

Executive Summary

Federal and state regulations require communities in Wisconsin to manage the pollution from their municipal separate storm sewer system (MS4). The Wisconsin Department of Natural Resources (WDNR) is delegated the responsibility of the United States Environmental Protection Agency (USEPA) to permit and oversee compliance with water quality regulations.

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

NR 151 and the city's permit contain conditions relating to storm water quality management, including a provision to implement storm water management practices necessary to achieve a 20% reduction in the annual average mass of total suspended solids (TSS) discharging from its MS4.

The "Stormwater Quality Management Analysis" Report (AECOM 2008) was developed to comply with these regulations and assess the city's TSS load against the 20% TSS reduction requirement. Through water quality computer modeling of city storm water discharges with and without best management practices (BMPs), it was estimated that BMPs in place at the time were reducing TSS by 16.3% and total phosphorus (TP) by 13.4%. The report also identified potential additional structural and non-structural BMPs to reduce TSS. This analysis was then followed up by additional planning work done by AECOM, titled "City of Greenfield Updated WinSLAMM Assessment of Compliance", which was completed in November of 2011. This work included site specific infiltration testing and an updated best management practices evaluation. The memorandum determined that the city was in compliance with water quality discharge requirements at the time, with in place BMP's reducing TSS by 31.2% and TP by 28.3%.

Since the 2008 and 2011 analysis, numerous updates have been made to regulations, guidance documents, and the computer model used for water quality analyses. Additionally, with the establishment of total maximum daily loads (TMDLs) for the Milwaukee River Basin watershed, which are outlined in "Total Maximum Daily Loads for Total Phosphorus, Total Suspended Solids, and Fecal Coliform" (Milwaukee River Basin, Wisconsin, March 19, 2018), the current guiding storm water quality requirements have been changed for a portion of the city, identifying new targets for TSS as well as TP for areas discharging to the Menomonee and Kinnickinnic River Watersheds. There are five reaches associated with the Kinnickinnic River and Menomonee River reaches that the city drains to, each with their own TMDLs and associated TSS and TP reduction targets as identified in Table 1B. The five reaches and their common names are as follows:

1. Kinnickinnic River reach KK-1 (Lyons Park Creek)
2. Kinnickinnic River reach KK-2 (Kinnickinnic River main stem from Wilson Park Creek to Lyons Park Creek)
3. Kinnickinnic River reach KK-4 (Edgerton Channel, Wilson Park Creek, Villa Mann Creek)
4. Kinnickinnic River reach KK-6 (Cherokee Park Creek)
5. Menomonee River reach MN-15 (Honey Creek)

With these changes in mind, in 2015 the city, with the assistance of AECOM, submitted an application for a Non-Point Source Water Quality Planning Grant to the WDNR to conduct an updated storm water plan. Following the award of that grant, the city contracted with AECOM to conduct this Storm Water Quality Management Plan Update. The grant and this report was developed to evaluate the city's current TSS and TP reductions based on existing BMPs compared to MS4 and TMDL reduction targets. It also identifies potential future BMPs available to the city to reduce storm water pollutant loadings in an effort to move towards compliance with TMDL targets.

Findings and Results

Using the computer simulation model, WinSLAMM, pollutant discharges associated with storm water for total suspended solids (TSS) and total phosphorus (TP) were computed for scenarios called no-controls and with-controls for two land use conditions in accordance with WDNR guidance. The first land use condition represents approximately October 2004 and is often referred to as the MS4 analysis. The second land use condition represents approximately July 2016 land use conditions for the areas tributary to the TMDL reaches only and is often referred to as the TMDL analysis.

The results of the pollution modeling are summarized in the Table 1A. The table displays the results of the no-controls and with-controls conditions modeling for the MS4 and TMDL analyses (see Section 4 of this report for more details).

Table 1A. Annual Loading Results								
Analysis	Sub-Basin	Modeled Area (ac)	TSS (tons)			TP (lbs)		
			No Controls	With Controls	Percent Reduction	No Controls	With Controls	Percent Reduction
MS4	KK-1	83	10	5	49%	74	39	48%
	KK-2	94	11	9	21%	85	70	17%
	KK-4	424	48	29	39%	361	219	39%
	KK-6	360	45	28	37%	312	231	26%
	MN-15	1284	160	111	31%	1130	828	27%
	OAK CREEK	146	19	13	32%	127	83	35%
	ROOT RIVER	2185	253	157	38%	1846	1173	36%
	Total	4576	546	352	36%	3935	2644	33%
TMDL	KK-1	91	11	5	49%	77	40	48%
	KK-2	94	11	9	21%	84	69	17%
	KK-4	424	46	28	39%	352	214	39%
	KK-6	355	43	27	37%	307	229	26%
	MN-15	1316	162	111	31%	1147	831	28%
	Total	2279	273	181	34%	1967	1383	30%

Conclusions and Recommendations

The results of the pollution modeling for the MS4 analyses show a 36% reduction for TSS and 33% reduction for TP. This meets and exceeds the required 20% city-wide TSS reduction requirement (there is no MS4 TP reduction requirement).

The results of the pollution modeling for the TMDL areas show reductions of TSS ranging from 21% to 49% and TP reductions ranging from 17% to 48%, with none of the reaches meeting the required TMDL TSS or TP targets at this time. See table 1B for a breakdown of the required TMDL targets (See Appendix A) vs. the actual loading results. The city will continue to take positive steps towards attempting to meet their TSS and TP reduction obligations for each TMDL subbasin as discussed in Sections 5 and 6 of this report.

Table 1B. TMDL Target Reductions With Annual Loading Results							
Sub-Basin	Common Name	TSS (%)			TP (%)		
		Target Percent Reduction	Actual Percent Reduction	Percent Difference	Target Percent Reduction	Actual Percent Reduction	Percent Difference
KK-1	Lyons Park Creek	78.4%	49.5%	28.9%	68.1%	48.2%	19.9%
KK-2	Kinnickinnic River main stem from Wilson Park Creek to Lyons Park Creek	77.6%	21.4%	56.2%	68.1%	17.4%	50.7%
KK-4	Edgerton Channel, Wilson Park Creek, Villa Mann Creek	84.0%	39.5%	44.5%	89.4%	39.1%	50.3%
KK-6	Cherokee Park Creek	77.6%	36.5%	41.1%	69.0%	25.5%	43.5%
MN-15	Honey Creek	73.6%	31.5%	42.1%	67.2%	27.6%	39.6%

