Parking Lot                            | 28-2018                   | 0.14                 | 0.27               |
| D&D Automotive                                        | 03-2018                   | 0.35                 | 0.94               |
| Edison Elementary School                              | 09-2018                   | 0.26                 | 1.34               |
| Eisenhower Elementary School                          | 08-2018                   | 0.27                 | 1.11               |
| Friar House Lofts                                     | 30-2018                   | 0.50                 | 2.26               |
| GEI Consultants                                       | 04-2018                   | 0.41                 | 1.16               |
| Hickory Hills Apartments                              | 13-2018                   | 0.74                 | 2.89               |
| Kennedy Elementary School                             | 12-2018                   | 0.13                 | 0.00               |
| Lok-Safe Storage                                      | 02-2018, 11-2018          | 0.60                 | 0.37               |
| Parking Lot Expansion                                 | 21-2018                   | 0.15                 | 0.00               |
| Paul's Pantry Addition                                | 31-2018                   | 0.01                 | 0.03               |
| Perkins Park                                          | 18-2018                   | 0.54                 | 0.00               |
| RGL Logistics                                         | 01-2018                   | 0.00                 | 0.01               |
| Wildlife Sanctuary Building Addition                  | 29-2018                   | 0.03                 | 0.30               |
| Beautiful Savior Evangelical Lutheran Church          | 2019-12                   | 0.25                 | 0.79               |
| Brown County Jail Expansion and Medical Office        | 2019-32                   | 0.44                 | 2.20               |
| Burger King Restaurant                                | 2019-23                   | 0.06                 | 0.23               |
| Contract Transport Services Building Addition         | 2019-13                   | 1.84                 | 5.56               |
| Daniel Schmidt Residence                              | 2019-14, 10-2018, 06-2017 | 1.01                 | 0.00               |
| Danz Elementary School Addition                       | 2019-01                   | 0.24                 | 0.00               |
| East River Optimist Park Improvements                 | 2019-03                   | 0.05                 | 0.41               |
| Fox River Papermaking Corridor Pond                   | 2019-10                   | 2.20                 | 4.97               |
| Freedom House                                         | 2019-21                   | 0.09                 | 0.30               |
| GBAPS Martin Elementary School Addition               | 2019-11                   | 0.78                 | 0.00               |
| GBAPS New Storage Building                            | 2019-19                   | 3.16                 | 10.31              |
| GBAPS Wilder Elementary School Addition               | 2019-17                   | 0.84                 | 0.00               |
| Gray Court Apartments                                 | 2019-15                   | 1.68                 | 5.54               |
| Kwik Trip #1051                                       | 2019-06                   | 1.16                 | 3.53               |
| Newcomer Funeral Home Building Addition               | 2019-22                   | 0.10                 | 0.35               |
| Panera Bread                                          | 2019-33                   | 0.13                 | 0.36               |
| Russel Metals Williams Bahcall Inc Addition           | 2019-16                   | 0.64                 | 1.76               |
| Seura Parking Lot Addition                            | 2019-31                   | 1.24                 | 3.54               |
| Sullivan Elementary School Addition                   | 2019-04                   | 0.07                 | 0.00               |
| The Duck Shack                                        | 2019-18                   | 0.01                 | 0.08               |
| The Standard - Tenant Buildout                        | 2019-26                   | 0.03                 | 0.08               |
| Trawitzki Residence                                   | 2019-24                   | 0.01                 | 0.09               |
| Water Resource Recovery and Electrical Energy Project | 2019-27                   | 3.52                 | 8.40               |
| Whitney School and Townhomes                          | 2019-07                   | 0.16                 | 0.00               |
| Amerhart Expansion                                    | 2020-17                   | 0.45                 | 0.00               |

Appendix B7

Private SMP Summary - 01-2017 to 2023-05

| Site Name                                                               | Permit Number(s)                                  | TSS Reduction (tons) | TP Reduction (lbs) |
|-------------------------------------------------------------------------|---------------------------------------------------|----------------------|--------------------|
| American Foods Group Temporary Parking Lot                              | 2020-8                                            | 0.81                 | 2.87               |
| Arnie Wolff Sports Complex                                              | 2020-20                                           | 1.06                 | 0.00               |
| Aurora Parking Lot                                                      | 27-2017, 2020-19,<br>2019-28, 20-2018,<br>03-2017 | 11.57                | 59.48              |
| Bay Title and Abstract                                                  | 2020-6                                            | 0.04                 | 0.18               |
| Community Treatment Center Addition                                     | 2020-9                                            | 0.11                 | 0.00               |
| Dollar Tree                                                             | 2020-1                                            | 0.11                 | 0.00               |
| Family Services of Northeast Wisconsin                                  | 2020-15                                           | 0.09                 | 0.31               |
| Green Bay Water Utility Addition                                        | 2020-14                                           | 0.03                 | 0.11               |
| Hurckman Mechanical                                                     | 2020-12                                           | 0.11                 | 0.31               |
| Lincoln Elementary Parking Lot                                          | 2020-7                                            | 0.08                 | 0.00               |
| Northeast Asphalt Parking Lot Reconstruction                            | 2020-18                                           | 0.00                 | 0.00               |
| O'Donahue Residence                                                     | 2020-2                                            | 0.24                 | 0.00               |
| Red Smith School Projects                                               | 2020-5, 2019-09                                   | 0.33                 | 1.25               |
| The Shores                                                              | 2020-10                                           | 0.06                 | 0.48               |
| Baycare Development                                                     | 2021-04                                           | 1.62                 | 4.64               |
| Broadway and Alexander Storage                                          | 2021-15                                           | 0.19                 | 0.00               |
| Cash Depot Expansion                                                    | 2021-16                                           | 0.47                 | 1.12               |
| Chipotle/Cousins                                                        | 2021-12                                           | 0.06                 | 0.16               |
| Kosmoski Apartments                                                     | 2021-17                                           | 0.64                 | 3.41               |
| Lutheran High School Expansion                                          | 2021-11                                           | 0.31                 | 0.00               |
| McDonald Lumber Company Angie Avenue Development                        | 2021-02                                           | 11.05                | 27.05              |
| NEW Community Clinic                                                    | 2021-10                                           | 0.08                 | 0.29               |
| Prevea St. Mary's Medical Office Building and Ambulatory Surgery Center | 2021-07, 2019-25                                  | 0.99                 | 3.84               |
| Scott's Subs                                                            | 2021-05                                           | 0.15                 | 0.00               |
| US Coast Guard Station                                                  | 2021-08                                           | 0.00                 | 0.00               |
| WPS-Preble Substation                                                   | 2021-09                                           | 1.44                 | 4.81               |
| Carnivore Meat Manufacturing Plant                                      | 2022-12                                           | 0.65                 | 1.50               |
| Club Car Wash                                                           | 2022-15                                           | 0.23                 | 0.65               |
| Elevate Apartments                                                      | 2022-14                                           | 3.44                 | 15.68              |
| Georgia-Pacific Parking Lot Combined                                    | 2022-11, 2019-02                                  | 0.74                 | 1.74               |
| Green Bay Botanical Gardens & NWTC                                      | 2022-06, 2019-29,<br>26-2018, 20-2017             | 17.83                | 70.87              |
| Hobby Lobby Alterations & Parking Lot Up-dates                          | 2022-09                                           | 0.19                 | 0.55               |
| Nature's Way - Gummy Plant Expansion                                    | 2022-10, 2018-06                                  | 7.15                 | 11.97              |
| Notre Dame Academy Maintenance Garage                                   | 2022-08                                           | 0.03                 | 0.00               |
| On the Rise Campus Expansion                                            | 2022-13                                           | 0.06                 | 0.00               |
| Shoreline Bank/Hobby Lobby                                              | 2022-03                                           | 0.11                 | 0.33               |
| Starbucks                                                               | 2022-07                                           | 0.10                 | 0.00               |
| The Legacy Hotel                                                        | 2022-03, 2020-16,<br>2019-30                      | 0.33                 | 0.90               |
| Bigelow Finger Road Apartments                                          | 2023-3                                            | 2.52                 | 11.81              |
| Caraton Commons                                                         | 2023-2                                            | 0.11                 | 0.00               |
| Circle K Stores Inc - NTI                                               | 2023-1                                            | 0.49                 | 1.50               |
| Gentle Vet Animal Hospital                                              | 2023-4                                            | 0.02                 | 0.00               |
| Rogan's Shoes                                                           | 2023-5                                            | 0.12                 | 0.00               |
|                                                                         | <b>Total</b>                                      | <b>97.3</b>          | <b>309.8</b>       |



Appendix B8  
City Practices WinSLAMM Modeling Log (2018-2022 Practices)

| City Practice                                                  | Existing Model or New Model? | New Model Developed? (Yes or N/A) | New Model QC Completed? (Yes or N/A) | Existing Model Reviewed for Appropriateness? (Yes or N/A) | Existing Model Modified? (Yes, Not Needed, or N/A) | Existing Model QC Completed (Yes or N/A) | Treatment Area Delineated in Project GIS? (Yes/No) | Modeled Treatment Area (ac) | Without Street Cleaning |              | With Street Cleaning (Mechanical) |              | With Street Cleaning (High-Efficiency) |              | With Street Cleaning (Weighted Average) |              | General Notes                                                                                                    |
|----------------------------------------------------------------|------------------------------|-----------------------------------|--------------------------------------|-----------------------------------------------------------|----------------------------------------------------|------------------------------------------|----------------------------------------------------|-----------------------------|-------------------------|--------------|-----------------------------------|--------------|----------------------------------------|--------------|-----------------------------------------|--------------|------------------------------------------------------------------------------------------------------------------|
|                                                                |                              |                                   |                                      |                                                           |                                                    |                                          |                                                    |                             | TSS Reduction           | TP Reduction | TSS Reduction                     | TP Reduction | TSS Reduction                          | TP Reduction | TSS Reduction                           | TP Reduction |                                                                                                                  |
| <b>Wet Detention</b>                                           |                              |                                   |                                      |                                                           |                                                    |                                          |                                                    |                             |                         |              |                                   |              |                                        |              |                                         |              |                                                                                                                  |
| Fox River Papermaking Corridor (FRPC) Pond, AKA Wolf Pack Pond | Existing                     | N/A                               | N/A                                  | Yes                                                       | Not Needed                                         | Yes                                      | Yes                                                | 173.9                       | 81.69%                  | 56.31%       | N/A                               | N/A          | N/A                                    | N/A          | N/A                                     | N/A          | See as-built models provided by City                                                                             |
| Superior Road                                                  | Existing                     | N/A                               | N/A                                  | Yes                                                       | Yes                                                | Yes                                      | Yes                                                | 62.5                        | 82.61%                  | 58.37%       | N/A                               | N/A          | N/A                                    | N/A          | N/A                                     | N/A          | See as-built models provided by City                                                                             |
| <b>Grass Swales</b>                                            |                              |                                   |                                      |                                                           |                                                    |                                          |                                                    |                             |                         |              |                                   |              |                                        |              |                                         |              |                                                                                                                  |
| Webster Avenue                                                 | New                          | Yes                               | Yes                                  | N/A                                                       | N/A                                                | N/A                                      | Yes                                                | 6.02                        | 96.73%                  | 96.62%       | N/A                               | N/A          | N/A                                    | N/A          | N/A                                     | N/A          | 2018 was planning level analysis, built model to evaluate final swales as constructed                            |
| <b>Lift Stations</b>                                           |                              |                                   |                                      |                                                           |                                                    |                                          |                                                    |                             |                         |              |                                   |              |                                        |              |                                         |              |                                                                                                                  |
| Shipyards                                                      | New                          | Yes                               | Yes                                  | N/A                                                       | N/A                                                | N/A                                      | Yes                                                | 377.62                      | 29.72%                  | 21.82%       | 35.00%                            | 25.21%       | 38.79%                                 | 27.71%       | 37.11%                                  | 26.60%       | Verified Sump > 1.0'. Then get tributary area using city basins, check against topo. Set trib area. Built model. |
| Quincy (Chip) Street                                           | New                          | Yes                               | Yes                                  | N/A                                                       | N/A                                                | N/A                                      | Yes                                                | 38.68                       | 10.76%                  | 7.80%        | 16.56%                            | 11.80%       | 18.84%                                 | 13.36%       | 17.83%                                  | 12.67%       | Verified Sump > 1.0'. Then get tributary area using city basins, check against topo. Set trib area. Built model. |
| Pearl and Howard                                               | New                          | Yes                               | Yes                                  | N/A                                                       | N/A                                                | N/A                                      | Yes                                                | 261.57                      | 12.55%                  | 9.20%        | 21.87%                            | 15.36%       | 28.96%                                 | 20.24%       | 25.81%                                  | 18.07%       | Verified Sump > 1.0'. Then get tributary area using city basins, check against topo. Set trib area. Built model. |
| Museum Place                                                   | New                          | N/A                               | N/A                                  |                                                           |                                                    |                                          | N/A                                                | N/A                         | N/A                     | N/A          | N/A                               | N/A          | N/A                                    | N/A          |                                         |              | Sump < 1.0', not eligible for credit                                                                             |
| Mather Street                                                  | New                          | Yes                               | Yes                                  | N/A                                                       | N/A                                                | N/A                                      | Yes                                                | 23.64                       | 8.94%                   | 6.49%        | 20.02%                            | 13.26%       | 29.87%                                 | 19.36%       | 25.49%                                  | 16.65%       | Verified Sump > 1.0'. Then get tributary area using city basins, check against topo. Set trib area. Built model. |
| <b>Green Infrastructure</b>                                    |                              |                                   |                                      |                                                           |                                                    |                                          |                                                    |                             |                         |              |                                   |              |                                        |              |                                         |              |                                                                                                                  |
| Eliza Street                                                   | Existing                     | N/A                               | N/A                                  | Yes                                                       | Yes                                                | Yes                                      | Yes                                                | 1.15                        | 75.68%                  | 63.76%       | N/A                               | N/A          | N/A                                    | N/A          | N/A                                     | N/A          | See model provided by City                                                                                       |

Appendix B9  
2023 Unit Costs

| City Item Code               | 2023 UNIT COSTS FOR SMP ESTIMATES                                                                                                    |                        | 2023 (based on CPI inflation) | 2018 Green Bay Plan | 2023 Cost notes                                                                                                                                                                                                                                                                                 |
|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|------------------------|-------------------------------|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                              | Line Item (units)                                                                                                                    | Unit Cost <sup>3</sup> | Unit cost                     | Unit Cost           |                                                                                                                                                                                                                                                                                                 |
| 317.01                       | Mobilization                                                                                                                         | \$65,615               | \$65,615                      | \$54,000            | Average Seymour SW Facility and Eliza: all bids = ~\$73k, winning bids = \$48k                                                                                                                                                                                                                  |
| 303.01                       | Excavation (\$ / cu. yd.)                                                                                                            | \$6.09                 | \$3.46                        | \$2.85              | Assumes non-contaminated material, City bids include excavation and haul; Avg Seymour and Eliza: all bids: \$21.28, winning bids = \$18.44, inflated 2018 values = \$10.75 (use winning bid total, split 33%/67%)                                                                               |
| 303.01                       | Trucking Material Offsite (\$ / cu. yd.)                                                                                             | \$12.35                | \$7.29                        | \$6.00              | Assumes non-contaminated material, City bids include excavation and haul; Avg Seymour and Eliza: all bids: \$21.28, winning bids = \$18.44, inflated 2018 values = \$10.75 (use winning bid total, split 33%/67%)                                                                               |
| 1000.48                      | Standard Grass Seeding (\$ / sq. ft.)                                                                                                | \$0.31                 |                               |                     | Standard grass seed mix, assume hydroseeding (avg of Shipyard project \$2.81/sy = \$0.31/sf)                                                                                                                                                                                                    |
| N/A                          | Custom Prairie or Wetland Seeding (\$ / sq. ft.)                                                                                     | \$0.36                 | \$0.12                        | \$0.10              | City review of various projects (Webster swales, Barina prairie expansion, Barina wet meadow overseeding - ranges \$0.18 - \$0.80/sq. ft.) suggested \$0.36/sq. ft. for custom seed mix on average which is used in the estimate                                                                |
| 801.01                       | Topsoil – Strip, Stockpile & Replace (\$ / cu. yd.)                                                                                  | \$6.50                 | \$4.86                        | \$4.00              | Average Seymour SW Facility: all bids = ~\$4.43, winning bids = \$6.50, utilizing winning bid based on recommendation of City                                                                                                                                                                   |
| 1000.21                      | Rip-Rap (\$ / ton)                                                                                                                   | \$103.28               | \$103.28                      | \$85.00             | Average from Shipyard (escalated 3%)= \$61.46, winning bid = \$60.47, 2018 escalated is much higher                                                                                                                                                                                             |
| 1000.02                      | Clay Liner (\$ / cu. yd.) <sup>1</sup>                                                                                               | \$24.30                | \$24.30                       | \$20.00             | Average bids from Seymour = \$24.67, winning bid = \$19.00                                                                                                                                                                                                                                      |
| 313.04                       | Erosion Matting (\$ / sq. yd.)                                                                                                       | \$2.13                 | \$2.13                        | \$1.75              |                                                                                                                                                                                                                                                                                                 |
| 415.07                       | Storm Sewer Pipe (\$ / L.F.) <sup>2</sup>                                                                                            | \$121.83               | \$91.13                       | \$75.00             | Non-specific storm sewer size in 2018 estimate, Avg 24" from Seymour = \$121.83                                                                                                                                                                                                                 |
| Not a standard city bid item | Inlet / Outlet Structure (Each)                                                                                                      | \$12,151               | \$12,151                      | \$10,000            |                                                                                                                                                                                                                                                                                                 |
| N/A                          | Native Plant Plugs or Wetland Plantings (\$ / sq. ft.)                                                                               | \$3.50                 | \$6.08                        | \$5.00              | [outflow structures] Not a standard City bid item, use 2018 inflated value<br>Wetland Plantings from City research range from \$1.31-\$5.61 (Eaton and Mossy Oak projects), Native Plant Plugs range from \$3.01-\$3.76 (Webster Ave Swales) Average of all is \$3.50. Use recent City average. |
| 415.3                        | Drain Tile (\$ / L.F.)                                                                                                               | \$60.05                | \$10.94                       | \$9.00              | Assuming 6" perforated, wrapped underdrain from Eliza Street: Avg bids (escalated 3%) = \$51.22, winning bid = \$70.97, one outlier, remove that at average = \$60.05 (use \$60.05)                                                                                                             |
| 1000.07                      | Engineered Soil (\$ / cu. yd.)                                                                                                       | \$74.68                | \$72.91                       | \$60.00             | Average from Shipyard (escalated 3%)= \$76.71, winning bid = \$74.68, escalated slightly lower                                                                                                                                                                                                  |
|                              | Pea Gravel (\$ / cu. yd.)                                                                                                            | \$12.15                | \$12.15                       | \$10.00             | not used in 2018 cost estimates                                                                                                                                                                                                                                                                 |
| 601.04                       | Base Course (\$ / cu. yd.)                                                                                                           | \$30.00                | \$29.16                       | \$24.00             | limited use in 2018 cost estimates (Walmart site 109); School Place average all bids = \$30.76, winning bid = \$30.00                                                                                                                                                                           |
| 601.08                       | Asphalt (\$ / ton)                                                                                                                   | \$161.51               | \$97.21                       | \$80.00             | limited use in 2018 cost estimates (Walmart site 109), price from City Asphalt Paving 2023 bid average \$161.51                                                                                                                                                                                 |
|                              | Design / Contingency                                                                                                                 | 25%                    |                               |                     |                                                                                                                                                                                                                                                                                                 |
|                              | <sup>1</sup> Includes importing and installing clay liner                                                                            |                        |                               |                     |                                                                                                                                                                                                                                                                                                 |
|                              | <sup>2</sup> Assumed 100 L.F. of misc. storm sewer required for each pond – large storm sewer diversions were estimated individually |                        |                               |                     |                                                                                                                                                                                                                                                                                                 |
|                              | <sup>3</sup> Escalated at inflation rate unless noted, see other notes on research                                                   |                        |                               |                     |                                                                                                                                                                                                                                                                                                 |

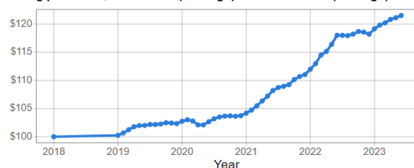
Result

**\$121.51** in Jun. 2023 equals \$100 of buying power in 2018 (Average).

The total inflation rate from 2018 (Average) to Jun. 2023 is **21.51%**. The average inflation rate is **4.04%** per year.

The CPI of 2018 (Average) is 251.107 and the CPI of Jun. 2023 is 305.109.

Purchasing power of \$100 in 2018 (Average) over time: 2018 (Average)–Jun. 2023



\$100

in

Average

2018

= ?

in

June

2023

Calculate

Clear

= Escalation factor 2018 - 2023 based on CPI (see graph and results from 'Inflation Calculator')

1.2151

[Inflation Calculator](https://www.calculator.net/inflation-calculator.html)

<https://www.calculator.net/inflation-calculator.html>

Underground Storage - recommendation from discussion with Jake Brunoehler (ADS) is \$11-\$12/cf. 2018 estimate was from another source and \$6/cf. Does not include restoration or disposal of excavated material

Coagulant Treatment - 2018 study referenced City of Appleton TMDL Plan - updated based on most recent City of Appleton plan

Appendix B10  
Potential Stormwater Management Practices Alternatives Details

|                 |                                                                    |                 |                                                        |                                                                   | Areas                |                      |                                 |                          |                | TSS                     |                                    |                                |                       | TP                      |                                    |                                |                       |                       |                       |                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------|--------------------------------------------------------------------|-----------------|--------------------------------------------------------|-------------------------------------------------------------------|----------------------|----------------------|---------------------------------|--------------------------|----------------|-------------------------|------------------------------------|--------------------------------|-----------------------|-------------------------|------------------------------------|--------------------------------|-----------------------|-----------------------|-----------------------|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SMP ID          | City Subbasin                                                      | TMDL Subbasin   | Practice                                               | Location                                                          | Drainage Area to SMP | Analyzed Area to SMP | SMP Permanent Pool Surface Area | SMP Total Disturbed Area | Available Land | No Controls Load to SMP | Existing With Controls Load to SMP | SMP Incremental Load Reduction | SMP Percent Reduction | No Controls Load to SMP | Existing With Controls Load to SMP | SMP Incremental Load Reduction | SMP Percent Reduction | Capital Cost Estimate | Cost Effectiveness    | Cost Effectiveness  | Comments                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                 |                                                                    |                 |                                                        |                                                                   | (ac)                 | (ac)                 | (ac)                            | (ac)                     | (ac)           | (tons/yr)               | (tons/yr)                          | (tons/yr)                      | (%)                   | (lbs/yr)                | (lbs/yr)                           | (lbs/yr)                       | (%)                   | 2023 \$               | \$/ton of TSS Removed | \$/lb of TP Removed |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| From 2007 Study |                                                                    |                 |                                                        |                                                                   |                      |                      |                                 |                          |                |                         |                                    |                                |                       |                         |                                    |                                |                       |                       |                       |                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 5               | 961                                                                | Lower Fox River | Wet Pond                                               | Ashland Ave                                                       | 84.0                 | 84.0                 | 1.8                             | 3.4                      | 7.5            | 14.8                    | 11.3                               | 8.4                            | 80%                   | 77.4                    | 63.9                               | 32.2                           | 59%                   | \$4,077,500           | \$ 486,505            | \$ 126,590          | Treat 7th Street storm sewer; pipe may be 6' deep; DOT would deed land to city. Requires Lift Station. Land acquisition and agreement concerns. As currently identified project would not be feasible. However, a nearby stormwater management project has potential if the City purchases the adjacent CN Railroad - Ashland property for redevelopment.                                                                                                                                                                                                 |
| 55              | 560                                                                | East River      | Wet Pond                                               | Amy St & Victoria St.                                             | 154.3                | 154.3                | 2.7                             | 4.8                      | 3.2            | 20.5                    | 15.9                               | 12.0                           | 81%                   | 131.9                   | 113.1                              | 62.6                           | 62%                   | \$1,419,400           | \$ 118,508            | \$ 22,681           | Take low flows from storm sewer under Amy St. Currently non City owned land. Land acquisition and agreement concerns.                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| From 2018 Study |                                                                    |                 |                                                        |                                                                   |                      |                      |                                 |                          |                |                         |                                    |                                |                       |                         |                                    |                                |                       |                       |                       |                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 104             | 82, 86, 90, 91, 358D, 369                                          | East River      | Wet Pond                                               | Mitigation Pond                                                   | 229.5                | 229.5                | 4.2                             | 13.8                     | 13.4           | 52.5                    | 18.8                               | 8.5                            | 80%                   | 209.2                   | 99.9                               | 14.3                           | 59%                   | \$1,901,800           | \$ 224,328            | \$ 132,869          | Retrofit mitigation pond, AKA P&G pond. Current permanent pool ~ 4.22 ac, Potential wetland and navigability issues; preliminary discussions with WDNR held in mid-2018.                                                                                                                                                                                                                                                                                                                                                                                  |
| 107             | Multiple portions                                                  | East River      | Stream Restoration                                     | Ellis Creek                                                       | 524.4                | 524.4                | N/A                             | 17.2                     | 17.2           | 54.2                    | 39.7                               | 7.2                            | 40%                   | 403.0                   | 329.8                              | 47.7                           | 30%                   | \$1,276,300           | \$ 178,106            | \$ 26,779           | Stream Restoration. Potential wetland and navigability issues; preliminary discussions with WDNR held in mid-2018.                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 108             | 413, 415, 417, 421, 427, 429, 519, 521, 579, 581, 581G, 581J, 581K | Lower Fox River | Lift Station, Wet Pond, Coagulant Treatment            | Bay Beach Wildlife Sanctuary                                      | 1,316.8              | 1,315.0              | 44.0                            | TBD                      | 200.0          | 125.4                   | 86.0                               | 73.4                           | 90%                   | 795.5                   | 590.8                              | 471.5                          | 85%                   | \$5,907,500           | \$ 80,447             | \$ 12,529           | Construct lift station to route flows into Bay Beach Wildlife Sanctuary Ponds, Current permanent pool ~44 ac. Ponds may be used for local stormwater management per WDNR. Potential wetland and navigability issues; preliminary discussions with WDNR held in mid-2018.                                                                                                                                                                                                                                                                                  |
| 111             | 235K, 510                                                          | Baird Creek     | Underground Storage                                    | East Town Mall                                                    | 35.0                 | 35.0                 | 4.0                             | 6.0                      | 9.2            | 6.9                     | 6.2                                | 4.9                            | 80%                   | 29.5                    | 27.6                               | 18.2                           | 68%                   | \$18,710,200          | \$ 3,846,639          | \$ 1,027,518        | May need to implement as smaller scale project.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 113             | 358, 358A, 358B                                                    | East River      | Coagulant Addition                                     | I-43 North Pond                                                   | 386.5                | 386.5                | 3.5                             | TBD                      | 9.5            | 64.2                    | 13.9                               | 7.5                            | 90%                   | 341.3                   | 140.8                              | 89.6                           | 85%                   | \$2,438,500           | \$ 325,798            | \$ 27,205           | Retrofit pond with coagulant treatment system, on hold pending WDNR guidance.                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 114             | 235, 502, 584, 586                                                 | Baird Creek     | Coagulant Addition                                     | Mills St Pond                                                     | 378.5                | 378.5                | 2.7                             | TBD                      | 8.2            | 41.7                    | 7.5                                | 3.4                            | 90%                   | 268.3                   | 83.4                               | 43.1                           | 85%                   | \$2,361,400           | \$ 699,271            | \$ 54,747           | Retrofit pond with coagulant treatment system, on hold pending WDNR guidance.                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 115             | 581C, 581F, 581G                                                   | Lower Fox River | Lift Station, Wet Ponds, Bioretention                  | Bay Beach Amusement Park                                          | 69.0                 | 30.6                 | 7.0                             | 10.5                     | 23.2           | 5.8                     | 3.8                                | 2.6                            | 80%                   | 26.4                    | 19.7                               | 10.7                           | 66%                   | \$31,125,800          | \$ 11,801,867         | \$ 2,908,133        | A site wide SWMP has been developed for this site (Ruekert & Mielke April 2022) and is being implemented in 3 phases. Data and cost estimate is from prior citywide study, updated information for all phases not currently available.                                                                                                                                                                                                                                                                                                                    |
| 116             | 957B, 957C                                                         | Lower Fox River | Underground Storage                                    | Notre Dame Practice fields                                        | 105.4                | 105.4                | 2.4                             | 2.4                      | 2.4            | 13.3                    | 10.3                               | 6.4                            | 71%                   | 81.2                    | 70.3                               | 32.2                           | 53%                   | \$10,725,600          | \$ 1,667,191          | \$ 333,167          | Install underground storage under Notre Dame Practice Fields. Land acquisition and agreement concerns. Known flooding concerns in this area.                                                                                                                                                                                                                                                                                                                                                                                                              |
| From 2023 Study |                                                                    |                 |                                                        |                                                                   |                      |                      |                                 |                          |                |                         |                                    |                                |                       |                         |                                    |                                |                       |                       |                       |                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 201             | 961                                                                | Lower Fox River | Lift Station Upgrade with Stormwater Quality Structure | 7th and Broadway Lift Station                                     | 85.6                 | 85.6                 | 0.0                             | 0.0                      | 0.1            | 13.8                    | 10.8                               | 0.7                            | 27%                   | 79.0                    | 68.4                               | 3.0                            | 17%                   | \$363,980             | \$ 530,758            | \$ 119,736          | Likely near-term upgrade of an existing stormwater lift station to add stormwater quality sump structure similar to other lift stations in the City (e.g. Mather Street which has a 4'x6'structure). If a larger structure can be used (e.g. 10'x10', pollutant reductions would roughly double) Note that the capital cost shown includes the lift station replacement cost of ~ \$350,000 (based on Mather Street LS cost). In 2024 CIP.                                                                                                                |
| 202             | 592, 595, 595-A, 595-B, WB7                                        | Lower Green Bay | New Lift Station and Stormwater Quality Structure      | Gray Street between I-43 and Railroad Tracks                      | 586.6                | 568.3                | 0.0                             | 0.0                      | 1.0            | 80.6                    | 62.7                               | 3.2                            | 26%                   | 509.4                   | 439.8                              | 15.3                           | 17%                   | \$611,681             | \$ 193,486            | \$ 40,038           | Identified new stormwater lift station with in-line, underground, wet detention box culvert structure modeled as a 40-foot long, 10-foot wide, 9-foot tall box structure inline with 72" (6-foot) diameter storm sewer, utilizing bottom 3-feet of box culvert as permanent pool for treatment. Current identified location is on Wisconsin Central Railroad Land. Note that the capital cost shown includes the new lift station cost of ~ \$375,000 (based on Mather Street LS and Museum Place electrical costs). Contingent on requiring an easement. |
| 203             | 302, 510, 515, 515-A, 515-B, 515-C, 517, 583                       | Baird Creek     | Wet Pond                                               | Between Van Beek Road and Auto Plaza Drive West of Manitowoc Road | 568.2                | 567.4                | 1.7                             | 2.1                      | 2.4            | 61.6                    | 48.0                               | 23.6                           | 60%                   | 436.4                   | 367.1                              | 123.9                          | 44%                   | \$1,046,600           | \$ 44,420             | \$ 8,447            | Wet detention pond in open space area south of Auto Plaza Drive. Land is owned by City of Green Bay, Potential wetland and navigability issues associated with the unnammed tributary of Baird Creek channel. Potential 2025 project if navigability and wetland issues can be addressed with WDNR.                                                                                                                                                                                                                                                       |



## Appendix C: Implementation Plan Tables

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|                                                                                |                               |                  |           |                |
|--------------------------------------------------------------------------------|-------------------------------|------------------|-----------|----------------|
| TMDL COMPLIANCE SUMMARY AND IMPLEMENTATION PLAN                                | BAIRD CREEK<br>Lower Fox TMDL | Assessment Date: | August    | 2023           |
|                                                                                |                               | TSS tons/yr      | TP lbs/yr | TSS %<br>TP %  |
| No Controls Loads (per 2023 Citywide Stormwater TMDL Plan)                     |                               | 437.4            | 2963.4    |                |
| TMDL REDUCTION TARGETS                                                         |                               | 227.5            | 1200.2    | 52.0%<br>40.5% |
| With Controls Current Load Reductions (per 2023 Citywide Stormwater TMDL Plan) |                               | 160.6            | 886.6     | 36.7%<br>29.9% |
| Remaining Loads (per 2023 Citywide Stormwater Plan)                            |                               | 276.8            | 2076.8    |                |
| Reduction Requirements Achieved?                                               |                               | NO               | NO        |                |
| Tradeable Loads (positive value) or remaining gap (negative value)             |                               | -66.9            | -313.6    |                |

| BENCHMARK | DESCRIPTION OF MEASURE                                             | IMPLEMENTATIO<br>N DATE | IMPACTED<br>AREA (ac) | INCREMENTAL MEASURE TREATMENT |           |       |      | CUMULATIVE REACHSHED REDUCTION |           |       |       |
|-----------|--------------------------------------------------------------------|-------------------------|-----------------------|-------------------------------|-----------|-------|------|--------------------------------|-----------|-------|-------|
|           |                                                                    |                         |                       | TSS Tons/yr                   | TP lbs/yr | TSS % | TP % | TSS Tons/yr                    | TP lbs/yr | TSS % | TP %  |
| 1         | Green Stormwater Infrastructure (GSI) Plan <sup>1</sup>            | 2023                    | Citywide              | 0.0                           | 0.0       | 0.0%  | 0.0% | 160.6                          | 886.6     | 36.7% | 29.9% |
| 2         | Innovative Stormwater Improvements Grants ARPA Project             | 2024                    | Citywide              | 0.0                           | 0.0       | 0.0%  | 0.0% | 160.6                          | 886.6     | 36.7% | 29.9% |
| 3         | Baird Creek ARPA Projects <sup>1</sup>                             | 2023-2024               |                       | 0.0                           | 0.0       | 0.0%  | 0.0% | 160.6                          | 886.6     | 36.7% | 29.9% |
| 4         | SMP 203 Auto Plaza Drive Wet Detention                             | 2024-2025               | 568.2                 | 23.6                          | 123.9     | 5.4%  | 4.2% | 184.2                          | 1,010.5   | 42.1% | 34.1% |
| 5         | Redevelopment Ordinance Review <sup>1</sup>                        | 2025                    | Citywide              | 0.0                           | 0.0       | 0.0%  | 0.0% | 184.2                          | 1,010.5   | 42.1% | 34.1% |
| 6         | Catch Basin Cleaning Evaluation <sup>1</sup>                       | 2026                    | Citywide              | 0.0                           | 0.0       | 0.0%  | 0.0% | 184.2                          | 1,010.5   | 42.1% | 34.1% |
| 7         | Incorporate Private SMPs Prior to 2017 and After 2022 <sup>1</sup> | 2028                    | Citywide              | 0.0                           | 0.0       | 0.0%  | 0.0% | 184.2                          | 1,010.5   | 42.1% | 34.1% |
| 8         | TMDL Plan Update <sup>1</sup>                                      | 2028                    | Citywide              | 0.0                           | 0.0       | 0.0%  | 0.0% | 184.2                          | 1,010.5   | 42.1% | 34.1% |
| 9         | SMP 111 Underground Storage                                        | Future                  | 35                    | 4.9                           | 18.2      | 1.1%  | 0.6% | 189.1                          | 1,028.7   | 43.2% | 34.7% |
| 10        | SMP 112 Wet Pond                                                   | Future                  | 75.7                  | 7.8                           | 32.5      | 1.8%  | 1.1% | 196.9                          | 1,061.2   | 45.0% | 35.8% |
| 11        | SMP 114 Coagulant Addition <sup>2</sup>                            | Future                  | 378.5                 | 3.4                           | 43.1      | 0.8%  | 1.5% | 200.3                          | 1,104.3   | 45.8% | 37.3% |
| 12        | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0% | 200.3                          | 1,104.3   | 45.8% | 37.3% |
| 13        | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0% | 200.3                          | 1,104.3   | 45.8% | 37.3% |
| 14        | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0% | 200.3                          | 1,104.3   | 45.8% | 37.3% |
| 15        | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0% | 200.3                          | 1,104.3   | 45.8% | 37.3% |
| 16        | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0% | 200.3                          | 1,104.3   | 45.8% | 37.3% |
| 17        | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0% | 200.3                          | 1,104.3   | 45.8% | 37.3% |
| 18        | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0% | 200.3                          | 1,104.3   | 45.8% | 37.3% |
| 19        | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0% | 200.3                          | 1,104.3   | 45.8% | 37.3% |
| 20        | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0% | 200.3                          | 1,104.3   | 45.8% | 37.3% |

Notes:

<sup>1</sup> Project itself is not a quantifiable load reduction activity

<sup>2</sup> Requires completion of WDNR guidance to confirm load reductions.

|                                                                                |  |                               |  |                  |           |                |
|--------------------------------------------------------------------------------|--|-------------------------------|--|------------------|-----------|----------------|
| TMDL COMPLIANCE SUMMARY AND IMPLEMENTATION PLAN                                |  | BOWER CREEK<br>Lower Fox TMDL |  | Assessment Date: | August    | 2023           |
|                                                                                |  |                               |  | TSS tons/yr      | TP lbs/yr | TSS %<br>TP %  |
| No Controls Loads (per 2023 Citywide Stormwater TMDL Plan)                     |  |                               |  | 1.4              | 13.0      |                |
| TMDL REDUCTION TARGETS                                                         |  |                               |  | 0.7              | 5.3       | 52.0%<br>40.5% |
| With Controls Current Load Reductions (per 2023 Citywide Stormwater TMDL Plan) |  |                               |  | 0.8              | 5.1       | 57.4%<br>39.0% |
| Remaining Loads (per 2023 Citywide Stormwater Plan)                            |  |                               |  | 0.6              | 7.9       |                |
| Reduction Requirements Achieved?                                               |  |                               |  | YES              | NO        |                |
| Tradeable Loads (positive value) or remaining gap (negative value)             |  |                               |  | 0.1              | -0.2      |                |

|           |                                                                    |                         |                       | INCREMENTAL MEASURE TREATMENT |           |       |      | CUMULATIVE REACHSHED REDUCTION |           |                    |                   |
|-----------|--------------------------------------------------------------------|-------------------------|-----------------------|-------------------------------|-----------|-------|------|--------------------------------|-----------|--------------------|-------------------|
| BENCHMARK | DESCRIPTION OF MEASURE                                             | IMPLEMENTATIO<br>N DATE | IMPACTED<br>AREA (ac) | TSS tons/yr                   | TP lbs/yr | TSS % | TP % | TSS tons/yr                    | TP lbs/yr | TSS % <sup>1</sup> | TP % <sup>1</sup> |
| 1         | Green Stormwater Infrastructure (GSI) Plan <sup>1</sup>            | 2023                    | Citywide              | 0.0                           | 0.0       | 0.0%  | 0.0% | 0.8                            | 5.1       | 57.4%              | 39.0%             |
| 2         | Innovative Stormwater Improvements Grants ARPA Project             | 2024                    | Citywide              | 0.0                           | 0.0       | 0.0%  | 0.0% | 0.8                            | 5.1       | 57.4%              | 39.0%             |
| 3         | Redevelopment Ordinance Review <sup>1</sup>                        | 2025                    | Citywide              | 0.0                           | 0.0       | 0.0%  | 0.0% | 0.8                            | 5.1       | 57.4%              | 39.0%             |
| 4         | Catch Basin Cleaning Evaluation <sup>1</sup>                       | 2026                    | Citywide              | 0.0                           | 0.0       | 0.0%  | 0.0% | 0.8                            | 5.1       | 57.4%              | 39.0%             |
| 5         | Incorporate Private SMPs Prior to 2017 and After 2022 <sup>1</sup> | 2028                    | Citywide              | 0.0                           | 0.0       | 0.0%  | 0.0% | 0.8                            | 5.1       | 57.4%              | 39.0%             |
| 6         | TMDL Plan Update <sup>1</sup>                                      | 2028                    | Citywide              | 0.0                           | 0.0       | 0.0%  | 0.0% | 0.8                            | 5.1       | 57.4%              | 39.0%             |
| 7         | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0% | 0.8                            | 5.1       | 57.4%              | 39.0%             |
| 8         | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0% | 0.8                            | 5.1       | 57.4%              | 39.0%             |
| 9         | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0% | 0.8                            | 5.1       | 57.4%              | 39.0%             |
| 10        | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0% | 0.8                            | 5.1       | 57.4%              | 39.0%             |
| 11        | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0% | 0.8                            | 5.1       | 57.4%              | 39.0%             |
| 12        | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0% | 0.8                            | 5.1       | 57.4%              | 39.0%             |
| 13        | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0% | 0.8                            | 5.1       | 57.4%              | 39.0%             |
| 14        | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0% | 0.8                            | 5.1       | 57.4%              | 39.0%             |
| 15        | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0% | 0.8                            | 5.1       | 57.4%              | 39.0%             |
| 16        | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0% | 0.8                            | 5.1       | 57.4%              | 39.0%             |
| 17        | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0% | 0.8                            | 5.1       | 57.4%              | 39.0%             |
| 18        | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0% | 0.8                            | 5.1       | 57.4%              | 39.0%             |
| 19        | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0% | 0.8                            | 5.1       | 57.4%              | 39.0%             |
| 20        | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0% | 0.8                            | 5.1       | 57.4%              | 39.0%             |

Notes:

<sup>1</sup> Project itself is not a quantifiable load reduction activity



| TMDL COMPLIANCE SUMMARY AND IMPLEMENTATION PLAN                                | DUCK CREEK<br>Lower Fox TMDL | (Combined City Proper and Oneida Reservation) | Assessment Date: |           | August | 2023  |
|--------------------------------------------------------------------------------|------------------------------|-----------------------------------------------|------------------|-----------|--------|-------|
|                                                                                |                              |                                               | TSS tons/yr      | TP lbs/yr | TSS %  | TP %  |
| No Controls Loads (per 2023 Citywide Stormwater TMDL Plan)                     |                              |                                               | 451.9            | 2756.0    |        |       |
| TMDL REDUCTION TARGETS                                                         |                              |                                               | 235.0            | 1116.2    | 52.0%  | 40.5% |
| With Controls Current Load Reductions (per 2023 Citywide Stormwater TMDL Plan) |                              |                                               | 113.3            | 477.3     | 25.1%  | 17.3% |
| Remaining Loads (per 2023 Citywide Stormwater Plan)                            |                              |                                               | 338.6            | 2278.6    |        |       |
| Reduction Requirements Achieved?                                               |                              |                                               | NO               | NO        |        |       |
| Tradeable Loads (positive value) or remaining gap (negative value)             |                              |                                               | -121.7           | -638.8    |        |       |

|           |                                                                    |                         |                       | INCREMENTAL MEASURE TREATMENT |           |       |      | CUMULATIVE REACHSHED REDUCTION |           |       |       |
|-----------|--------------------------------------------------------------------|-------------------------|-----------------------|-------------------------------|-----------|-------|------|--------------------------------|-----------|-------|-------|
| BENCHMARK | DESCRIPTION OF MEASURE                                             | IMPLEMENTATIO<br>N DATE | IMPACTED<br>AREA (ac) | TSS Tons/yr                   | TP lbs/yr | TSS % | TP % | TSS Tons/yr                    | TP lbs/yr | TSS % | TP %  |
| 1         | Green Stormwater Infrastructure (GSI) Plan <sup>1</sup>            | 2023                    | Citywide              | 0.0                           | 0.0       | 0.0%  | 0.0% | 113.3                          | 477.3     | 25.1% | 17.3% |
| 2         | Innovative Stormwater Improvements Grants ARPA Project             | 2024                    | Citywide              | 0.0                           | 0.0       | 0.0%  | 0.0% | 113.3                          | 477.3     | 25.1% | 17.3% |
| 3         | Redevelopment Ordinance Review <sup>1</sup>                        | 2025                    | Citywide              | 0.0                           | 0.0       | 0.0%  | 0.0% | 113.3                          | 477.3     | 25.1% | 17.3% |
| 4         | Catch Basin Cleaning Evaluation <sup>1</sup>                       | 2026                    | Citywide              | 0.0                           | 0.0       | 0.0%  | 0.0% | 113.3                          | 477.3     | 25.1% | 17.3% |
| 5         | Incorporate Private SMPs Prior to 2017 and After 2022 <sup>1</sup> | 2028                    | Citywide              | 0.0                           | 0.0       | 0.0%  | 0.0% | 113.3                          | 477.3     | 25.1% | 17.3% |
| 6         | TMDL Plan Update <sup>1</sup>                                      | 2028                    | Citywide              | 0.0                           | 0.0       | 0.0%  | 0.0% | 113.3                          | 477.3     | 25.1% | 17.3% |
| 7         | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0% | 113.3                          | 477.3     | 25.1% | 17.3% |
| 8         | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0% | 113.3                          | 477.3     | 25.1% | 17.3% |
| 9         | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0% | 113.3                          | 477.3     | 25.1% | 17.3% |
| 10        | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0% | 113.3                          | 477.3     | 25.1% | 17.3% |
| 11        | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0% | 113.3                          | 477.3     | 25.1% | 17.3% |
| 12        | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0% | 113.3                          | 477.3     | 25.1% | 17.3% |
| 13        | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0% | 113.3                          | 477.3     | 25.1% | 17.3% |
| 14        | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0% | 113.3                          | 477.3     | 25.1% | 17.3% |
| 15        | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0% | 113.3                          | 477.3     | 25.1% | 17.3% |
| 16        | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0% | 113.3                          | 477.3     | 25.1% | 17.3% |
| 17        | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0% | 113.3                          | 477.3     | 25.1% | 17.3% |
| 18        | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0% | 113.3                          | 477.3     | 25.1% | 17.3% |
| 19        | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0% | 113.3                          | 477.3     | 25.1% | 17.3% |
| 20        | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0% | 113.3                          | 477.3     | 25.1% | 17.3% |

Notes:

<sup>1</sup> Project itself is not a quantifiable load reduction activity

|                                                                                |                                                              |  |                  |           |                |
|--------------------------------------------------------------------------------|--------------------------------------------------------------|--|------------------|-----------|----------------|
| TMDL COMPLIANCE SUMMARY AND IMPLEMENTATION PLAN                                | DUTCHMAN CREEK (Combined City Proper and Oneida Reservation) |  | Assessment Date: | August    | 2023           |
|                                                                                | Lower Fox TMDL                                               |  |                  |           |                |
|                                                                                |                                                              |  | TSS tons/yr      | TP lbs/yr | TSS %<br>TP %  |
| No Controls Loads (per 2023 Citywide Stormwater TMDL Plan)                     |                                                              |  | 51.1             | 361.9     |                |
| TMDL REDUCTION TARGETS                                                         |                                                              |  | 26.6             | 146.6     | 52.0%<br>40.5% |
| With Controls Current Load Reductions (per 2023 Citywide Stormwater TMDL Plan) |                                                              |  | 11.9             | 53.9      | 23.2%<br>14.9% |
| Remaining Loads (per 2023 Citywide Stormwater Plan)                            |                                                              |  | 39.3             | 308.0     |                |
| Reduction Requirements Achieved?                                               |                                                              |  | NO               | NO        |                |
| Tradeable Loads (positive value) or remaining gap (negative value)             |                                                              |  | -14.7            | -92.7     |                |

| BENCHMARK | DESCRIPTION OF MEASURE                                             | IMPLEMENTATIO<br>N DATE | IMPACTED<br>AREA (ac) | INCREMENTAL MEASURE TREATMENT |           |       |      | CUMULATIVE REACHSHED REDUCTION |           |       |                   |
|-----------|--------------------------------------------------------------------|-------------------------|-----------------------|-------------------------------|-----------|-------|------|--------------------------------|-----------|-------|-------------------|
|           |                                                                    |                         |                       | TSS tons/yr                   | TP lbs/yr | TSS % | TP % | TSS tons/yr                    | TP lbs/yr | TSS % | TP % <sup>7</sup> |
| 1         | Green Stormwater Infrastructure (GSI) Plan <sup>1</sup>            | 2023                    | Citywide              | 0.0                           | 0.0       | 0.0%  | 0.0% | 11.9                           | 53.9      | 23.2% | 14.9%             |
| 2         | Innovative Stormwater Improvements Grants ARPA Project             | 2024                    | Citywide              | 0.0                           | 0.0       | 0.0%  | 0.0% | 11.9                           | 53.9      | 23.2% | 14.9%             |
| 3         | Redevelopment Ordinance Review <sup>1</sup>                        | 2025                    | Citywide              | 0.0                           | 0.0       | 0.0%  | 0.0% | 11.9                           | 53.9      | 23.2% | 14.9%             |
| 4         | Catch Basin Cleaning Evaluation <sup>1</sup>                       | 2026                    | Citywide              | 0.0                           | 0.0       | 0.0%  | 0.0% | 11.9                           | 53.9      | 23.2% | 14.9%             |
| 5         | Incorporate Private SMPs Prior to 2017 and After 2022 <sup>1</sup> | 2028                    | Citywide              | 0.0                           | 0.0       | 0.0%  | 0.0% | 11.9                           | 53.9      | 23.2% | 14.9%             |
| 6         | TMDL Plan Update <sup>1</sup>                                      | 2028                    | Citywide              | 0.0                           | 0.0       | 0.0%  | 0.0% | 11.9                           | 53.9      | 23.2% | 14.9%             |
| 7         | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0% | 11.9                           | 53.9      | 23.2% | 14.9%             |
| 8         | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0% | 11.9                           | 53.9      | 23.2% | 14.9%             |
| 9         | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0% | 11.9                           | 53.9      | 23.2% | 14.9%             |
| 10        | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0% | 11.9                           | 53.9      | 23.2% | 14.9%             |
| 11        | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0% | 11.9                           | 53.9      | 23.2% | 14.9%             |
| 12        | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0% | 11.9                           | 53.9      | 23.2% | 14.9%             |
| 13        | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0% | 11.9                           | 53.9      | 23.2% | 14.9%             |
| 14        | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0% | 11.9                           | 53.9      | 23.2% | 14.9%             |
| 15        | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0% | 11.9                           | 53.9      | 23.2% | 14.9%             |
| 16        | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0% | 11.9                           | 53.9      | 23.2% | 14.9%             |
| 17        | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0% | 11.9                           | 53.9      | 23.2% | 14.9%             |
| 18        | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0% | 11.9                           | 53.9      | 23.2% | 14.9%             |
| 19        | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0% | 11.9                           | 53.9      | 23.2% | 14.9%             |
| 20        | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0% | 11.9                           | 53.9      | 23.2% | 14.9%             |

Notes:

<sup>1</sup> Project itself is not a quantifiable load reduction activity

|                                                                                |  |                              |  |                  |           |                |
|--------------------------------------------------------------------------------|--|------------------------------|--|------------------|-----------|----------------|
| TMDL COMPLIANCE SUMMARY AND IMPLEMENTATION PLAN                                |  | East River<br>Lower Fox TMDL |  | Assessment Date: | August    | 2023           |
|                                                                                |  |                              |  | TSS tons/yr      | TP lbs/yr | TSS %<br>TP %  |
| No Controls Loads (per 2023 Citywide Stormwater TMDL Plan)                     |  |                              |  | 490.9            | 2741.8    |                |
| TMDL REDUCTION TARGETS                                                         |  |                              |  | 255.3            | 1110.4    | 52.0%<br>40.5% |
| With Controls Current Load Reductions (per 2023 Citywide Stormwater TMDL Plan) |  |                              |  | 187.7            | 729.8     | 38.2%<br>26.6% |
| Remaining Loads (per 2023 Citywide Stormwater Plan)                            |  |                              |  | 303.2            | 2012.0    |                |
| Reduction Requirements Achieved?                                               |  |                              |  | NO               | NO        |                |
| Tradeable Loads (positive value) or remaining gap (negative value)             |  |                              |  | -67.6            | -380.6    |                |

|           |                                                                    |                         | INCREMENTAL MEASURE TREATMENT |             |           |       | CUMULATIVE REACHSHED REDUCTION |             |           |                            |
|-----------|--------------------------------------------------------------------|-------------------------|-------------------------------|-------------|-----------|-------|--------------------------------|-------------|-----------|----------------------------|
| BENCHMARK | DESCRIPTION OF MEASURE                                             | IMPLEMENTATIO<br>N DATE | IMPACTED<br>AREA (ac)         | TSS tons/yr | TP lbs/yr | TSS % | TP %                           | TSS tons/yr | TP lbs/yr | TSS %<br>TP % <sup>7</sup> |
| 1         | Green Stormwater Infrastructure (GSI) Plan <sup>1</sup>            | 2023                    | Citywide                      | 0.0         | 0.0       | 0.0%  | 0.0%                           | 187.7       | 729.8     | 38.2%<br>26.6%             |
| 2         | Innovative Stormwater Improvements Grants ARPA Project             | 2024                    | Citywide                      | 0.0         | 0.0       | 0.0%  | 0.0%                           | 187.7       | 729.8     | 38.2%<br>26.6%             |
| 3         | East River Flood Solutions Study <sup>1</sup>                      | 2024                    | 3,193                         | 0.0         | 0.0       | 0.0%  | 0.0%                           | 187.7       | 729.8     | 38.2%<br>26.6%             |
| 4         | Redevelopment Ordinance Review <sup>1</sup>                        | 2025                    | Citywide                      | 0.0         | 0.0       | 0.0%  | 0.0%                           | 187.7       | 729.8     | 38.2%<br>26.6%             |
| 5         | Catch Basin Cleaning Evaluation <sup>1</sup>                       | 2026                    | Citywide                      | 0.0         | 0.0       | 0.0%  | 0.0%                           | 187.7       | 729.8     | 38.2%<br>26.6%             |
| 6         | Incorporate Private SMPs Prior to 2017 and After 2022 <sup>1</sup> | 2028                    | Citywide                      | 0.0         | 0.0       | 0.0%  | 0.0%                           | 187.7       | 729.8     | 38.2%<br>26.6%             |
| 7         | TMDL Plan Update <sup>1</sup>                                      | 2028                    | Citywide                      | 0.0         | 0.0       | 0.0%  | 0.0%                           | 187.7       | 729.8     | 38.2%<br>26.6%             |
| 8         | SMP 55 Wet Pond                                                    | Future                  | 154.3                         | 12.0        | 62.6      | 2.4%  | 2.3%                           | 199.7       | 792.4     | 40.7%<br>28.9%             |
| 9         | SMP 104 Wet Pond                                                   | Future                  | 229.5                         | 8.5         | 14.3      | 1.7%  | 0.5%                           | 208.2       | 806.7     | 42.4%<br>29.4%             |
| 10        | SMP 107 Stream Restoration                                         | Future                  | 524.4                         | 7.2         | 47.7      | 1.5%  | 1.7%                           | 215.4       | 854.4     | 43.9%<br>31.2%             |
| 11        | SMP 113 Coagulant Addition <sup>2</sup>                            | Future                  | 386.5                         | 7.5         | 89.6      | 1.5%  | 3.3%                           | 222.9       | 944.0     | 45.4%<br>34.4%             |
| 12        | Project Name                                                       | Year                    | Area                          | 0.0         | 0.0       | 0.0%  | 0.0%                           | 222.9       | 944.0     | 45.4%<br>34.4%             |
| 13        | Project Name                                                       | Year                    | Area                          | 0.0         | 0.0       | 0.0%  | 0.0%                           | 222.9       | 944.0     | 45.4%<br>34.4%             |
| 14        | Project Name                                                       | Year                    | Area                          | 0.0         | 0.0       | 0.0%  | 0.0%                           | 222.9       | 944.0     | 45.4%<br>34.4%             |
| 15        | Project Name                                                       | Year                    | Area                          | 0.0         | 0.0       | 0.0%  | 0.0%                           | 222.9       | 944.0     | 45.4%<br>34.4%             |
| 16        | Project Name                                                       | Year                    | Area                          | 0.0         | 0.0       | 0.0%  | 0.0%                           | 222.9       | 944.0     | 45.4%<br>34.4%             |
| 17        | Project Name                                                       | Year                    | Area                          | 0.0         | 0.0       | 0.0%  | 0.0%                           | 222.9       | 944.0     | 45.4%<br>34.4%             |
| 18        | Project Name                                                       | Year                    | Area                          | 0.0         | 0.0       | 0.0%  | 0.0%                           | 222.9       | 944.0     | 45.4%<br>34.4%             |
| 19        | Project Name                                                       | Year                    | Area                          | 0.0         | 0.0       | 0.0%  | 0.0%                           | 222.9       | 944.0     | 45.4%<br>34.4%             |
| 20        | Project Name                                                       | Year                    | Area                          | 0.0         | 0.0       | 0.0%  | 0.0%                           | 222.9       | 944.0     | 45.4%<br>34.4%             |

Notes:

<sup>1</sup> Project itself is not a quantifiable load reduction activity

<sup>2</sup> Requires completion of WDNR guidance to confirm load reductions.



| TMDL COMPLIANCE SUMMARY AND IMPLEMENTATION PLAN                                | Lower Fox River<br>Lower Fox TMDL | Assessment Date: |           | August | 2023  |
|--------------------------------------------------------------------------------|-----------------------------------|------------------|-----------|--------|-------|
|                                                                                |                                   | TSS tons/yr      | TP lbs/yr | TSS %  | TP %  |
| No Controls Loads (per 2023 Citywide Stormwater TMDL Plan)                     |                                   | 698.0            | 3964.5    |        |       |
| TMDL REDUCTION TARGETS                                                         |                                   | 491.4            | 1605.6    | 70.4%  | 40.5% |
| With Controls Current Load Reductions (per 2023 Citywide Stormwater TMDL Plan) |                                   | 200.8            | 790.2     | 28.8%  | 19.9% |
| Remaining Loads (per 2023 Citywide Stormwater Plan)                            |                                   | 497.2            | 3174.3    |        |       |
| Reduction Requirements Achieved?                                               |                                   | NO               | NO        |        |       |
| Tradeable Loads (positive value) or remaining gap (negative value)             |                                   | -290.6           | -815.4    |        |       |

| BENCHMARK | DESCRIPTION OF MEASURE                                             | IMPLEMENTATIO<br>N DATE | IMPACTED<br>AREA (ac) | INCREMENTAL MEASURE TREATMENT |           |       |       | CUMULATIVE REACHSHED REDUCTION |           |       |                   |
|-----------|--------------------------------------------------------------------|-------------------------|-----------------------|-------------------------------|-----------|-------|-------|--------------------------------|-----------|-------|-------------------|
|           |                                                                    |                         |                       | TSS tons/yr                   | TP lbs/yr | TSS % | TP %  | TSS tons/yr                    | TP lbs/yr | TSS % | TP % <sup>7</sup> |
| 1         | Green Stormwater Infrastructure (GSI) Plan <sup>1</sup>            | 2023                    | Citywide              | 0.0                           | 0.0       | 0.0%  | 0.0%  | 200.8                          | 790.2     | 28.8% | 19.9%             |
| 2         | Innovative Stormwater Improvements Grants ARPA Project             | 2024                    | Citywide              | 0.0                           | 0.0       | 0.0%  | 0.0%  | 200.8                          | 790.2     | 28.8% | 19.9%             |
| 3         | Shipyard Redevelopment bioretention                                | 2023                    | 8.11                  | 0.1                           | 1.3       | 0.0%  | 0.0%  | 200.9                          | 791.5     | 28.8% | 20.0%             |
| 4         | 102 Seymour Park East dry detention                                | 2023                    | 8.8                   | 0.0                           | 0.0       | 0.0%  | 0.0%  | 200.9                          | 791.5     | 28.8% | 20.0%             |
| 5         | 103 Seymour Park West Wet Detention                                | 2024                    | 177                   | 12.3                          | 62.6      | 1.8%  | 1.6%  | 213.2                          | 854.1     | 30.5% | 21.5%             |
| 6         | Bay Beach Stormwater Management Plan                               | 2024                    | 74.6                  | 0.0                           | 0.0       | 0.0%  | 0.0%  | 213.2                          | 854.1     | 30.5% | 21.5%             |
| 7         | Redevelopment Ordinance Review <sup>1</sup>                        | 2025                    | Citywide              | 0.0                           | 0.0       | 0.0%  | 0.0%  | 213.2                          | 854.1     | 30.5% | 21.5%             |
| 8         | SMP 201 Lift Station Upgrade and Stormwater Quality Structure      | 2024-2025               | 85.6                  | 0.7                           | 3.0       | 0.1%  | 0.1%  | 213.9                          | 857.1     | 30.6% | 21.6%             |
| 9         | Catch Basin Cleaning Evaluation <sup>1</sup>                       | 2026                    | Citywide              | 0.0                           | 0.0       | 0.0%  | 0.0%  | 213.9                          | 857.1     | 30.6% | 21.6%             |
| 10        | SMP 115 Bay Beach Amusement Park Wet Detention and Lift Station    | 2023-2027               | 41.57                 | 3.0                           | 12.2      | 0.4%  | 0.3%  | 216.9                          | 869.3     | 31.1% | 21.9%             |
| 11        | Incorporate Private SMPs Prior to 2017 and After 2022 <sup>1</sup> | 2028                    | Citywide              | 0.0                           | 0.0       | 0.0%  | 0.0%  | 216.9                          | 869.3     | 31.1% | 21.9%             |
| 12        | TMDL Plan Update <sup>1</sup>                                      | 2028                    | Citywide              | 0.0                           | 0.0       | 0.0%  | 0.0%  | 216.9                          | 869.3     | 31.1% | 21.9%             |
| 13        | SMP 5 Wet Pond                                                     | Future                  | 84                    | 8.4                           | 32.2      | 1.2%  | 0.8%  | 225.3                          | 901.5     | 32.3% | 22.7%             |
| 14        | SMP 108 Lift Station, Wet Pond, Coagulant Treatment <sup>2</sup>   | Future                  | 1316.8                | 73.4                          | 471.5     | 10.5% | 11.9% | 298.7                          | 1,373.0   | 42.8% | 34.6%             |
| 15        | SMP 115 Lift Station, Wet Ponds, Bioretention                      | Future                  | 69                    | 2.6                           | 10.7      | 0.4%  | 0.3%  | 301.3                          | 1,383.7   | 43.2% | 34.9%             |
| 16        | SMP 116 Underground Storage                                        | Future                  | 105.4                 | 6.4                           | 32.2      | 0.9%  | 0.8%  | 307.7                          | 1,415.9   | 44.1% | 35.7%             |
| 17        | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0%  | 307.7                          | 1,415.9   | 44.1% | 35.7%             |
| 18        | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0%  | 307.7                          | 1,415.9   | 44.1% | 35.7%             |
| 19        | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0%  | 307.7                          | 1,415.9   | 44.1% | 35.7%             |
| 20        | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0%  | 307.7                          | 1,415.9   | 44.1% | 35.7%             |

Notes:

<sup>1</sup> Project itself is not a quantifiable load reduction activity

<sup>2</sup> Requires completion of WDNR guidance to confirm load reductions.

| TMDL COMPLIANCE SUMMARY AND IMPLEMENTATION PLAN                                | Lower Green Bay<br>Lower Fox TMDL | Assessment Date: |           | August | 2023  |
|--------------------------------------------------------------------------------|-----------------------------------|------------------|-----------|--------|-------|
|                                                                                |                                   | TSS tons/yr      | TP lbs/yr | TSS %  | TP %  |
| No Controls Loads (per 2023 Citywide Stormwater TMDL Plan)                     |                                   | 471.8            | 2945.9    |        |       |
| TMDL REDUCTION TARGETS                                                         |                                   | 245.3            | 1193.1    | 52.0%  | 40.5% |
| With Controls Current Load Reductions (per 2023 Citywide Stormwater TMDL Plan) |                                   | 122.7            | 498.7     | 26.0%  | 16.9% |
| Remaining Loads (per 2023 Citywide Stormwater Plan)                            |                                   | 349.1            | 2447.2    |        |       |
| Reduction Requirements Achieved?                                               |                                   | NO               | NO        |        |       |
| Tradeable Loads (positive value) or remaining gap (negative value)             |                                   | -122.7           | -694.4    |        |       |

| BENCHMARK | DESCRIPTION OF MEASURE                                             | IMPLEMENTATIO<br>N DATE | IMPACTED<br>AREA (ac) | INCREMENTAL MEASURE TREATMENT |           |       |      | CUMULATIVE REACHSHED REDUCTION |           |       |                   |
|-----------|--------------------------------------------------------------------|-------------------------|-----------------------|-------------------------------|-----------|-------|------|--------------------------------|-----------|-------|-------------------|
|           |                                                                    |                         |                       | TSS tons/yr                   | TP lbs/yr | TSS % | TP % | TSS tons/yr                    | TP lbs/yr | TSS % | TP % <sup>7</sup> |
| 1         | Green Stormwater Infrastructure (GSI) Plan <sup>1</sup>            | 2023                    | Citywide              | 0.0                           | 0.0       | 0.0%  | 0.0% | 122.7                          | 498.7     | 26.0% | 16.9%             |
| 2         | Innovative Stormwater Improvements Grants ARPA Project             | 2024                    | Citywide              | 0.0                           | 0.0       | 0.0%  | 0.0% | 122.7                          | 498.7     | 26.0% | 16.9%             |
| 3         | Redevelopment Ordinance Review <sup>1</sup>                        | 2025                    | Citywide              | 0.0                           | 0.0       | 0.0%  | 0.0% | 122.7                          | 498.7     | 26.0% | 16.9%             |
| 4         | Catch Basin Cleaning Evaluation <sup>1</sup>                       | 2026                    | Citywide              | 0.0                           | 0.0       | 0.0%  | 0.0% | 122.7                          | 498.7     | 26.0% | 16.9%             |
| 5         | Gray Street LS and Stormwater Quality Structure                    | 2025-2027               | 586.6                 | 3.2                           | 15.3      | 0.7%  | 0.5% | 125.9                          | 514.0     | 26.7% | 17.4%             |
| 6         | Incorporate Private SMPs Prior to 2017 and After 2022 <sup>1</sup> | 2028                    | Citywide              | 0.0                           | 0.0       | 0.0%  | 0.0% | 125.9                          | 514.0     | 26.7% | 17.4%             |
| 7         | TMDL Plan Update <sup>1</sup>                                      | 2028                    | Citywide              | 0.0                           | 0.0       | 0.0%  | 0.0% | 125.9                          | 514.0     | 26.7% | 17.4%             |
| 8         | SMP 202 New Lift Station and Stormwater Quality Structure          | Future                  | 586.6                 | 3.2                           | 15.3      | 0.7%  | 0.5% | 129.1                          | 529.3     | 27.4% | 18.0%             |
| 9         | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0% | 129.1                          | 529.3     | 27.4% | 18.0%             |
| 10        | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0% | 129.1                          | 529.3     | 27.4% | 18.0%             |
| 11        | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0% | 129.1                          | 529.3     | 27.4% | 18.0%             |
| 12        | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0% | 129.1                          | 529.3     | 27.4% | 18.0%             |
| 13        | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0% | 129.1                          | 529.3     | 27.4% | 18.0%             |
| 14        | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0% | 129.1                          | 529.3     | 27.4% | 18.0%             |
| 15        | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0% | 129.1                          | 529.3     | 27.4% | 18.0%             |
| 16        | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0% | 129.1                          | 529.3     | 27.4% | 18.0%             |
| 17        | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0% | 129.1                          | 529.3     | 27.4% | 18.0%             |
| 18        | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0% | 129.1                          | 529.3     | 27.4% | 18.0%             |
| 19        | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0% | 129.1                          | 529.3     | 27.4% | 18.0%             |
| 20        | Project Name                                                       | Year                    | Area                  | 0.0                           | 0.0       | 0.0%  | 0.0% | 129.1                          | 529.3     | 27.4% | 18.0%             |

Notes:

<sup>1</sup> Project itself is not a quantifiable load reduction activity

Check on Permit Requirement A.5.2 and A.6.3.c1

| No-Controls and With-Controls TSS Loadings and Reduction Results |                            |                                  |                                              |                                                                             |                                  |                                                                    |                                   |
|------------------------------------------------------------------|----------------------------|----------------------------------|----------------------------------------------|-----------------------------------------------------------------------------|----------------------------------|--------------------------------------------------------------------|-----------------------------------|
| Reachshed                                                        | Total Treated Area (acres) | No-Controls TSS Load (tons/year) | With-Controls TSS Load Reduction (tons/year) | Remaining Wasteload = No-controls load minus with-controls load (tons/year) | TMDL Target TSS Load Reduction % | With-Controls TSS Reduction % (compared to no-controls total load) | Is TSS Load Reduction Target Met? |
| Baird Creek                                                      | 4,468                      | 437.4                            | 160.6                                        | 276.8                                                                       | 52.0%                            | 36.7%                                                              | No                                |
| Bower Creek                                                      | 40                         | 1.4                              | 0.8                                          | 0.6                                                                         | 52.0%                            | 57.4%                                                              | Yes                               |
| Duck Creek                                                       | 3,974                      | 451.9                            | 113.3                                        | 338.6                                                                       | 52.0%                            | 25.1%                                                              | No                                |
| Dutchman Creek                                                   | 666                        | 51.1                             | 11.9                                         | 39.3                                                                        | 52.0%                            | 23.2%                                                              | No                                |
| East River                                                       | 3,193                      | 491                              | 188                                          | 303.2                                                                       | 52.0%                            | 38.2%                                                              | No                                |
| Lower Fox River                                                  | 4,878                      | 698                              | 201                                          | 497.2                                                                       | 70.4%                            | 28.8%                                                              | No                                |
| Lower Green Bay                                                  | 4,180                      | 472                              | 123                                          | 349.1                                                                       | 52.0%                            | 26.0%                                                              | No                                |
| Totals                                                           | 21,400                     | 2,603                            | 798                                          | 1,804.9                                                                     |                                  | 30.6%                                                              |                                   |

|                    |       |     |    |       |       |       |    |
|--------------------|-------|-----|----|-------|-------|-------|----|
| Duck Creek         |       |     |    |       |       |       |    |
| Green Bay proper   | 902   | 115 | 27 | 88.8  | 52.0% | 23.1% | No |
| Oneida Reservation | 3,072 | 337 | 87 | 249.9 | 52.0% | 25.8% | No |
| Dutchman Creek     |       |     |    |       |       |       |    |
| Green Bay proper   | 4     | 0   | 0  | 0.1   | 52.0% | 36.4% | No |
| Oneida Reservation | 662   | 51  | 12 | 39.2  | 52.0% | 23.2% | No |

Wasteload Allocation

| Ultimate Mass Reduction Required for Full TMDL Compliance (tons/year) | Calculated Wasteload Allocation (tons/year) |
|-----------------------------------------------------------------------|---------------------------------------------|
| 227.5                                                                 | 210.0                                       |
| 0.7                                                                   | 0.7                                         |
| 235.0                                                                 | 216.9                                       |
| 26.6                                                                  | 24.5                                        |
| 255.3                                                                 | 235.6                                       |
| 491.4                                                                 | 206.6                                       |
| 245.3                                                                 | 226.5                                       |
| 1,481.8                                                               | 1,120.8                                     |

Minimum Control Required Under NR 151.13(2)(b)1.b.

| NR 151 Required Reduction (tons/year) | NR 151 Allowable Load (tons/year) |
|---------------------------------------|-----------------------------------|
| 87.5                                  | 349.9                             |
| 0.3                                   | 1.1                               |
| 90.4                                  | 361.5                             |
| 10.2                                  | 40.9                              |
| 98.2                                  | 392.7                             |
| 139.6                                 | 558.4                             |
| 94.4                                  | 377.4                             |
| 520.5                                 | 2,082.1                           |

Required Reduction at end of 2019-2024 permit term : 712.8 tons/year  
(NR 151 Required 20% + additional 20% of remaining required compared to current reduction)  
(Pemit Requirement A.5.2)

Required Reduction at end of 2024-2029 permit term : 849.6 tons/year  
(NR 151 Required 20% + additional 40% of remaining required compared to current reduction)  
(Permit Requirement A.6.3.c1)

2019-2024 Permit Term  
20% Additional Reduction  
From NR 151.13(2)(b)1.b.

| Additional Reduction from NR 151 (tons/year) | 20% Additional Reduction from NR 151 Compared to Current (tons/year) |
|----------------------------------------------|----------------------------------------------------------------------|
| 140.0                                        | 28.0                                                                 |
| 0.4                                          | 0.1                                                                  |
| 144.6                                        | 28.9                                                                 |
| 16.4                                         | 3.3                                                                  |
| 157.1                                        | 31.4                                                                 |
| 351.8                                        | 70.4                                                                 |
| 151.0                                        | 30.2                                                                 |
| 961.3                                        | 192.3                                                                |

Achieved Reduction (August 2023): 797.7  
Project Reductions Through 4/2024: 0.14  
Total Reductions Through Permit Term: 797.8  
TSS Excess (positive) # or Deficit (negative #) 85.0

2024-2029  
Permit Term

| Remaining Load Reduction Needed From End of 2019-2024 Permit Term (lbs/year) | 20% Additional Reduction Compared to Current Remaining Load Needed (tons/year) |
|------------------------------------------------------------------------------|--------------------------------------------------------------------------------|
| 66.9                                                                         | 13.4                                                                           |
| -0.1                                                                         | 0.0                                                                            |
| 121.7                                                                        | 24.3                                                                           |
| 14.7                                                                         | 2.9                                                                            |
| 67.6                                                                         | 13.5                                                                           |
| 290.6                                                                        | 58.1                                                                           |
| 122.7                                                                        | 24.5                                                                           |
| 684.1                                                                        | 136.8                                                                          |

2023 Projects From Table 4-1 Projects List

All Projects From Table 4-1 Projects List for ne



Check on Permit Requirement A.5.2 and A.6.3.c1

| No-Controls and With-Controls TP Loadings and Reduction Results |                            |                                |                                            |                                                                            |                                 |                                                                   |                                  |
|-----------------------------------------------------------------|----------------------------|--------------------------------|--------------------------------------------|----------------------------------------------------------------------------|---------------------------------|-------------------------------------------------------------------|----------------------------------|
| Reachshed                                                       | Total Treated Area (acres) | No-Controls TP Load (lbs/year) | With-Controls TP Load Reduction (lbs/year) | Remaining Wasteload = No-controls load minus with-controls load (lbs/year) | TMDL Target TP Load Reduction % | With-Controls TP Reduction % (compared to no-controls total load) | Is TP Load Reduction Target Met? |
| Baird Creek                                                     | 4,468                      | 2,963.4                        | 886.6                                      | 2,076.8                                                                    | 40.5%                           | 29.9%                                                             | No                               |
| Bower Creek                                                     | 40                         | 13.0                           | 5.1                                        | 7.9                                                                        | 40.5%                           | 39.0%                                                             | No                               |
| Duck Creek                                                      | 3,974                      | 2,756.0                        | 477.3                                      | 2,278.6                                                                    | 40.5%                           | 17.3%                                                             | No                               |
| Dutchman Creek                                                  | 666                        | 361.9                          | 53.9                                       | 308.0                                                                      | 40.5%                           | 14.9%                                                             | No                               |
| East River                                                      | 3,193                      | 2,741.8                        | 729.8                                      | 2,012.0                                                                    | 40.5%                           | 26.6%                                                             | No                               |
| Lower Fox River                                                 | 4,878                      | 3,964.5                        | 790.2                                      | 3,174.3                                                                    | 40.5%                           | 19.9%                                                             | No                               |
| Lower Green Bay                                                 | 4,180                      | 2,945.9                        | 498.7                                      | 2,447.2                                                                    | 40.5%                           | 16.9%                                                             | No                               |
| Totals                                                          | 21,400                     | 15,747                         | 3,442                                      | 12,304.9                                                                   |                                 | 21.9%                                                             |                                  |

|                    |       |         |       |         |       |       |    |
|--------------------|-------|---------|-------|---------|-------|-------|----|
| Duck Creek         |       |         |       |         |       |       |    |
| Green Bay proper   | 902   | 725.5   | 105.1 | 620.5   | 40.5% | 14.5% | No |
| Oneida Reservation | 3,072 | 2,030.4 | 372.3 | 1,658.2 | 40.5% | 18.3% | No |
| Dutchman Creek     |       |         |       |         |       |       |    |
| Green Bay proper   | 4     | 0.6     | 0.1   | 0.4     | 40.5% | 25.2% | No |
| Oneida Reservation | 662   | 361.4   | 53.7  | 307.6   | 40.5% | 14.9% | No |

Wasteload Allocation

| Ultimate Mass Reduction Required for Full TMDL Compliance (lbs/year | Calculated Wasteload Allocation (lbs/year) |
|---------------------------------------------------------------------|--------------------------------------------|
| 1,200.2                                                             | 1,763.2                                    |
| 5.3                                                                 | 7.7                                        |
| 1,116.2                                                             | 1,639.8                                    |
| 146.6                                                               | 215.4                                      |
| 1,110.4                                                             | 1,631.4                                    |
| 1,605.6                                                             | 2,358.9                                    |
| 1,193.1                                                             | 1,752.8                                    |
| 6,377.3                                                             | 9,369.2                                    |

Required Reduction at end of 2019-2024 permit term : 2,763.5 lbs/year  
(NR 151 Required 20% + additional 20% of remaining required compared to current reduction)  
(Pemit Requirement A.5.2)

Required Reduction at end of 2024-2029 permit term : 3,057.1 lbs/year  
(20% additional reduction compared to remaining load vs TMDL allowable)  
(Permit Requirement A.6.3.c1)

Minimum Control Required Under NR 151.13(2)(b)1.b.

| NR 151 Required Reduction (lbs/year) | NR 151 Allowable Load (lbs/year) |
|--------------------------------------|----------------------------------|
| 444.5                                | 2,518.9                          |
| 1.9                                  | 11.0                             |
| 413.4                                | 2,342.6                          |
| 54.3                                 | 307.7                            |
| 411.3                                | 2,330.5                          |
| 594.7                                | 3,369.9                          |
| 441.9                                | 2,504.0                          |
| 2,362.0                              | 13,384.5                         |

Achieved Reduction (August 2023): 3,441.6  
Project Reductions Through 4/2024: 1.31  
Total Reductions Through Permit Term: 3,442.9  
TP Excess or Deficit (negative #) 679.4

Achieved Reduction Through 4/2024 3,442.9  
Project Reductions Through 4/2029: 217.02  
Total Reductions Through Permit Term: 3,659.9  
Permit Term TP Excess or Deficit (negative #) -76.6  
Cumulative TP Excess or Deficit (negative #) 602.8

2019-2024 Permit Term 10% Additional Reduction From NR 151.13(2)(b)1.b.

| Additional Reduction from NR 151 (lbs/year) | 10% Additional Reduction from NR 151 Compared to Current (lbs/year) |
|---------------------------------------------|---------------------------------------------------------------------|
| 755.7                                       | 75.6                                                                |
| 3.3                                         | 0.3                                                                 |
| 702.8                                       | 70.3                                                                |
| 92.3                                        | 9.2                                                                 |
| 699.2                                       | 69.9                                                                |
| 1,011.0                                     | 101.1                                                               |
| 751.2                                       | 75.1                                                                |
| 4,015.4                                     | 401.5                                                               |

2024-2029 Permit Term

| Remaining Load Reduction Needed From End of 2019-2024 Permit Term (lbs/year) | 10% Additional Reduction Compared to Current Remaining Load Needed |
|------------------------------------------------------------------------------|--------------------------------------------------------------------|
| 313.6                                                                        | 31.4                                                               |
| 0.2                                                                          | 0.0                                                                |
| 638.8                                                                        | 63.9                                                               |
| 92.7                                                                         | 9.3                                                                |
| 380.6                                                                        | 38.1                                                               |
| 815.4                                                                        | 81.5                                                               |
| 694.4                                                                        | 69.4                                                               |
| 2,935.8                                                                      | 293.6                                                              |

2023 Projects From Table 4-1 Projects List

All Projects From Table 4-1 Projects List fo



## Report to the Improvement and Service Committee of the City of Green Bay

### MEETING DATE

October 11, 2023

### PREPARED BY

### AGENDA ITEM # E.4

Consideration with possible action on request by Department of Public Works to award the East River Flood Mitigation Solutions Study to Emmons & Olivier Resources.

### BACKGROUND

The City of Green Bay (City) proposes to improve flood hazard conditions along the East River through development of a planning approach that addresses needs and is consistent with the Brown County 2020 All Hazards Mitigation Plan. City residents within the floodplain of the East River face frequent flooding due to changes in the frequency and intensity of storm events and development pressure in flood prone zones. Sixteen flood and flash flood events have occurred in Brown County since 1990, impacting critical City of Green Bay facilities, public health and safety, infrastructure, and economics. Areas adjacent to the East River are identified by FEMA as areas at greatest risk for flood hazards.

The City's overall goal of this project is to develop feasible flood mitigation strategies for the East River, which can be implemented within City-owned or managed properties. This project will collect and review existing data, including available models; complete modeling and conveyance assessments; prepare concept plans for three flood mitigation solutions, and one preliminary plan to address flooding threats. A variety of stakeholders and project partners will be involved in the planning process, to mitigate flooding hazards and reduce flood levels during peak storm events.

The City will use Wisconsin Coastal Management Program funding to support the planning and development of flood mitigation strategies along the East River. By funding this project, the City will take the necessary steps towards implementing flood mitigation controls on municipally owned or managed lands within the East River floodplain, benefiting residents, City of Green Bay infrastructure and facilities, public health, and safety, and improving water quality to the East River and Bay of Green Bay/Lake Michigan. Construction or additional design work will be funded under separate grant funding.

The Department of Public Works (DPW) – Utility Division staff prepared a request for proposal (RFP) for professional engineering services for the East River Flood Mitigation Solutions Study. The RFP was sent to twelve (12) consulting firms specializing in flood mitigation and other environmental engineering services. The City received four (4) proposals from the following firms: Emmons & Olivier Resources, Geosyntec, GRAEF, and Stantec.

A review panel comprised of staff, an alder, a Sustainability Commission member, and a representative of the East River Collaborative reviewed and evaluated the proposals based on ten quality-based categories. Because this project is fully grant funded, the total cost should not exceed \$107,000. Based on the review, DPW recommends awarding the professional engineering services contract to Emmons & Olivier Resources in the amount of \$107,000. The City's timeline for this project is October 2023 – July 2024.

DPW appreciates the time and thought that went into each of the proposals prepared and submitted in response to the RFP.

## RECOMMENDATION

To approve a recommendation from the Department of Public Works to award the East River Flood Mitigation Solutions Study to Emmons & Olivier Resources for a cost of \$107,000.

## FISCAL IMPACT

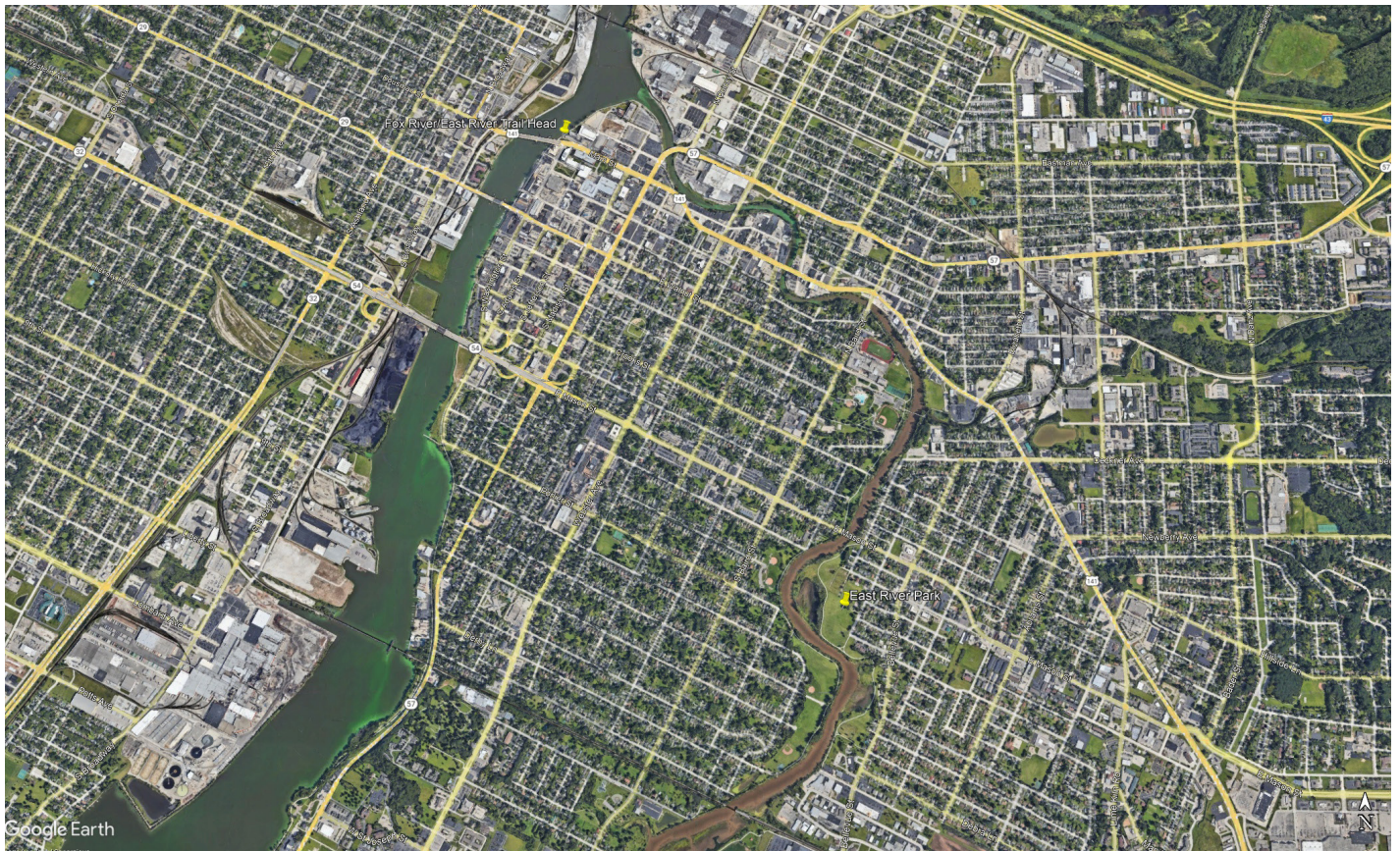
\$107, 000 (grant funded by Wisconsin Coastal Management Program and the Fund for Lake Michigan).

## ATTACHMENTS

- I. GB\_E River Flood Mitigation Solutions\_EOR



# Proposal for East River Flood Mitigation Solutions



September 6, 2023

Melissa M. Schmitz, C.E.M., LEED GA  
Resiliency Coordinator  
City Hall - Room 300  
100 N. Jefferson Street  
Green Bay, WI 54301



RE: Proposal for East River Flood Mitigation Solutions

Dear Ms. Schmitz:

Alleviating the persistent flooding problems in the east side of Green Bay requires traditional engineering expertise in river hydraulics and civil design, as well as a broad perspective on watershed green infrastructure opportunities and benefits. EOR understands the underlying issues that cause flooding and has decades of experience helping communities plan and design solutions that also create natural and aesthetic amenities.

**EOR provides the following key benefits for this project:**

- Extensive floodplain modeling and flood mitigation experience.
- Expertise with the HEC-RAS, HEC-HMS and FLO-2D modeling platforms that have been used for the East River.
- Passion and expertise in evaluating and implementing watershed green infrastructure, such as wetlands, restored stream channels, and urban low-impact stormwater practices, that benefit water quantity and quality, habitat, recreation, and aesthetics.
- Many years of experience engaging stakeholders in watershed planning in the upper Midwest.
- Current experience in the Green Bay watershed, including ongoing work with the Wisconsin Department of Natural Resources on the Green Bay Watershed Blueprint Action Plan Framework.
- Working relationships with The Nature Conservancy, Sea Grant, and the University of Wisconsin – Madison Department of Civil and Environmental Engineering.

We would like to discuss whether EOR's insurance limits for general liability of \$2mil and automobile liability of \$1mil will be acceptable for this project, given that EOR has \$10mil umbrella liability policy. We are excited about helping the City of Green Bay with this important project and are grateful for the opportunity to provide this proposal.

Sincerely,

A handwritten signature in black ink, appearing to read "Stephen J. Gafffield".

Stephen J. Gafffield, PhD, PE, CFM  
Project Manager  
608.839.6213 / [sgafffield@eorinc.com](mailto:sgafffield@eorinc.com)



## FIRM INFORMATION

### Emmons & Olivier Resources, Inc. (EOR)

Is a collaborative group of environmental and design professionals passionate about protecting our waters, restoring healthy ecosystems, & enhancing our community's unique sense of place. We are an employee owned, multi-disciplinary water resource-based firm that specializes in:

- water-resources engineering, watershed planning, & modeling
- environmental compliance, biological surveying, & restoration
- sustainable site design, planning, & landscape architecture

### Mission and Values:

*We care for the Earth and its inhabitants by:*

- *collaborating with environmentally conscious customers*
- *attracting passionate, creative professionals*
- *working in an inspiring and healthy environment*
- *fostering a culture of ownership*
- *supporting the communities we serve*
- *believing now is the time to act*

Founded in 1996 by Brett Emmons, PE who along with principal Cecilio Olivier, PE (who joined in 1997) recognized the crucial need for providing alternative and sustainable approaches to resources management that would provide long-term, holistic solutions. EOR's multidisciplinary team of engineers, scientists, and landscape architects deliver integrated **WATER** (Watersheds & Water Resources) + **ECOLOGY** (Ecosystems & Natural Resources) + **COMMUNITY** (Civil Engineering & Landscape Architecture) services. Visit [www.eorinc.com](http://www.eorinc.com) for more information.

### Burse Surveying and Engineering

Provides Professional Land Surveying services for a variety of private and municipal clients. They are based in Madison, WI and have collaborated with EOR for many years. [www.bursesurveyengr.com](http://www.bursesurveyengr.com)

### Jewell Associates Engineers, Inc.

Jewell Associates are professional engineers, architects and surveyors with four offices in Wisconsin, including Wisconsin Rapids. Founded in 1993 in Spring Green, Jewell is a leading regional provider of architectural services and transportation, civil, and structural engineering. They have extensive experience with highway and bridge design projects. Jewell and EOR have worked together frequently, including Kickapoo River floodplain mapping and flood mitigation analysis in Cross Plains. [www.jewellassoc.com](http://www.jewellassoc.com)



#### EOR's 65 employees

- 17 Professional Engineers
- 8 Engineers-in-Training
- 3 Professional Landscape Architects
- 1 Professional Geologist
- 1 Certified Wildlife Biologists
- 1 Restoration Ecologist
- 1 Professional Wetland Scientist
- 5 Certified Wetland Delineators
- 3 Cert. Floodplain Managers
- 4 Certified Prof. in Erosion & Sediment Control
- 1 GIS Professional
- 6 LEED Accredited Professionals
- 11 other related Professionals
- 23 with Master's degree or higher
- 8 with 10-20 years of experience
- 21 with 20+ years of experience



# TEAM

## City of Green Bay



**Stephen J. Gaffield, PhD, PE, CFM**  
Project Manager

### Flood Mitigation Alternatives Analysis



**Stephen J. Gaffield, PhD, PE, CFM**  
Project Manager/Modeler



**Nick Hayden, PE, GISP**  
Water Resources Engineer/Modeler



**Evan Murdock, PhD, CFM**  
Water Resources Engineer/Modeler

\* Subconsultants

### Flood Mitigation Design



**Mike Rupiper, PE, ENV SP**  
Lead Civil/Environmental Engineer



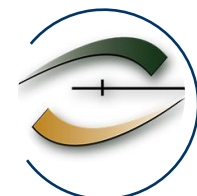
**Tiffany Mueller**  
Civil Engineer



**Britta Hansen, PLA**  
Landscape Architecture/Stormwater Management



**Robert Hanold, PE\***  
Jewel Engineering/Structural Engineering



**Michelle Burse, PE, PLS\***  
Burse Surveying and Engineering, Inc.

## Project Experience

### Watershed Modeling, Analysis, and Planning

#### ***Green Bay Action Plan Framework***

WI DNR / QA-QC

Performing oversight for stakeholder engagement and watershed issues analysis for the action plan framework for the entire Green Bay watershed in Wisconsin. Key elements include best practices for identifying stakeholders, an engagement plan, vision statement, governance structure, work group charter, and facilitators' guide.

#### ***Black Earth Creek Watershed Green Infrastructure Plan***

Capital Area Regional Planning Commission / Project Manager

Led technical analysis and coordinated stakeholder engagement for the 100-square-mile trout stream watershed. Developed hydrologic modeling approach to evaluate benefits of urban and rural green infrastructure for flood reduction and water quality improvement. Presented at 6 stakeholder events and 7 steering committee meetings. Led development of green infrastructure recommendations, including funding and implementation planning, and was primary author of plan.

#### ***Fitchburg Lake Barney Flood Study***

City of Fitchburg, WI / Principal-in-Charge & Groundwater Modeler  
Planned surface water and groundwater modeling to evaluate flood mitigation alternatives for a close depression with approximately 400 flooded acres. Performed groundwater modeling with MODFLOW to quantify seepage into the lake with and without a proposed outlet, and the extent of groundwater lowering around the lake. Evaluated precipitation and water level data to estimate the time that the flooding extent would likely be reduced without a constructed outlet. Reviewed surface water modeling and outlet conceptual designs. Presented project updates to a stakeholder group and City Council.

#### ***Middleton Floodplain Study, Scenarios, and Costing***

City of Middleton, WI / Project Manager

Coordinated planning, development, and calibration of a 1D/2D PCSWMM model of the Pheasant Branch Creek watershed. Oversaw mapping of the 1% and 0.2% annual chance floodplains. Led use of model to evaluate benefits of potential flood mitigation projects and conceptual cost estimates. Presented project findings to City commission and at public meetings, and discussed the potential project mitigation with dairy farm representatives.

#### ***Cross Plains Flood Mitigation***

Jewell Associates Engineers / Principal-in-Charge

Provided technical advice and QA/QC review for hydrologic and hydraulic analysis of potential flood mitigation projects in the Village of Cross Plains, WI, including green infrastructure (wetland/floodplain restoration), and gray infrastructure (flood control dam and street crossing improvements).

#### ***Spring Harbor Watershed Study in Madison, WI***

AE2S / Project Manager

Led EOR's support to AE2S' development of a SWMM watershed model for the City of Madison, WI. Participated in 3 public stakeholder meetings to gather input from break-out groups. Led development of conceptual design drawings and cost estimates for potential infrastructure improvements for flood mitigation.

#### ***McCandless Remap Feasibility***

Village of Plover, WI / Project Manager

Planned and reviewed evaluation of the accuracy of Flood Insurance Study hydrologic and hydraulic models. Provided advice on actions



**Stephen  
J. Gaffield,  
PhD, PE, CFM**

**Water Resources  
Engineer**

Steve has 30 years of experience in hydro-geology and water resources engineering. He brings a geological perspective to engineering and natural resource problems with a focus on groundwater-surface water interactions. Steve has been project manager and technical lead for many projects involving groundwater protection, floodplain management, stormwater planning and design, and wetland restoration. He is active on research committees at the University of Wisconsin and presents frequently at technical conferences. Steve also has extensive experience with public participation and education.

### Education

- 1988 Bachelor of Arts in Geology and Physics Albion College
- 1991 Masters of Sciences in Geology University of Wisconsin-Madison
- 2000 Doctor of Philosophy in Geological Engineering University of Wisconsin-Madison

### Professional Registration

#39140 WI Professional Engineer: civil  
US-16-09286 Certified Floodplain Mgr.

### Professional Activities

- 2012-23 Univ. of Wisc. Groundwater Research Advisory Council
- 2009-23 Wisconsin Geological & Natural History Survey Geologic Mapping Committee - 2023 Chair
- 2011 American Water Resources Assoc. WI - former president

### Areas of Expertise

Groundwater Analysis & Management  
Watershed Green Infrastructure Planning  
Wetland Restoration  
Floodplain Hydraulics & Management  
Stormwater Management  
Project Management

the City could take to improve the accuracy of floodplain maps.

#### ***Evansville Wetland Mitigation Design***

Heartland Ecological Group / Principal-in-Charge

Provided technical input and review for wetland mitigation site grading and drainage disablement at a Wisconsin Department of Natural Resources mitigation site. Planned and reviewed Lateral Effect modeling of the effect of breaking drain tiles.

#### ***Stormwater Infiltration Mounding and Design***

Terravessa Plat, Fitchburg, WI / Technical Advisor

Modeled groundwater mounding below regional infiltration basins with analytical equations and MODFLOW, including interference with system performance and off-site impacts. Developed iterative approach to balance infiltration volume from WinSLAMM design model with groundwater mounding constraints.

#### ***UW-Madison Neighborhood Stormwater Study***

UW-Madison & WI Dept. of Administration / Project Manager

Planned and directed WinSLAMM model analysis of stormwater runoff volume and sediment controls for 6 parcels on the UW-Madison campus planned for future redevelopment. Researched performance of green infrastructure / low-impact development options including green roofs and walls, permeable pavement and water harvesting and reuse. Directed installation and sampling of monitoring wells to evaluate subsurface hydraulic properties of fine-grained glacial lake sediment and performed groundwater mounding analysis to determine limitations of stormwater infiltration. Simulated green roof performance with EPA's Stormwater Calculator. Developed new technique to model tree canopy interception over impervious surfaces to evaluate quantity and quality benefits in WinSLAMM; published in the Center for Watershed Protection's Watershed Science Bulletin in collaboration with U.S. Forest Service. Developed integrated conceptual stormwater plan for campus neighborhood, including several options for future site design evaluation, and cost per gallon of runoff reduced and pounds of sediment removed.

### **Floodplain Modeling, Planning & Management**

Steve has performed floodplain modeling and permitting analyses for nearly 20 projects over the past 15 years, and he is a Certified Floodplain Manager. His experience includes hydrologic modeling of flood discharge with HEC-HMS, NRCS methods and statistical regression, and hydraulic modeling of flood elevations and mitigation alternatives using HEC-RAS. Steve's role in floodplain projects commonly include evaluating existing Flood Insurance Study models, modifying models to simulate proposed floodplain fill and stream crossings, designing mitigation alternatives to minimize floodplain impacts, QA/QC review, and helping clients understand the opportunities and constraints of floodplain regulations.

- ***Lake Belle View Restoration*** (for Village of Belleville, WI)
- ***Front St. Development*** (Clifton Corporation, Watertown, WI)
- ***Rowan and Hinkson Creeks Letter of Map Amendment*** (for Town of Dekorra, WI)
- ***Cell Tower Permitting*** (Edge Consulting, Oneida County, WI)
- ***Clark Creek Flood Study*** (for Sauk County, WI)
- ***Bike Trail Floodplain Permitting*** (for City of Jefferson, WI)
- ***Campground Fill Permitting*** (Riverbend RV Resort, Watertown, WI)
- ***Blackhawk Island Floodplain Permitting*** (Luke Purucker, Jefferson County, WI)
- ***Tenney Avenue Crossing*** (Smart Realty Company, Waukesha, WI)
- ***Traynor Aggregate Pit Bridge*** (Dodge Concrete, Rock County, WI)
- ***Brewing Expansion Permit Scoping*** (New Glarus Brewing, New Glarus, WI)
- ***Drumlin Grove Floodplain Delineation*** (Burse Surveying & Engineering, Cottage Grove, WI)
- ***Kinnickinnic River Restoration Design*** (Milwaukee Metropolitan Sewerage District, Milwaukee, WI)
- ***McCoy Property Development Permitting*** (D'Onofrio Kottke Assoc., Sun Prairie, WI)
- ***Zander Farms Development Permitting*** (D'Onofrio Kottke Assoc., Cross Plains, WI)
- ***Three Waters Reserve Flood Impact Analysis*** (Applied Ecological Services, Brodhead, WI)
- ***After-the-Fact Floodplain Permitting*** (Ripon Rifle & Pistol Club, Fond du Lac County, WI)
- ***Warner Park Channel Restoration Design*** (for City of Madison, WI)
- ***Powerplant Floodplain Analysis*** (SCS Engineers, WI)



## Project Experience

### H&H Modeling - Floodplain and Stormwater Management

#### ***Outlet Modification Design***

Carnellian Marine St. Croix Watershed District/Lead Modeler, Conceptual Designer

Updated and added local detail to EOR H&H Model (PCSWMM), provided Scenario Testing of new lake outlet to increase effectiveness of phosphorous treatment system and provided cost estimate assistance.

#### ***Kickapoo Watershed Floodplain Update***

Wisconsin DNR / Lead Mapper, Data Manager, and Model QC

Reviewed and finalized updated HEC-RAS models in coordination with DNR. Created FEMA-compliant metadata for survey, model, and mapping submittals. Created new floodplain map data to DNR and FEMA standards.

#### ***Cumberland Stormwater Model Update***

Beaver Dam Lake Management District / Model Mentorship and QC Assisted junior staff with PCSWMM H&H model development and parameterization, provided model QA/QC.

#### ***Tupper Phase 2***

City of Thunder Bay / Lead modeler

Refined and presented results of EOR 2-D PCSWMM model, tested conceptual drainage solutions and predicted performance of City's design of off-line underground storage for reducing urban flood elevations and damages.

#### ***Tribeca Stormwater Modeling***

City of Middleton / H&H Modeling and QC

Updated EOR PCSWMM H&H Model, QC model updates by others, predicted performance of City's design of off-line underground storage for reducing urban flood elevations and damages, presented at City Water Resources Management Commission.

#### ***FIRM Update & Flood Improvements***

City of Middleton / H&H Modeling and Reporting

Lead modeler for revisions to EOR PCSWMM H&H Model, QC model updates by others, co-wrote technical memo and presented to Water Resources Management Commission.

#### ***Connect CR – Lightline Bridge Hydraulic Modeling***

WSP USA, Inc./ Hydraulic Modeler

Model hydraulic impacts of preliminary bridge designs (designed by others) using HEC-RAS.

#### ***Stoughton Dam Modifications Review***

Town of Pleasant Springs / Hydraulic Modeler and Analyst

Reviewed impacts of proposed dam modifications on upstream riverine habitat, led hydraulic model assessment, co-authored technical memo and QA/QC findings and recommendations.

#### ***Seymour Culvert Construction Flooding Review***

Simpson & Deardorff, S.C. / Hydraulic Investigator

Reviewed regional hydrology upstream of flooded warehouse, investigated construction-time flooding causes and outcomes and summarized findings for attorney.

#### ***Cheryl Drive Flooding Analysis Study***

City of Fitchburg / Engineer-consultant

Led assessment of urban flash flooding problems in the Tower Hill neighborhood along Cheryl Drive. Conducted runoff monitoring and field assessments, created 1D-2D PCSWMM H&H model to



**Nick  
Hayden**  
PE, GISP

**Water Resource  
Engineer**

Nick Hayden has 20 years of experience in Geographic Information Systems (GIS), stream monitoring and geomorphology, and water resources engineering. Over his career he has worked as a stream and watershed analyst, GIS lead for a multi-year public participatory ocean uses effort, and water resources engineer conducting groundwater, hydrologic, and hydraulic analyses for a variety of resource assessment and restoration projects. Nick routinely uses a breadth of models, software and water resources understanding to analyze, design and communicate solutions for EOR water-related projects.

### Education

- |      |                                                                                                                    |
|------|--------------------------------------------------------------------------------------------------------------------|
| 2001 | Bachelor of Science in Geology & Geophysics and Environmental Studies Certificate, University of Wisconsin-Madison |
| 2004 | Graduate Certificate in GIS, University of Wisconsin-Madison                                                       |
| 2006 | Master's of Science in GIS and Environmental Monitoring, University of Wisconsin-Madison                           |
| 2015 | Master's of Science in Civil and Environmental Engineering, University of Wisconsin-Madison                        |

### Professional Registration

- |          |                            |
|----------|----------------------------|
| #47310-6 | WI Professional Engineer   |
| #60550   | MN Professional Engineer   |
| #64008   | Certified GIS Professional |

### Professional Affiliations

American Society of Civil Engineers  
American Water Resources Assoc.

### Areas of Expertise

GIS Analysis  
Stream Analysis & Restoration Design  
Groundwater Analysis  
Stormwater Management

### Additional Training

Stream Stability & Scour at  
Highway Bridges - National  
Highway Institute  
Rosgen Applied Fluvial  
Geomorphology Level I

identify major storm sewer and downstream conveyance restrictions, and assessed the impact and costs of potential improvements to mitigate flooding. Presented study briefings to neighborhood stakeholder group and presented draft and final findings and recommendations to Fitchburg Common Council.

#### ***Tupper Street Storm Sewer Assessment***

City of Thunder Bay / Engineer-consultant

Provided QA/QA of the 2D H&H model for Phase 1 of the assessment. Led Phase 2 H&H technical modeling portion for identifying storm sewer restrictions, proposing storm sewer improvements, and identifying low impact development opportunities to reduce urban flash flooding.

#### ***Lake Barney Stormwater Management Study***

City of Fitchburg / Engineer-consultant

Led feasibility study assessing problematic high lake levels and downstream flooding at Lake Barney in southern Dane County. Implemented monitoring plan, led surface water H&H analysis, assisted with technical groundwater analysis, designed proposed solutions, and assessed the cost/benefit of solutions. Presented regular study briefings to stakeholder group and presented draft and final findings to Fitchburg Common Council.

#### ***Floodplain Modeling and Mapping - Pheasant Branch Creek***

City of Middleton / Engineer-consultant

Served as modeling technical lead for creation of a new SWMM floodplain model and GIS floodplain mapping. Coordinated survey, consolidated available structure and BMP data, and constructed model. Oversaw model calibration process. Used model to create updated floodplain maps for the City along Pheasant Branch Creek. Performed follow-up work including assessing performance and cost of flood mitigation solutions and evaluating the impacts of a potential watershed development and associated flow rerouting. Routinely presented results to Water Resources Management Committee and Stormwater Utility Board.

#### ***Linn Grove Dam and Channel Modifications***

Buena Vista county Conservation Department / Engineer-consultant

H&H modeling lead for feasibility and design stages for modification of the Linn Grove Dam, including modification and stabilization of an eroded breach channel adjacent to the dam. Performed hydrology analysis including PeakHQ stream gage analysis and StreamStats regression equations. Performed hydraulic analysis including creating a 2D HEC-RAS model to inform design and for permitting, including assessment of project impacts on the floodplain and nearby infrastructure.

### **GIS Planning and Analysis**

#### ***District-wide Pond Management***

Brown's Creek Watershed District / GIS Web Map Developer

Updated interactive ArcGIS Story Map for District usage.

#### ***EPA Wetland Grant Services***

Wisconsin Wetlands Association / GIS Analyst

Lead GIS Assessment of WI Central Sands region, co-author project report, presented project methods at WI Wetland Association Conference.

#### ***Terravessa SmartCode Article 3***

Fitchburg Lands LLC / GIS Analyst/Planner

Performed GIS analysis of ongoing neighborhood development to ensure conformance with the City of Fitchburg's SmartCode zoning ordinance. Worked with developer and planner, along with site engineers (EOR), to calculate land use density, parks coverage and access, and other planning metrics during a multi-year, iterative process. Created Article 3 submittals to City staff for review and approval.

#### ***GIS Support and Tool Development for Wetland and Environmental Reviews for Solar Site Developments***

Multiple Clients / GIS Data Manager, Analyst and Automation Developer

Co-managed storage of base and project data using PostGIS and cloud infrastructure, developed GIS models, map templates, and python scripts to automate GIS procedures and create consistent, high-quality map products. Trained new and intermediate GIS users and helped resolve GIS challenges.

## Project Experience

Evan has planned and undertaken a range of research and outreach projects involving numerical modeling, data analysis, human dimensions research using survey and focus group tools, and stakeholder engagement. This work has included extensive data analysis and processing automation using Matlab, development of custom models and research tools, technical writing, and other relevant research tasks.

### ***Green Bay Action Plan Framework***

WI DNR / Project Engineer

Supporting DNR-led development of Green Bay Action Plan Framework. Providing expertise in social science methodologies and organizational structure, developing documentation for Steering Committee structure, governance, and public engagement planning.

### ***Floodplain Modeling***

City of Middleton, WI / Modeling Team Member

Led model calibration effort, including identification of calibration events, development of Radar-based precipitation time series, and parameter sensitivity analysis. Developed 2D model. Assisted in other aspects of model development and mapping.

### ***Flood Modeling***

City of Thunder Bay, ON / Lead Modeler

Developed from scratch and modified existing HEC-RAS 1D and 2D models to evaluate the adequacy of existing road crossings and design replacement crossings.

### ***Flood Modeling and Drainage Design***

City of Parksville, BC / Lead Modeler

Developed 1D/2D model of surface/subsurface drainage network to guide the upgrade and overhaul of an existing storm sewer network. Integrated future precipitation and sea level projections to assess risk under climate change conditions.

### ***Flood Bypass Channel Evaluation***

Village of Mazomanie, WI / Modeler

Assessed existing 1D models and developed new 2D HEC-RAS model for evaluating the potential for improving a flood channel to reduce inundation under extreme storm flows.

### ***Flood Mapping Evaluation***

City of Onawa, IA / Lead Modeler

Assessed potential for FEMA map revisions to reduce floodplain extents in an area with outdated modeling. Examined existing hydraulic and hydrologic modeling, soils, elevation, and precipitation data.

### ***FEMA Map Update Submittal***

McCoy Trust, Sun Prairie, WI / Lead Modeler

Developed HEC-RAS models for existing and proposed conditions for a planned development, carried out floodplain mapping, and completed successful CLOMR and LOMR applications through the FEMA review process.

### ***Mississippi River Stream Temperature Modeling***

Private Client, Upper Mississippi River / Lead Modeler

Undertook analysis of the effects of climate change on stream temperatures in the Mississippi River, and analyzed the impacts on thermal discharge permit compliance.

### ***Reservoir Withdrawal Modeling***

Private Client, Wisconsin River / Lead Modeler

Developed custom numerical model of water losses from a reservoir based on seasonal withdrawals and storage; analyzed impacts of changes in management hydropower energy production.



**Evan  
Murdock**  
PhD, CFM  
Water  
Resources  
Engineer

Evan has been involved in water resources management in Southern Wisconsin for more than 13 years. He earned his Masters Degree studying sediment transport in a small agricultural stream, and his PhD studying the impacts of climate change on water resources and how farmers are reacting to climate variability. Evan's professional interests include climate change, socio-environmental systems, integrated water management planning, and risk assessment and mitigation. He has experience carrying out scientific research including field-based hydrology studies, complex numerical modeling, and social science investigations.

Evan has extensive experience with public engagement, outreach and education, and qualitative social science research methods. He has developed and delivered public presentations on climate change and flooding, and facilitated focus groups to understand stakeholder concerns about weather- and climate-related risks.

## **Education**

- |      |                                                                                       |
|------|---------------------------------------------------------------------------------------|
| 1996 | Bachelor of Arts in Physics<br>Macalester College                                     |
| 2006 | Master's of Water<br>Resource Engineering<br>University of Wisconsin-Madison          |
| 2017 | Doctor of Philosophy in<br>Environment & Resources<br>University of Wisconsin-Madison |

## **Academic Awards/Grants**

Northeast Climate Science  
Center Graduate Fellow

## **Academic Teaching Experience**

Teaching Assistant for  
Fluid Dynamics and Hydrosience  
Univ. of Wisconsin - Madison

## **Areas of Expertise**

Numerical Modeling  
Watershed Planning  
Stormwater Management  
Qualitative Research Methods



***Climate Change Impacts Modeling***

University of Wisconsin/ Graduate Student-Thesis

Developed and implemented research program to analyze the impacts of climate change on groundwater recharge in Southern Wisconsin. Obtained and processed climate model data, developed custom processing and analysis tools, and developed models using the Simultaneous Heat and Water (SHAW) model.

***Social Science Research***

University of WI - Dairy Coordinated Agriculture Project / Research Staff

Developed and implemented focus group and survey tools to study the attitudes and beliefs of dairy farmers about climate change and climate adaptation. Partnered with industry organizations to obtain access to farmers' contact information and to build credibility. Presented findings at academic conferences.

***Climate Change Outreach and Education***

Wisconsin Sea Grant / Outreach Staff

Developed outreach and educational tools for planners in coastal communities. Participated in public meetings as a climate adaptation expert. Authored the *Great Lakes Coastal Community Climate Adaptation Checklist* (NOAA-Sea Grant 2013). Partnered with the Lakeshore Natural Resources Partnership to develop modeling as a risk assessment and communication tool in the Manitowoc River watershed.

***Environmental Policy Development***

Office of State Representative Spencer Black / Legislative Staff

Research and developed policy proposals, developed draft legislation, assisted in public hearings and met with lobbyist groups.

**Selected Publications and Presentations**

Murdock, E., K. Genskow, C. Betz. *Climate change risk assessment, adaptation, and mitigation influences for Wisconsin dairy producers*. Presentation at the Joint Annual Meeting of the Agriculture, Food, and Human Values Society and the Association for the Study of Food and Society, June 2018.

Murdock E., and D. Hart, 2013. *Great Lakes Coastal Community Climate Adaptation Checklist*. Wisconsin Sea Grant, WISCU-G-13-002.

Murdock, E. *Scratching Below the Surface: Climate change and groundwater recharge in Wisconsin*. Presentation to the Wisconsin Wetlands Association Wetland Science Conference, Feb 2018.

Murdock, E., K. Potter. *Impacts of Climate Change on snow and frost depth in Southern Wisconsin*. Poster presentation to the American Geophysical Union, Dec 2013.

## Project Experience

### Watershed Management and Planning

Mike has led and facilitated several watershed management plans that included managing large, multidisciplinary teams of internal professionals and external consultants. Projects involved fostering joint planning among units of local government and required developing a network of positive relationships with agency partners & community stakeholders to implement the established goals and objectives.

#### ***Green Bay Action Plan Framework***

WI DNR / Project Engineer

Facilitating development of a conservation blueprint action plan framework for the Green Bay watershed. Key elements include steering committee selection best practices, vision statement and governance structure, work group charter, public engagement plan, and facilitators' guide.

#### ***Black Earth Creek Green Infrastructure Plan\****

Dane County, WI / Project Manager

Led the development of a green infrastructure plan for the Black Earth Creek Watershed, a Class 1 trout stream in western Dane County that is prized for recreation, but it also presents a flood hazard. Facilitated a team of stakeholders to identify specific urban and rural projects and LID practices that provide flood protection along with water quality, recreational, economic, and ecological benefits. Established partnerships between local government, private landowners, non-governmental organizations, and other stakeholders, taking advantage of federal, state, and local funding sources. Managed consultants, project schedule and budget. Responsible for tracking stakeholder engagement and plan review.

#### ***Starkweather Creek Chloride Management Plan\****

Madison, WI / Project Manager & Primary Author

Facilitated a Steering Committee of local stakeholders and developed a Chloride Management Plan for the Starkweather Creek watershed. The project included monitoring chloride concentrations in the creek, identifying chloride pollutant sources and management measures, and developing an information and education plan to reduce salt use. The resulting Chloride Management Plan promotes the use of Salt Wise practices and monitors the resulting improvements in the watershed.

### Water Resources Management and Stormwater Engineering

Served as a project manager and engineer for a variety of water resources and stormwater management projects at the regional and municipal level. Conducted policy analysis, rules & regulatory review, technical evaluations, and authored environmental studies/reports. Prepared cost estimates, conducted permitting, and secured grant funding. Managed consultants, bidding and contract management, and provided construction inspection.

#### ***Stormwater Management Standards Development\****

Dane County, WI / Project Manager & Engineer

Stormwater Technical Advisory Committee member and contributing author for a 2017 report on Reducing Increased Risk of Flooding in Dane County, WI. Provided recommendations for stormwater volume control standards and policies and the management of closed basins. Lead staff and facilitator for a 2010 Technical Advisory Committee recommending changes to stormwater volume control standards for Dane County, WI.

#### ***Urban Nonpoint Source Analysis Report\****

Dane County, WI / Project Manager & Engineer

Principal author for this report that provided an overview and



**Mike  
Rupiper,  
PE, ENV SP**

**Senior Civil /  
Environmental  
Engineer**

Mike has over 30 years of experience as a civil /environmental engineer. As a senior project manager, Mike has extensive experience working with communities to become more sustainable through projects and programs involving public works infrastructure.

Having worked as an engineer for consulting firms, as program manager for municipalities and as a divisional dir. for regional planning agencies, Mike's experience has spanned a broad range of public works project types including: land use planning, water resources & stormwater management, green infrastructure, sustainability, renewable energy and wastewater systems, water supply, waste management and recycling.

### Education

- 1998 MS, Environmental Studies  
- Land Resources,  
University of Wisconsin-Madison
- 1989 BS, Civil & Environmental Eng.,  
University of Wisconsin-Madison

### Professional Registration

- #29620 Professional Engineer - WI
- #50129 Professional Engineer - MN  
Envision Sustainability  
Professional Certification  
Certified Professional in Low  
Impact Development - NC State

### Professional Affiliations

- 2018-23 American Water  
Resources Association  
(WI Chapter); Board Member
- 2016-23 Clean Lakes Alliance  
Community Board Member
- 2003 Standards Oversight Council
- 2002 Dane County Erosion Control/  
Stormwater Mgmt. Manual  
Advisory Group

### Areas of Expertise

Civil/Environmental Engineering  
Wastewater & Water Supply Planning  
Water Resources & Stormwater Mgmt.  
Sustainable/Green Infrastructure  
Watershed Management + Plans

assessment of the design, operation and effectiveness of private on-site wastewater treatment (septic) systems for the Dane County Water Quality Plan.

***Nine Springs Creek Streambank Restoration\****

City of Fitchburg, WI / Project Manager & Engineer

Project manager for a streambank restoration project on Nine Springs Creek. Responsibilities included securing grant funding, permitting, managing consultants, bidding and contract management, and construction inspection.

***Stormwater Basin Retrofit Projects\****

City of Fitchburg, WI / Project Manager & Engineer

Project manager for several stormwater basin retrofit projects converting dry detention basins to wet detention basins for improved water quality. Responsibilities included securing grant funding, permitting, managing consultants, bidding and contract management, and construction inspection.

***Stormwater Permit Compliance\****

City of Fitchburg, WI / Project Manager & Engineer

Responsible for all aspects of the City's MS4 permit compliance under NR 216.

***Stormwater Utility\****

City of Fitchburg, WI / Project Manager & Engineer

Led the development and implementation of Fitchburg's Stormwater Utility to provide consistent funding for meeting the City's stormwater management responsibilities. Rate structure was based on impervious area with a credit system developed for property owners who implement on-site stormwater management practices.

***Stormwater Ordinance\****

City of Fitchburg, WI / Project Manager & Engineer

Led the development and implementation of Fitchburg's stormwater and erosion control ordinance.

## **Development Plan Reviews**

Mike has reviewed, supervised and/or technically supported over 400 development plans regarding sanitary sewer service, drainage flooding potential, erosion, impacts on water resources, and stormwater quality, quantity and volume control practices for compliance with state and local ordinances and regional water quality plan requirements. These development reviews QA/QC and supervision included a variety of municipalities throughout Dane County, WI.

## **Wastewater Engineering and Planning**

Served as a project manager and engineer for a variety of wastewater treatment and collection system projects at the regional and municipal level. Developed feasibility reports, engineering plans, specifications, and cost estimates, conducted flow monitoring studies, prepared permit and grant applications, and authored associated studies and reports.

***Collection System Evaluation Reports\****

Madison Metropolitan Sewerage District, WI / Project Manager & Engineer

Principal author for these reports / studies which provided an analysis of the District's interceptor, force main, and lift station capacities based on population and land use projections. Studies were completed in 2018 and 2008.

***Private On-Site Wastewater Treatment Systems Management Report\****

Dane County, WI / Project Engineer

Principal author for this report, which provided an overview and assessment of the design, operation and effectiveness of private on-site wastewater treatment (septic) systems for the Dane County Water Quality Plan.

***Combined Sewer Overflow Study\****

City of Streator, IL / Project Engineer

Project engineer for this study which included flow monitoring and sewer capacity evaluation.

***Wastewater Treatment Facility Operation and Maintenance Manual\****

City of Streator, IL / Project Engineer

Project engineer for the operation and maintenance manual for the City of Streator Wastewater Treatment Facility.

***Wastewater Treatment Feasibility Study\****

Town of Ogema, WI / Project Engineer

Project engineer and principal author for feasibility study of wastewater treatment alternatives for the Town of Ogema.

***\* Experience performed before employment at EOR***



## Project Experience

### Site Design and Stormwater Management

#### ***Vinburn Substation, Dane County, WI***

Alliant Energy / Project Engineer

Preliminary scoping for substation addition. Created preliminary grading plan and ordinance review for permitting.

#### ***Shoreland Permitting Project, Dane County, WI***

Multiple Private Clients / Project Engineer

Obtained shoreland zoning, shoreland mitigation, and shoreland erosion control permits for residential site development. Services included site grading, stormwater modeling to design an infiltration trench, and permitting of the site.

#### ***Trumbull Substation, Trumbull County, OH***

Realtime Utility Engineers, Inc. / Project Engineer

Design grading, stormwater, and erosion control for substation and access drives. Create stormwater and erosion control report for permitting.

#### ***Eden Substation, Iowa County, WI***

ATC / Project Engineer

Investigate/analyze drainage improvement alternatives to prevent control house flooding, create design drawings.

#### ***Osceola Yaholi Substation Site Design, Osceola, IA***

Alliant Energy / Project Engineer

Developed construction plans for substation that included erosion control measures, grading design, and stormwater management features.

#### ***Sharon West Substation Site Design, Walworth County, WI***

Alliant Energy / Project Engineer

Developed construction plans for substation that included erosion control measures, grading design, and stormwater management features. Prepared permitting reports, models, and figures for county.

#### ***Brooklyn Substation Rebuild Site Design, Dane County, WI***

Alliant Energy / Project Engineer

Developed site layout alternatives for substation expansion and provided hydrologic and water quality analysis.

#### ***Rock N Roll (Solar Design), TX***

Sunrise Energy Ventures/Project Engineer

Prepared Texas Stormwater Pollution Prevention Plan and stormwater and erosion control plan for solar site.

#### ***Bliss Addition Water Quality Improvements***

Big Marine Lake – Carnelian-Marine-St. Croix WD/Project Engineer

Provided volume surface analysis for dredging quantities.

#### ***ATCW Kittyhawk Detailed Design & Substation Expansion***

Electrical consultants, Inc./Project Engineer

Substation expansion with design and modeling on stormwater and infiltration basin. Creation of plan set for construction.

#### ***Beers Dam Permitting & Repair Design***

Promega Corporation/Project Engineer

Provided dam retrofit to bring it up to code. Re-designed embankment and emergency spill way. Created plan set and profiles for permitting and construction drawings.



**Tiffany  
Mueller**

**Civil Engineer**

Tiffany is a recent engineering graduate with a focus in sustainability and renewable energy sources. Her education includes the study of hydrology, stormwater management and best management practices, as well as site design - including the creation of erosion and sediment control plans.

Tiffany has also been an active participant in the advancement of STEM in schools and in mentoring women within the university's math, science, and engineering program.

### Education

2022 Bachelor of Science  
Environmental Engineering  
University of Wisconsin-Platteville

2018 Association of Applied Sciences  
Business Administration  
Rochester Technical College

### Certifications

NASECA Construction Site Erosion  
Control & Stormwater Permit  
Compliance Training

### Technical Skills

AutoCAD  
HydroCAD  
WinSLAMM  
ArcGIS

### Areas of Expertise

Technical Reports  
Microsoft Office  
Water Quality Analysis  
BMP Design & Review

***Kettle Moraine Substation Scoping Rebuild***

Alliant Energy/Project Engineer

Scoping project including preliminary grading plan for rebuild of substation and memo outlining environmental constraints.

***Riceville Substation***

Electrical Consultants, Inc./Project Engineer

Provided design including grading and erosion control with creation of plan set for new substation.

***Browntown Substation Rebuild***

Electrical consultants, Inc./Project Engineer

Provided driveway grading updates.

***Terravessa Outlot 66 (Site Design)***

Sherry Yu (Private client)/Project Engineer

Provided site design for multifamily housing.

***Terravessa 2nd and 3rd additions***

Fitchburg Lands, LLC/Project Engineer

Provided redlines and plan set updates for the 2nd and 3rd additions of new development.

***Seminole Hwy & Lacy Road Intersection Reconstruction***

KL Engineering/Project Engineer

Provided redlines and plan set updates for this road reconstruction project.

***Platteville, WI / Undergraduate Student\****

Utilized NR codes and given lot-specific designs and conducted cost-benefit analysis on stormwater BMPs to determine costs for each varying BMP size. Performed preliminary analysis of campus to delineate the drainage area and determine size of existing retention ponds.

***\* Experience performed before employment at EOR***

## Project Experience

### ***Lily Lake Park***

Stillwater, MN / Landscape Architect

Designed large rain garden complex in this community park to treat urban runoff before entering Lily Lake. This project led to the removal of Lily Lake from the state impaired waters list. Incorporated trails, benches, and over 3 acres of native seed restoration.

### ***Northwood Playfield Park***

Thunder Bay, ON, Canada / Landscape Architect

Designed cutting edge park improvements including green infrastructure landscape that captures and treats parking lot and splash pad runoff. Interpretive elements are interwoven through the site to express First Nations' values and heritage.

### ***Marine Village Stormwater Improvements***

Marine on St. Croix, MN / Landscape Architect

Worked with stormwater and traffic engineers to plan and design a series of low impact, stormwater management features to implement in conjunction with a state aid funded road improvement project in this quaint small town with tons of history and character. Stormwater improvements focused on achieving maximum water quality benefit for the picturesque Mill Stream and the St. Croix River, while at the same time maintaining and expanding existing pedestrian connections and outdoor community event spaces.

### ***Hennepin County Library Sustainability Improvements***

Hennepin County, MN. Landscape Architect & Project Manager

Created sustainable site improvement plans for libraries in the Hennepin County system. Sustainable futures included turf conversion, stormwater landscaping, rain gardens, tree trenches, and permeable pavements. Oversaw stormwater modeling to understand site hydrology and design stormwater management BMPs. Prepared concept plans, cost estimates, and construction documents for bidding.

### ***McVicar Creek Green Infrastructure***

Thunder Bay, ON, Canada / Landscape Designer

Designed grading and landscape plans for multiple LID projects in the McVicar Creek neighborhood of Thunder Bay. Projects were located on city park land and street ROWs and were aimed at treating stormwater runoff before it contributed pollutants to McVicar Creek, an urban stream which outlets to Lake Superior. Each project included a rain garden or treatment basin with pre-treatment device, subsurface drainage, piped overflow, and native plant restoration.

### ***Green Stormwater Infrastructure Vegetation Support and Training***

Minneapolis, MN / Landscape Architect & Project Manager

A multi-year project to develop guidance documents and training materials for Minneapolis City staff to implement green infrastructure projects within the road right-of-way throughout the City. Also, provide plan review services for green stormwater infrastructure and sustainable landscaping projects in a variety of settings.

### ***Capitol Region Watershed District Office Renovation***

St. Paul, Minnesota. Landscape Architect

Designed site and stormwater features for the new home office of the Capitol Region Watershed District. The site was transformed from an urban brownfield to a lush, green and vibrant landscape featuring



**Britta  
Hansen,  
PLA**

**Landscape  
Architect**

Britta has 13 years of experience as a landscape architect and project manager designing and constructing public spaces, parks, school and corporate campuses, and stormwater management features. Britta specializes in site design that weaves together elements of conservation, sustainability, education, performance, and art. She is experienced and capable at leading all levels of design from master planning and iterative concept design to construction documentation.

In addition, Britta designs and facilitates public input processes and is a trained visual artist who incorporates artistic elements and interactive interpretive experiences into much of her work. She is also experienced at ecological restoration design and has developed and implemented many successful projects across the Upper Midwest and Canada.

## Education

- |      |                                                                    |
|------|--------------------------------------------------------------------|
| 2011 | Master of Landscape Architecture,<br>University of Texas at Austin |
| 2006 | Bachelor of Arts in Studio Art,<br>Saint Catherine University      |

## Professional Registration

- |         |                             |
|---------|-----------------------------|
| #53307  | MN Reg. Landscape Architect |
| #436-14 | WI Reg. Landscape Architect |
| #00696  | IA Reg. Landscape Architect |

## Additional Training

- |      |                                                                                                                 |
|------|-----------------------------------------------------------------------------------------------------------------|
| 2022 | Erosion and Stormwater<br>Management Certification:<br>Construction Site Management,<br>University of Minnesota |
| 2019 | National Green Infrastructure<br>Certification Program (NGICP)                                                  |

## Areas of Expertise

Climate Resilient Design  
Low Impact Development  
Visual Arts & Engagement



multiple formal and informal gathering areas, including a public pocket park with an interactive watershed-themed educational exhibit. The design strove to express the mission of the District to visitors and neighbors while also capturing and treating nearly all stormwater runoff on the site. This project has achieved LEED Gold Certification.

### ***Big Brothers Big Sisters - Twin Cities Headquarters***

Minneapolis, MN. Landscape Architect

Designed site improvements for the new headquarters of Big Brothers Big Sisters - Twin Cities. Added green stormwater management features to a nearly 100% developed site, leveraging watershed district grant funds to create a teaching tool that program coordinators will use to educate boys and girls about the importance of stormwater management and green infrastructure adjacent to the nearby Mississippi River.

### ***Transforming Central High School***

St. Paul, Minnesota. Landscape Architect

Developed landscape and stormwater design for Minnesota's oldest high school. Worked closely with students, staff, community members, and parents to create a unique and inviting campus space that was more sustainable, green and equitable than the existing concrete plaza. Incorporated stormwater management features throughout the design to meet watershed district goals and protect urban water resources. Provided construction documentation, cost estimating, construction administration services, and illustrated interpretive signage.

### ***Thomas Building***

St. Paul, MN / Landscape Architect

Prepared site design plans for the renovation of a former industrial building in St. Paul's midway neighborhood. Site improvements and a redesigned parking lot support the new use for the building as an office and storage space adjacent to the Capital Region Watershed District. Removed a significant amount of impervious area from the site and replaced this with native pollinator habitat and stormwater landscaping.

### ***Storm Lake High School Courtyard***

Storm Lake, IA / Landscape Architect

Worked closely with students and staff to design site improvements for the high school courtyard. Plans improved accessibility of the space while adding green infrastructure features such as permeable pavers and rain gardens. Helped students document fundraising goals and install custom pavers and seating elements within the plaza. Two outdoor classrooms help the school manage covid risks while giving students access to greenspace during the school day.

### ***Burnsville Sustainability Guide Plan Update***

Burnsville, MN / Landscape Architect

Built on the work of the original Sustainability Guide Plan of 2009 that was developed by EOR as a first-of-its-kind document. Worked with city staff to identify critical areas of focus for the city over the next 10 to 20 years. Developed sustainability goals for each area and workshopped a variety of actions to help the city achieve each goal.

### ***Library Lake Master Plan Implementation Projects***

Cumberland, WI / Project Landscape Architect

Created concept designs and supporting documents for Wisconsin DNR grant application process. Once grants were received, designed grading and landscape plans for two stormwater treatment wetland projects. Developed construction plan sets, executed bidding processes, and performed construction site management and administration throughout the construction process for both sites. These projects were Phase II and III in a four-phase masterplan for improving water quality in Library Lake, a community amenity in downtown Cumberland, WI. Currently working on the planning stage of Phase IV of the masterplan.

### ***1919 University Ave Site Improvement Plan***

St. Paul, MN / Landscape Architect

Prepared site improvement plans for 100% impervious office building site on the edge of an industrial neighborhood. Plans solve current flooding issues on site while adding climate resilient green infrastructure including permeable pavers, an intensive green roof, and stormwater capture and reuse features that improve the local environmental and provide an urban refuge for beneficial pollinators, birds, and people.

### ***Mountdale Boat Launch***

Thunder Bay, ON, Canada / Landscape Architect

Redesigned a recreational area along the shores of Lake Superior to function as a boat launch, shore fishing location, and a recreation destination with views of phenomenal scenery. The design also integrated stormwater management best practices to prevent siltation into the lake, and improve water quality, as well as a native shoreline buffer to prevent erosion and add pollinator and wildlife habitat.



## Robert Hanold

PE

Senior Engineer, Project Engineer

### EDUCATION

Bachelor of Science, Civil  
Engineering, Structural Emphasis,  
UW-Platteville

### REGISTRATIONS & CERTIFICATIONS

Professional Engineer  
- WI

FHWA Certified  
Bridge Inspector  
HEC-RAS Modeling Training

### EXPERIENCE

11 years

### CONTACT

PHONE  
(608) 459-6051

EMAIL  
robert.hanold@jewellassoc.com

## PROFILE

Robert Hanold is a Wisconsin Professional Engineer and supervises the structures bridges unit within Jewell Associates Engineers, Inc. His experience includes project management and design staff oversight. In addition to management Robert is a highly capable design engineer who has completed a variety of structural and transportation projects in both rural and urban settings. He is knowledgeable and familiar with WisDOT FDM, PS&E process, and State of Wisconsin Standard Specifications for Highway and Structure Construction. He is also a certified bridge inspector and regularly performs Interim and Biennial Bridge Inspections for numerous Wisconsin counties. Through his bridge inspection experience, Robert has witnessed a gamut of bridge design and construction miscues. Seeing these issues first-hand gives him an additional constructability perspective to bridge design.

## WORK EXPERIENCE

- NBIS Bridge Inspection/CS4 PE Structural Reviews
- CTH G Bridge Replacement, Town of Milton, Buffalo County, WI
- CTH K Bridge Rehabilitation, Town of Bergen, Vernon County, WI
- CTH X Bridge Replacement, Town of Irving, Jackson County, WI
- McAvoy Road Bridge Replacement, Town of Ithaca, Richland County, WI.
- Creek Road Bridge Replacement, Rock County, WI.
- Mineral Point Road Box Culvert, Rock County, WI.
- Skinner Road Bridge, Rock County, WI.
- Holland Road Bridge Replacement, Town of Darlington, Lafayette County, WI.
- CTH C Bridge Replacement, Town of Glencoe, Buffalo County, WI.
- CTH E Bridge Replacement, Town of Mifflin, Iowa County, WI.
- Blotz Road Bridge Replacement, Town of Dodgeville, Iowa County, WI.
- Ferndale Road Bridge Rehabilitation, Town of Willow Springs, Lafayette County, WI.
- Watertown Plank Road Bridge Replacement, Elm Grove, Waukesha County, WI.
- Husker Hollow Road Bridge Replacement, Town of Webster, Vernon County, WI.
- Badger Road Bridge Replacement, Town of North Lancaster, Grant County, WI.

**JEWELL**  
associates engineers, inc.  
Engineers - Architects - Surveyors

## PROFESSIONAL & COMMUNITY ACTIVITIES

*ACEC - American  
Council of Engineering  
Companies (WI)*

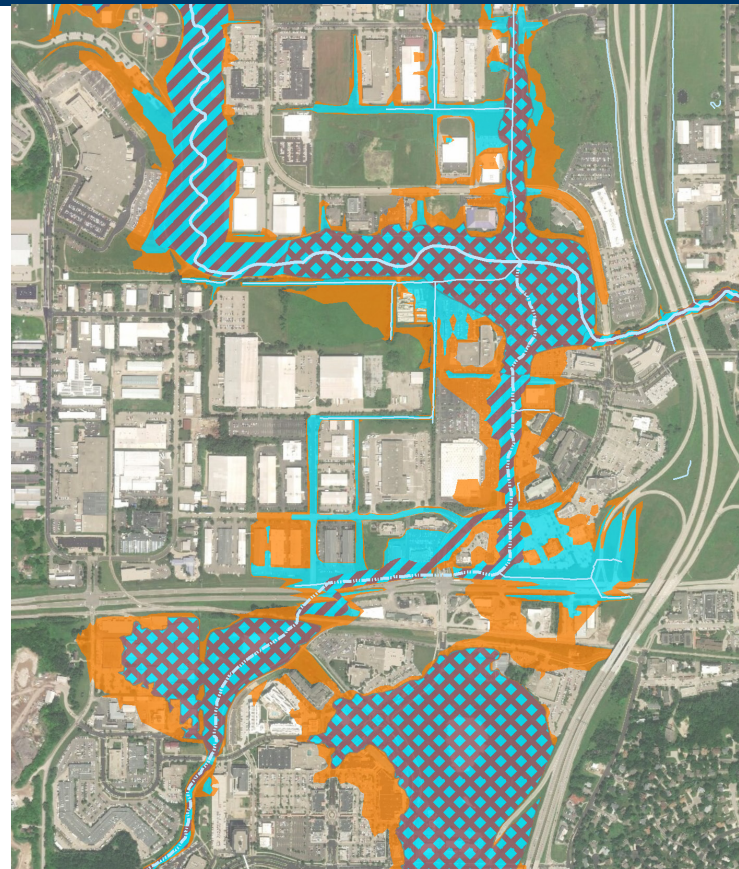
- Wilson Creek Road Bridge Replacement, Town of Spring Green, Sauk County, WI.
- Five Corner Road Bridge Replacement, Towns of Jefferson and Clarno, Green County, WI.
- Badgerland Drive Bridge Replacement, Village of Howard, Brown County, WI.
- Rock River Bridge (B-53-0287, Jackson Street), Janesville, Rock County, WI.
- USH 14 Kickapoo River Bridge Replacement, Village of Readstown, WI.
- CTH Z Bridge Replacement, Monroe County, WI.
- County Line Road Bridge Replacement, Town of Meeme, Manitowoc County, WI.
- Haynes Road Bridge Replacement, Town of Marcellon, Columbia County, WI.
- CTH U Bridge Replacement, Town of Caledonia, Columbia County, WI.
- CTH U Bridge Replacement, Town of Clayton, Crawford County, WI.
- Spiral Road Bridge Replacement, Town of Ithaca, Richland County, WI.
- CTH H Bridge Replacement, Jackson County, WI.
- CTH F Bridge Replacement, Trempealeau County, WI.
- E. Jefferson Street Reconstruction, Spring Green, WI.
- W. Madison Street Reconstruction, Spring Green, WI.
- 7th Street Roundabout Construction, City of Racine, Racine County, WI.
- CTH E Reconstruction, Iowa County, WI.
- CTH N Highway Safety Improvements, Crawford County, WI.
- IH 39, Coloma Safety & Weight Facility, Waushara County, WI.
- Eau Claire County, 2014 Roadway Resurfacing Projects.
- Beloit Powerhouse Shared Use Trail & Walkway, Beloit, WI.
- Kickapoo Valley Reserve Shared Use Path, Bridge #13 Rehabilitation, Vernon County, WI.



# PROJECT EXPERIENCE

EOR has several years of experience helping municipal clients in Wisconsin, Minneapolis, Iowa, and Canada with a wide variety of water related issues. The following are examples of some of our flood mitigation work.

## Pheasant Branch Creek Floodplain 2D Model and Maps



### Summary

A historic rainfall in August 2018 dropped 9-11 inches of rain on the Pheasant Branch Creek watershed over 12 hours, causing unprecedented flooding and millions of dollars in damages. This prompted the City to update its FEMA floodplain maps to better reflect flood risk. EOR developed a detailed floodplain model using PCSWMM that could be used to evaluate flood mitigation options.

The PCSWMM model covered the 22.6-square-mile watershed, including a 2D component for the flat-lying confluence of the North and South Forks where flood damage was concentrated. The model closely matches the 2018 flood events, and the new maps identify complex flood overflow routes well beyond the FEMA floodplain.

|           |                   |
|-----------|-------------------|
| Date:     | 2019              |
| Location: | Middleton, WI     |
| Client:   | City of Middleton |



# Rochester Comprehensive Surface Water Management Plan



## Summary

EOR is assisting the City of Rochester in the development of its Comprehensive Surface Water Management Plan (CSWMP). This Plan will facilitate a more strategic, collaborative and fiscally responsible approach to stormwater management.

EOR and its partners (Freshwater and Perkins and Will) are working with city staff from various departments to explore the vision and needs for the CSWMP. The Plan will address issues related to sustainability, environmental equity, asset management planning and climate resiliency by exploring and prioritizing the surface water and groundwater management needs of today and the future.

The City will incorporate issues related to social equity and environmental justice such as flood hazard risk and stormwater investments as a key element of the CSWMP.

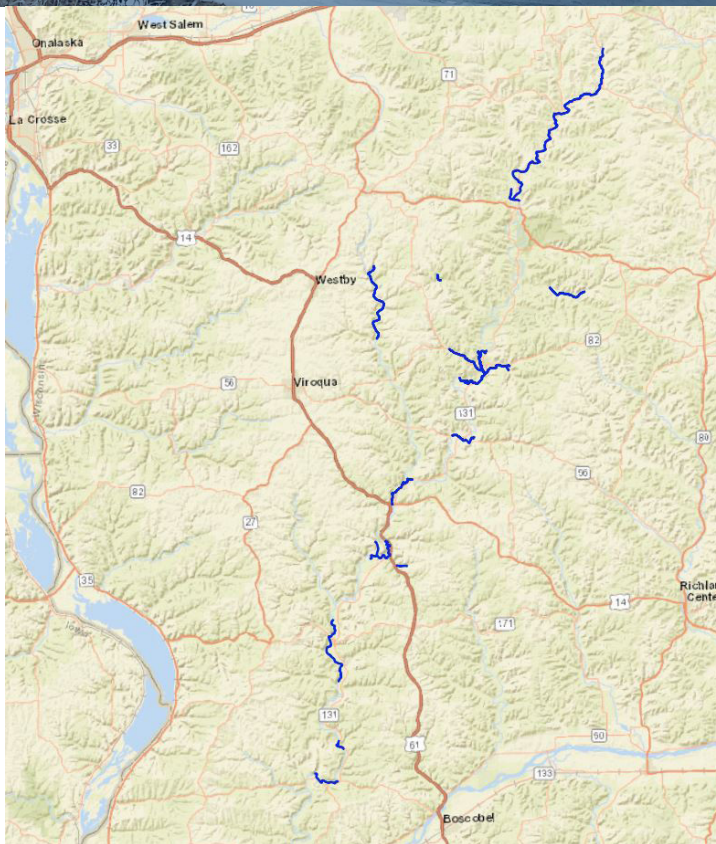
|            |                   |
|------------|-------------------|
| Date:      | On-going          |
| Location:  | Rochester, MN     |
| Client(s): | City of Rochester |



# Kickapoo Watershed Floodplain Studies



West Fork Kickapoo River - CTH "P"



## Summary

Kickapoo is the longest tributary of the Wisconsin River and drains over 800 Sq mi of land in Monroe, Vernon, Richland, and Crawford Counties.

EOR was hired to update floodplain maps of several streams that were determined to be deficient by the Federal Emergency Management Agency (FEMA).

The stream reaches studied included 64.2 linear miles of waterways with approximately 290 cross sections and 62 structures (culvers/bridges/dams).

Mapped the 1- and 0.2-percent-annual-chance floodplain boundaries, regulatory floodway boundaries, cross sections, base flood elevations, and the profile baselines. GIS deliverables met WI DNR standards.

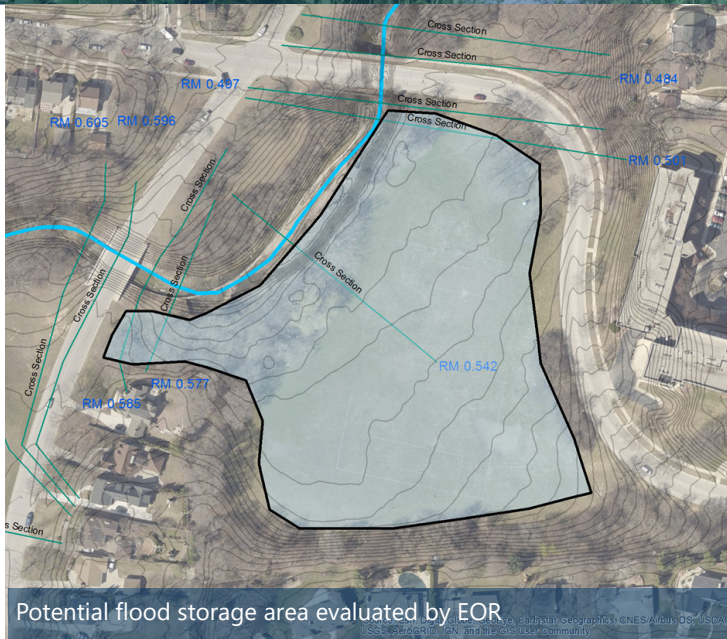
|           |              |
|-----------|--------------|
| Date:     | 2021 - 2023  |
| Location: | SW Wisconsin |
| Clients:  | WI DNR       |



# Zoo Interchange Runoff Impacts



Portland Avenue Bridge after large storm



## Summary

EOR investigated potential damages to Honey and Underwood Creeks on county park lands due to stormwater runoff from the Wisconsin Department of Transportation's Zoo Interchange highway expansion project. We used site visits, review of DOT's design, and modeling with HSPF and HEC-RAS to evaluate changes in discharge and channel velocity due to the project. EOR also developed an unsteady HEC-RAS hydraulic model to evaluate potential flood storage enhancements within County Parks lands to reduce flood peak discharges and damages.

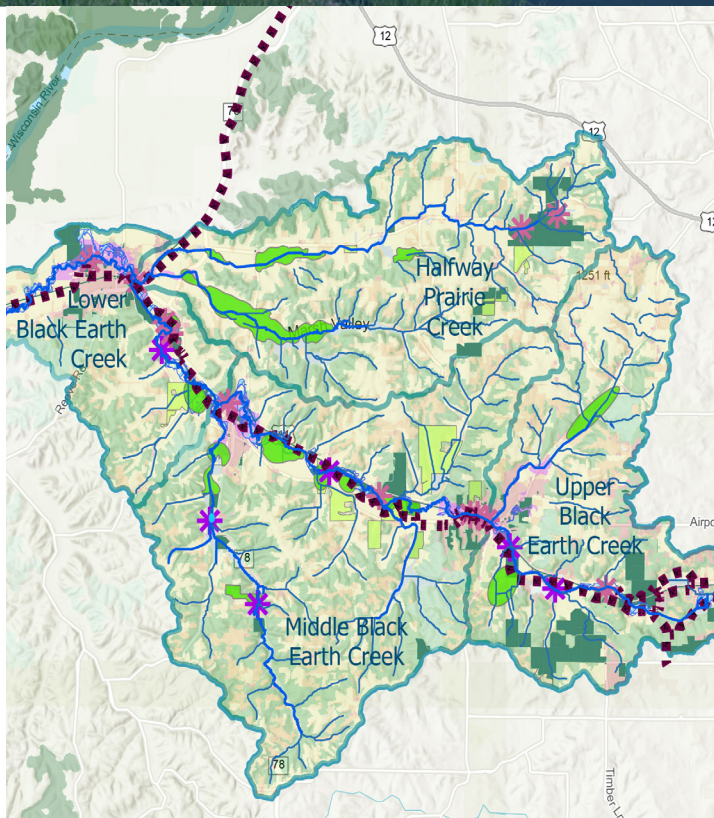
|           |                        |
|-----------|------------------------|
| Date:     | 2017 - 2018            |
| Location: | Milwaukee, WI          |
| Clients:  | Milwaukee County Parks |



# Black Earth Creek Watershed Green Infrastructure Plan



Image credit Groundswell Conservancy



## Summary

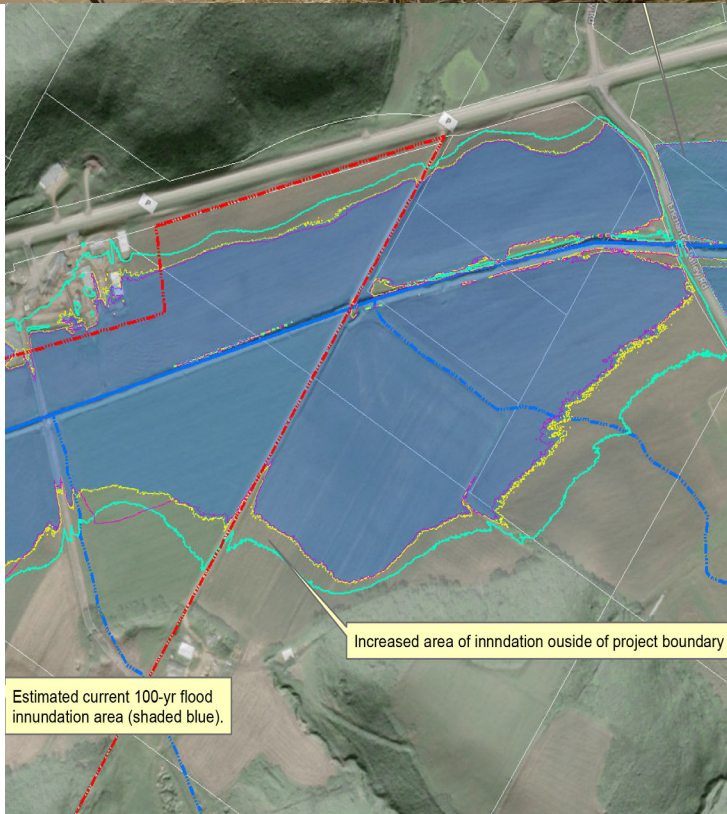
EOR led development of a green infrastructure (GI) plan in this 100-square-mile watershed straddling the glaciated landscape of southern Wisconsin and Driftless Area. The plan identifies and prioritizes projects & practices that will enhance flood protection, water quality, trout habitat, recreational opportunities, and economic development. EOR and partners mapped flood hazards, quantified flood reduction benefits of rural and urban GI, identified costs, benefits & funding sources, and prioritized projects for implementation.

The planning process worked with a steering committee of 16 local government and non-profit organizations to engage local businesses, farmers, riparian landowners and other residents through the development of an ArcGIS Hub website, community events, and public meetings.

|                  |                                           |
|------------------|-------------------------------------------|
| <b>Date:</b>     | 2021 - 2022                               |
| <b>Location:</b> | Madison, WI                               |
| <b>Clients:</b>  | Capital Area Regional Planning Commission |



# Cross Plains Flood Mitigation Planning



## Summary

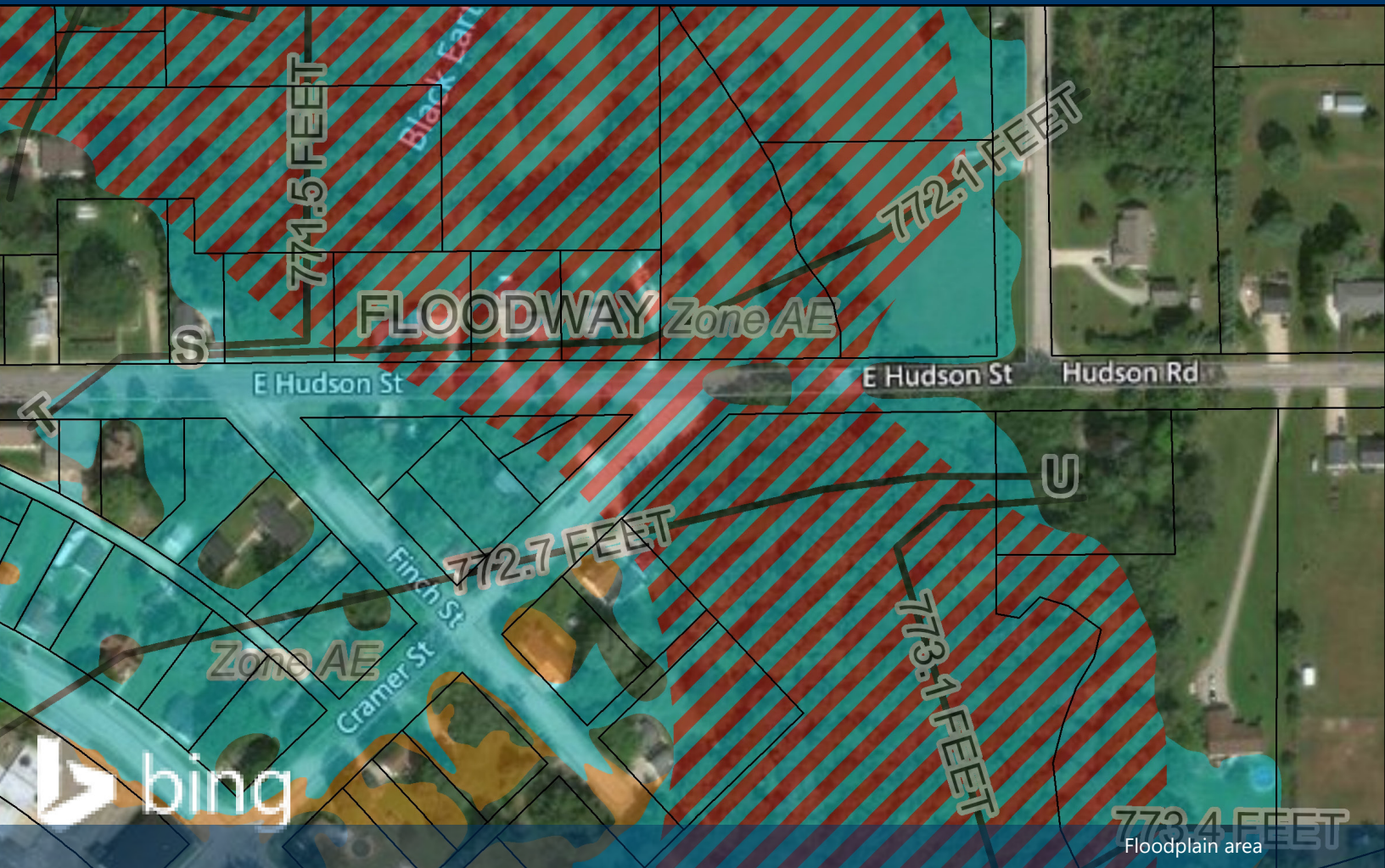
In August 2018, more than 10 inches of rain fell over portions of western Dane County in under 12 hours, an estimated 500- to 1,000-year rain event, resulting in significant flooding throughout Cross Plains. EOR teamed with another local civil design firm to develop flood mitigation plans for Brewery Creek and Black Earth Creek, both flowing through the Village. Potential flood mitigation projects were developed based on input from Village staff and the contracted municipal engineer.

Projects focused on increased flood conveyance and flood storage to reduce damage to private property and public infrastructure during large floods. Emphasis was put into projects providing improved habitat and recreational opportunities, including trails along a naturalized stream corridor through prairie and wetland restorations.

**Date:** 2020  
**Location:** Dane County, WI  
**Clients:** Village of Cross Plains



## Flood Bypass Channel



### Summary

The extreme flood of August 2018 caused widespread flooding and damage in downtown Mazomanie. The Village was looking for options to reduce the flood hazards, including a potential bypass channel along the route where flood flows currently split off from the main channel and flow overland north of downtown.

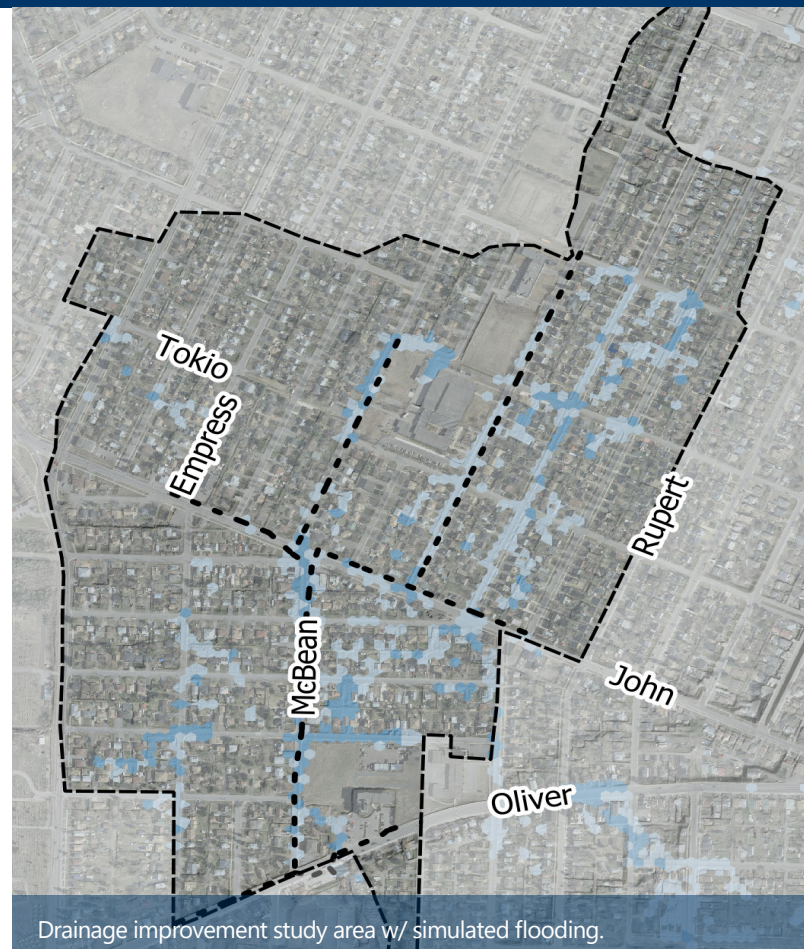
EOR evaluated the potential for improvements to water surface elevations during the 100-year flood from an increase in the capacity of the northern remnant channel.

Modeled conceptual designs of a bypass using the 1-dimensional FIS hydraulic model to evaluate how much the flood flow through the bypass can be increased and the flood flow along the main channel through downtown can be decreased for the 100-year and 500-year events.

Date: 2021-2022  
 Location: Mazomanie, WI  
 Clients: Village of Mazomanie



# McBean Street Drainage Improvements Study



## Summary

EOR was retained to assess the storm sewer system tributary to the trunk sewer system along McBean Street in Thunder Bay. This area has seen frequent localized flooding in multiple areas and presented several challenges to drainage improvements, including the fully developed nature of the drainage area and the potential for storm sewer improvements to exacerbate downstream flooding and channel instability along the receiving ditch. The City's existing 2D PCSWMM model was improved and used to evaluate multiple potential flood reduction solutions, including pipe upsizing, underground storage, and green infrastructure. The evaluation revealed that simply upgrading the storm sewer system could result in more than doubling the peak discharge rates into the receiving ditch, but that using a combination of these approaches could reduce flood impacts to a significant degree while substantially mitigating these negative outcomes.

Date: 2020 - 2021  
 Location: Thunder Bay  
 Clients: City of Thunder Bay



# Field Street Flood Reduction Analysis



Neebing-McIntyre Floodway looking upstream from Lake Superior. City of Thunder Bay, ON. (LRCA n.d.)

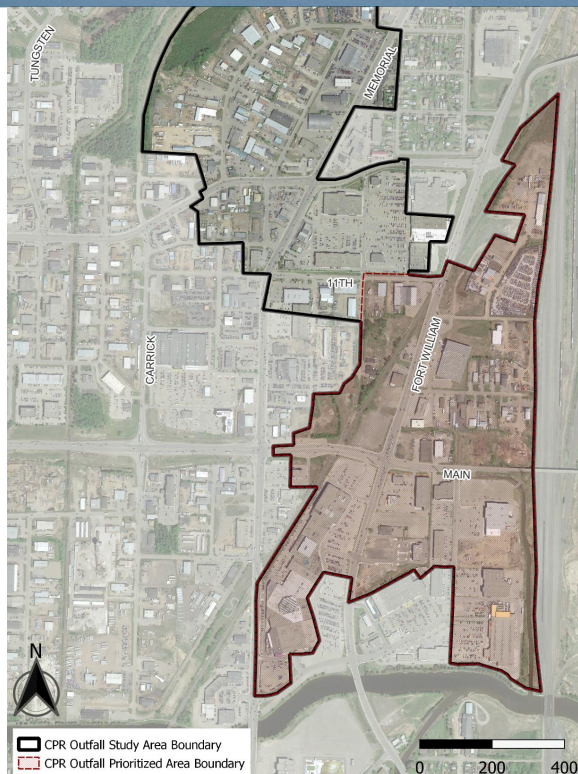


Figure 2. CPR Outfall Study Area Boundary and CPR Outfall Prioritized Area Boundary

## Summary

EOR was retained to investigate and provide strategies for mitigating flooding to the area south of Field Street and north of the Harbour Expressway in Thunder Bay. This project is a continuation of similar work performed by EOR in the Intercity area, including both Tupper Avenue and McBean Street. Industrial and commercial areas along Field Street have experienced frequent flooding and the area presented several challenges to drainage improvements, including the fully developed nature of the area, the high proportion of impervious surfaces, inflows from adjacent upslope drainage areas, and high tailwater conditions due to its proximity to the Neebing-McIntyre Floodway. EOR's analysis focused on improving and using the City's 2D PCSWMM model to investigate the efficacy of multiple proposed approaches to reducing flooding in the area, including storm sewer upgrades, detention ponds, and diversions.

|                  |                     |
|------------------|---------------------|
| <b>Date:</b>     | 2022 - 2023         |
| <b>Location:</b> | Thunder Bay         |
| <b>Clients:</b>  | City of Thunder Bay |



## Bridge Design Services

### Bridge & Culvert Design

- Single & Multi-Span Bridges
- Pre-stressed Concrete Girders
- Reinforced Concrete Flat Slabs
- Haunched Concrete Slabs
- Steel Girder/Concrete Deck
- Railroad Structures
- Box Culverts
- Culvert Pipes
- Pipe Arch Culverts
- Timber Structures
- Prefabricated Structures
- Pedestrian/Bicycle Bridges
- Temporary Bypass Bridges

### Structure Rehabilitation

- Deck Replacements & Overlays
- Widening & Elevating
- Maintenance & Painting
- Independent Engineer's Reports

### Relevant Experience

- Hydrology & Hydraulics
- Alternatives Analysis
- Aesthetic Treatments
- TRANS 207 Projects
- Federal Bridge Program
- Bridge Inspections
- Environmental Documents
- LRFD Design
- Emergency Repair Design
- Public Involvement
- Construction Oversight



Bridge projects were among the company's first undertakings when Jewell Associates began in 1993, and bridges continue to be a mainstay of our business. Our structural engineers are experienced with a wide variety of structure types for crossings over waterways, railroads and highways. We also design box culverts and pipe culverts for locations where these types of structures are appropriate and cost effective.

Our engineers utilize LRFD (Load Resistance Factor Design) and all the applicable standards and procedures required by the Wisconsin Department of Transportation (WisDOT), the Federal Highway Administration and the American Association of State Highways and Transportation Officials. We provide bridge design services for counties and local governments throughout Wisconsin and to all regions of WisDOT.



Spring Green, WI

•

Madison, WI

•

Wisconsin Rapids, WI

•

Eau Claire, WI

[www.jewellassoc.com](http://www.jewellassoc.com)



# Project Understanding

The east side of Green Bay has suffered repeated damages from large floods, including March and September of 2019 events that caused extensive damages and condemnation of 37 homes. Floods have been caused by heavy rains and snowmelt, sometimes compounded by high water levels and wind conditions in Green Bay. Damages have been exacerbated by the proximity of urban development to the floodway of the East River and increased runoff from urban and agricultural areas of the watershed. In addition to risks to homes and businesses, there are numerous pieces of critical infrastructure along the East River corridor in the City including bridges, municipal works facilities, and administrative buildings. These flood risks are summarized in the 2020 Brown County All Hazards Mitigation Plan.



WBAY photo of flooding in eastern Green Bay on September 11, 2019.

The East River Collaborative was formed in response to the 2019 floods. Supported by The Nature Conservancy, Wisconsin Sea Grant, NEW Water and the University of Wisconsin-Madison, this initiative is taking a watershed approach to reducing flooding impacts. Nature-based solutions, green infrastructure, and getting homes and businesses out of the harm's way are key strategies. Stakeholders in the Black Earth Creek watershed in Dane County have taken a very similar approach to reducing flood risk and improving watershed health, leading to a [watershed green infrastructure plan](#) focused on both urban and agricultural areas authored by EOR.

## Planning for Flood Resilience and Water Quality

**Goal** To identify specific projects and practices that provide a quantifiable level of **flood protection** to communities, **water quality benefits** to Black Earth Creek and its tributaries, and **recreational, economic, and ecological benefits** to the watershed as a whole.

### Black Earth Creek Watershed Green Infrastructure Plan

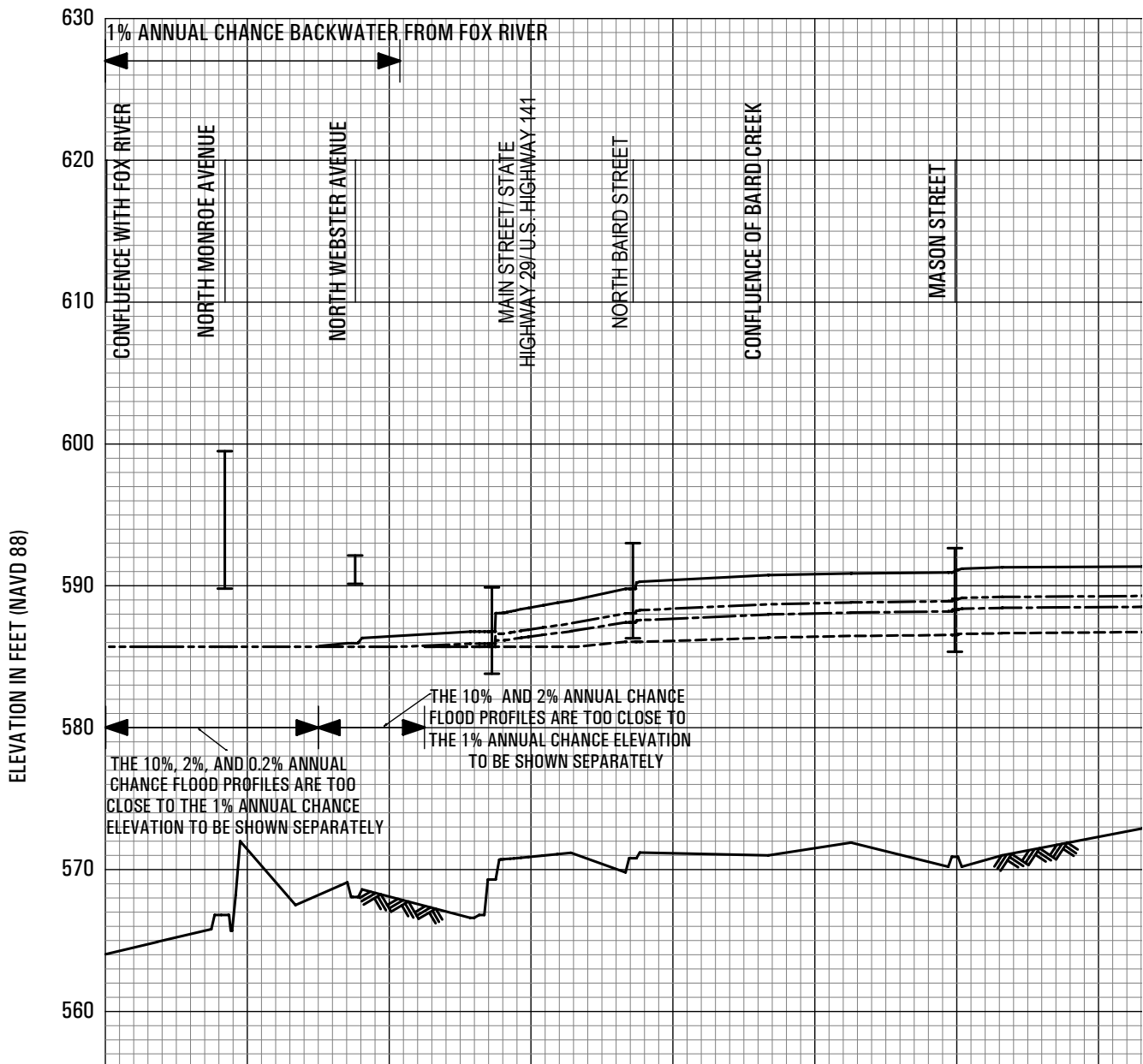
Black Earth Creek is a Class 1 trout stream in western Dane County and northeastern Iowa County that is prized for recreation by local community members and visitors. It is a focal point of the communities it flows through, but it also presents a flood hazard that was underscored by an extreme flood in August of 2018 that caused extensive damage.

To address this flood hazard, a team of stakeholders led by the Capital Area Regional Planning Commission put together a watershed green infrastructure plan. The purpose of this plan is to identify specific projects and practices that provide flood protection along with water quality, recreational, economic, and ecological benefits.

Strategies in this plan use green infrastructure, a nature-based approach that uses soil and vegetation to retain and infiltrate water in urban and rural areas, creating multiple benefits. Implementing these strategies will require partnerships between local government, private landowners, non-governmental organizations, and other stakeholders, taking advantage of federal, state, and local funding sources.

EOR authored watershed green infrastructure plan

One flood mitigation opportunity identified in the request for proposals (RFP) is increasing floodwater conveyance at bridges. EOR has conducted similar hydraulic analyses for the Village of Cross Plains and the City of Middleton, evaluating potential water surface lowering upstream of a bridge and the potential for adverse impacts downstream due to increased flood discharge through a larger bridge opening. Our initial review of the Flood Insurance Study hydraulic profile for the 5 bridges identified in the RFP suggests that these bridges do not cause an excessive upstream rise in the effective FEMA 100-year flood elevation, with the maximum of about 1 ft at Main Street. However, this observation might not reflect the current watershed hydrology or impacts of lake levels, and higher flows (FEMA 500-yr) do show a more noticeable hydraulic constriction at that particular structure. The hydrologic model refinement and hydraulic modeling testing will shed more light onto potential improvements to the bridges.



Flood Insurance Study profiles for the 10-, 50-, 100- and 500-year floods in the lower East River including the 5 bridges to be analyzed in this project.



The City has also identified increased flood storage, particularly on City property, as a flood mitigation strategy. This has the potential to create multiple benefits through the creation of green space for passive recreation, enhanced habitat, additional active floodplain areas for water quality treatment, and keeping development out of flood prone areas. **EOR's Black Earth Creek watershed green infrastructure plan** evaluated similar opportunities, including flood reduction, economic, and habitat benefits. EOR's expertise using 1D and 2D hydraulic models will help the City understand the frequency and magnitude of flood reduction benefits that these strategies might create.

This project will ultimately lead to the implementation of a flood mitigation solution at the 90% design level. EOR regularly designs, permits, and performs construction oversight for a variety of civil sites including green infrastructure, parks, and stormwater management. Our in-house familiarity with both urban flood modeling and design will help to ensure that the City's selected project can be permitted and constructed, and that the flood mitigation goals won't be compromised during the design and implementation process.

[Black Earth Creek Watershed Green Infrastructure Plan - link to website](#)

### Watershed Planning

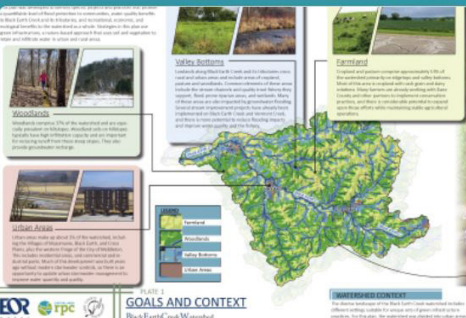
Working together with communities of the Black Earth Creek watershed, we created a plan to address flooding, water quality, and natural resource protection through green infrastructure strategies. The plan, led by the Capital Area Regional Planning Commission and a Steering Committee of watershed partners, explores nature-based design and practices for alleviating flooding and water quality challenges in the watershed.





### Green Infrastructure

Green infrastructure is the range of measures that use plant or soil systems, permeable pavement or surfaces, stormwater harvest, or landscaping to capture rainwater and reduce flows. This can include building soil health or planting buffers on farmland, and adding features like bioswales in developed area.



**GOALS AND CONTEXT**  
Black Earth Creek Watershed

**Executive Summary**

Set of seven 11 x 17 plates that form the Executive Summary of the Black Earth Creek Watershed Green Infrastructure Plan.

[View](#)

### Black Earth Creek Green Infrastructure Plan



**Black Earth Creek Watershed Green Infrastructure Plan**

Final plan approved in August 2022

[View](#)

# Project Scope

EOR is committed to providing the services and deliverables described in the RFP's General Description of Work, and our approach and proposed sequence is demonstrated in both our Project Schedule and our Staff-Task-Cost Analysis spreadsheet. Additional information or proposed modifications to the City's scope are presented by task below:

## TASK 1: PROJECT COORDINATION AND DATA COLLECTION

We recommend there be an additional City review step at the 60% Plan stage of the Preferred Concept, to ensure that the 90% design will meet the City's vision. This could be a virtual meeting and/or City Staff providing plan set markups.

## TASK 2: FLOOD MITIGATION ANALYSIS AND CONVEYANCE ASSESSMENT

Our cost assumes we will be updating the existing hydrology model, not building the entire HEC-HMS model from scratch for the entire East River watershed. We expect that the combined 1-D HEC-RAS model will be most efficient for analyzing the conveyance and mitigation solutions, but at a minimum an unsteady version of the model will be needed to account for downstream flow changes from bridge conveyance testing and for analyzing the performance of proposed flood storage areas. There may also be complex flow areas where 2D modeling is needed, or at least where the results of previous 2D modeling can inform and add realism to the 1D model.

## TASK 3: FLOOD MITIGATION SOLUTIONS & PLANNING-LEVEL COST-BENEFIT ANALYSIS

While we have assumed one traditional in-person stakeholder meeting, we recognize there have been numerous efforts already conducted by the City and the East River Collaborative, and the stakeholder engagement efforts for this project should dovetail with those. Based on our other stakeholder projects, there may also be an opportunity to conduct outreach and receive feedback from the community using innovative technologies, such as online map sharing and surveys. We anticipate working closely with the City to create the most effective and efficient stakeholder outreach within the grant budget.

## TASK 4: SUMMARY TECHNICAL MEMO

No recommended modifications.

## TASK 5: PREFERRED CONCEPT 90% DESIGN AND TOPOGRAPHIC SURVEY

As mentioned above, we have allotted time for City review at both the 60% and 90% design stages of the Preferred Concept. The RFP addendum acknowledged that there are a variety of potential project types that might be selected as the designed solution, including flood storage and bridge conveyance work. Our cost assumes that if river channel conveyance is selected as the Preferred Concept, our design work may include modifications to the channel or banks near bridges or other relatively simple means of improving conveyance such as rail modifications or overflow terrain adjustments, and we will analyze potential impacts to the bridges based on scour and other calculations. We would consult with bridge design experts at Jewell Engineering (subconsultants) during that process. But our cost does not include full design of a new bridge or bridge abutments, as in our experience the costs for that level of bridge design would exceed the entire grant amount.

## ASSUMPTIONS

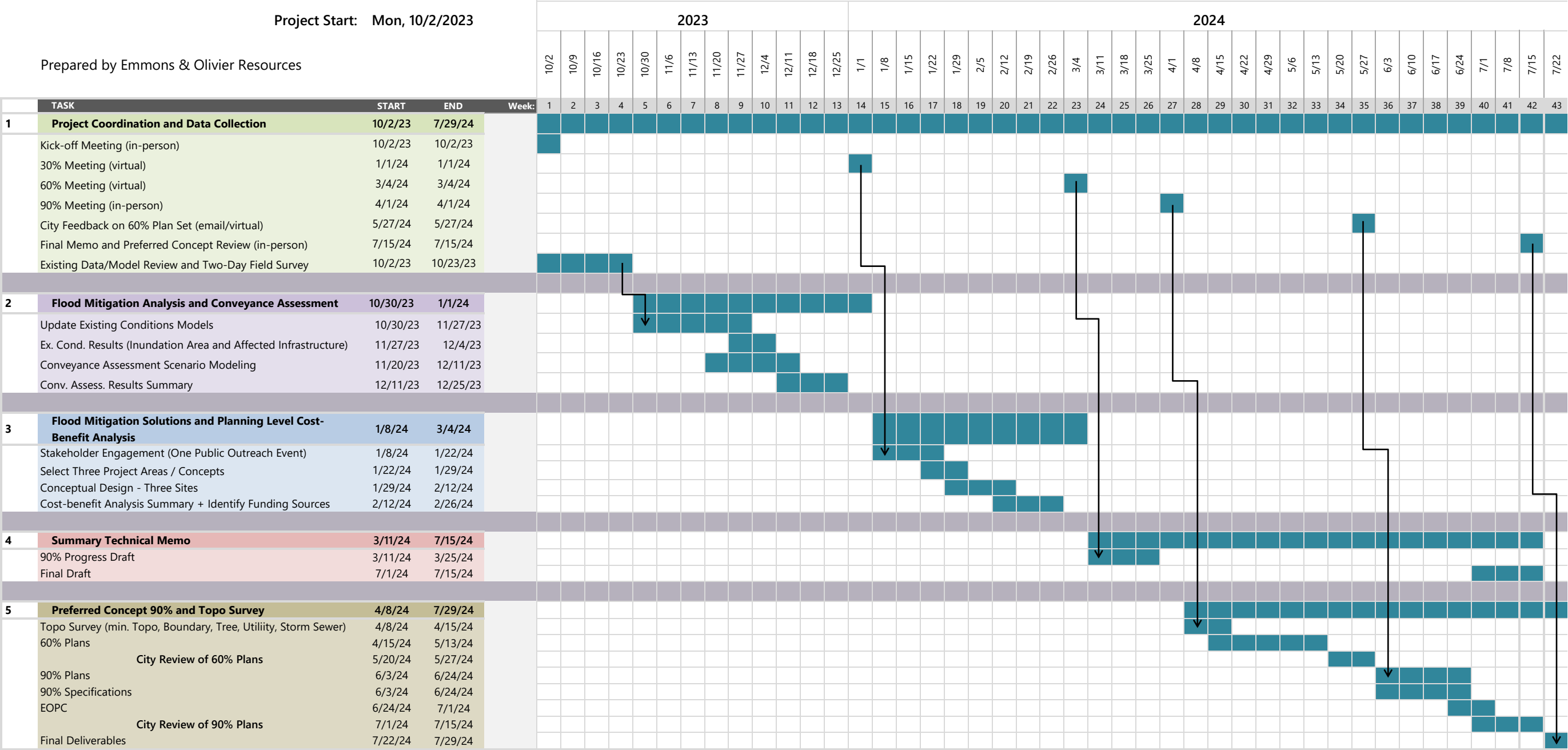
EOR is in agreement with the assumptions and has no further additions beyond those already stated.

Schedule

EAST RIVER FLOOD MITIGATION  
Proposed Project Schedule

Project Start: Mon, 10/2/2023

Prepared by Emmons & Olivier Resources



Key Anticipated Submittals by Month:

- Task 2 Summary - December 2023
- Task 3 Summary - February 2024
- 90% Progress Draft of Technical Memo - March 2024
- 60% Design Plan Set - May 2024
- 90% Design Plans and Specs - June 2024
- Final Deliverables - July 2024

Key City Processes by Month:

- Kick-off Meeting - early October 2023
- Provide Background, Studies, Data, Models, etc. - October 2023
- Review Task 2 Summary (30% Meeting) - December 2023 / January 2024
- Stakeholder Engagement Process - January 2024
- Review Task 3 Summary, Select Preferred Concept (60% Meeting) - March 2024
- Review Technical Memo Progress Draft (90% Meeting) - April 2024
- Review 60% Design - May 2024
- Review Final Memo and 90% Design - July 2024



Staff – Task – Cost Analysis Spreadsheet

East River Flood Mitigation - Tasks, Hours, and Cost

| Team Member     |                                                                              | Steve Gaffield                     | Mike Rupiper                             | Nick Hayden                    | Evan Murdock                   | Tiffany Mueller | Britta Hansen          | Jewell Engineering<br>(subconsultant) | Burse Surveying and Engineering, Inc.<br>(subconsultant) |
|-----------------|------------------------------------------------------------------------------|------------------------------------|------------------------------------------|--------------------------------|--------------------------------|-----------------|------------------------|---------------------------------------|----------------------------------------------------------|
| Job Title       |                                                                              | PM, Water<br>Resources<br>Engineer | Civil and Water<br>Resources<br>Engineer | Water<br>Resources<br>Engineer | Water<br>Resources<br>Engineer | Civil Engineer  | Landscape<br>Architect | Bridge Advisor                        | PLS Surveying                                            |
| Hourly Rate     |                                                                              | \$ 216                             | \$ 216                                   | \$ 192                         | \$ 159                         | \$ 128          | \$ 192                 | \$ 150                                | LUMP SUM                                                 |
| TASK 01         | Project Coordination and Data Collection                                     |                                    |                                          |                                |                                |                 |                        |                                       |                                                          |
| TASK 01-A       | Kick-off Meeting (in-person)                                                 | 12                                 | 0                                        | 0                              | 0                              | 0               | 0                      |                                       | -                                                        |
| TASK 01-B       | 30% Meeting (virtual)                                                        | 8                                  | 0                                        | 1                              | 2                              | 0               | 0                      |                                       | -                                                        |
| TASK 01-C       | 60% Meeting (virtual)                                                        | 8                                  | 0                                        | 1                              | 2                              | 0               | 0                      |                                       | -                                                        |
| TASK 01-D       | 90% Meeting (in-person)                                                      | 11                                 | 0                                        | 1                              | 2                              | 0               | 0                      |                                       | -                                                        |
| TASK 01-E       | Final Memo and Preferred Concept Review (in-person)                          | 11                                 | 0                                        | 1                              | 2                              | 0               | 0                      |                                       | -                                                        |
| TASK 01-F       | Existing Data/Model Review and Two-Day Field Survey                          | 2                                  | 0                                        | 16                             | 24                             | 0               | 0                      |                                       | -                                                        |
| TASK 01-I       | Project Management                                                           | 10                                 | 0                                        | 0                              | 0                              | 0               | 0                      |                                       | -                                                        |
| TASK 01-J       | QC                                                                           | 4                                  | 0                                        | 0                              | 0                              | 0               | 0                      |                                       | -                                                        |
| PHASE 01 TOTAL: |                                                                              | 66                                 | 0                                        | 20                             | 32                             | 0               | 0                      |                                       | -                                                        |
| TASK 02         | Flood Mitigation Analysis and Conveyance Assessment                          |                                    |                                          |                                |                                |                 |                        |                                       |                                                          |
| TASK 02-A       | Update Existing Conditions Models                                            | 2                                  | 0                                        | 12                             | 48                             | 0               | 0                      |                                       | -                                                        |
| TASK 02-B       | Ex. Cond. Results (Inundation Area and Affected Infrastructure for 3 Events) | 1                                  | 0                                        | 4                              | 8                              | 0               | 0                      |                                       | -                                                        |
| TASK 02-C       | Conveyance Assessment Scenario Modeling                                      | 1                                  | 0                                        | 4                              | 32                             | 0               | 0                      |                                       | -                                                        |
| TASK 02-D       | Conv. Assess. Results Summary                                                | 1                                  | 0                                        | 2                              | 12                             | 0               | 0                      |                                       | -                                                        |
| TASK 02-I       | Project Management                                                           | 4                                  | 0                                        | 0                              | 0                              | 0               | 0                      |                                       | -                                                        |
| TASK 02-J       | QC                                                                           | 8                                  | 0                                        | 0                              | 0                              | 0               | 0                      |                                       | -                                                        |
| PHASE 02 TOTAL: |                                                                              | 17                                 | 0                                        | 22                             | 100                            | 0               | 0                      |                                       | -                                                        |
| TASK 03         | Flood Mitigation Solutions and Planning-Level CBA                            |                                    |                                          |                                |                                |                 |                        |                                       |                                                          |
| TASK 03-A       | Stakeholder Engagement (One Public Outreach Event)                           | 8                                  | 8                                        | 6                              | 0                              | 0               | 2                      |                                       | -                                                        |
| TASK 03-B       | Select Three Project Areas / Concepts                                        | 1                                  | 4                                        | 0                              | 2                              | 0               | 0                      | 4                                     | -                                                        |
| TASK 03-C       | Conceptual Design - Three Sites                                              | 1                                  | 12                                       | 8                              | 4                              | 24              | 2                      |                                       | -                                                        |
| TASK 03-D       | Cost-benefit Analysis Summary + Identify Funding Sources                     | 2                                  | 16                                       | 0                              | 0                              | 2               | 0                      |                                       | -                                                        |
| TASK 03-I       | Project Management                                                           | 4                                  | 0                                        | 0                              | 0                              | 0               | 0                      |                                       | -                                                        |
| TASK 03-J       | QC                                                                           | 4                                  | 0                                        | 0                              | 0                              | 0               | 0                      |                                       | -                                                        |
| PHASE 03 TOTAL: |                                                                              | 20                                 | 40                                       | 14                             | 6                              | 26              | 4                      | 4                                     | -                                                        |
| TASK 04         | Summary Technical Memo                                                       |                                    |                                          |                                |                                |                 |                        |                                       |                                                          |
| TASK 04-A       | 90% Progress Draft                                                           | 8                                  | 8                                        | 24                             | 4                              | 0               | 0                      |                                       | -                                                        |
| TASK 04-B       | Final Draft                                                                  | 2                                  | 4                                        | 4                              | 2                              | 0               | 0                      |                                       | -                                                        |
| TASK 04-I       | Project Management                                                           | 4                                  | 0                                        | 0                              | 0                              | 0               | 0                      |                                       | -                                                        |
| TASK 04-J       | QC                                                                           | 4                                  | 0                                        | 0                              | 0                              | 0               | 0                      |                                       | -                                                        |
| PHASE 04 TOTAL: |                                                                              | 18                                 | 12                                       | 28                             | 6                              | 0               | 0                      |                                       | -                                                        |
| TASK 05         | Preferred Concept 90% and Topo Survey                                        |                                    |                                          |                                |                                |                 |                        |                                       |                                                          |
| TASK 05-A       | Topo Survey (min. Topo, Boundary, Tree, Utility, Storm Sewer)                | 1                                  | 0                                        | 1                              | 0                              | 8               | 0                      |                                       | LS (\$4,025)                                             |
| TASK 05-B       | 90% Plans                                                                    | 1                                  | 4                                        | 4                              | 0                              | 44              | 8                      | 4                                     | -                                                        |
| TASK 05-C       | 90% Specifications                                                           | 0                                  | 2                                        | 8                              | 0                              | 16              | 2                      |                                       | -                                                        |
| TASK 05-D       | EOPC                                                                         | 0                                  | 0                                        | 6                              | 0                              | 4               | 1                      |                                       | -                                                        |
| TASK 05-E       | Deliverables                                                                 | 0                                  | 1                                        | 1                              | 0                              | 8               | 0                      |                                       | -                                                        |
| TASK 05-I       | Project Management                                                           | 4                                  | 0                                        | 0                              | 0                              | 0               | 0                      |                                       | -                                                        |
| TASK 05-J       | QC                                                                           | 4                                  | 0                                        | 0                              | 0                              | 0               | 0                      |                                       | -                                                        |
| PHASE 05 TOTAL: |                                                                              | 10                                 | 7                                        | 20                             | 0                              | 80              | 11                     | 4                                     | n/a                                                      |
| Project Total:  |                                                                              | 131                                | 59                                       | 104                            | 144                            | 106             | 15                     | 8                                     |                                                          |

|                            |            |
|----------------------------|------------|
| Total EOR Hours            | 559        |
| Total EOR Cost             | \$ 101,595 |
| Bridge Subconsultant       | \$ 1,380   |
| Survey Subconsultant       | \$ 4,025   |
| Total Cost (Not to Exceed) | \$ 107,000 |

ADDENDUM NO. 1

**Professional Engineering Services for East River Flood Mitigation Solutions**

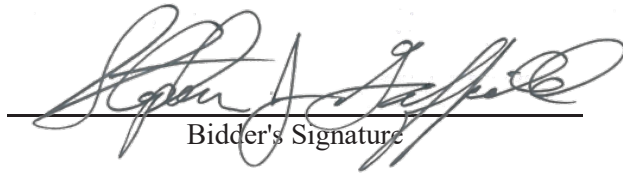
Engineering Division  
Department of Public Works  
City of Green Bay

August 25, 2023

Proposals Due: **DUE DATE EXTENDED to Friday, September 8, 2023**

This Addendum is issued in response to questions received from potential bidders to the Request for Proposals for the above-mentioned Plan. This addendum must be signed and attached to the Bidder's Proposal.

(Pages: 3 including cover sheet)



Bidder's Signature

**SIGN AND ATTACH THIS ADDENDUM TO THE BIDDER'S PROPOSAL**

---

James M. Brunette, P.E.  
Assistant Director of Public Works

**THE FOLLOWING ARE ANSWERS TO QUESTIONS SUBMITTED:****1) Can you provide any information on the H&H model(s) available for use on this project?**

There are HEC-RAS models publicly available of the East river and Tributaries. Also, UW-Madison did some modeling work of the East River in 2021(1-D HEC-RAS model files, HEC-RAS Projection File, Inundation Shapefiles). The hydrology model (HEC-HMS) files from UW-Madison were not made available. The UW model sews together several smaller HEC-RAS models of the East River and tributaries available through the DNR into a single model. There will also be 2D model files available (FLOW-2D) from Wisconsin Sea Grant (that work in almost complete).

**2) The RFP introduction says the primary focus of the project is to provide additional flood storage, but the modeling scope only describes evaluating conveyance improvements at road crossings. Are flood storage projects also to be evaluated by the consultant as potential flood mitigation solutions?**

Yes, a variety of innovative flood storage project solutions that improve flood hazard conditions and offer co-benefits can be evaluated. The City is looking for designs that help to mitigate flooding and provide storage solutions. We don't have a set concept in mind. However, incorporating nature-based solutions to address flooding issues and provide other benefits along the East River will be considered.

**3) The scope and cost for design and survey services for the 90% design will depend on the details of the preferred concept, which is not known yet. Are there assumptions about that preferred concept you would like proposers to use to allow apples-to-apples comparison of proposals?**

The City does not have a preferred concept in mind. We would like the consultant to evaluate a variety of flood mitigation strategies for the City and the community to consider.

**4) Does the City currently have hydraulic models of storm sewer systems within the East River basin (SWMM or other)?** There was an 2016 H&H study of one (1) storm sewer system (basin 162) within the East River basin.**5) Has the City experienced flooding in areas not directly adjacent to the river where storm sewer system models will be required, or is all the flooding located within a block of the river?**

Historically, flooding occurs well beyond a block of the East river.

**6) Would the city anticipate an alternative that would involve a bridge and associated roadway modifications that would require bridge and structural designers?**

Potentially, yes, depending on the modeled benefits of improved flow capacity at the bridge crossings. Other proposed solutions that offer flood resiliency will also be considered and those may or may not require bridge and structural designers.

**7) On page 4 of the RFP, under Conveyance Assessment Scenarios: Is the intent to analyze each crossing independently by increasing capacity by 25%, determining the crossing of greatest hydraulic constriction, and then analyzing that crossing with another (yet to be determined) crossing at an increase of 25% capacity at the same time? It's unclear the difference between the first and second halves of that paragraph.**



This will be a combination of runs/analyses; probably 5-6 scenarios to identify which bridge/crossing within Green Bay is the hydraulic restriction and then determining how increasing the bridge/hydraulic crossing(s) will impact upstream and downstream flood/inundation levels.



## Report to the Improvement and Service Committee of the City of Green Bay

### MEETING DATE

October 11, 2023

### PREPARED BY

### AGENDA ITEM # E.5

Consideration with possible action on request by Department of Public Works to make changes to Chapter 32 (Solid Waste) ordinance.

### BACKGROUND

In response to recent discussion regarding tipper cart setout time, DPW reviewed all content of City ordinance Chapter 32 (Solid Waste). As a result of that review, DPW recommends five edits summarized below, and shown on a mark-up version of ordinance text. Following is a summary of those suggested edits:

1. Page 2: **32-1(2)(a)** – add text that allows more than number 1 and 2 plastics, as and when prescribed by the Tri County MRF. Current text in this section refers only to numbers 1 (PET/PETE) and 2 (HDPE). The MRF currently allows ALL plastic bottles and containers. Then they sort out what they can recycle. Other sections of the ordinance already talk to the multiple plastics. We must have inadvertently overlooked this one.
2. Page 4: **32-2(a)** – add text to clarify that trash CAN be set outside of trash carts, BUT only during periods (i.e. – overflow weeks noted elsewhere in the ordinance) as allowed. Current text in this section says to NEVER do this.
3. Page 10: **32-2(g)(5)(c)** – add text to clarify that trash carts set out for collection must be 4 feet from ANY obstruction. Current text only says to maintain 4 feet of clearance only from other tipper carts.
4. Page 11: **32-2(g)(5)(d)** – add text to clarify that recycle carts set out for collection must be 4 feet from ANY obstruction. Current text only says to maintain 4 feet of clearance only from other tipper carts.
5. Page 11: **32-2(g)(5)(f)** – change setout time limit to “6:00 AM on day of collection” on a year-round basis.

### RECOMMENDATION

Approve Chapter 32 changes and refer to Legal Department to put in proper format for Council reading and adoption.

### FISCAL IMPACT

### ATTACHMENTS

1. Chapter 32 Solid Waste

# Chapter 32 - SOLID WASTE

## ARTICLE I. - IN GENERAL

### Sec. 32-1. - Definitions.

The following words, terms and phrases, when used in this chapter, shall have the meanings ascribed to them in this section, except where the context clearly indicates a different meaning:

*City* means the City of Green Bay.

*Collecting and transporting service* means a municipal or privately-operated agency, business, or service for collecting or transporting solid waste for disposal purposes.

*Condominium* means a residential property which is subject to the provisions of Wis. Stats. Ch. 703, and governed by a declaration or bylaw that requires all units to be owner-occupied.

*Department* means the Department of Public Works.

*Manufactured and mobile home park*, as defined in Wis. Stats. § 66.0435, means any plot of ground upon which two or more units occupied for dwelling or sleeping purposes are located, regardless of whether a charge is made for the accommodation.

*Nonresidential properties* means commercial, retail, industrial, institutional, manufacturing, and governmental facilities and properties.

*Sanitary landfill* means a method of disposing of solid waste on land without creating nuisances or hazards to public health or safety, but utilizing the principles of engineering to confine the solid waste to the smallest practical volume, and by covering it with a layer of earth at the conclusion of each day's operation or at such more frequent intervals as may be necessary.

*Solid waste* consists of garbage, refuse, and other discarded, salvageable, and recyclable material, including waste material resulting from domestic use, public service activities, commercial, manufacturing, and industrial operations. Solid waste consists of the following categories:

- (1) *Bulky waste*. Discarded articles of such size that do not fit in the collection cart including, but not limited to, appliances, large furniture items, bicycles, exercise equipment, play equipment, and other household items.
- (2) *Commercial waste*. Waste resulting from the operation of business enterprises including, but not limited to, offices, stores, restaurants, and similar businesses.



- (3) *Construction and/or demolition waste.* Waste resulting from building construction or demolition, alteration, or repair, including excavated material, remodeling, and other waste such as windows, doors, drywall, framing and roofing material, flooring, cabinets and counter tops, concrete, stone, asphalt, sod, earth, dirt, and brick, except as indicated in subsection (11) of this definition.
- (4) *Garbage.* Waste resulting from the handling, cooking, processing, preparation, serving, storage, and consumption of food, including animal, fish, fowl, fruits, vegetables, or other matter which is subject to decomposition, decay, putrefaction, and the generation of offensive and noxious gases or odors.
- (5) *Hazardous and/or toxic wastes.* Waste material or substances which during normal storage or handling may be a potential cause of harm, sickness, or death, such as explosives, petroleum products, medical or pharmaceutical materials, corrosive chemicals, poisonous or pathogenic substances, pesticide chemicals, radioactive materials, toxic materials, and all other similar harmful substances whether in solid, liquid, or gaseous form.
- (6) *Industrial waste.* Waste resulting from industrial processes and operations.
- (7) *Manufacturing waste.* Waste resulting from manufacturing processes and operations.
- (8) *Nauseous and/or offensive wastes.* Those wastes that are unwholesome or have an unpleasant smell or are otherwise nauseous and/or offensive, such as manure, filth, slops, carcasses, carrion, meat, fish, entrails, hides and hide scrapings, paint, kerosene, oily or greasy substances, and objects that may cause injury to any person or animal or damage to vehicles such as barbed wire, briar thorns, or similar materials.
- (9) *Recyclable waste.* That portion of miscellaneous combustible and noncombustible waste material resulting from residential and commercial activities that can be recovered through processes to regain that material for human use including, but not limited to, the following:
- a. *Co-mingled containers.* Glass bottles and jars which contain a food or beverage product, aluminum beverage cans, plastic containers made of polyethylene terephthalate (PET) or high density polyethylene (HDPE) and other plastics as allowed by regional recycling facilities, and steel and bi-metal cans which contained a food or beverage product.
  - b. *Major appliances.* Residential or commercial air conditioners, clothes dryers, clothes washers, dishwashers, freezers, microwave ovens, ovens, refrigerators, stoves, furnaces, boilers, dehumidifiers, or water heaters.

c. *Paper*. That portion of paper which remains in substantially original condition at the time of disposal so that material is suitable for commercial-grade recycling. The term "paper" does include the paper commonly used in the production of newsprint, magazines, books, and other physical media for written materials, cardboards, and other container boards. Paper is not suitable for recycling purposes when in a state which makes separation unreasonable or unduly expensive because the paper has been put to another use, such as wrappings for items that soiled the paper, thus rendering it unfit for commercial recycling.

d. *Waste tire*. A tire that is no longer suitable for its original purpose because of wear, damage or defect.

e. *Yard waste*. Leaves, grass clippings, garden debris, and brush, including clean woody vegetative material no greater than six inches in diameter. The term "yard waste" does not include stumps, roots, or shrubs with intact root balls.

(10) *Refuse*. Miscellaneous combustible and noncombustible, nonrecyclable waste material resulting from residential and commercial activities including, but not limited to, cans, bottles, plastic, paper, ashes, glass, lawn and garden waste, metal, rubber, street waste, wood, cloth, litter, leaves, shrubbery, brush, and cardboard.

(11) *Residential waste*. Garbage, refuse, ashes, and other waste generated from typical residential activity. This type of waste includes, but is not limited to, metal, paper, cardboard, plastic, cans, bottles, wood, rags, rubber, glass, cloth, litter, leaves, shrubbery, tree trimming, branches, trunks and stumps, grass clippings, brush, and small quantities of construction and/or demolition waste, which are either recycled or disposed of.

(12) *Sewage plant refuse*. Debris collected on the primary screens of the sewage treatment plant consisting of sticks, rags, etc.

*Solid waste disposal operation* means the site, facility, operating practices, and maintenance thereof for the utilization, processing, or final disposal of solid waste including, but not limited to, sanitary landfill, incineration, composting, reduction, shredding, compression, salvage, and resource recovery.

(Code 1984, § 9.01; Ord. No. 47-03; Ord. No. 13-11; Ord. No. 25-13)

## **Sec. 32-2. - Solid waste collection regulations.**

(a) Residential and commercial waste shall be collected by the Department from all properties, provided such waste is properly handled, prepared, contained, stored, and located in conformance with this chapter

and rules and regulations established and publicized by the Director of Public Works. Residential waste collection shall be provided once per week at no charge for a maximum of one 96-gallon container per property or dwelling unit, whichever is greater. The garbage cart must be one which was purchased from the City. All refuse must fit inside the garbage cart with the lid fully closed. Residential waste placed outside the garbage cart will not be collected except during periods as defined by the Department.

(b) Recyclable waste to include co-mingled containers and paper shall be collected by the Department for all residential properties, up to and including six dwelling units, provided such waste is properly separated, handled, prepared, contained, stored, and located in conformance with this chapter and rules and regulations established and publicized by the Director of Public Works. Recycling is mandatory, and residents will be required to comply with recycling regulations. Curbside recycling waste collection shall be provided once every two weeks to each household. There is no limit on the number of recycling carts collected at each residence. The recycling cart must be one which was purchased from the City. Recycling waste shall be placed out for collection separate from other residential waste on the regular collection day. All recycling waste must fit inside the recycling cart with the lid fully closed. Recycling waste placed outside the recycling cart will not be collected.

(c) Special assessment for extra solid waste pick-up.

(1) In those instances where the periodic solid waste pick-up is not followed by residents or property owners, the Director of Public Works, or their designee, is hereby authorized, when scheduling time permits, to dispatch City crews to remove the following:

- a. Solid waste;
- b. Tires;
- c. Batteries;
- d. Waste oil;
- e. Yard waste;
- f. Electronic waste;
- g. Construction, remodeling, and demolition waste;
- h. Bulky waste; or
- i. Other items that are placed out for collection that would not normally be collected.

Any items removed are subject to removal charges noted below and any cost of disposal.

(2) The costs of such removal shall be the hourly rate (including fringe benefits) per employee dispatched, plus truck charges and administration fees, for the time spent collecting such solid waste



from the time of dispatch to the time the truck returns to the municipal garage. There shall be a three-tenths-hour minimum charge for such dispatch. Should City crews be dispatched at a time to collect such solid waste items which requires the City to incur overtime, the appropriate hourly rate will be charged (whether time and one-half or double-time).

(3) Should the property owner fail to pay such charge as invoiced within 30 days of the date of the invoice, the same shall become a lien upon the property as provided in Wis. Stats. § 66.0627 and subsection (h) of this section, on behalf of the City of Green Bay and carrying such interest as has been determined by the Common Council.

(4) The City will schedule two bulky waste collection periods annually during which residents will not be charged. During these periods, the City will collect up to two cubic yards of bulky waste per residence placed outside of a trash cart. At all other times, the above rules shall apply.

(5) The City will schedule four overflow residential waste collection periods annually during which residents will not be charged. During these periods, the City will collect up to four 32-gallon bags of waste per residence placed outside of a trash cart. At all other times, the above rules shall apply.

(6) Bulky waste may be disposed of by residents using the bulky waste drop-off locations provided by the City at no cost to the residents. The drop-off locations are for bulky waste only. Disposal of overflow volumes of residential waste at the drop-off locations is prohibited.

(d) Separation of recyclable waste.

(1) The following recyclable materials from single-family and two- to six-unit residences, multifamily dwellings and nonresidential facilities and properties shall be separated from other solid waste:

- a. Lead acid batteries.
- b. Major appliances.
- c. Waste oil.
- d. Yard waste.
- e. Aluminum containers.
- f. Bi-metal containers.
- g. Corrugated paper or other container board.
- h. Foam polystyrene packaging.
- i. Glass containers.
- j. Magazines.
- k. Newspapers.

- l. Office paper.
- m. Rigid plastic containers made of PETE and HDPE.
- n. Rigid plastic containers made of PVC, LDPE, PP, PS and other resins, or multiple resins.
- o. Steel containers.
- p. Tires.
- q. Electronic waste or E-waste.

(2) Separation requirements exempted. The separation requirements of subsection (d)(1) of this section do not apply to the following:

- a. Occupants of single-family and two- to six-unit residences, multiple-family dwellings and nonresidential facilities and properties that send their solid waste to a processing facility licensed by the Wisconsin Department of Natural Resources that recovers the materials specified in subsection (d)(1) of this section from solid waste in as pure a form as is technically feasible.
- b. Solid waste which is burned as a supplemental fuel at a facility if less than 30 percent of the heat input to the facility is derived from solid waste burned as supplemental fuel.
- c. A recyclable waste item specified in subsection (d)(1)a through o of this section for which a variance has been granted by the Department of Natural Resources under Wis. Stats. § 287.11(2m) or Wis. Admin. Code § NR 544.14.

(e) Recyclable waste from buildings containing seven or more dwelling units.

(1) Recyclable waste shall not be collected by the City from buildings containing seven or more dwelling units. Owners of these buildings shall be responsible to provide collection and disposal of recyclable waste which is banned under Wis. Stats. Ch. 287. Items included in Wis. Stats. Ch. 287 are aluminum containers, corrugated paper or other container board, foam polystyrene packaging, glass containers, magazines or other material printed on similar paper, newspapers or other material printed on newsprint, office paper, rigid plastic containers, steel containers, and bi-metal steel/aluminum containers for carbonated and malt beverages. All owners or designated agents of rented and leased residential properties are required to do all the following:

- a. Notify tenants in writing at the time of renting or leasing the dwelling and at least semi-annually thereafter about the established recycling program.
- b. Provide adequate, separate containers to tenants for the separation of recyclable waste included in the ban.

- c. Provide for the collection and recycling of recyclable materials separated from solid waste by the tenants and the delivery of the materials to a recycling facility.
- d. Notify tenants of reasons to reduce and recycle solid waste, which materials are collected, how to prepare the materials in order to meet processing requirements, collection methods or sites, locations and hours of operation and a contact person, including a name, address and telephone number.

All owners of these buildings are required to comply with state statutes which ban the items listed above from landfilling and incineration.

(2) The requirements specified in subsection (e)(1) of this section do not apply to the owners or designated agents of multifamily dwellings if the solid waste generated within the dwellings is treated at a processing facility licensed by the Department of Natural Resources that recovers for recycling the materials specified in subsection (d)(1)e through o of this section from solid waste in as pure a form as is technically feasible.

(f) Recyclable waste from nonresidential facilities.

(1) Recyclable waste shall not be collected by the City from nonresidential facilities and properties. Owners of these buildings shall be responsible to provide collection and disposal of recyclable waste which is banned under Wis. Stats. Ch. 287.

(2) Recycling laws apply to both residential properties and nonresidential facilities and properties. All nonresidential facilities or properties are required to separate the materials subject to Wis. Stats. Ch. 287.

(3) Owners or designated agents of nonresidential facilities and properties shall do all of the following to the materials specified in subsection (d)(1)e through o of this section:

- a. Notify in writing, at least semi-annually, all users, tenants and occupants of the properties about the established recycling program.
- b. Provide adequate, separate containers for the collection of recyclable materials.
- c. Provide for the collection of the materials separated from the solid waste by the users, tenants and occupants and the delivery of the materials to a recycling facility.
- d. Notify users, tenants and occupants of reasons to reduce and recycle, which materials are collected, how to prepare materials in order to meet the processing requirements, collection methods or sites, locations and hours of operation, and a contact person or company, including a name, address, and telephone number.



(4) The requirements specified in subsection (f)(2) of this section do not apply to the owners or designated agents of nonresidential facilities and properties if the solid waste generated within the facility or property is treated at a processing facility licensed by the Department of Natural Resources that recovers for recycling the materials specified in subsections (d)(1)e through o of this section from solid waste in as pure a form as is technically feasible.

(g) The Director of Public Works is hereby authorized to control the collection, removal, and hauling of solid waste in the City in conformity with the following administrative regulations:

(1) Solid waste not collected by the City.

- a. Industrial waste.
- b. Manufacturing waste.
- c. Hazardous and/or toxic waste.
- d. Nauseous and/or offensive waste.
- e. Sewage plant refuse.
- f. Batteries.
- g. Tires.
- h. Waste oil.
- i. Medical and infectious waste.

(2) Preparation.

- a. Residential and commercial waste including miscellaneous refuse may be mixed and placed in a common container. Yard waste and recyclables are prohibited from being mixed with other waste.
- b. Residential or commercial refuse and garbage shall be wrapped, packaged, and/or bundled and drained of any liquid.
- c. Recyclable material such as glass, plastic bottles, tin, paper, cardboard and aluminum cans shall be co-mingled and placed in one container.
- d. To the greatest extent practicable, the recyclable materials separated from solid waste shall be clean and kept free of contaminants such as food, product residue, oil or grease, or other nonrecyclable materials.
- e. Branches, limbs, and cuttings from trees shall be cut in three-foot to eight-foot lengths and must be at least one-half inch in diameter when set out for collection. No brush will be picked up by the City when generated from vacant property or new building construction or from

any contracted job. If said brush is not disposed of properly by the owner or contractor, the City will dispose of it and charge the property owner the actual cost.

f. Bulky waste will be picked up by a special collection crew. All amounts collected will be charged a fee except as designated in subsection (e)(4) of this section. Said fee is to be a charge per cubic yard and will be established by resolution annually by the Common Council. Items placed out due to periodic change of tenancy (move-outs) from residences shall be charged for said service and proper disposal.

g. Hot cinders, ashes, or any smoldering embers shall not be placed in any collection container; however, cold ashes shall not be placed in cardboard or paper containers, but shall only be placed in sealed/tied plastic bags of a type and composition suitable for handling and disposal.

(3) Tipper cart—Garbage and refuse.

a. The cost of all garbage tipper carts provided by the City shall be at a charge established by resolution. One tipper cart shall be provided to each property with a maximum capacity of 96 gallons. All tipper carts must be purchased from the City.

b. All tipper carts for the storage of solid waste shall be maintained in such a manner as to prevent the creation of a nuisance to public health and safety.

c. Any tipper cart deemed defective or otherwise inadequate by the Director of Public Works shall be replaced within one week's time following notification by the City.

d. Any defective tipper cart not replaced subsequent to the notification shall result in the issuance of a citation.

(4) Tipper cart—Recycling.

a. The cost of all recycling tipper carts provided by the City shall be at a charge established by resolution. A minimum of one tipper cart is required at each residential unit as long as there are no more than six such units in a building. All tipper carts must be purchased from the City.

b. All tipper carts for the storage of recyclable waste shall be maintained in such a manner as to prevent the creation of a nuisance to public health and safety.

c. Any tipper cart deemed defective or otherwise inadequate by the Director of Public Works shall be replaced within one week's time following notification by the City.

d. Any defective tipper cart not replaced subsequent to the notification shall result in the issuance of a citation.

(5) Storage and collection.

a. The owner and/or occupant of any premises shall be responsible for proper and sanitary storage, separation and preparation of all solid waste accumulated at that premises until collected by the collecting and transporting service.

b. Manufactured and mobile home park and condominium waste. On the scheduled day of collection, manufactured and mobile home park and condominium waste shall be properly prepared and placed at the curblin of the adjacent public street. No collection will be made on private property or in alleys, unless provided for by the Common Council and meeting the following conditions:

1. The property owner and lessee, if applicable, shall provide the City with an indemnification and hold harmless agreement protecting the City from any and all liability for coming upon such private property, in a form to be approved by the City Attorney's Office.
2. The property owner shall also maintain a policy of liability insurance, the terms and limits of which shall be determined by the City Insurance Department, in which the City of Green Bay shall be named as an additional insured, protecting it from any and all liability for coming upon said property.
3. City collection vehicles are able to enter and leave the private property while proceeding in a forward motion, the private driveways or streets are of an adequate width to safely accommodate City collection vehicles and the solid waste is placed out for collection in an open area readily accessible for collection.
4. If waste stored on private property is not disposed of properly, the City will see that proper disposal is made and charge the property owner the actual cost of said disposal.

c. Residential waste. Waste materials shall be stored in a manner which protects them from wind, rain, and other inclement weather conditions. Residential waste shall be placed in a garbage cart and placed at the curb a minimum of four feet from regular recycling waste obstructions such as other tipper carts, trees, signposts, traffic signals and power poles for collection. Pick-ups shall not be made on residential private property or in the alley adjoining



residential property, except for manufactured and mobile home parks and condominiums as defined above.

d. Recyclable waste. Recyclable materials shall be stored in a manner which protects them from wind, rain, and other inclement weather conditions. Recyclable wastes shall be placed in a recycling cart and placed at the curb a minimum of four feet from ~~regular solid waste~~ obstructions such as other tipper carts, trees, signposts, traffic signals and power poles for collection. Recyclable waste collection shall be made on the same day as regular solid waste collection. Pick-ups shall not be made on residential private property, or in the alley adjoining residential property except for manufactured and mobile home parks and condominiums as defined above.

e. Manufactured and mobile home park and condominium waste. Waste from manufactured and mobile home parks and condominiums shall be considered residential waste and shall be stored and collected under the provisions of subsection (g)(5)b of this section.

f. Any solid waste, when placed out for collection, shall be out by 6:00 a.m. ~~from June 1 through August 31 and shall be out by 7:00 a.m. from September 1 through May 31~~ on the scheduled day of collection, but shall not be placed out more than 12 hours before collection day and shall be removed not more than 12 hours after collection day. Solid waste for collection shall be placed along the curblin immediately adjacent to the property which has generated the solid waste. Failure to comply may result in the issuance of a citation.

g. Items too large or otherwise unsuitable for storage containers shall be stored in a nuisance-free manner consistent with regulations established by the Director of Public Works.

h. All solid waste placed out for collection becomes City property upon being collected.

i. Garbage, recycling, or refuse containers shall be stored during the time period between collection days in the following locations:

1. Tipper carts shall not be stored within 15 feet of the public right-of-way.
2. Tipper carts shall not be stored on any street side or alongside of a building unless the cart is completely screened from view of an observer located at the public right-of-way.
3. Tipper carts shall be stored in the backyard, garage, or any other convenient discreet location.
4. All tipper carts must be stored with the lids completely closed.

5. Carts shall not be stored near a furnace, grill or any other heat source.

j. There shall be no variance from this section without the prior approval of the Director of Public Works therefor.

k. Any garbage, recycling, yard waste, or refuse container stored in violation of this chapter, irrespective of the provisions of subsection (g)(5)i of this section, shall be subject to the following:

1. The Director of Public Works shall have the authority to order that any exterior storage of garbage, recyclables, or refuse be enclosed in a structure if, in their determination, the storage of such garbage, recyclables, or refuse is unsanitary or creates or tends to create a nuisance to public health or safety.

2. In determining whether an exterior storage structure shall be required under this section, the Director of Public Works shall take into account the location of the waste storage, its proximity to residential areas, the likelihood of human exposure or contact with the waste storage areas, and the type of waste being stored. These considerations are to be deemed illustrative and not exclusive.

3. All structures ordered under this section shall be at least three-sided and constructed of opaque materials sufficient to ensure the waste is concealed from view from the exterior of the three sides. The walls of the structure shall be of a height equal to one foot taller than the garbage or refuse receptacle, but in no event in excess of six feet in height, and shall be maintained in a neat and orderly manner.

4. Any person aggrieved by such an order by the Director of Public Works to enclose said waste containers shall have the opportunity to bring such order before the Improvement and Service Committee for its review within 30 days of the issuance of the order.

(h) All charges by the City of Green Bay for early set-out as defined in subsection (g)(5)f of this section and bulk pick-ups must be paid within 30 days after the billing date or said charge will become a lien on the property according to Wis. Stats. § 66.0627 and will be added to that year's taxes with interest.

(Code 1984, § 9.02; Ord. No. 47-03; Ord. No. 43-04; Ord. No. 59-04; Ord. No. 13-11; Ord. No. 8-13; Ord. No. 25-13)

### **Sec. 32-3. - Transportation.**

(a) Transportation nuisance. No person shall transport any material in any vehicle unless the vehicle is operated and constructed so that the contents shall not blow, scatter, leak, or spill upon streets or alleys or otherwise create a nuisance.

(b) All vehicles or conveyers, whether publicly- or privately-owned, used for the collection or transportation of solid waste shall not be kept in any street, alley, or public place, or upon any private premises within the City longer than is reasonably necessary to collect the solid waste except by permission of the Director of Public Works.

(c) Private collector's license.

(1) No person, except employees of the Department in the regular performance of duty, shall collect or transport waste materials on any street or alley without a license. Each license shall bear a number corresponding to the license plate issued which shall be prominently displayed on the vehicle used by such licensee in their business as herein provided.

(2) Such license shall be available only to the person in whose name it is issued and shall not be used by any person other than the original licensee. Any licensee who shall permit their license to be used by any other person, and any other person who shall use such license granted to another person shall be in violation of this chapter.

(3) Such license shall be issued by the City Clerk upon approval of the Director of Public Works. The license fee for one year or fraction thereof shall be as provided in the City Fee Schedule.

(4) This license does not provide authorization for the licensee to collect solid waste placed out by the property owner on a public right-of-way for collection by the City.

(5) Each license shall automatically expire on January 1 following issuance. Such license may be suspended or removed by the Director of Public Works for failure to comply with any of the rules of the Director of Public Works. Appeal from this decision may be made to the Common Council.

(Code 1984, § 9.03; Ord. No. 47-03)

## **Sec. 32-4. - Solid waste disposal.**

(a) Following collection, all solid waste shall be disposed of under the direction of the Director of Public Works in a manner approved by them with the concurrence of the Brown County Solid Waste Authority, in conformance with the State Department of Natural Resources Solid Waste Disposal Standards, under terms approved by the Council.



(b) Prohibitions on disposal of recyclable wastes separated for recycling. No person may dispose of in a solid waste disposal facility or burn in a solid waste treatment facility any of the materials specified in [Section 32-2\(d\)\(1\)a](#) through o which have been separated for recycling, except:

(1) Waste tires may be burned with energy recovery in a solid waste treatment facility; and

(2) Microwave ovens may be disposed of in a landfill after the capacitor has been removed.

(c) No person shall burn any solid waste outdoors at any time within the City.

(d) No person in the City shall deposit, throw, place, or leave any solid waste upon any street, court, lane, alley, business, square, public enclosure, vacant lot, house yard, body of water, or any public place except in a container herein required. No person shall upset or turn over the contents of any waste containers in any street, alley, and other public place. No person shall remove any waste from containers on private premises without the consent of occupant, owner, or lessee of the premises, and no person shall remove any waste from a container which has been set out on a public right-of-way for collection. No person shall remove any waste from public trash receptacles placed on public property.

(e) Disposal of construction and/or demolition waste. All construction and/or demolition waste shall be disposed of at the Brown County Landfill Site or other licensed landfill site except as indicated in [Section 32-2\(d\)\(1\)](#). If collected by the City, rules contained in [Section 32-2\(e\)](#) shall apply. Excavated material consisting of sand, clay, or other earth and broken concrete, brick, or rubble free of debris may be used for filling private property as herein provided. Prior to placing fill material, the owner of the property shall apply to the Director of Public Works for a permit to conduct the filling operation. The property owner shall cover the fill material with at least six inches of dirt and grade and level the site. When such property owner neglects to do so after sufficient notice, the Director of Public Works shall do the required work. The expense thereof shall be charged against the property involved and may be placed on the City tax roll as previously agreed by such property owner.

(f) Disposal of industrial and/or manufacturing waste. Industrial and/or manufacturing waste shall be disposed of by the owner or occupant at the Brown County Landfill Site or other licensed landfill site.

(g) Dead animals.

(1) Small animals. The owners or custodians of dead dogs, cats, and other animals weighing less than 100 pounds shall notify the Humane Officer, who shall arrange to have such animals removed.

(2) Large animals. The owners or custodians of dead animals weighing over 100 pounds shall be required to deliver such dead animals to the Brown County landfill site at their own cost. Dead animals weighing over 100 pounds shall be brought to the Brown County landfill site promptly after

death. If any owner or custodian of a dead animal refuses to bring such animal to the Brown County Landfill site within 24 hours after death thereof, the Director of Public Works may arrange for the collection and disposal of such animal, and all costs of collection, including truck service and any other expense, shall be charged against them as a special charge and collected in the same manner as other special charges are collected.

(h) Disposal of animal offal and other offensive wastes. Animal offal, the droppings from pet animals, manure, and night-soil shall not be collected by the City. It shall be the responsibility of the owner of such animals to dispose of such wastes in a sanitary and responsible manner.

(i) Disposal of infectious material. The removal of wearing apparel, bedding, or other refuse from homes or other places where highly infectious or contagious diseases have prevailed shall be performed under the supervision of the Director of Public Works or their representative. Such refuse shall not be placed in containers for regular collection with normal solid waste.

(j) Explosive material. No person shall place or deposit any explosive material such as dynamite, dynamite caps, shotgun shells, rifle cartridges, gun powder, gasoline, or similar material in a container for collection or disposal at any dumping grounds, private or municipal. It shall be the responsibility of the owner of such items to dispose of such wastes in a safe and legal manner.

(k) Concerns regarding proper disposal. When any person is in doubt as to the proper preparation, handling, and disposal of any type of solid waste, they shall contact the Department of Public Works for information concerning safe, legal and proper handling and disposal.

(Code 1984, § 9.04; Ord. No. 47-03; Ord. No. 59-04; Ord. No. 25-13)

### **Sec. 32-5. - Director of Public Works may make rules.**

The Director of Public Works shall make reasonable rules for the regulation and administration of this chapter as may be found necessary for the proper storage, collection, removal, and disposal of solid waste in the City. Collection schedules for all areas of the City shall be prepared and advertised so that all persons will know the correct collection day. Such rules shall be available for public inspection at the office of the Director of Public Works.

(Code 1984, § 9.05; Ord. No. 47-03)

### **Sec. 32-6. - Enforcement.**

(a) The Director of Public Works shall enforce the provisions of this chapter and see that all violations are promptly abated and a citation issued if necessary. The Chief of Police shall give attention throughout the

City of any violation of this chapter and promptly report to the Director of Public Works in writing every violation within the City which comes to their knowledge.

(b) Special penalties. If the owner, occupant, or lessee of any premises neglects or refuses to clean up and remove from such premises all solid waste when so ordered by the Director of Public Works, such owner, occupant, or lessee shall be liable to maximum penalty as provided by [Section 32-7](#). If such accumulation occurs on any street, alley, or public thoroughfare, such solid waste may be collected under the direction of the Director of Public Works, and the entire cost thereof shall be assessed against the abutting property. If said cost is not paid within 30 days, it will be added to the taxes as a lien on the property according to Wis. Stats. § 66.0627.

(c) Failure to comply.

(1) The Director of Public Works may refuse to furnish collection service of solid waste to any person not complying and refusing to comply with this chapter and the rules and regulations made by the Director of Public Works for the collection and disposal of solid waste.

(2) When services for the collection of solid waste have been withdrawn by the Director of Public Works from any person for failure to comply with such rules and regulations, resulting in an accumulation of solid waste on their premises which is offensive or a public nuisance, that person may be prosecuted under any ordinances of the City regulating the same.

(Code 1984, § 9.06; Ord. No. 47-03)

## **Sec. 32-7. - Penalty.**

Any person who violates any provisions of this chapter or who shall fail or refuse to obey any order issued hereunder shall be subject to a forfeiture. Such forfeiture shall be not less than \$10.00 nor more than \$2,000.00, together with the costs of such action. Upon default or refusal to pay such forfeiture, such person shall be imprisoned for not more than 60 days. Each day of violation, disobedience, omission, neglect, or refusal shall be a separate offense. This section shall not preclude the City from maintaining any appropriate action to prevent or remove a violation of this chapter.

(Code 1984, § 9.07; Ord. No. 8-94)

## **Sec. 32-8. - Sanitary landfill operations.**

(a) *Purpose.* A sanitary landfill operation is recognized as a safe, sanitary method of disposal of solid waste materials, provided the operation is properly conducted. Sanitary landfill operations are regulated for the purpose of promoting and protecting the public health, safety, comfort, commerce, and general welfare,



and to provide assurance that natural land resources may be restored or retained in usable form following the deposition of solid waste materials without polluting air or water resources.

(b) *Applicability.* This section governs the operation of a sanitary landfill site located within the City by any person or municipality except the City, regardless of zoning districts, and the issuance of permits for such according to state statutes.

(1) Reference and incorporation is made of the Solid Waste Disposal Standards adopted by the Wisconsin Department of Natural Resources.

(2) Requirements of this section and the standards referred to above are intended to be complementary, and where varied, shall be interpreted in favor of the more restrictive requirement or agency.

(3) Provisions for disposal of inert earth materials are regulated by permits issued by the Director of Public Works.

(c) *Definitions.* The definitions found in this Code and in Wisconsin Department of Natural Resources Solid Waste Disposal Standards (Wis. Admin. Code § NR 500.03) are incorporated herein.

(d) *Application for sanitary landfill permit.* No person shall establish, maintain, conduct, expand, or operate a sanitary landfill operation without first obtaining an annual permit to do so from the City and, after receipt of such permit, obtaining an annual license to do so from the Wisconsin Department of Natural Resources. Such annual permit from the City and annual license from the Wisconsin Department of Natural Resources shall terminate annually on September 30.

(1) *Form of application.* Persons desiring a permit shall annually, before September 1 or at least 30 days before the desired effective date, make application to the Director of Public Works on forms supplied by the Department of Public Works. A separate application shall be made for each proposed sanitary landfill operation.

(2) *Surety bond.* Each applicant desiring a permit shall provide a surety bond conditioned upon compliance with this section, the amount of which shall be determined by the Director of Public Works. The Director of Public Works shall recommend to the Council the amount of such bond for confirmation by the Council. A copy of the proposed surety bond shall accompany the permit application.

(3) *Copies of application.* Each applicant desiring a permit shall provide a copy of the license and permit application submitted to the Wisconsin Department of Natural Resources.

(4) *Operational procedures.* Each application shall be accompanied by a set of operational procedures and plan materials, as required herein, indicating how the requirements of this section will be fulfilled.

(5) *Review by department.* Upon receipt of the completed application, the Department of Public Works shall review the same to ensure that all municipal provisions of this section are met. The Department of Public Works shall notify the applicant when the application is satisfactory, and of the amount of the required surety bond.

(6) *Notice and hearing.* The Director of Public Works shall forward a recommendation to the Common Council, which shall publish a Class 1 notice of the application and hold a public hearing thereon prior to approval.

(e) *Revocation of a sanitary landfill permit.* The Director of Public Works shall suspend or revoke any permit if it is found the operation is not in conformance with this section. The Director of Public Works shall make the determination as to whether or not there is in fact such a violation by applying local existing practices of good engineering.

(f) *Location requirements.* Sanitary landfill permits shall be issued where consistent with the Solid Waste Disposal Standards of the Wisconsin Department of Natural Resources (Wis. Admin. Ch. NR 500). In addition, the quality of the following environmental factors is desirable to protect and shall be considered by the Director of Public Works, who shall determine that these factors, where present, will be seriously impaired neither during nor at the completion of a sanitary landfill operation:

(1) Surface drainage.

(2) Soil drainage.

(3) Floodplain or floodway areas.

(4) Erosion susceptibility.

(5) Immediate surrounding land values.

(6) Preservation of historical sites, water quality, and forest, wildlife, and recreational areas.

(g) *Maps, plans, and report.* Persons desiring a permit shall submit the following maps, plans, and report with their initial application for a permit and shall submit any revisions or additions thereto prior to the subsequent annual review and annual issuance of the permit. One set of the following information shall be submitted with the permit application to the City and one set with the application to the Wisconsin Department of Natural Resources pursuant to Wis. Admin. Code Ch. NR 500:

(1) A sanitary landfill shall not be established until the site location and proposed method of operation has been approved in writing by the Department. A minimum of three sets of the following information shall be submitted to the Department for consideration for approval:

- a. Map or aerial photograph of the area showing land use and zoning within one-quarter mile of the solid waste disposal site. The map or aerial photograph shall be of sufficient scale to show all homes, industrial buildings, wells, watercourses, dry runs, rock outcroppings, roads, and other applicable details and shall indicate the general topography.
- b. Site plan of the site showing dimensions, location of soil borings, proposed trenching plan or original fill face, winter cover stockpiles, and fencing. Cross-sections shall be included on the site plan or on separate sheets showing both the original and proposed fill elevations. The scale of the site plan shall not be greater than 200 feet per inch.
- c. A report shall accompany the plans indicating:
  1. Population and area to be served by proposed site.
  2. Anticipated type, quantity, and source of material to be disposed of at the site.
  3. Geological formations and groundwater elevations to a depth of at least ten feet below proposed excavation and lowest elevation of the site. Such data shall be obtained by soil borings or other appropriate means.
  4. Source and characteristics of cover material and method of protecting cover material for winter operations.
  5. Type and amount of equipment to be provided at the site for excavating, earth moving, spreading, compaction, and other needs.
  6. Persons responsible for actual operation and maintenance of the site.
  7. Intended operating procedure.

(2) The report shall also include a brief evaluation of each of the environmental factors listed in subsection (f) of this section.

(h) *Operation of sanitary landfill.* Any person who maintains or operates a sanitary landfill site or who permits the use of property for such shall maintain and operate the site in conformance with the following practices as required by the Wisconsin Department of Natural Resources pursuant to Wis. Admin. Code Ch. NR 500:

- (1) Open burning of solid waste is prohibited.



- (2) No solid waste shall be deposited in such a manner that material or leachings therefrom will have a detrimental effect on any groundwater or surface water.
- (3) Dumping of solid waste shall be confined to as small an area as practicable and shall be surrounded with appropriate facilities to confine possible windblown material within that area. At the conclusion of each day of operation, all windblown material shall be collected and returned to the area by the owner or operator.
- (4) Each single layer of garbage or refuse shall be compacted to a depth of approximately two feet. No more than three compacted layers may be placed prior to covering.
- (5) Solid waste shall be compacted and covered after each day of operation, or as specified by the Department of Natural Resources, with a compacted layer of at least six inches of suitable cover material. Surface water drainage shall be diverted around the landfill area.
- (6) Putrescible materials such as spoiled foods and animal carcasses shall be immediately covered and compacted as indicated in this section.
- (7) Special provision shall be made to dispose of toxic and hazardous wastes in compliance with Wis. Admin. Code Ch. NR 500.
- (8) The boundaries of the disposal site shall be fenced for the protection of persons or animals and a minimum distance of 50 feet maintained between the disposal operation and adjacent property.
- (9) Effective means shall be taken to control flies, rodents, and other insects or vermin.
- (10) The approach road to the disposal site shall be of all-weather construction maintained in good condition and treated as necessary to minimize dust. The approach road shall connect as closely as possible to an arterial street.
- (11) The operation shall be conducted so that traffic at the site may travel over the filled area as much as possible to aid in compaction.
- (12) Equipment shall be provided to control accidental fires and arrangements shall be made with the local fire protection agency to immediately acquire their services when needed.
- (13) An attendant shall be on duty at the site at all times while it is open for use.
- (14) A gate shall be provided at the entrance to the site and shall be kept locked when an attendant is not on duty.
- (15) A sign identifying and showing the license number of the site and indicating the hours during which the site is open for use, the penalty for nonconforming dumping, and other pertinent information shall be posted at the site entrance.

(16) The site shall be surrounded by rapidly growing trees, shrubbery, or other appropriate means to screen it from the surrounding area and to provide a natural windbreak.

(17) Within one week after final termination of a site or a major part thereof, the area shall be covered with at least two feet of compacted earth material adequately sloped to allow surface water runoff.

(18) The finished surface of the filled area shall be covered with adequate topsoil and seeded with native grasses or other suitable vegetation immediately upon completion or immediately in the spring on areas terminated during winter conditions. If necessary, seeded slopes shall be covered with straw or similar material to prevent erosion.

(19) Prior to completion of a sanitary landfill site, the Department of Public Works shall be notified so that a site investigation may be conducted by the Department before earth moving equipment is removed from the property.

(20) Following the completion and abandonment of the sanitary landfill site, inspection and maintenance shall be continued by the landfill owner or operator until the fill becomes stabilized.

(21) Hours of operation shall be reasonable and shall prohibit use on Sundays.

(22) Outdoor lighting shall be mounted in such a manner that no glare is created to public rights-of-way or adjoining properties.

(23) Telephone or radio communications shall be maintained with either a public system or a company-monitored system when the site is in operation.

(i) *Inspection and enforcement.* Any authorized officer, employee, or representative of the City may enter and inspect any property, premises, or place at any reasonable time for the purpose of determining compliance within this section. No person may refuse access to any authorized officer, employee or representative of the Department of Public Works who requests access for purposes of inspection, and who presents appropriate credentials.

(j) *Exemptions.* The Director of Public Works may recommend and the Council may grant exemptions for any one or a number of requirements contained herein, provided the purpose of this section and the public interest is served, and provided such exemptions are not contrary to state requirements.

(k) *Appeals.* All procedures and requirements contained herein are subject to review by the Council upon receipt of an appeal by an applicant for a permit or by a citizen of the City. The Council may delegate to an appropriate committee or officer the duty to hear any appeal under this section. The Council, committee, or officer shall provide procedures to hear any such appeal.

(Code 1984, § 9.10; Ord. No. 8-94)

### **Sec. 32-9. - Dumping prohibited; penalty.**

(a) No person shall place or dump solid waste on any property, unless such person owns, controls, or leases such property, or is otherwise authorized by the property owner, and such person does so in a manner consistent with other provisions of this Code.

(b) Penalty. The forfeiture for violating this section shall not be less than \$500.00, nor more than \$1,000.00.

(Code 1984, § 9.11; Ord. No. 38-99)

### **Secs. 32-10—32-36. - Reserved.**

## **ARTICLE II. - LITTERING**

### **Sec. 32-37. - Definitions.**

The following words, terms and phrases, when used in this section, shall have the meanings ascribed to them in this subsection, except where the context clearly indicates a different meaning:

*Garbage* is as defined in [Section 32-1](#).

*Litter* means garbage, refuse, and rubbish as defined herein and all other waste material which, if thrown or deposited as herein prohibited, tends to create a danger to public health, safety, and welfare.

*Receptacles, private and public.* Private receptacles are as described in [Section 32-2\(g\)\(5\)](#). Public receptacles are litter containers which are placed on City streets or fastened to poles and maintained by the City and marked as litter receptacles.

*Refuse* means all putrescible and nonputrescible solid wastes including ashes, street cleanings, dead animals, and all other abandoned personal property and solid market and industrial wastes.

*Rubbish* means nonputrescible and solid wastes, both combustible and noncombustible, including, but not limited to, circulars, leaflets, pamphlets, wrappers, handbills, newspapers, and all and any other printed or non-printed paper material, cigarettes, cardboard, tin cans, yard clippings, leaves, wood, glass, and other similar materials.

(Code 1984, § 8.12(1); Ord. No. 65-85; [Ord. No. 4-18](#), § 1, 4-2-2018)

### **Sec. 32-38. - Litter in public places.**

No person shall throw, deposit, or cause to be placed litter upon any street, sidewalk, alley, or other public place within the City except in public receptacles provided by the City.

(Code 1984, § 8.12(2); Ord. No. 65-85; [Ord. No. 4-18](#), § 1, 4-2-2018)



### **Sec. 32-39. - Placement of litter in receptacles so as to prevent scattering.**

Persons placing litter in public receptacles or in authorized private receptacles shall do so in such a manner and in such containers as will prevent it from being carried or deposited by the elements upon any street, sidewalk, alley, or other public place or upon private property.

(Code 1984, § 8.12(3); Ord. No. 65-85; [Ord. No. 4-18](#), § 1, 4-2-2018)

### **Sec. 32-40. - Sweeping litter into gutters prohibited.**

No person shall sweep into or deposit in any gutter, street, alley, or other public place within the City the accumulation of litter from any building or lot or from any public or private sidewalk or driveway. Persons owning or occupying property shall keep the sidewalks, entrance walks, parking lots, and parking areas in front of or upon the premises free of litter.

(Code 1984, § 8.12(4); Ord. No. 65-85; [Ord. No. 4-18](#), § 1, 4-2-2018)

### **Sec. 32-41. - Litter in public waters.**

No person shall throw or deposit litter in any fountain, pond, wading pool, river, bay, or other body of water in a public place or elsewhere within the City.

(Code 1984, § 8.12(5); Ord. No. 65-85; [Ord. No. 4-18](#), § 1, 4-2-2018)

### **Sec. 32-42. - Litter on occupied private property.**

No person shall throw or deposit litter on any occupied private property within the City, whether owned by such person or not, unless in such a manner that litter will be prevented from being carried or deposited by the elements upon any street, sidewalk, alley, or other public place. No person shall throw, deposit, or cause any litter to be scattered or placed upon any driveway, apron, front, rear, or side yard of any occupied private property. Litter must be deposited in a private receptacle if one is available.

(Code 1984, § 8.12(6); Ord. No. 65-85; [Ord. No. 4-18](#), § 1, 4-2-2018)

### **Sec. 32-43. - Owner to maintain premises free of litter.**

The owner or person in control of any private property shall at all times maintain the premises free of litter; provided, however, this section shall not prohibit the storage of litter in authorized private receptacles for collection.

(Code 1984, § 8.12(7); Ord. No. 65-85; [Ord. No. 4-18](#), § 1, 4-2-2018)

### **Sec. 32-44. - Litter on vacant lots.**

No person shall throw or deposit litter on any open or vacant private property within the City, whether owned by such person or not.

(Code 1984, § 8.12(8); Ord. No. 65-85; [Ord. No. 4-18](#), § 1, 4-2-2018)

### **Sec. 32-45. - Firewood.**

Wood shall not be considered rubbish where it is stored for residential use under the terms and conditions of this section.

(1) *Front yard storage.* No firewood shall be permitted in a front yard as defined at [Section 44-249](#).

(2) *Rear and side yard storage.* Firewood may be stored in a side or rear yard only in the following manner:

- a. *Stacking.* All firewood shall be ranked and well stowed, with due regard to stability.
- b. *Height.* Firewood stacks shall not be in excess of four feet in height unless such stack is adjacent to and amply supported by a fence or structure. Where the firewood is so supported, the stack shall not be in excess of six feet.
- c. *Setback.* No firewood shall be permitted within four feet of an adjoining property line, unless the firewood is stored in a box or building.
- d. *Nuisance.* Nothing in this section shall prohibit enforcement and abatement proceedings as provided in [Chapter 24](#).

(Code 1984, § 8.12(9); Ord. No. 65-85; [Ord. No. 4-18](#), § 1, 4-2-2018)



Report to the  
Improvement and Service Committee  
of the City of Green Bay

**MEETING DATE**

October 11, 2023

**PREPARED BY**

**AGENDA ITEM # E.6**

Report of actions taken by the Department of Public Works.

- I. Granting of Licenses
  - I. Sidewalk Builder

- a. Rok Concrete LLC

2. Tree & Brush Trimmer
  - a.

**BACKGROUND**

**RECOMMENDATION**

**FISCAL IMPACT**

**ATTACHMENTS**

None





Report to the  
Improvement and Service Committee  
of the City of Green Bay

**MEETING DATE**

October 11, 2023

**PREPARED BY**

**AGENDA ITEM # F.1**

Director's Report on recent activities of the Public Works Department.

**BACKGROUND**

**RECOMMENDATION**

**FISCAL IMPACT**

**ATTACHMENTS**

None