Stormwater Management Plan

TOWN-WIDE STORMWATER QUALITY MANAGEMENT PLAN

Prepared For The

TOWN OF NEENAH

WINNEBAGO COUNTY, WISCONSIN

December 14, 2012

NAV

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1.0 INTRODUCTION

At the request of the Town of Neenah, McMAHON prepared the following Town-Wide Stormwater Quality Management Plan. The Town obtained an Urban Nonpoint Source and Stormwater Planning (UNPS&SW) Grant from the Wisconsin Department of Natural Resources (DNR) to assist with preparation of the plan.

The purpose of the plan is to provide the Town with the long-term guidance necessary to comply with Wisconsin Administrative Code NR 216 stormwater regulations and improve water quality in receiving waters. Pursuant to NR 216, the Town of Neenah obtained a WPDES Municipal Stormwater Discharge Permit from the DNR on October 13, 2006. The purpose of the permit is to regulate discharges from municipal separate storm sewer systems (MS4) and reduce urban non-point source pollution.

Relationship to Other Plans:

This Town-Wide Stormwater Quality Management Plan compliments and is part of efforts to implement recommendations contained in several existing resource management plans. These related resource management plans include the following:

- The Lower Green Bay Remedial Action Plan (RAP) recommends a 50% total phosphorus (TP) reduction for the Green Bay Area of Concern. The RAP also recommends a reduction in other urban stormwater pollutants such as sediment, heavy metals, toxics, and bacteria. The RAP was finalized by DNR in 1993. The RAP recommends that municipalities develop and implement programs for construction site erosion control, post-construction stormwater management, illicit discharges, and shoreland / wetland zoning. The RAP also recommends that municipalities develop and implement programs that preserve, restore and enhance environmental corridors, shoreline buffers, wetlands, habitat, and public access for shoreline fishing, boating and other water-based recreation. To meet these goals, the RAP recommends planning and implementation of best management practices to reduce nonpoint source pollutants. The RAP also recommends that municipalities seek innovative and alternative ways to achieve nonpoint source goals.

- The Total Maximum Daily Load (TMDL) developed for the Lower Fox River Basin identifies TSS and TP waste load allocations for wastewater, urban stormwater and agricultural sources located within the Lower Fox River Basin. The TMDL was finalized by DNR in 2012. The TMDL identifies waste load allocations for the Town of Neenah's municipal boundary within the Neenah Slough and Fox River Sub-Basins. In the next few years, the DNR anticipates finalizing a phosphorus and sediment TMDL for the Upper Fox River Basin and Wolf River Basin.

- The Town of Neenah's Comprehensive Plan contains several recommendations related to natural resource management: (1) proactively work with state, county, and other agencies in reducing sediment and nutrient loads from the Little Lake Butte des Morts Watershed and Lake Winnebago North & West Watershed; (2) adopt stormwater ordinances in conjunction with Stormwater Utility District to comply with Wisconsin Administrative Code NR 216; (3) actively identify and properly abandon old and unused wells and failing septic systems to help protect water resources; (4) use drainage easements, official mapping, land acquisition, or other legal means to ensure environmentally sensitive areas and unique open space areas are protected and preserved for ecological purposes and the enjoyment of residents now and in the future; (5) encourage water conservation; (6) retain and expand green space; (7) environmentally valuable areas should be preserved from development whenever possible; and (8) protect and preserve wildlife habitat wherever possible.

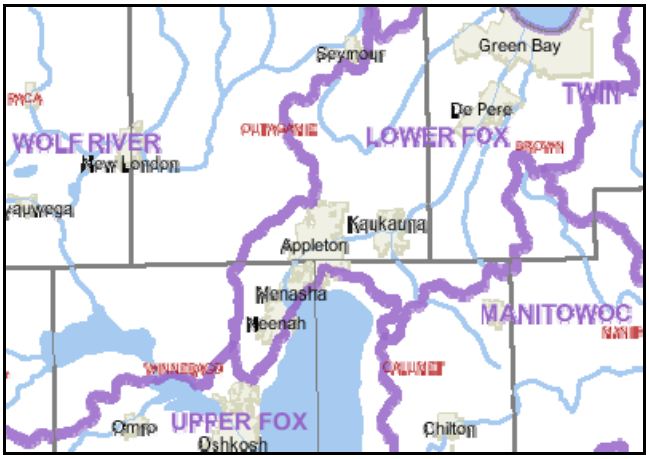
2.0 OVERVIEW OF STUDY AREA

The study area for the Town of Neenah's Stormwater Management Plan is depicted in Figure 1. The Town of Neenah is located in Winnebago County, Wisconsin. As shown in Figure 2, several Municipal Separate Storm Sewer System (MS4) jurisdictions are located within and directly adjacent to the Town of Neenah. The Town's municipal boundary contains approximately 5,084 acres or 7.9 square miles of area. The Town's 2012 population is estimated at 3,306 and is part of the Appleton Urbanized Area as determined by the US Census Bureau.

Basins

The Wisconsin Department of Natural Resources (DNR) divided the state into 24 basins or Water Management Units (WMU). The Town's study area is located in the Lower and Upper Fox River Basins or WMUs. The WMU boundaries are similar to the federally designated 8-digit Hydrologic Unit Code (HUC) boundaries for the Lower Fox River Basin and Upper Fox River Basin.

Exhibit 2-1: Lower & Upper Fox River Basins

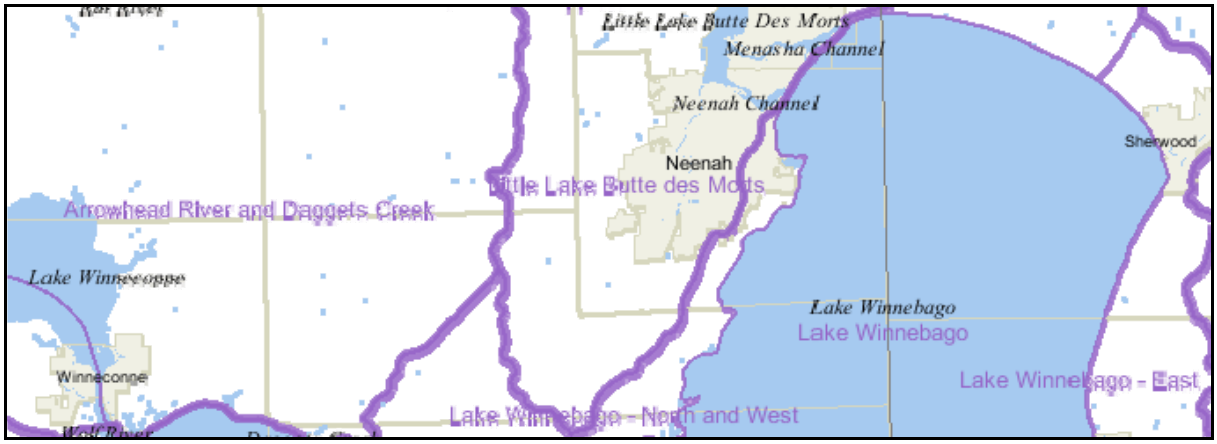


Watersheds

The DNR divided the Lower Fox River Basin into 6 watersheds. The Town's study area is located in one of these watersheds: Little Lake Butte des Morts Watershed (LF02-113).

The DNR divided the Upper Fox River Basin into 15 watersheds. The Town's study area is located in one of these watersheds: Lake Winnebago North & West Watershed (UF01-111).

Exhibit 2-2: Little Lake Butte des Morts and Lake Winnebago North & West Watersheds



Sub-Watersheds

For purposes of this stormwater management plan, the DNR watersheds were divided into three sub-watersheds. The sub-watersheds are depicted in Figure 3 and summarized in Table 2-1. The sub-watersheds were delineated after considering the federally designated 12-digit Hydrologic Unit Code (HUC) boundaries, state designated Total Maximum Daily Load (TMDL) sub-basin boundaries, and locally designated stormwater planning boundaries.

Table 2-1: Sub-Watersheds

Sub-Watershed	HUC 12	TMDL Sub-Basin Name
Fox River	040302040201 Little Lake Butte des Mortes	Lower Fox River Main Stem
Neenah Slough	040302040201 Little Lake Butte des Mortes	Neenah Slough
Lake Winnebago	040302030101 City of Oshkosh-Lake Winnebago	N/A

Natural Resources

Natural resource features include surface waters (lakes, rivers, streams), wetlands, and endangered or threatened resources. Natural resource features located in the study area are depicted in Figure 4. Some of these natural resource features are protected with a special regulatory designation such as outstanding resource water, exceptional resource water, 303(d) impaired water, endangered species, and threatened species. Natural resource features located in the study area with one of these special regulatory designations are identified below.

Outstanding and exceptional resource waters are pristine surface waters which are not significantly impacted by human activities and provide valuable fisheries, unique hydrological or geological features, outstanding recreational opportunities, or unique environmental settings. For example, cold water trout streams and natural waterfalls are typically classified as an outstanding or exceptional resource waters. The Town of Neenah does not discharge stormwater runoff into any outstanding resource waters or exceptional resource waters.

Impaired water bodies are degraded surface waters which are not meeting water quality standards or their potential uses, such as fishing and swimming, due to pollutants and poor water quality. The US EPA requires each state to update its 303(d) impaired waters list every two years, including Wisconsin. The Town of Neenah discharges stormwater runoff into three 303(d) impaired waters:

- Fox River: The Fox River is a 303(d) impaired water due to contaminated sediment and a blend of non-point and point source pollution. Pollutants of concern include polychlorobiphenyls and phosphorus. Impairments include contaminated fish tissue and low dissolved oxygen. The attainable use for the Fox River is fish and aquatic life. Currently, the Fox River is not supporting its attainable use.

- Neenah Slough: Neenah Slough is a 303(d) impaired water due to contaminated sediment and a blend of non-point and point source pollution. Pollutants of concern include polychlorobiphenyls and phosphorus. Impairments include contaminated fish tissue and low dissolved oxygen. The attainable use for the Neenah Slough is fish and aquatic life. Currently, the Neenah Slough is not supporting its attainable use.

- Lake Winnebago: Lake Winnebago is a 303(d) impaired water due to atmospheric deposition, contaminated sediment, and non-point source pollution. Pollutants of concern include mercury, polychlorobiphenyls, sediment, and phosphorus. Impairments include contaminated fish tissue, low dissolved oxygen, eutrophication, water quality use restrictions, and turbidity. The attainable use for Lake Winnebago is fish and aquatic life. Currently, Lake Winnebago is not supporting its attainable use.

Endangered and threatened resources are wild animal and plant species which are either in danger of extinction throughout all or a significant portion of its range or likely to become endangered in the foreseeable future. Typically, the location of an endangered or threatened species is tracked in Wisconsin's Natural Heritage Inventory and is only identified by township. Sensitive species that are particularly vulnerable to collection or disturbance are only identified by county. The Natural Heritage Inventory indicates four sensitive species are located within Winnebago County and the Neenah study area. The four aquatic occurrences include the Bald Eagle, Banded Killifish, Lake Sturgeon, and Pugnose Minnow. The maps and species lists are routinely updated by DNR.

Cultural Resources

Cultural resources are places of cultural significance. Some cultural resources are protected with a special regulatory designation such as historical sites and archeological sites. Cultural resource features located in the study area with one of these special regulatory designations are identified below.

No historical sites are listed in the Wisconsin Historical Society's register for the Town of Neenah study area.

Archeological sites may be located within the study area, but can not be disclosed by law. The State of Wisconsin maintains maps and a computer database on the location and nature of archaeological sites. Special permission is required to view these maps and databases.

The location of archaeological sites is exempt from public disclosure to prevent collection or disturbance of valuable artifacts.

Remediation & Waste Disposal Sites

Remediation sites are places where cleanup of environmental soil or groundwater contamination is ongoing or completed. Remediation sites may involve hazardous wastes, underground storage tanks, or other contaminant sources. Waste disposal sites are places where solid wastes are stored. Understanding the location of remediation and waste disposal sites is an important consideration when evaluating potential stormwater retrofit locations. The approximate location of DNR identified remediation sites (open and closed sites) and waste disposal sites (not archived) are depicted in Figure 4.

Table 2-2: Waste Disposal Sites

Name of Site / Landfill	Site Location	SHWIMS Link
Kampo Warehouse (Gen Chem-Alum)	Between Oakridge & Larson Roads	471015270
Bergstom Paper LF - Neenah	Larson Road	471013290
Froze Farm	Oakridge Road	471158820
Schulz LF	Oakridge Road	471017690

Soils

Soil information is from the *Winnebago County Soil Survey,* Natural Resource Conservation Service, U.S. Department of Agriculture. The U.S. Department of Agriculture has classified soil types into four hydrologic soil groups (HSG). The four hydrologic soil groups (i.e. A, B, C and D) are classified according to the minimum infiltration rate of the soil column. Group A soils have the highest permeability rate or lowest runoff potential, whereas Group D soils have the lowest permeability rate or highest runoff potential. Hydrologic soil groups are depicted in Figure 5.

MS4 System

The municipal separate storm sewer system (MS4) consists of publicly owned or operated conveyance systems including streets, curbs, gutters, catch basins, storm sewers, swales, channels, culverts, and occasionally bridges. The MS4 system is depicted in Figure 6. As shown in Figure 2, portions of the drainage system are privately owned and operated roads.

The MS4 system contains several structural best management practices (BMPs). The structural BMPs are depicted in Figure 7 and summarized in Table 2-3. Structural BMPs include wet detention ponds, dry detention ponds, biofilters, proprietary devices, and other devices. Some of these structural BMPs are publicly owned and others are privately owned.

Table 2-3: Structural BMPs

BMP I.D.	BMP Owner	BMP Name	Type of Structural BMP	Maintenance Agreement
G4a1b	Private	Tuckaway Storage Pond	Wet Detention Pond	Yes
G8b2d	Private	Gibson Salvage Pond	Wet Detention Pond	Yes
G8b3c	Private	Ogden Pond	Wet Detention Pond	Yes
G8b3d	Private	Tuchsherer Self-Storage Pond	Wet Detention Pond	Yes
G8c1b	Private	Rockwood Warehouse N Pond	Wet Detention Pond	Yes
G8c1c	Private	Rockwood Warehouse S Pond	Wet Detention Pond	Yes
G8c1d	Private	4C Storage Pond	Wet Detention Pond	Yes
G9c2	Private	Dermatology Associates Pond	Wet Detention Pond	Yes
N4c5	Private	Sunset Terrace Pond	Wet Detention Pond	Yes
N4d6	Private	White Tail Run South Pond	Wet Detention Pond	Yes
N4d7	Private	White Tail Run West Pond	Wet Detention Pond	Yes
N7e8	Private	Woodside Acres Pond	Wet Detention Pond	Yes
S8a1b	Private	Spring Meadow Pond	Wet Detention Pond	Yes
W6b1	Private	Hidden Acres Pond	Wet Detention Pond	Yes
W7a3	Town	Herziger Pond	Wet Detention Pond	N/A

The MS4 system is based on available records. The MS4 system contains four different types of surface drainage: curb & gutter, grass filter strips, grass swales and areas not served by a control measure. The types of surface drainage are depicted in Figure 8. As shown in Figure 2, portions of the surface drainage system are owned, operated and maintained by the Wisconsin Department of Transportation (DOT), Winnebago County Highway Department, Town of Neenah, and private landowners (private roads).

WPDES Industrial Permits

Several industrial operations with coverage under a WPDES Industrial Permit are located within the Town. WPDES Industrial Permits are regulated by the Wisconsin Department of Natural Resources (DNR). Some WPDES Industrial Permits may allow discharges into the MS4 system during dry weather. Understanding the location of the WPDES Industrial Permitted sites is important to effective implementation of the Town's stormwater program. WPDES Industrial Permits are depicted in Figure 9 and summarized in Table 2-4.

Table 2-4: WPDES Industrial Permits

I.D.	Facility Name	Facility Address	WPDES Permit No.
1	Napuck Salvage and Supply Inc.	680 N Tullar Rd	S058831
2	BenCarrie Quarry	Tullar Road - Neenah	46515
3	Michels Materials Pansay No. 181	T20N R17E S30 SE 1/4	46515
4	N & M Transfer Co Inc.	630 Muttart Rd	S067857
5	American Colloid Co. Neenah Plant	901 ACCO Ave	S067849
6	Gibson Iron Metal & Auto Salvage	139 S. Fieldcrest	S058831

7	Koch Quarry	Tullar Road - Neenah	46515
8	Lycon Inc. - Neenah	700 Tullar Rd	S067857
9	United Plastic Fabricating Inc.	219 Rockwood Lane	S067857
10	Checker Logistics, Inc.	1715 Dixie Road	S067857
11	Loren's Auto Recycling LLC	2405 Schultz Drive	S059145

Drinking Water System

The Town does not have a public drinking water system. Property owners obtain drinking water from private wells.

Land Uses

The location of publicly owned parks, recreational areas, open lands, and municipal facilities are depicted in Figure 9. Understanding the location of publicly owned land is important to effective implementation of the Town's stormwater program.

Table 2-5: Land Uses

Land Use	2004 Land Use		2012 Land Use		Future Land Use	
	(acres)	(%)	(acres)	(%)	(acres)	(%)
Residential						
High Density	0	0.0%	2	0.0%	46	0.9%
Low Density	499	9.8%	523	10.3%	659	13.0%
Med Density	309	6.1%	400	7.9%	1,364	26.8%
Multi-Family	0	0.0%	0	0.0%	0	0.0%
Suburban	526	10.3%	535	10.5%	964	19.0%
Commercial						
Commercial Strip	48	1.0%	81	1.6%	310	6.1%
Office Park	13	0.3%	15	0.3%	16	0.3%
Institutional						
Misc. Institutional	7	0.1%	9	0.2%	27	0.5%
School	4	0.1%	4	0.1%	4	0.1%
Industrial						
Light Industrial	146	2.9%	161	3.2%	717	14.1%
Medium Industrial	357	7.0%	375	7.4%	430	8.5%
Airport	4	0.1%	4	0.1%	4	0.1%
Open Space						
Cemetery	32	0.6%	32	0.6%	32	0.6%
Park	98	1.9%	98	1.9%	82	1.6%
Undeveloped*	2,999	59.0%	2,802	55.1%	386	7.6%
Freeway	43	0.8%	43	0.8%	43	0.8%
Total:	5,084	100%	5,084	100%	5,084	100%

*Undeveloped land includes agriculture, grass, woods, wetlands, and open water.

Land uses on or before October 1, 2004 are depicted in Figure 10 and summarized in Table 2-5 for the study area. For purposes of the NR 151 pollutant analysis, undeveloped in-fill sites less than 5 acres are shown to be developed based on adjoining land uses. Undeveloped in-fill sites greater than 5 acres are shown as agriculture, woods, grass, or another undeveloped open space, as appropriate.

2012 land uses are depicted in Figure 11 and summarized in Table 2-5 for the study area. For purposes of the Total Maximum Daily Load (TMDL) pollutant analysis, the undeveloped in-fill sites are shown as agriculture, grass, woods, wetland or another undeveloped open space, as appropriate.

Future land uses are depicted in Figure 12 and summarized in Table 2-5 for the study area. For purposes of the Total Maximum Daily Load (TMDL) pollutant analysis, the future land uses generally match the 2012 land uses, except the appropriate undeveloped sites are converted to a future land use based on adjoining land uses and information from the Town.

3.0 NR 151 POLLUTANT ANALYSIS

Performance Standard

Pursuant to the Municipal Stormwater Discharge (MS4) Permit and NR 151.13, the Town is required to reduce the total suspended solid (TSS) load by 40% for urban areas developed before October 1, 2004. The TSS reduction is calculated from a baseline load that does not include any stormwater best management practices (BMPs), such as street sweeping, grass swales and wet detention ponds. The compliance schedule for the required 40% TSS reduction is as follows:

- A 20% TSS reduction is required within 2 years of receiving MS4 Permit coverage. The Town received permit coverage from the DNR on October 13, 2006. As such, the Town is required to achieve the 20% TSS reduction before October 13, 2008.

- A 40% TSS reduction is required before March 31, 2013. If the 40% reduction cannot be achieved by March 31, 2013, the Town is required to prepare a long-term stormwater management plan that identifies the control measures already implemented, the control measures to be implemented, and a schedule for achieving the 40% TSS reduction. As part the MS4 Permit, the Town is required to track phosphorus, but no NR 151.13 performance standard is provided for phosphorus.

The 2011 Wisconsin Act 32 modified the compliance schedule for the NR 151.13 performance standards. According to Wisconsin Act 32, the DNR may enforce the Town's compliance date for achieving the required 20% TSS reduction, but the DNR is currently prohibited from enforcing a specific compliance date for achieving the required 40% TSS reduction. Also, the 2011 Wisconsin Act 32 requires that the pollutant reduction benefits associated with all structural BMPs implemented before July 1, 2011 must be maintained.

Methodology

The NR 151 pollutant analysis uses the Source Loading and Management Model for Windows (version 10.0.0). WinSLAMM is a stormwater quality model that predicts runoff volumes and non-point source pollution loads for urban land uses. WinSLAMM also calculates the amount of pollutant removal provided by BMPs such as street sweeping, catch basin cleaning, grass swales, grass filter strips, biofiltration, infiltration basins, wet detention ponds, wetland systems, proprietary devices, and other BMPs.

The NR 151 pollutant analysis uses the series of small rainfall events that occurred between March 29, 1968 and November 25, 1972 in Green Bay, Wisconsin. For purposes of MS4 Permit compliance, this 5-year rainfall series was determined by the DNR to represent an average annual rainfall condition for municipalities located in Northeast Wisconsin.

The NR 151 pollutant analysis uses data files developed by the United States Geological Survey (USGS) and DNR for the WinSLAMM model. The data files identify typical runoff volumes, pollutant concentrations, pollutant distributions, pollutant deliveries, and pollutant particle size distributions for typical urban stormwater runoff. The WinSLAMM data files obtained from the USGS and used in the NR 151 pollutant analysis are as follows:

- WisReg - Green Bay Five Year Rainfall.ran
- WI_GEO02.ppdx
- v10 WI_SL06 Dec06.rsv
- WI_avg01.pscx
- WI_Res and Other Urban Dec06.std
- WI_Com Inst Indust Dec06.std
- Freeway Dec06.std
- Nurp.cpz

The NR 151 pollutant analysis is based on the standard land use files developed by the DNR for WinSLAMM. The standard land use files identify the amount of roof, parking lot, driveway, sidewalk, street, and lawn source areas which are typical for each standard land use. The standard land use files also identify the amount of connected imperviousness for each source area.

The NR 151 pollutant analysis uses the October 1, 2004 land uses and urban planning boundary depicted in Figure 10. The Town's 2004 urban planning boundary contains 2,583 acres. Of the 2,583 acres, 1,542 acres are classified as developed urban land uses on October 1, 2004. The remaining 1,041 acres are classified as agriculture, grass, woods, wetlands, open water, or quarries (211 acres). The 20% and 40% TSS reductions only apply to the 1,542 acres of developed urban land uses in existence on October 1, 2004.

According to DNR guidance, the portions of developed urban area which may be excluded from the Town's 20% and 40% TSS reduction goal include the following:

- State & County Highways: The Town's NR 151 pollutant analysis excludes the pollutant load for state and county highway right-of-ways. The Town has limited authority to regulate stormwater runoff, issue permits, and charge stormwater utility fees to state and county highway right-of-ways. Also, the state and county highway right-of-ways are separately regulated and permitted by DNR. Of the 1,542 acres of developed urban area, 1,433 acres are Town MS4 jurisdiction, 67 acres are County MS4 jurisdiction, and 42 acres are State MS4 jurisdiction.

- Publicly Owned Parcels: The Town's NR 151 pollutant analysis includes the pollutant load for publicly owned parcels located within the Town's urban planning boundary. The Town has legal authority to regulate stormwater runoff, issue permits, and charge stormwater utility fees to publicly owned parcels.

- WPDES Industrial Permits: Except for quarries, the Town's NR 151 pollutant analysis includes the pollutant load for industrial areas with coverage under a WDPES Industrial Permit if the permitted area is located within the Town's urban planning boundary. The Town anticipates providing the 20% and 40% TSS reductions for these industrial permitted areas for the following reasons: the Town has legal authority to regulate stormwater runoff; the Town has legal authority to charge a stormwater utility fee; it is difficult to determine which portions of an industrial site are covered by a WPDES Industrial Permit; and the pollutant load is the Town's responsibility if the WPDES Industrial Permit is terminated or certified "No Exposure" in the future.

- Internally Drained Areas: Except for quarries, the Town's NR 151 pollutant analysis includes the pollutant load for internally drained areas. The Town is responsible for the pollutant load if the internally drained area is eliminated. The Town has limited authority to regulate filling or draining of internally drained areas.

Baseline Load

The NR 151 baseline loads for the Town's developed urban area are summarized in Table 3-1. These baseline or "no control" loads exclude the pollutant reduction benefits of existing BMPs. Per NR 151.13, the baseline or "no control" loads are used to determine the required 40% total suspended solids (TSS) load reduction.

Table 3-1: NR 151 Baseline Pollutant Analysis (WinSLAMM)

Sub-Watershed	Town MS4 (acres)	Baseline TSS Load (lbs/yr)	Required Load Reduction		Baseline TP Load (lbs/yr)
			TSS (%)	TSS (lbs/yr)	
Fox River	257	78,146	40%	31,258	178
Neenah Slough	866	178,496	40%	71,398	554
Lake Winnebago	310	46,488	40%	18,595	196
Total	1,433	303,130	40%	121,252	927

As shown in Table 3-1, the Town's baseline TSS and total phosphorus (TP) loads are 303,130 pounds per year and 927 pounds per year, respectively. Based on the TSS baseline load, the Town is required to achieve a 121,252 pound per year TSS reduction.

2004 Best Management Practices

Several BMPs qualified for NR 151 pollutant reduction credit in 2004: street sweeping, grass swales, grass filter strips, White Tail Run West Pond, White Tail Run South Pond, and Hidden Acres Pond. The 2004 BMPs are depicted in Figure 17.

2012 Best Management Practices

Several BMPs qualified for NR 151 pollutant reduction credit in 2012: street sweeping, grass swales, grass filter strips, and several wet detention ponds. The 2012 BMPs are depicted in Figure 18. As shown in Table 3-2, the 2012 BMPs provided a 42% total suspended solids (TSS) reduction and a 39% total phosphorus (TP) reduction for the Town's developed urban area during 2012.

Infiltrometer tests were performed for existing grass swales located in Town street right-of-ways. A separate report was prepared summarizing the grass swale infiltrometer tests. As part of this pollutant analysis, the infiltrometer testing results were used to more accurately evaluate the stormwater quality benefits of existing publicly-owned grass swales located within the Town's MS4 jurisdiction. The water quality results provided in Table 3-2 include the stormwater quality benefits of existing publicly-owned grass swales located within the Town's MS4 jurisdiction. As shown in Figure 18, the publicly-owned grass swales located within the County and State MS4 jurisdictions were not included in the Table 3-2 results. The Town does not currently have permission to take stormwater quality credit for existing grass swales owned, operated and maintained by Winnebago County or the Wisconsin DOT.

Table 3-2: NR 151 Pollutant Analysis With 2012 BMPs (WinSLAMM)

Sub-Watershed	Town MS4 (acres)	Total Suspended Solids			Total Phosphorus		
		Baseline Load (lbs/yr)	Load Reduction		Baseline Load (lbs/yr)	Load Reduction	
			(lbs/yr)	(%)		(lbs/yr)	(%)
Fox River	257	78,146	31,869	41%	178	67	38%
Neenah Slough	866	178,496	62,084	35%	554	174	32%
Lake Winnebago	310	46,488	34,765	75%	196	124	64%
Total	1,433	303,130	128,718	42%	927	365	39%

In summary, the 42% TSS reduction provided in Table 3-2 indicates the Town of Neenah has achieved compliance with the required 40% TSS reduction contained in NR 151.13.

4.0 TMDL POLLUTANT ANALYSIS

A Total Maximum Daily Load (TMDL) is the maximum amount of a pollutant that a water body can receive and still meet water quality standards. A TMDL for total phosphorus and total suspended solid (e.g. sediment) pollutants was developed by the DNR for the Lower Fox River Basin. The TMDL for the Lower Fox River Basin was approved by the US Environmental Protection Agency (EPA) on May 18, 2012.

The Lower Fox River Basin has 14 streams and rivers that are impaired by phosphorus and/or sediment pollutants. Excessive amounts of these pollutants cause poor water clarity, increase algae, impact swimming, and degrade aesthetics. The top photograph depicts Fox River algae during 2008 (DNR photo) and the bottom photograph depicts sediment discharging into Green Bay during 2011 (Steve Seilo photo).

The Lower Fox River Basin TMDL was calibrated and developed using stream, river and lake monitoring data collected by the United States Geological Survey, Wisconsin DNR, UW-Green Bay, UW-Milwaukee, and Green Bay Metropolitan Sewerage District.

As shown in Figure 6, the Town's storm sewer system discharges to two water bodies impaired by phosphorus and sediment pollutants: Fox River and Neenah Slough. The Fox River and Neenah Slough are specifically included in the Lower Fox River Basin TMDL.

Performance Standard

The TMDL Report developed for the Lower Fox River Basin states that a Municipal Stormwater Discharge Permit (MS4) Permit cannot be reissued without a waste load allocation that is consistent with an EPA approved TMDL. The DNR anticipates reissuing the Town's MS4 Permit during 2013.

The TMDL Report developed for the Lower Fox River Basin identifies waste load allocations for permitted Urban MS4 areas. The total phosphorus (TP) and total suspended solid (TSS) waste load allocations identified in the TMDL Report for the Town's municipal boundary are summarized in Tables 4-1 and 4-2, respectively. The DNR anticipates using these waste load allocations to derive more specific allocations for each Urban MS4 Permitted entity including the Town of Neenah, Winnebago County Highway Department, Wisconsin Department of Transportation, and others, if any.

Table 4-1: Phosphorus Allocations from TMDL Report

Sub-Basin	Urban Area (acres)	Total Phosphorus			
		Baseline (lbs/yr)	Allocated (lbs/yr)	Reduction (lbs/yr)	Reduction (%)
Fox River	349	194	135.8	58.2	30%
Neenah Slough	971	560	392.0	168.0	30%
Total	1,320	754	527.8	226.2	30%

Table 4-2: Sediment Allocations from TMDL Report

Sub-Basin	Urban Area (acres)	Total Suspended Solids			
		Baseline (lbs/yr)	Allocated (lbs/yr)	Reduction (lbs/yr)	Reduction (%)
Fox River	349	116,109	40,404	75,705	65%
Neenah Slough	971	272,484	163,490	108,994	40%
Total	1,320	388,593	203,894	184,699	48%

Methodology

The TMDL pollutant analysis uses the Source Loading and Management Model for Windows (WinSLAMM version 10.0.0). WinSLAMM is a stormwater quality model that predicts runoff volumes and non-point source pollution loads for urban land uses. WinSLAMM also calculates the amount of pollutant removal provided by Best Management Practices (BMPs) such as street sweeping, catch basin cleaning, grass swales, grass filter strips, biofiltration, infiltration basins, wet ponds, wetland systems, proprietary devices, and other BMPs.

The TMDL pollutant analysis uses the series of small rainfall events that occurred between March 29, 1968 and November 25, 1972 in Green Bay, Wisconsin. For purposes of MS4 Permit compliance, this 5-year rainfall series was determined by the DNR to represent an average annual rainfall condition for municipalities located in Northeast Wisconsin.

The TMDL pollutant analysis uses data files developed by the United States Geological Survey (USGS) and DNR for the WinSLAMM model. The data files identify typical runoff volumes, pollutant concentrations, pollutant distributions, pollutant deliveries, and pollutant

particle size distributions for typical urban stormwater runoff. The WinSLAMM data files obtained from the USGS and used in the TMDL pollutant analysis are as follows:

- WisReg - Green Bay Five Year Rainfall.ran
- WI_GEO02.ppdx
- v10 WI_SL06 Dec06.rsv
- WI_avg01.pscx
- WI_Res and Other Urban Dec06.std
- WI_Com Inst Indust Dec06.std
- Freeway Dec06.std
- Nurp.cpz

The TMDL pollutant analysis is based on the standard land use files developed by the DNR for WinSLAMM. The standard land use files identify the amount of roof, parking lot, driveway, sidewalk, street, and lawn source areas which are typical for each standard land use. The standard land use files also identify the amount of connected imperviousness for each source area.

The TMDL pollutant analysis uses the 2012 land uses depicted in Figure 11 and the study area depicted in Figure 1. The Town's study area contains 5,084 acres. Of the 5,084 acres, 1,554 acres are classified as developed urban land uses within the Fox River and Neenah Slough Sub-Watersheds. The TMDL allocations only apply to the 1,554 acres of developed urban land uses. The DNR is currently developing TMDL and WinSLAMM modeling guidance to assist with MS4 Permit compliance. This TMDL pollutant analysis will likely require updating after the DNR guidance documents are completed.

Baseline Load

The TMDL baseline loads from WinSLAMM for the Fox River and Neenah Slough Sub-Watersheds are summarized by land use in Table 4-3 and Exhibit 4-1. These baseline or "no control" loads exclude the pollutant reduction benefits of existing BMPs. Table 4-3 and Exhibit 4-1 indicate residential land uses comprise the majority of land area in the study area, but street and highway land uses generate the largest amounts of pollutant load.

Table 4-3: TMDL Baseline Loads by Land Use (WinSLAMM)

Land Use	Area (acres)	Area (%)	TP (lbs/yr)	TP (%)	TSS (lbs/yr)	TSS (%)
Residential	784	50%	342	28%	57,833	13%
Commercial	78	5%	64	5%	26,489	6%
Industrial	288	19%	177	15%	119,666	28%
Institutional	8	1%	6	1%	2,062	1%
Open Space	98	6%	47	4%	9,650	2%
Street & Highway ROW	296	19%	574	47%	214,754	50%
Total	1,554		1,210		430,455	

Appendix A contains a list of TMDL baseline pollutant yields (pounds per acre per year) and loads (pounds per year) from WinSLAMM for total phosphorus and total suspended solid pollutants. The baseline pollutant yields and loads are ranked by drainage area from highest to lowest within each sub-watershed. Figures 13 through 16 depict the TMDL baseline pollutant yields and loads.

The TMDL pollutant analysis is based on the watershed areas and WinSLAMM baseline pollutant loads contained in Tables 4-4, 4-5 and 4-6. Inside the urban planning boundary (UPB), these watershed areas and baseline pollutant loads are categorized by MS4 jurisdiction. Outside the UPB, the watershed areas and pollutant loads for each MS4 jurisdiction are grouped together. The urban planning boundary is depicted in Figure 11. Later in this report, Tables 4-4, 4-5 and 4-6 are used to illustrate different methods of splitting up the waste load allocations contained in the TMDL Report. Each MS4 permitted entity located within the Town's municipal boundary is expected to receive a portion of the allocations identified in the TMDL Report (i.e. Town of Neenah MS4, Winnebago County Highway MS4, and Wisconsin Department of Transportation MS4). In addition, developed urban areas located outside the UPB are also expected to receive a portion of the allocations identified in the TMDL Report.

Table 4-4: Watershed Areas

Sub-Watershed	Watershed Areas (WinSLAMM)								
	Town MS4		County Hwy		State Hwy		Outside UPB		Total
	(acres)	(%)	(acres)	(%)	(acres)	(%)	(acres)	(%)	(acres)
Fox River	319	81%	34	9%	0	0%	42	10%	396
Neenah Slough	994	86%	29	2%	42	4%	92	8%	1,158
	1,314		64		42		134		1,554

Table 4-5: Total Phosphorus Baseline Loads

Sub-Watershed	Total Phosphorus Baseline Loads (WinSLAMM)								
	Town MS4		County Hwy		State Hwy		Outside UPB		Total
	(lbs/yr)	(%)	(lbs/yr)	(%)	(lbs/yr)	(%)	(lbs/yr)	(%)	(lbs/yr)
Fox River	221.2	67%	62.1	19%	0.0	0%	46.1	14%	329.4
Neenah Slough	635.7	72%	52.5	6%	120.3	14%	72.4	8%	880.8
	856.9		114.5		120.3		118.5		1,210.2

Table 4-6: Total Suspended Solid Baseline Loads

Sub-Watershed	Total Suspended Solid Baseline Loads (WinSLAMM)								
	Town MS4		County Hwy		State Hwy		Outside UPB		Total
	(lbs/yr)	(%)	(lbs/yr)	(%)	(lbs/yr)	(%)	(lbs/yr)	(%)	(lbs/yr)
Fox River	100,938	71%	25,968	18%	0	0%	15,971	11%	142,878
Neenah Slough	198,902	69%	19,796	7%	49,560	17%	19,319	7%	287,577
	299,841		45,764		49,560		35,290		430,455

Allocation Analysis

Each MS4 permitted entity located within the Town's municipal boundary is anticipated to receive a portion of the phosphorus and sediment waste load allocations contained in the TMDL Report. These MS4 permitted entities include the Town of Neenah, Winnebago County Highway Department, and Wisconsin Department of Transportation (DOT). In addition to the MS4 permitted entities, properties located outside the urban planning boundary (UPB) are anticipated to receive a portion of the allocations. At this time, allocations associated with the developed riparian properties located inside the UPB are included in the Town MS4 category.

This report discusses two methods for splitting the phosphorus and sediment waste load allocations contained in the Lower Fox River TMDL Report:

- Watershed Area Method: For the watershed area method, the waste load allocations are split using the percent of watershed area associated with each category as compared to the total watershed area. Table 4-4 and Exhibit 4-2 summarize the percent of allocation set aside for each category if the watershed area method is used. The Exhibit 4-2 pie charts indicate the Town's allocation percent is different for each water body, but not for each pollutant.

- Baseline Load Method: For the baseline load method, the waste load allocations are split using the percent of baseline pollutant load associated with each category as compared to the total baseline load. Table 4-5, Table 4-6 and Exhibit 4-3 summarize the percent of waste load allocation set aside for each category if the baseline load method is used. The Exhibit 4-3 pie charts indicate that the Town's allocation percent is different for each water body and each pollutant.

As indicated in Exhibit 4-1, the street and highway right-of-ways generate a majority of the phosphorus and sediment baseline loads. More specifically, the baseline sediment yield for the Wisconsin DOT's street and highway right-of-way within the Neenah Slough Sub-Watershed is 1,180 pounds per acre per year (49,560 pounds per year / 42 acres) according to Tables 4-4 and 4-6. However, the baseline sediment yield for an average commercial parcel is 340 pounds per acre per year (26,489 pounds per year / 78 acres) according to Table 4-3. The DOT's sediment yield is 3 times larger than the commercial parcel's yield.

In summary, the watershed area method is more favorable to the Town since a larger percent of the total waste load allocation is provided to the Town as compared to the baseline load method. However, the watershed area method does not consider differences in pollutant yield. As such, in order to be more equitable, the baseline load method is used in this study to split the pollutant allocations contained in the TMDL Report. As previously discussed, the allocations will likely need to be revised after the DNR guidance is completed.

Table 4-7 summarizes the Town of Neenah's portion of the TMDL waste load allocations if the baseline load method is used. The allocated loads in Table 4-7 were calculated by multiplying the waste load allocations contained in Tables 4-1 and 4-2 by the Town MS4 percentages contained in Tables 4-5 and 4-6.

Table 4-7: TMDL Allocations for Town MS4 Using Baseline Load Method

Sub-Watershed	Town MS4 (acres)	Total Phosphorus Load			Total Suspended Solid Load		
		Baseline (lbs/yr)	Allocated (lbs/yr)	Reduce (%)	Baseline (lbs/yr)	Allocated (lbs/yr)	Reduce (%)
Fox River	319	221.2	91.2	59%	100,938	28,544	72%
Neenah Slough	994	635.7	282.9	55%	198,902	113,078	43%
Total	1,314	856.9	374.1	56%	299,841	141,622	53%

Table 4-8 summarizes the Town of Neenah's portion of the TMDL waste load allocations after adjusting for agricultural, natural background and non-regulated urban land uses identified in the TMDL Report. The adjustments in Table 4-8 are needed to account for land use changes between the TMDL Report and this TMDL pollutant analysis.

Table 4-8: TMDL Allocation Adjustments for Town MS4 Using Baseline Load Method

Sub-Watershed	Town MS4 (acres)	Total Phosphorus Load			Total Suspended Solid Load		
		Baseline (lbs/yr)	Allocated (lbs/yr)	Reduce (%)	Baseline (lbs/yr)	Allocated (lbs/yr)	Reduce (%)
Fox River	319	221.2	112.6	49%	100,938	40,455	60%
Neenah Slough	994	635.7	373.0	41%	198,902	160,400	19%
Total	1,314	856.9	485.6	43%	299,841	200,856	33%

Based on Table 4-8, the Town needs to achieve a 49% TP reduction and 60% TSS reduction within the Fox River Sub-Watershed, as compared to the WinSLAMM baseline or "no controls" load. Similarly, the Town needs to achieve a 41% TP reduction and 19% TSS reduction within the Neenah Slough Sub-Watershed, as compared to the WinSLAMM baseline or "no controls" load.

2012 Best Management Practices

Several BMPs qualified for pollutant reduction credit in 2012: street sweeping, grass swales, grass filter strips, and several wet ponds. The 2012 BMPs are depicted in Figure 18.

- Fox River: Table 4-9 indicates the 2012 BMPs provided a 37% TP reduction within the Fox River Sub-Watershed, which does not satisfy the 49% TP reduction required in Table 4-8. Also, Table 4-9 indicates the 2012 BMPs provided a 41% TSS reduction within the Fox River Sub-Watershed, which does not satisfy the 60% TSS

reduction required in Table 4-8. As such, additional BMPs are needed within the Fox River Sub-Watershed to target both phosphorus and sediment pollutants.

- Neenah Slough: Table 4-9 indicates the 2012 BMPs provided a 32% TP reduction within the Neenah Slough Sub-Watershed, which does not satisfy the 41% TP reduction required in Table 4-8. However, Table 4-9 indicates the 2012 BMPs provided a 35% TSS reduction within the Neenah Slough Sub-Watershed, which exceeds the 19% TSS reduction required in Table 4-8. As such, additional BMPs are needed within the Neenah Slough Sub-Watershed to target phosphorus pollutants.

Table 4-9: TMDL Pollutant Analysis With 2012 BMPs (WinSLAMM)

Sub-Watershed	Town MS4 (acres)	Total Phosphorus			Total Suspended Solids		
		Baseline Load (lbs/yr)	Load Reduction		Baseline Load (lbs/yr)	Load Reduction	
			(lbs/yr)	(%)		(lbs/yr)	(%)
Fox River	319	221.2	82.9	37%	100,938	41,614	41%
Neenah Slough	994	635.7	203.0	32%	198,902	70,365	35%
Total	1,314	856.9	285.8	33%	299,841	111,979	37%

5.0 POLLUTANT REDUCTION ANALYSIS

WinSLAMM (version 10.0.0) was used in conjunction with national literature to analyze the stormwater quality benefits and cost-effectiveness of proposed urban stormwater BMPs such as street sweeping, catch basin cleaning, grass swales, grass filter strips, biofiltration, infiltration basins, wet detention ponds / wetland systems, proprietary devices, and mechanical / biological treatment facilities. The results of the pollutant reduction analysis are summarized herein. More detailed water quality results are provided in Appendix B.

The capital costs contained in Tables 5-1 through 5-3 are the estimated present value capital costs for the BMP. The capital costs include an allowance for construction, land acquisition, engineering, and contingency costs. The 20-year costs provided in the tables are the estimated present value costs per pound of TSS removed during a 20-year period. The 20-year costs include an allowance for capital costs and long-term operation and maintenance costs. The 20-year period was determined to be a reasonable life cycle or planning period for evaluating BMP cost-effectiveness. A longer planning period would improve the cost-effectiveness of structural BMPs (e.g. wet detention pond) as compared to non-structural BMPs (e.g. street sweeping).

Street Sweeping

Street sweeping is effective at collecting large sediment particles (sand sized particles), trash, debris and leaves. Limited pollutant removal occurs for fine-grained particles such as silt, clay, metals and nutrients. Research indicates that street pollutants tend to accumulate within 3 feet of the street's curb and gutter. Wind turbulence from traffic tends to blow pollutants toward the curb. The curb acts as a barrier and traps pollutants. For streets without curb, wind turbulence generated by a passing vehicle tends to blow pollutants onto the adjacent grass. As such, for street sweeping to be effective, the street must have curb.

The effectiveness of a municipal street sweeping program depends on the type of street sweeper, number of curb-miles, sweeping frequency, traffic volume, time of year, rainfall, and operator knowledge. In addition, the benefits of sweeping are significantly reduced when vehicles are parked along the curb. Whenever a street sweeper needs to maneuver around a parked car, the pollutants under the car are not removed. As such, the more cars parked along a street, the less pollutant removal.

There are two types of street sweeper: mechanical and high efficiency. Mechanical street sweepers use a broom to remove pollutants from the street surface and high efficiency street sweepers use a vacuum system to remove pollutants. Typically, a high efficiency sweeper is more effective at removing pollutants as compared to a mechanical sweeper.

Street sweeping has limited effectiveness in the Town due to the small quantity of curb and gutter streets. A significant amount of curb and gutter streets are located along County

highways, which are not part of the Town's MS4. Finally, curb and gutter streets associated with the Town's MS4 are currently scattered across the Town making it difficult to develop an efficient street sweeping program. Currently, the Town does not own a street sweeper. The Town contracts with other public or private entities for street sweeping services.

Catch Basin Cleaning

Catch basin cleaning is effective at collecting large sediment particles (sand sized particles), trash, debris and leaves. Limited pollutant removal occurs for fine-grained particles such as silt, clay, metals and nutrients. Catch basin sumps are effective for parking lots and streets that serve a small drainage area (less than 1 acre). Ideally, a catch basin sump has a minimum 3 foot depth to prevent scouring of previously settled pollutants during a rainfall.

Catch basin cleaning has limited effectiveness in the Town due to the small quantity of curb and gutter streets with storm sewers. Currently, the Town's storm sewer system does not contain any catch basin sumps.

Grass Swales

Grass swales remove pollutants from concentrated stormwater by filtration through the grass and infiltration into the soil. The filtering capacity depends on the flow depth in the swale as compared to the grass height. Typically, when the flow depth is above the grass, filtering is minimal and scouring of previously settled pollutants is a concern. The water quality benefits of a grass swale are largely determined by the infiltrating capacity of underlying soils and the depth to groundwater. A grass swale located in sandy soil has a much higher pollutant removal as compared to a grass swale located in clay soil.

Grass swales are typically located along streets. As shown in Figure 8, most streets in the Town are drained via grass swales, rather than curb and gutter. In the Town, the curb and gutter streets are primarily located along CTH 'II', CTH 'CB', CTH 'JJ', and other urban streets associated with the City of Neenah's MS4 jurisdiction.

As shown in Figure 5, soils in the Town are predominately silt and clay (hydrologic soil group B, C and D). As part of the stormwater quality analysis, infiltrometer tests were performed. The infiltrometer test results were used to more accurately evaluate the water quality benefits of existing publicly-owned grass swales located within the Town's MS4 jurisdiction.

Grass Filter Strips

Grass filter strips remove pollutants from stormwater by filtration through the grass and infiltration into the soil. The filtering capacity of a grass filter strip depends on its longitudinal slope, length and grass density. The water quality benefits of a grass filter strip are largely

determined by the infiltrating capacity of underlying soils. A grass filter strip located in sandy soil has a higher pollutant removal as compared to a grass filter strip located in clay soil.

Grass filter strips are effective for parking lots that serve small drainage areas (less than 1 acre). Typically, grass filter strips need to be a minimum of 20 feet long, but at least as long as the contributing impervious surface length. A 64 foot wide parking lot would typically require a 64 foot long grass filter strip. As such, grass filter strips require a significant amount of land area as compared to other BMPs.

In order for a grass filter strip to be effective, the stormwater flowing into the filter strip can not be concentrated within a swale, ditch, channel, gutter, or other similar conveyance system. Rather, the stormwater must be flowing across the surface of a parking lot, lawn or other ground surface in a very thin sheet of dispersed water.

As shown in Figure 18, the Town contains a limited amount of grass filter strips. Grass filter strips are generally located on Town-owned property, primarily in parks.

As shown in Figure 5, soils in the Town are predominately silt and clay (hydrologic soil group B, C and D). Due to space requirements, the construction and land costs to retrofit a grass filter strip in a commercial or industrial land use are high as compared to the water quality benefit provided. The Town would need to acquire maintenance authority from a private land owner in order to take stormwater quality credit for a grass filter strip. However, it may be practicable for the Town to adopt an ordinance that requires roof downspouts located on one and two family residential lots to discharge stormwater onto a 20 foot long grass filter strip, rather than onto a paved surface or directly into a storm sewers, grass swale or waterway. Roof downspout disconnections are cost-effective pollutant reduction techniques, particularly in areas with sandy and silty soils.

Biofiltration

Biofiltration devices remove pollutants from stormwater by filtration through an engineered soil mixture. Typically, the engineered soil is three feet deep and consists of a sand, compost, peat, and/or topsoil mixture. A diverse mix of prairie flowers, grasses, shrubs and/or trees are typically planted in a mulch layer located above the engineered soil. During a rainfall, stormwater is temporarily stored above the mulch layer until it can be filtered through the engineered soil. A perforated underdrain pipe located beneath the engineered soil collects the filtered water and discharges it into an adjacent storm sewer or other conveyance system. Biofiltration devices are effective for small drainage areas (less than 2 acres). An adequate vertical separation needs to be maintained between the bottom of the device and any bedrock layers, highly permeable soils, or seasonally high groundwater.

Biofiltration devices are called a “bioretention” device when the native soils located beneath the engineered soil layer are permeable and stormwater is allowed to infiltrate into the native

soils. In sandy soils, it may be feasible to eliminate the perforated underdrain pipe so that all of the filtered stormwater infiltrates into the underlying soils. Bioretention devices are used to recharge groundwater and improve stormwater quality, whereas biofiltration devices are only used to improve stormwater quality.

Bioretention devices are sometimes called a "rain garden" if the device does not contain an engineered soil layer. Rain gardens are typically installed for groundwater recharge purposes rather than stormwater pollutant removal. Often, runoff from a residential roof, patio, sidewalk or driveway is directed to a rain garden. These residential source areas have a low pollutant load but generate a significant amount of runoff volume. Whenever a source area has a high pollutant load (i.e. street or parking lot), an engineered soil layer is recommended to provide a higher capacity filter media. A high capacity filter media reduces the device's surface area, ponding duration, and clogging potential. If stormwater is allowed to pond on the surface of a rain garden, bioretention device, or biofiltration device for more than 24 hours, the plants may become diseased or die due to wet conditions or poor system hydrology. Rain gardens can be used on a residential lot if a roof downspout disconnection is not practicable due to a driveway being located directly adjacent to the house.

Biofiltration devices are sometimes called a "bio-swale" if the device contains a longitudinal slope to facilitate flow conveyance. Typically, a bio-swale has a linear configuration. Bio-swales are typically installed within parking lots or along streets. Bio-swales can be used to recharge groundwater and/or improve stormwater quality. As such, a bio-swale may or may not include a perforated underdrain pipe.

The costs to incorporate biofiltration into a street retrofit project or a street reconstruction project are summarized in Table 5-1. Typically, it is more cost-effective to incorporate biofilters into a street reconstruction project, as compared to a street retrofit project. The costs in Table 5-1 can be compared to the other BMP costs contained in Tables 5-2 and 5-3.

Table 5-1: Street Biofiltration

Street Corridor Land Use	Pollutant Load Reduction		Avg. Annual TSS Cost ($/lb)			
			Retrofit		Reconstruct	
	TSS (%)	TP (%)	Sand	Clay	Sand	Clay
Commercial Corridors	80%	71%	$5.5	$17.6	$4.4	$14.2
Industrial Corridors	80%	49%	$3.4	$11.6	$2.8	$9.3
Institutional Corridors	80%	72%	$3.8	$12.0	$3.1	$9.7
Residential Corridors	80%	66%	$6.7	$20.7	$5.4	$16.7
Open Space Corridors	80%	66%	$6.1	$20.1	$4.9	$16.2

The costs to incorporate biofiltration into a parcel retrofit project or a parcel reconstruction project are summarized in Table 5-2. Typically, it is more cost-effective to incorporate biofilters into a parcel or site reconstruction project, as compared to a parcel or site retrofit

project. The costs contained in Table 5-2 can be compared to the other BMP costs contained in Tables 5-1 and 5-3.

Table 5-2: Parcel Biofiltration

Parcel Land Use	Pollutant Load Reduction		Avg. Annual TSS Cost ($/lb)			
			Retrofit		Reconstruct	
	TSS (%)	TP (%)	Sand	Clay	Sand	Clay
Commercial Downtown	80%	69%	$65.0	$81.8	$52.5	$66.1
Hospital	80%	68%	$53.0	$76.2	$42.9	$61.6
Institutional	80%	66%	$38.0	$57.1	$30.7	$46.2
Light Industrial	80%	55%	$14.6	$17.7	$11.8	$14.3
Medium Industrial	80%	69%	$23.9	$35.7	$19.4	$28.9
Mulit-Family Residential	80%	60%	$38.9	$71.6	$31.4	$57.9
Office Park	80%	67%	$35.4	$51.5	$28.6	$41.7
Schools	80%	63%	$33.6	$52.5	$27.2	$42.5
Shopping Center	80%	69%	$39.3	$51.8	$31.8	$41.9
Strip Commercial	80%	69%	$44.0	$57.6	$35.6	$46.6

Infiltration Basins

An infiltration basin is a water impoundment constructed over a highly permeable soil. The purpose of an infiltration basin is to temporarily store stormwater and allow it to infiltrate through the bottom and sides of the infiltration basin. Pollutants are removed by the filtering action of the underlying soil. The primary functions of an infiltration basin are to provide groundwater recharge, reduced runoff volumes, and reduced peak discharge rates. The secondary function of an infiltration basin is water quality.

Infiltration basins require pretreatment to prevent clogging and failure. Wisconsin DNR Technical Standard 1003 - Infiltration Basin requires a pretreatment system to reduce the TSS load entering an infiltration basin by 60% for a residential land use and 80% for a commercial, industrial, or institutional land use. Typically, a wet detention pond or biofiltration device is used as the pretreatment system. The pretreatment system prevents the infiltration basin from failing and helps reduce the risk of groundwater contamination due to pollutants contained in stormwater. Not all stormwater runoff should be infiltrated due to concern for groundwater contamination.

In order for an infiltration basin to be feasible, the depth to groundwater and bedrock typically needs to be 5 feet or more. Also, the infiltration basins are more feasible if the soil is a loam, silt or sand. As shown in Figure 5, soils in the Town are predominately silt and clay (hydrologic soil group B, C and D). Although not depicted in Figure 5, the Town contains a significant amount of bedrock.

A significant amount of the water quality benefit is provided by the infiltration basin's pretreatment system. Typically, the pretreatment system is a wet detention pond or biofiltration device. From a water quality perspective, an infiltration basin is not cost effective after considering the pretreatment costs. As such, infiltration basin costs are not included in the analysis; rather pretreatment system costs are included in the analysis (i.e. wet detention ponds and biofiltration devices).

Wet Detention Ponds / Wetland Systems

Wet detention ponds and wetland systems are effective at removing sediment, nutrients, heavy metals, oxygen demanding compounds (BOD), hydrocarbons, and bacteria. Pollutant removal within a wet pond and wetland system is primarily due to gravity settling of particulate pollutants and sediment. Filtration, adsorption and microbial decomposition also remove pollutants, particularly within a wetland system.

Typically, a wet detention pond or wetland system must contain a minimum water depth of 5 feet within a portion of the permanent pool to minimize re-suspension of pollutants during a rainfall event. The Wisconsin DNR requires that wet detention ponds and wetland systems be sized using the National Urban Runoff Project (NURP) particle size distribution. To achieve an 80% reduction in TSS, a wet detention pond or wetland system needs to remove the 3 micron sediment particle.

Currently, DNR does not allow water quality credit for dry detention ponds. As indicated in Table 2-3, no known dry detention ponds are currently located within the Town. Occasionally, it is cost-effective and practicable to convert an existing dry detention pond into a wet detention pond. Generally, wet detention ponds are not recommended for small watersheds (less than 15 to 20 acres in clay soil). A wet detention pond located in a small watershed may develop stagnation problems and become a public nuisance. Public acceptance of stormwater BMPs is important to the success of the Town's stormwater program. If there a dry detention pond located within the Town, the pond's watershed is likely too small to convert into a wet detention pond.

Wet detention ponds and wetland systems tend to be cost-effective structural BMPs. A cost analysis was completed to determine the most cost-effective retrofits within the Town. As part of the analysis, the publicly-owned property depicted in Figure 9 and aerial photographs were used to identify potential undeveloped properties that could be used for a retrofit. The location of drainage infrastructure and the watershed size in relation to the undeveloped property was also considered. Table 5-3 summarizes the cost and water quality benefits of those wet detention ponds / wetland systems analyzed for the Town. The costs contained in Table 5-3 can be compared to the other BMP costs contained in Tables 5-1 and 5-2.

Table 5-3: Potential Wet Detention Ponds / Wetland Systems

Wet Detention Pond / Wetland System	Portion of Town MS4 (acres)	Pollutant Reduction		Capital Costs	Capital & O&M Costs Over 20 Years	Avg. Annual TSS Cost ($/lb)
		TSS (%)	TP (%)			
**Green Valley Pond	24	80%	60%	$30,000	$30,000	$0.3
*Dixie Pond	9	80%	60%	$20,000	$20,000	$1.8
*Westowne Pond	1	80%	60%	$10,000	$10,000	$1.9
*Commerce Ct Pond	15	60%	45%	$30,000	$30,000	$2.2
N&M Transfer North Pond	36	80%	65%	$350,000	$492,251	$3.0
Checker Pond	13	80%	60%	$200,000	$275,608	$3.2
*Tuller Pond	1	80%	60%	$5,000	$5,000	$4.7
N&M Transfer South Pond	59	60%	45%	$610,000	$875,487	$4.8
CTO "O" Pond	156	80%	65%	$2,100,000	$2,527,431	$5.0
Oakridge Pond	12	80%	60%	$200,000	$275,608	$6.3
Harrison Pond	29	80%	65%	$780,000	$953,060	$7.7
Kappell Pond	44	80%	60%	$225,000	$310,766	$8.9
Pendleton Pond	51	80%	60%	$450,000	$561,888	$10.1
Sturgis Pond	16	80%	60%	$200,000	$275,608	$12.8
Klompen Pond	40	80%	60%	$450,000	$561,888	$14.6
Rockledge Pond	20	80%	60%	$265,000	$407,251	$18.1
Cummings Pond	34	80%	60%	$300,000	$390,120	$26.5
Armstrong Pond	13	80%	60%	$150,000	$218,351	$26.9
Breezewood Pond	129	80%	60%	$3,100,000	$3,720,233	$50.4
Hedgeview Pond	34	80%	60%	$200,000	$275,608	$69.2
Woodside Pond	55	80%	60%	$1,718,000	$2,076,022	$71.3
Sally Pond	34	80%	60%	$945,000	$1,141,167	$188.8
Bayview Pond	61	80%	60%	$270,000	$361,571	-$13.9
Harvard Pond	19	80%	60%	$150,000	$218,351	-$34.9
Muttart Pond	29	80%	60%	$235,000	$314,961	-$119.5

* City of Neenah Pond (water quality benefits approximate) - Town obtain agreement &/or 'buy in' for water quality credit

** WisDOT Pond (water quality benefits approximate) - Town obtain an agreement &/or 'buy in' for water quality credit

In the future, the Town may want to investigate the feasibility of adding polymers or flocculants to offline wet detention ponds to enhance pollutant removal efficiencies. Polymer or flocculent additions will likely require installation of mechanical injection systems. Due to DNR environmental concerns, polymer and flocculent costs were not evaluated for this study.

Concept drawings for a few of the Table 5-3 facilities are provided in Appendix C.

Proprietary Devices

Several private companies have developed proprietary stormwater quality treatment devices. These underground treatment devices are advantageous within ultra-urban watersheds where there is not land available for wet detention ponds, wetland systems, or biofiltration devices. Some of the devices are based on simple hydraulics and residence times, and others devices are based on complex hydrodynamics or the use of different filter materials. Maintenance activities vary from vacuum truck suctioning of pollutants to replacing filter media in cartridges.

The Wisconsin DNR Technical Standard 1006 - Proprietary Sedimentation Devices was published in May of 2008. The DNR Technical Standard provides guidance to model proprietary devices within the SLAMM model. Prior to release of the DNR Technical Standard, proprietary devices could be modeled as catch basin sumps to predict water quality benefits. Currently, the Town does not have any ultra-urban watershed areas where proprietary devices are anticipated to be cost effective.

Mechanical / Biological Treatment Facilities

Mechanical / biological treatment facilities are not currently used in Wisconsin, with the exception of combined sewer systems that treat wastewater and stormwater. A mechanical / biological treatment facility would be difficult to implement for stormwater given the number of storm sewer outfalls located within the Town. Significant storm sewer pumping would likely be needed to convey stormwater from each outfall to a regional stormwater treatment facility, similar to a wastewater treatment facility. As a result, stormwater treatment facilities are not typically cost effective BMPs. A mechanical / biological treatment facility and associated pumping systems are estimated to have an average annual cost that is well above $20 per pound of TSS removed. In addition, diverting low flows from all storm sewer outfalls to a regional treatment facility may dry up existing wetlands and streams located near the Town's current storm sewer outfalls.

Alternatives

The Town is responsible for reducing phosphorus and sediment discharges to below the waste load allocations for the Town's developed urban area. Two alternatives were developed to satisfy the TMDL allocations. Each alternative identifies a combination of existing and proposed BMPs that satisfies the TMDL allocations for the Town's MS4.

- Alternative 1 – As shown in Figure 19, Alternative 1 includes construction of proposed rain gardens and one proposed wet detention pond: N&M Transfer North Pond. In addition, Alternative 1 includes entering into agreements with the City of Neenah and Wisconsin DOT for the following existing wet detention ponds: Westowne Pond, Tullar Pond, Commerce Court Pond, Green Valley Pond, and Dixie Pond. Alternative

1 also involves entering into an agreement with Winnebago County for the existing grass swales located along County Highways. Finally, as shown in Figure 19, Alternative 1 includes street sweeping every once a year with a high efficiency street sweeper, existing grass swales along Town roads, and existing wet detention ponds.

- Alternative 2 – As shown in Figure 20, Alternative 2 includes construction of proposed rain gardens and four proposed wet detention ponds: CTH 'O' Pond, Pendleton Pond, Checker Pond, and N&M Transfer North Pond. In addition, Alternative 2 includes entering into agreements with the City of Neenah and Wisconsin DOT for the following existing wet detention ponds: Westowne Pond, Tullar Pond, Commerce Court Pond, Green Valley Pond, and Dixie Pond. Finally, as shown in Figure 20, Alternative 2 includes street sweeping every once a year with a high efficiency street sweeper, existing grass swales along Town roads, and existing wet detention ponds.

Costs associated with the proposed structural BMPs are provided in Table 5-4. The capital costs provided in Table 5-4 are the estimated present value capital costs for the proposed structural BMPs. The capital costs include an allowance for construction, land acquisition, engineering, and contingency costs. The 20-year costs provided in Table 5-4 are the estimated present value costs per pound of TSS removed during a 20-year period. The 20-year costs include an allowance for capital, operation and maintenance costs associated with the existing and proposed BMPs.

Table 5-4: TMDL Alternatives Analysis

Town MS4 Alternative	Proposed Street Sweeping*			Proposed Structural BMPs
	Type of Sweeper	Sweeping Frequency	Parking Control	Capital Costs
1	H.E.	Once per year	No	$0.6 million
2	H.E.	Once per year	No	$3.3 million

* Street sweeping begins March 29 and ends November 25 of each year. High efficiency (H.E.). Mechanical (M).

Plan of Action

In the future, the Town intends to develop a Plan of Action for achieving compliance with the TMDL waste load allocations. The Plan of Action will be developed after the DNR finalizes its TMDL implementation guidance and the waste load allocations for each MS4 permitted entity located within the Town's municipal boundary. The waste load allocations identified in this report for the Town's MS4 Permit may change after the DNR finalizes its allocation and permitting process. The final TMDL waste load allocations for the Town's MS4 will likely influence the Plan of Action.

6.0 STREAM & SHORELINE STABLIZATION

Stream and shoreline erosion can result in a significant amount of sediment and phosphorus pollutants being discharged into the Fox River and Neenah Slough. Stream, shoreline and channel stabilization projects can reduce sediment and phosphorus loads being discharged into the Fox River and Neenah Slough. The estimated sediment and phosphorus loads associated with the existing stream or shoreline erosion problems were not estimated as part of this study, but should be considered during implementation of the Town's stormwater quality management plan and Plan of Action. Grant funding is available to assist with stream, shoreline and channel stabilization projects. In addition to the water quality benefits, these projects provide an opportunity to improve habitat, remove invasive species, and potentially restore wetland areas.

7.0 IMPLEMENTATION & RECOMMENDATIONS

Below are various recommendations for the Town to consider when implementing the Stormwater Quality Management Plan and working toward MS4 Permit compliance.

Resource Management Plans

Several resource management plans were discussed in Section 1.0 of this Stormwater Quality Management Plan. It is recommended that the priorities and recommendations contained in these resource management plans be incorporated into this plan by reference.

Plan of Action

It is recommended that the Town develop a Plan of Action for stormwater quality after the DNR finalizes its TMDL guidance documents and calculates the TMDL waste load allocations that are specific to the Town's municipal separate storm sewer system. The TMDL allocations calculated by the DNR will likely influence the Town's Plan of Action.

It is recommended that pollutants of concern associated with the Fox River, Neenah Slough, Lake Winnebago, and Green Bay be targeted during implementation. Pollutant loads and pollutant yields depicted in Figures 13 through 16 can be used to target specific drainage areas with heavier pollutant loads or yields. In addition, the pollutant load and BMP analysis contain in this report can be used to target specific source areas with a heavier load or BMPs with a more favorable cost.

Public Education & Public Involvement

Public education and public involvement are recommended during development and implementation of the Town's Plan of Action. Potential stakeholders include the general public, elected officials, Town Staff, developers, regulatory entities, individual property owners and other regulated entities. Although this stormwater quality management plan includes a cost versus benefit analysis, the plan does not take into consideration intangibles such as public sentiment and public opinion.

Redevelopment Sites

It is recommended that the Town evaluate public / private partnerships with landowners when developing and implementing its Plan of Action. As required by NR 151.12 and the Town's Post-Construction Stormwater Management Ordinance, redevelopment sites with 1 acre or more of land disturbance are required to achieve a minimum 40% TSS reduction. Compliance with the TSS reduction is only required when a construction project occurs on the site. As such, these redevelopment sites do not have a specific timeline for achieving a 40% TSS reduction. Nonetheless, when redevelopment occurs on commercial, industrial,

institutional and multi-family residential parcels, stormwater quality improvements will be required. Public / private partnerships provide an opportunity to work together such that both the landowner and Town benefit.

For example, redevelopment of a 20 acre industrial site may provide an opportunity to increase the site's TSS reduction goal from 40% to 80% through a cost sharing agreement between the landowner and Town. In some instances, cost sharing can be used as a financial incentive. Typically, it is more cost effective to incorporate stormwater quality improvements into an already planned construction project as compared to retrofitting a BMP without considering other construction activities in the watershed.

Ordinances

It is recommended that the Town evaluate the feasibility of adopting an ordinance that requires roof downspouts located on one and two family residential lots to discharge stormwater onto a 20 foot long grass filter strip, rather than onto a paved surface or directly into a storm sewers, grass swale or waterway. Roof downspout disconnections are cost-effective pollutant reduction techniques, particularly in areas with sandy and silty soils. The Town would be able to take stormwater quality credit for the grass filter strip's pollutant reduction benefits if the Town has legal authority to regulate downspout connections. Restrictions associated with the Wisconsin Uniform Dwelling Code will require investigation.

It is recommended that the Town evaluate if revisions to the Winnebago County post-construction stormwater management ordinance are needed. Another option is for the Town to develop its own post-construction stormwater management ordinance. It is recommended that post-construction stormwater management requirements mimic the Town's TMDL allocations. This will assist with TMDL compliance and prevent future backsliding.

Inter-Governmental Agreements

It is recommended that the Town evaluate inter-governmental agreements when developing and implementing its Plan of Action. It may be more cost effective to work together with adjoining municipal jurisdictions, such as the Wisconsin Department of Transportation or County Highway Department. Also, it may be beneficial to work together with adjoining cities, Towns and townships to cost share in a mutually beneficial stormwater BMPs, share equipment, restore wetlands, or improve water quality within the Fox River, Neenah Slough or Lake Winnebago Sub-Watersheds.

Water Quality Trading

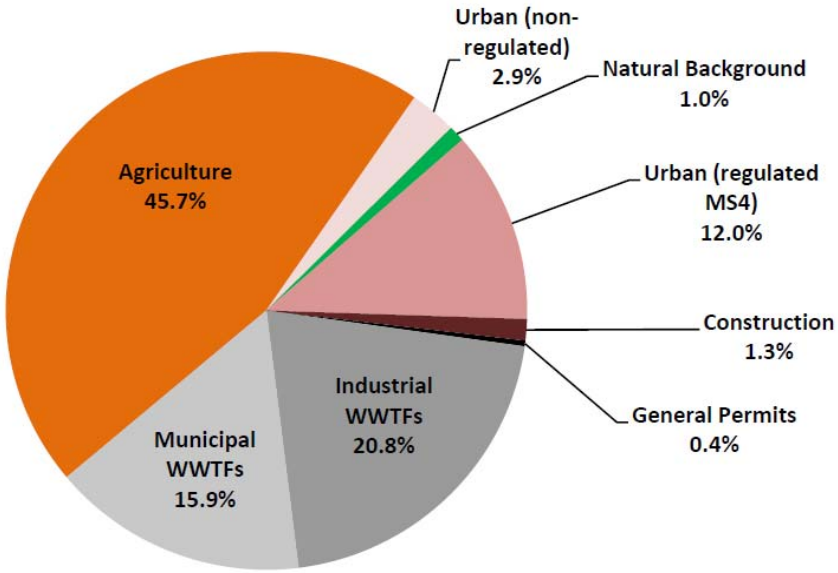
It is recommended that the Town evaluate the feasibility and cost effectiveness of water quality trading when developing and implementing its Plan of Action. The cost for achieving compliance with TMDL allocations is not uniform among dischargers and source areas. As

such, compliance with TMDL allocations may be more cost-effectively achieved by trading with other dischargers. Water quality trading is allowed between wastewater treatment facilities, agricultural landowners, and other urban stormwater dischargers. In order to be eligible for water quality trading, specific criteria needs to be satisfied. The DNR recently developed a water quality trading framework for Wisconsin. This framework has led to two additional guidance documents for trading implementation, but these documents have not yet been approved by the EPA or state.

Watershed Adaptive Management

It is recommended that the Town evaluate the feasibility and cost effectiveness of Watershed Adaptive Management when developing and implementing its Plan of Action. Adaptive management is a watershed approach that focuses on meeting water quality standards within a river, stream or lake in a more cost-effective manner. Watershed Adaptive Management needs to be initiated by a wastewater treatment facility owner, but would likely involve cooperation among all phosphorus dischargers located in the Fox-Wolf Basin including agricultural, urban stormwater, and wastewater dischargers. Exhibit 7-1 depicts the portion of phosphorus that is being generated by agriculture, urban stormwater and wastewater treatment facilities within the Lower Fox River Basin. Exhibit 7-1 was obtained from the Lower Fox River Basin TMDL Report.

Exhibit 7-1: Phosphorus Sources in Lower Fox River Basin



Municipal Leaf Collection Program

It is recommended that the Town review and potentially revise its municipal leaf collection program after the DNR and United States Geological Survey (USGS) complete their scientific

research. Currently, the DNR and USGS are sampling and monitoring stormwater runoff in the City of Madison to determine the amount of phosphorus reduction associated with different municipal leaf collection techniques. The study will help the Town evaluate its municipal leaf collection program and potentially reduce phosphorus loads from leaf litter.

Stream, Shoreline & Channel Stabilization

It is recommended that the Town undertake stream, shoreline and channel stabilization projects to reduce the discharge of sediment and phosphorus pollutants associated with bed, bank or steep slope erosion. In addition to the water quality benefits, stabilization projects provide an opportunity to improve habitat, remove invasive species, and potentially restore wetland areas. Grant funding is available to assist with stabilization projects.

5-Year Capital Improvement Plan

It is recommended that the Town develop a 5-year capital improvement plan based on this stormwater quality management plan and the Town's Plan of Action. We recommend that the 5-year capital improvement plan include ample time for public education, public input, inter-governmental agreements, BMP design, land acquisition, regulatory permits, grant applications, financing, and construction. The 5-year capital improvement plan should also take into consideration other local capital improvement projects, such as street reconstruction projects, utility projects, and private development projects. We recommend the Town explore all potential opportunities to partner with other public and private entities.

Financing Plan

It is recommended that the Town develop a financing plan. The financing plan will allow the Town to implement its Action Plan and 5-year Capital Improvement Plan. Below is a discussion of various funding sources which may be available to the Town. Depending on the project, funding options may be used individually or in combination.

- Property Taxes: Property taxes and general funds may be used to pay for stormwater projects. Typically, property tax revenue and general funds are allocated to a specific stormwater project during the community's annual budget process.

- Debt / Bonds: General obligation and revenue bonds may be used to secure funding for stormwater projects. Property taxes and revenue fees are used for long-term debt payments.

- Special Assessments: Special assessments may be used to generate funds for a specific project. Property owners that benefit from the project pay the assessment fee. Typically, other funding sources are needed to pay for project costs until property owners pay the assessment.

- Impact Fees: Impact fees may be charged to developers for stormwater projects that benefit the development. Impact fees are usually paid during initial stages of development. Typically, projects include regional stormwater facilities or improvements to deficient downstream infrastructure. Often, other funding sources are needed to pay for project costs until developers and property owners are required to pay the impact fee. Impact fees are recommended as needed to fund the Town's stormwater program.

- Tax Incremental Financing (TIF) District: TIF Districts may be used by Cities and Towns to fund stormwater projects that benefit property located within the District. Property value increases within the TIF District generate additional tax revenue that is used for long-term debt payments.

- Stormwater Utility: Stormwater utilities are similar to sanitary and water utilities. Stormwater utilities generate revenue for stormwater related projects by charging property owners an annual service fee. Annual service fees are based upon the amount of runoff generated by a specific property. Properties with more impervious area (i.e. roofs, parking lots, driveways, etc.) are charged a higher fee as compared to properties with less impervious area. All properties, including tax exempt properties, pay the service fee. Rate adjustments are recommended as needed to fund the Town's stormwater program.

- Grants / Loans: State and federal grant / loans are available for certain stormwater projects. Typically, only a certain percent of the total project cost is eligible for grant / loan money with remaining revenues to be generated by the applicant. Below are a few grant / loan programs which the Town of Neenah may or may not be familiar with. Grant applications are recommended.
    - Urban Non-Point Source and Stormwater Construction Grant
    - Targeted Runoff Management Construction Grant
    - Great Lakes Basin Program
    - Community Development Block Grant
    - Clean Water Fund

APPENDIX A

Baseline Pollutant Load & Yield Rankings

Fox River Sediment Load		
Rank	Area ID	TSS (lbs/yr)
1	G8b2d	17,717
2	G8b1	14,386
3	G8b2b	12,624
4	G8a	10,454
5	G8b2a	8,780
6	G9a1a	5,925
7	G4b2	5,373
8	G8b2c	4,764
9	G8b3a	4,529
10	G7	3,726
11	G4a3	3,659
12	G8b3c	3,656
13	G9a1b	3,478
14	G9a2	3,278
15	G8c1c	2,814
16	C11f	2,781
17	G9a3	2,731
18	G9a4	2,727
19	G9c1	2,664
20	G9b3	2,592
21	G4a1b	2,483
22	G8c1a	2,203
23	G4a1a	2,132
24	C11d	1,978
25	G8c1b	1,831
26	G6a1	1,743
27	C11c2	1,418
28	G6b	1,244
29	G8b3d	1,219
30	G9b1	1,074
31	G4b1	1,035
32	G9b3a	1,019
33	C12a2	923
34	C11c3	856
35	G8c2	547
36	G8c1d	462
37	C11g	427
38	G4b3	397
39	G8b3b	380
40	G9c2	371
41	G5c	231

Fox River Sediment Load		
Rank	Area ID	TSS (lbs/yr)
42	G4a4	148
43	C11c1	100

Neenah Slough Sediment Load		
Rank	Area ID	TSS (lbs/yr)
1	N4c5	12,449
2	S8b6	12,310
3	S8b3	11,005
4	S8a7	10,005
5	N4c6	9,667
6	N2b5	8,539
7	S6a2	8,208
8	N4c4	8,015
9	N7e1b	7,207
10	S8b4b	6,857
11	N2e1	6,598
12	S7e5	6,595
13	N2d1	6,449
14	S7e4	6,050
15	N7e9a	5,634
16	S8b7	5,301
17	N7e9b	4,974
18	N4d5	4,781
19	N2b4	4,696
20	N2e4	4,677
21	S8b2b	4,619
22	N2e5	4,536
23	N7d3	4,384
24	S7e2	3,970
25	N2b3	3,937
26	S8b5	3,861
27	N8b1a	3,836
28	S8b9	3,806
29	N2d3	3,785
30	N4b1	3,526
31	N2e7	3,500
32	N4c3	3,430
33	S8b4a	3,416
34	N2b1	3,136
35	S8a5b	3,014
36	N2c2	2,986

Neenah Slough Sediment Load		
Rank	Area ID	TSS (lbs/yr)
37	N4d6	2,887
38	N2b6	2,882
39	N2e6	2,880
40	S8a4	2,847
41	S8a5a	2,823
42	N8b1b	2,618
43	S8a6	2,601
44	N2d5	2,464
45	S8a5c	2,450
46	N7e8	2,424
47	N2d2	2,359
48	S8a1b	2,347
49	N8a4	2,215
50	N8b3	2,148
51	S8a1a	2,135
52	N4d7	2,046
53	S8b1	2,021
54	N6b	1,998
55	N2d4	1,515
56	S7e3	1,494
57	N8f1	1,482
58	N2b7	1,438
59	N7d1	1,430
60	N7e1c	1,406
61	S8a2	1,372
62	N2d6	1,365
63	N8a8	1,288
64	N2e8	1,252
65	N4c1	1,182
66	S8b2a	1,128
67	N7e6	1,100
68	S8c3	1,000
69	N8a5	946
70	N8h1	909
71	N7e3	904
72	S8a3	897
73	N4d4	886
74	S7e1	868
75	N7a2	785
76	N7e5	702
77	N5a1	695
78	S5b	582
79	S5a6	536
80	N6c	460

Neenah Slough Sediment Load		
Rank	Area ID	TSS (lbs/yr)
81	N8a7	439
82	N4a1	424
83	N8g1	398
84	N7e2	380
85	N3d2	344
86	N4c7	342
87	N8c1	342
88	N7a3	334
89	S8a8	331
90	N4c2	291
91	N8a3	255
92	N4b4	231
93	N8c2	228
94	S8c2	193
95	N3d3	180
96	N2f2	171
97	N2f1	152
98	S5c2	138
99	N7a1	131
100	S8d	117
101	N8a1	114
102	N7a4	109
103	S7d3	101
104	N8b4	79
105	N5c1	66
106	N7e7	56
107	N8a6	44
108	N8b2	32
109	N8d2	31
110	N7c1	0
111	N7c3	0
112	N7e1a	0
113	N8a2	0
114	N8d1	0
115	N8e1	0

Lake Winnebago Sediment Load		
Rank	Area ID	TSS (lbs/yr)
1	W4e	11,127
2	W7a2	5,024
3	W8a1	4,340
4	W8a4	4,114
5	W6d1	3,554
6	W4g	3,484

Lake Winnebago Sediment Load		
Rank	Area ID	TSS (lbs/yr)
7	W7c2	3,388
8	W6b2	3,031
9	W7d	2,834
10	W7c1	2,435
11	W6b1	2,398
12	W4j	2,094
13	W5a	2,052
14	W7c4	1,948
15	W8b1	1,829
16	W7e2	1,780
17	W8a5	1,764
18	W5c	1,702
19	W6c	1,643
20	W8a3	1,606
21	W8a6	1,466
22	W3d2	1,286
23	W8b2	1,024
24	W5e	1,001
25	W8a2	922
26	W6a	902
27	W7b	802
28	W4f	780
29	W3e1	719
30	W4h	718
31	W7e1	712
32	W7c5a	638
33	W6d4	621
34	W7c3	575
35	W3d7	567
36	W3d4	563
37	W4i	512
38	W6d3	484
39	W3d6	474
40	W3e2	413
41	W3c	412
42	W3d3	365
43	W5d	320
44	W6b3	306
45	W3d5	269
46	W7a3	266
47	W4d	224
48	W4a1	220
49	W3d1	160
50	W3a	131

Lake Winnebago Sediment Load		
Rank	Area ID	TSS (lbs/yr)
51	W5b	115
52	W7c5b	29
53	W3b4	27
54	W3b3	24
55	W6d2	20

Fox River Sediment Yield		
Rank	Area ID	TSS (lbs/ac/yr)
1	G4a4	890
2	G9a4	752
3	G8b3a	743
4	C11g	728
5	G9c1	705
6	G4b3	572
7	G4a3	569
8	C11c3	544
9	G8a	445
10	G8b1	435
11	G8b2c	426
12	G7	412
13	G8b2d	403
14	G8c1b	403
15	G9a2	398
16	G8b2b	397
17	G9a3	389
18	G8c1c	389
19	G9a1b	381
20	G8c1a	369
21	G4a1a	357
22	G8b3c	347
23	G8c1d	347
24	G8b3d	346
25	G8b3b	346
26	G9b1	343
27	G4b2	334
28	G8b2a	326
29	G9b3a	325
30	G4a1b	320
31	G9c2	306
32	C11c1	275
33	G9a1a	274
34	C11c2	268
35	G9b3	267
36	G5c	237
37	C11f	215
38	G6b	204
39	G4b1	200
40	C12a2	155
41	G6a1	151

Fox River Sediment Yield		
Rank	Area ID	TSS (lbs/ac/yr)
42	C11d	148
43	G8c2	135

Neenah Slough Sediment Yield		
Rank	Area ID	TSS (lbs/ac/yr)
1	N2c2	1,179
2	S8b5	1,010
3	S8a6	974
4	S8b6	973
5	S7e5	906
6	S8a7	896
7	N2f2	833
8	N2f1	833
9	N2b4	777
10	N2d1	769
11	N8a6	687
12	N2e1	671
13	N2b5	643
14	N8b4	637
15	N8b2	598
16	N7a4	595
17	S7d3	595
18	N7e7	592
19	N7e6	505
20	S8b1	472
21	N4d4	469
22	N2e4	442
23	S8a3	440
24	S8a5b	431
25	S8a5c	431
26	S7e4	424
27	S8b3	421
28	S7e2	415
29	N4c6	411
30	S8b2b	407
31	N7d1	401
32	S8b4b	390
33	S8a4	387
34	N7a2	381
35	N2b3	364
36	N8g1	335

Neenah Slough Sediment Yield		
Rank	Area ID	TSS (lbs/ac/yr)
37	N7a3	316
38	S7e1	315
39	N8a5	305
40	N7d3	298
41	S6a2	277
42	N2b6	270
43	N4b1	267
44	S8b9	263
45	S8a5a	259
46	S8a8	256
47	N2e5	256
48	S7e3	246
49	N3d2	244
50	N7e1c	232
51	S8b4a	231
52	N2d5	227
53	N2d2	226
54	N8a7	223
55	S8b7	212
56	N6b	209
57	N7e1b	205
58	N4d5	205
59	N2b1	198
60	N2e7	188
61	N7e9b	185
62	N4d7	175
63	N4c5	174
64	N7e8	174
65	N8h1	173
66	N8f1	172
67	N4d6	169
68	N8a8	167
69	N7e9a	164
70	S5c2	162
71	N8a4	160
72	N4c4	158
73	S8a1b	156
74	N4a1	154
75	N4b4	151
76	S8a1a	149
77	N2b7	148
78	N2d4	144
79	S8c3	140
80	S8a2	139

Neenah Slough Sediment Yield		
Rank	Area ID	TSS (lbs/ac/yr)
81	N4c3	138
82	N7e3	134
83	S8b2a	133
84	N7e5	131
85	N2d3	129
86	N8c1	128
87	S5a6	121
88	N5a1	120
89	N8a3	118
90	N8b1a	113
91	S8c2	111
92	N2e6	110
93	N2e8	100
94	S5b	92
95	N8b3	91
96	N6c	89
97	N8b1b	89
98	N7e2	81
99	N2d6	81
100	N4c1	80
101	N7a1	78
102	N5c1	78
103	N3d3	78
104	N4c7	76
105	N8a1	69
106	N8c2	69
107	N8d2	69
108	S8d	69
109	N4c2	58
110	N7c1	0
111	N7c3	0
112	N7e1a	0
113	N8a2	0
114	N8d1	0
115	N8e1	0

Lake Winnebago Sediment Yield		
Rank	Area ID	TSS (lbs/ac/yr)
1	W3a	595
2	W7c5a	442
3	W6d4	380
4	W8a6	301
5	W8a2	273
6	W7d	266

Lake Winnebago Sediment Yield		
Rank	Area ID	TSS (lbs/ac/yr)
7	W5b	210
8	W6d3	201
9	W7c3	200
10	W3c	200
11	W7a3	199
12	W7a2	198
13	W5a	195
14	W7e1	195
15	W7b	190
16	W7c4	188
17	W3d2	184
18	W4e	184
19	W8a3	183
20	W6b1	180
21	W8b1	172
22	W4g	171
23	W8a5	170
24	W5e	167
25	W3e1	160
26	W6d1	154
27	W4h	154
28	W7e2	154
29	W4i	148
30	W7c2	146
31	W4f	143
32	W8b2	140
33	W8a1	139
34	W3d3	129
35	W5c	129
36	W3d6	124
37	W8a4	120
38	W3e2	119
39	W3d7	113
40	W7c1	109
41	W5d	105
42	W3d5	100
43	W4a1	99
44	W6b3	98
45	W6d2	93
46	W6c	93
47	W4j	93
48	W3d1	86
49	W6b2	85
50	W6a	85

Lake Winnebago Sediment Yield		
Rank	Area ID	TSS (lbs/ac/yr)
51	W3b4	78
52	W3b3	78
53	W4d	77
54	W3d4	76
55	W7c5b	64

Fox River Phosphorus Load		
Rank	Area ID	TP (lbs/yr)
1	G8b1	26.63
2	G8b2d	25.15
3	G8a	21.82
4	G8b2a	21.35
5	G8b2b	21.34
6	G9a1a	18.16
7	G4b2	14.21
8	G9a1b	11.07
9	C11f	10.49
10	G9a2	10.21
11	G8b3a	9.86
12	G8b3c	8.94
13	G9a3	8.71
14	C11d	8.64
15	G9b3	8.62
16	G7	8.47
17	G6a1	7.88
18	G4a3	7.81
19	G8b2c	6.98
20	G4a1b	6.12
21	G9c1	6.09
22	G9a4	5.73
23	G8c1c	5.27
24	G4a1a	5.23
25	C11c2	4.93
26	G6b	4.85
27	G8c1a	4.81
28	G4b1	4.06
29	C12a2	3.87
30	G8c1b	3.16
31	G8b3d	2.98
32	G9b1	2.57
33	C11c3	2.52
34	G8c2	2.33
35	G9b3a	1.77
36	G4b3	1.19
37	G8c1d	1.13
38	C11g	1.10
39	G8b3b	0.93
40	G9c2	0.92
41	G5c	0.86

Fox River Phosphorus Load		
Rank	Area ID	TP (lbs/yr)
42	C11c1	0.35
43	G4a4	0.27

Neenah Slough Phosphorus Load		
Rank	Area ID	TP (lbs/yr)
1	N4c5	47.84
2	N4c4	32.24
3	S8b6	30.52
4	S8a7	25.64
5	N7e1b	25.38
6	N4c6	24.02
7	N7e9a	22.70
8	N2b5	21.38
9	S8b3	20.44
10	N8b1a	19.52
11	S6a2	18.87
12	S8b7	18.28
13	N4d5	17.64
14	S7e5	17.21
15	N7e9b	17.03
16	N2d3	16.78
17	N8b1b	15.20
18	N2e6	13.97
19	N2d1	13.93
20	N7d3	13.67
21	N4c3	13.62
22	N2e1	13.30
23	N2e5	13.22
24	S7e4	13.21
25	N2e7	12.99
26	N2b1	12.34
27	N8b3	12.26
28	S8b4b	11.59
29	S8b9	11.56
30	N4d6	11.29
31	N2b4	11.21
32	N2e4	10.38
33	N2b3	9.67
34	N7e8	9.56
35	N8a4	9.54
36	N2b6	9.44

Neenah Slough Phosphorus Load		
Rank	Area ID	TP (lbs/yr)
37	S8b5	9.31
38	S8a1a	9.22
39	S8a1b	9.19
40	N4b1	8.90
41	S8b4a	8.07
42	N4d7	7.88
43	S8b2b	7.85
44	N6b	7.77
45	S7e2	7.66
46	N2c2	7.26
47	N2d2	7.18
48	N2d6	7.08
49	S8a6	6.54
50	N8f1	6.22
51	N4c1	6.20
52	S8a2	6.20
53	N2d4	6.18
54	S8a5a	6.10
55	N2e8	6.06
56	N2b7	5.82
57	N2d5	5.79
58	N8a8	5.45
59	S7e3	5.08
60	N7e1c	4.95
61	S8a4	4.61
62	S8a5b	4.54
63	N7d1	4.51
64	S8b1	4.41
65	S8b2a	4.16
66	N7e3	4.06
67	S8c3	3.90
68	N8h1	3.80
69	S8a5c	3.69
70	N5a1	3.38
71	N7e6	3.37
72	N8a5	3.26
73	N7e5	3.26
74	S7e1	2.73
75	N4d4	2.71
76	N6c	2.65
77	S5b	2.60
78	S5a6	2.34
79	N7e2	2.23
80	N7a2	2.11

Neenah Slough Phosphorus Load		
Rank	Area ID	TP (lbs/yr)
81	N4c7	2.03
82	N4a1	1.84
83	N4c2	1.84
84	S8a3	1.83
85	N8a7	1.67
86	N8c1	1.63
87	N8c2	1.54
88	N8g1	1.34
89	N3d2	1.27
90	N8a3	1.27
91	S8a8	1.20
92	N7a3	1.14
93	N3d3	1.10
94	S8c2	1.00
95	N4b4	0.93
96	N7a1	0.80
97	S8d	0.79
98	N8a1	0.77
99	S5c2	0.56
100	N5c1	0.40
101	N2f2	0.38
102	N2f1	0.33
103	N7a4	0.33
104	S7d3	0.31
105	N8b4	0.22
106	N8d2	0.21
107	N7e7	0.17
108	N8a6	0.12
109	N8b2	0.10
110	N7c1	0.00
111	N7c3	0.00
112	N7e1a	0.00
113	N8a2	0.00
114	N8d1	0.00
115	N8e1	0.00

Lake Winnebago Phosphorus Load		
Rank	Area ID	TP (lbs/yr)
1	W4e	43.62
2	W7a2	19.35
3	W8a1	19.20
4	W8a4	19.00
5	W6d1	15.58
6	W6b2	15.09

Lake Winnebago Phosphorus Load		
Rank	Area ID	TP (lbs/yr)
7	W7c2	14.17
8	W4g	14.15
9	W4j	11.40
10	W7c1	11.35
11	W7d	9.64
12	W6b1	9.03
13	W6c	8.58
14	W5c	7.97
15	W5a	7.92
16	W7c4	7.82
17	W7e2	7.70
18	W8b1	7.37
19	W8a5	7.11
20	W8a3	6.01
21	W3d2	5.28
22	W8a6	5.09
23	W6a	4.78
24	W8b2	4.60
25	W5e	4.04
26	W4f	3.52
27	W3d4	3.36
28	W8a2	3.12
29	W4h	3.11
30	W7b	3.07
31	W3e1	2.94
32	W7e1	2.82
33	W3d7	2.80
34	W4i	2.27
35	W3d6	2.13
36	W7c3	2.01
37	W7c5a	2.01
38	W6d4	1.98
39	W3e2	1.96
40	W6d3	1.88
41	W5d	1.66
42	W6b3	1.65
43	W3c	1.62
44	W3d3	1.60
45	W4d	1.40
46	W3d5	1.28
47	W4a1	1.12
48	W3d1	0.95
49	W7a3	0.78
50	W5b	0.44

Lake Winnebago Phosphorus Load		
Rank	Area ID	TP (lbs/yr)
51	W3a	0.40
52	W7c5b	0.17
53	W3b4	0.17
54	W3b3	0.15
55	W6d2	0.11

Fox River Phosphorus Yield		
Rank	Area ID	TP (lbs/ac/yr)
1	C11g	1.87
2	G4b3	1.72
3	G4a4	1.63
4	G8b3a	1.62
5	G9c1	1.61
6	C11c3	1.60
7	G9a4	1.58
8	G9a3	1.24
9	G9a2	1.24
10	G4a3	1.22
11	G9a1b	1.21
12	C11c1	0.96
13	G7	0.94
14	C11c2	0.93
15	G8a	0.93
16	G9b3	0.89
17	G4b2	0.88
18	G5c	0.88
19	G4a1a	0.88
20	G8b3c	0.85
21	G8c1d	0.85
22	G8b3d	0.84
23	G8b3b	0.84
24	G9a1a	0.84
25	G9b1	0.82
26	C11f	0.81
27	G8c1a	0.81
28	G8b1	0.80
29	G6b	0.79
30	G8b2a	0.79
31	G4a1b	0.79
32	G4b1	0.78
33	G9c2	0.76
34	G8c1c	0.73
35	G8c1b	0.69
36	G6a1	0.68
37	G8b2b	0.67
38	C12a2	0.65
39	C11d	0.65
40	G8b2c	0.62
41	G8c2	0.58

Fox River Phosphorus Yield		
Rank	Area ID	TP (lbs/ac/yr)
42	G8b2d	0.57
43	G9b3a	0.56

Neenah Slough Phosphorus Yield		
Rank	Area ID	TP (lbs/ac/yr)
1	N2c2	2.87
2	S8a6	2.45
3	S8b5	2.44
4	S8b6	2.41
5	S7e5	2.36
6	S8a7	2.30
7	N8a6	1.87
8	N2b4	1.86
9	N2f2	1.83
10	N2f1	1.83
11	N8b2	1.80
12	N7a4	1.79
13	S7d3	1.79
14	N7e7	1.77
15	N8b4	1.77
16	N2d1	1.66
17	N2b5	1.61
18	N7e6	1.55
19	N4d4	1.43
20	N2e1	1.35
21	N7d1	1.26
22	N8g1	1.13
23	N7a3	1.08
24	N8a5	1.05
25	S8b1	1.03
26	N7a2	1.03
27	N4c6	1.02
28	S7e1	0.99
29	N2e4	0.98
30	N7d3	0.93
31	S8a8	0.93
32	S7e4	0.93
33	N3d2	0.90
34	S8a3	0.90
35	N2b3	0.89
36	N2b6	0.89

Neenah Slough Phosphorus Yield		
Rank	Area ID	TP (lbs/ac/yr)
37	N8a7	0.85
38	S7e3	0.84
39	N7e1c	0.82
40	N6b	0.81
41	S7e2	0.80
42	S8b9	0.80
43	S8b3	0.78
44	N2b1	0.78
45	N4d5	0.76
46	N2e5	0.75
47	S8b7	0.73
48	N8f1	0.72
49	N8h1	0.72
50	N7e1b	0.72
51	N8a8	0.70
52	N2e7	0.70
53	S8b2b	0.69
54	N8a4	0.69
55	N2d2	0.69
56	N7e8	0.68
57	N4b1	0.67
58	N4d7	0.67
59	N4a1	0.67
60	N4c5	0.67
61	N4d6	0.66
62	S5c2	0.66
63	N7e9a	0.66
64	S8b4b	0.66
65	S8a5c	0.65
66	S8a5b	0.65
67	S8a1a	0.64
68	S6a2	0.64
69	N4c4	0.64
70	N7e9b	0.63
71	S8a2	0.63
72	S8a4	0.63
73	N4b4	0.61
74	S8a1b	0.61
75	N7e5	0.61
76	N8c1	0.61
77	N7e3	0.60
78	N2b7	0.60
79	N2d4	0.59
80	N8a3	0.59

Neenah Slough Phosphorus Yield		
Rank	Area ID	TP (lbs/ac/yr)
81	N5a1	0.58
82	N8b1a	0.57
83	N2d3	0.57
84	S8c2	0.57
85	S8a5a	0.56
86	S8c3	0.55
87	N4c3	0.55
88	S8b4a	0.55
89	N2d5	0.53
90	N2e6	0.53
91	S5a6	0.53
92	N8b3	0.52
93	N8b1b	0.51
94	N6c	0.51
95	S8b2a	0.49
96	N2e8	0.48
97	N7a1	0.48
98	N5c1	0.48
99	N3d3	0.48
100	N7e2	0.48
101	N8a1	0.46
102	S8d	0.46
103	N8d2	0.46
104	N8c2	0.46
105	N4c7	0.45
106	N4c1	0.42
107	N2d6	0.42
108	S5b	0.41
109	N4c2	0.36
110	N7c1	0.00
111	N7c3	0.00
112	N7e1a	0.00
113	N8a2	0.00
114	N8d1	0.00
115	N8e1	0.00

Lake Winnebago Phosphorus Yield		
Rank	Area ID	TP (lbs/ac/yr)
1	W3a	1.79
2	W7c5a	1.39
3	W6d4	1.21
4	W8a6	1.05
5	W8a2	0.92
6	W7d	0.90

Lake Winnebago Phosphorus Yield		
Rank	Area ID	TP (lbs/ac/yr)
7	W5b	0.82
8	W3c	0.78
9	W6d3	0.78
10	W7e1	0.77
11	W7a2	0.76
12	W7c4	0.76
13	W3d2	0.75
14	W5a	0.75
15	W7b	0.73
16	W4e	0.72
17	W7c3	0.70
18	W4g	0.69
19	W8b1	0.69
20	W8a5	0.68
21	W8a3	0.68
22	W6b1	0.68
23	W6d1	0.68
24	W5e	0.67
25	W4h	0.67
26	W7e2	0.66
27	W3e1	0.66
28	W4i	0.65
29	W4f	0.64
30	W8b2	0.63
31	W8a1	0.62
32	W7c2	0.61
33	W5c	0.60
34	W7a3	0.59
35	W3d3	0.57
36	W3e2	0.56
37	W3d7	0.56
38	W8a4	0.56
39	W3d6	0.55
40	W5d	0.54
41	W6b3	0.53
42	W6d2	0.51
43	W7c1	0.51
44	W3d1	0.51
45	W4j	0.51
46	W4a1	0.50
47	W6c	0.48
48	W4d	0.48
49	W3b3	0.48
50	W3b4	0.48

Lake Winnebago Phosphorus Yield		
Rank	Area ID	TP (lbs/ac/yr)
51	W3d5	0.47
52	W3d4	0.45
53	W6a	0.45
54	W6b2	0.42
55	W7c5b	0.38

APPENDIX B

Water Quality Results

Town of Neenah Stormwater Management Plan
McM No. N0003-900379

Jurisdictions (Land Use Category from TMDL Report)	Area From TMDL Report GIS Map (acres)	Town Sub-Watershed
Town UPB		
Town ROW & Private Parcels inside Study Area (Agriculture)	56.4	Fox River
Town ROW & Private Parcels inside UPB (Forest & Wetland)	10.9	Fox River
Town ROW & Private Parcels inside Study Area (Agriculture)	178.6	Neenah Slough
Town ROW & Private Parcels inside Study Area (Quarry)	13.4	Neenah Slough
Town ROW & Private Parcels inside UPB (Forest & Wetland)	86.6	Neenah Slough
Town-Outside UPB		
Town ROW & Private Parcels inside Study Area (Agriculture)	13.5	Fox River
Town ROW & Private Parcels inside UPB (Forest & Wetland)	8.0	Fox River
Town ROW & Private Parcels inside Study Area (Agriculture)	24.1	Neenah Slough
Town ROW & Private Parcels inside UPB (Forest & Wetland)	7.4	Neenah Slough
Hwy County-UPB		
Town ROW & Private Parcels inside Study Area (Agriculture)	5.1	Fox River
Town ROW & Private Parcels inside Study Area (Agriculture)	7.2	Neenah Slough
Town ROW & Private Parcels inside Study Area (Quarry)	2.2	Neenah Slough
Town ROW & Private Parcels inside UPB (Forest & Wetland)	0.3	Neenah Slough
Hwy County-Outside UPB		
Town ROW & Private Parcels inside Study Area (Agriculture)	5.08	Fox River
Town ROW & Private Parcels inside Study Area (Agriculture)	2.05	Neenah Slough
Town ROW & Private Parcels inside UPB (Forest & Wetland)	0.39	Neenah Slough
	421.2	

Town Sub-Watershed	TMDL Report Urban Area (acres)	TMDL Report TSS					TMDL Report TP				
		Baseline (lbs/yr)	Allocate (lbs/yr)	Agric Allocate (lb/ac)	[1]Urban Non-Regulated Allocate (lb/ac)	[2]Natural Backgrnd Allocate (lb/ac)	Baseline (lbs/yr)	Allocate (lbs/yr)	Agric Allocate (lb/ac)	Urban Non-Regulated Allocate (lb/ac)	Natural Backgrnd Allocate (lb/ac)
Fox River	349	116,109	40,404	206	150	30	194	135.8	0.36	0.51	0.10
Neenah Slough	971	272,484	163,490	245	171	14	560	392.0	0.42	0.40	0.11

[1]Includes Quarries

[2]Includes Forest, Wetlands & other natural areas

Town Sub-Watershed	TMDL Report Land Use	TMDL Report (acres)	Extra TSS Allocated (lbs/yr)	Extra TP Allocated (lbs/yr)
Fox River	Agriculture	80.1	16,460	28.78
Neenah Slough	Agriculture	211.9	51,956	89.63
Fox River	Urban Non-Regulated	0.0	0	0.00
Neenah Slough	Urban Non-Regulated	15.6	2,673	6.17
Fox River	Natural Background	18.9	562	1.98
Neenah Slough	Natural Background	94.7	1,366	10.14
		421.2	73,016	136.70

Town Sub-Watershed	Revised TMDL Report Area (acres)	Revised TMDL Report Total TSS Allocations (lbs/yr)	Revised TMDL Report Total TP Allocations (lbs/yr)
Fox River	448	57,425	166.56
Neenah Slough	1,293	219,484	497.94
	1,741	276,910	664.50

Town of Neenah Stormwater Management Plan
McM No. N0003-900379 December 14, 2012

2012 Condition: (2012 Land Use, No Parking Control Ordinance, High Efficiency Street Sweeping once per year, No Quarries)

			Town - Within UPB (Excludes areas outside UPB, other MS4 jurisdictions and land owned by others)										
				Total Suspended Solids (TSS)					Total Phosphorus (TP)				
Drainage System	Watershed	BMP Name	Area (acres)	Before Drain System (lbs/yr)	After Drain System (lbs/yr)	BMP Reduct (%)	After Outfall Control (lbs/yr)	Total Load Reduc (%)	Before Drain System (lbs/yr)	After Drain System (lbs)	BMP Reduct (%)	After Outfall Control (lbs/yr)	Total Load Reduc (%)
EBMP G4a1b	Fox River	Tuckaway Storage Pond	7.75	2,483	2,483	86.8%	327	86.8%	6.12	6.12	70.5%	1.81	70.5%
EBMP G8b2d	Fox River	Gibson Salvage Pond	43.98	17,717	17,717	66.6%	5,910	66.6%	25.15	25.15	54.8%	11.37	54.8%
EBMP G8b3c	Fox River	Ogden Pond	10.50	3,635	3,635	78.7%	775	78.7%	8.87	8.87	54.9%	4.00	54.9%
EBMP G8b3d	Fox River	Tushsherer Self-Storage Pond	3.52	1,219	1,219	81.0%	232	81.0%	2.98	2.98	56.3%	1.30	56.3%
EBMP G8c1b	Fox River	Rockwood Warehouse North Pond	4.55	1,831	1,831	93.0%	128	93.0%	3.16	3.16	77.4%	0.71	77.4%
EBMP G8c1c	Fox River	Rockwood Warehouse South Pond	7.24	2,814	2,814	87.8%	342	87.8%	5.27	5.27	73.1%	1.42	73.1%
EBMP G8c1d	Fox River	4C Storage Pond	1.33	462	462	80.0%	92	80.0%	1.13	1.13	67.0%	0.37	67.0%
EBMP G9c2	Fox River	Dermatology Associates Pond	1.21	371	371	80.6%	72	80.6%	0.92	0.92	64.3%	0.33	64.3%
Other Drainage System	Fox River		128.05	31,458	18,572		18,572	41.0%	92.23	55.11		55.11	40.3%
G8b3a	Fox River		97.97	34,845	29,742		29,742	14.6%	61.58	50.73		50.73	17.6%
G9a3	Fox River		12.17	3,945	2,973		2,973	24.6%	12.99	10.39		10.39	20.0%
EBMP N4c5	Neenah Slough	Sunset Terrace Pond	167.03	25,334	25,334	76.4%	5,969	76.4%	101.66	101.66	49.0%	51.80	49.0%
EBMP N4d6	Neenah Slough	White Tail Run South Pond	17.04	2,887	2,887	75.0%	722	75.0%	11.29	11.29	48.5%	5.82	48.5%
EBMP N4d7	Neenah Slough	White Tail Run West Pond	11.70	2,046	2,046	84.6%	316	84.6%	7.88	7.88	50.5%	3.90	50.5%
EBMP N7e8	Neenah Slough	Woodside Acres Pond	13.49	2,159	2,159	88.5%	248	88.5%	8.76	8.76	52.1%	4.19	52.1%
EBMP S8a1b	Neenah Slough	Spring Meadows Pond	0.00	0	0	91.7%	0	-	0.00	0.00	55.0%	0.00	-
Other Drainage System	Neenah Slough		397.53	80,629	63,503		63,503	21.2%	258.31	211.14		211.14	18.3%
N2b6	Neenah Slough		20.26	4,246	1,972		1,972	53.6%	15.04	7.73		7.73	48.6%
N2e5	Neenah Slough		15.96	3,315	1,737		1,737	47.6%	9.96	6.06		6.06	39.2%
N2e7	Neenah Slough		18.59	3,500	387		387	88.9%	12.99	1.95		1.95	85.0%
N3d2	Neenah Slough		1.41	344	329		329	4.6%	1.27	1.24		1.24	2.9%
N4b4	Neenah Slough		22.60	3,436	3,430		3,430	0.2%	14.15	14.13		14.13	0.1%
N5c3	Neenah Slough		0.84	66	66		66	0.0%	0.40	0.40		0.40	0.0%
N7e1b	Neenah Slough		33.61	6,217	1,978		1,978	68.2%	22.80	7.00		7.00	69.3%
N7e1c	Neenah Slough		21.71	2,741	1,268		1,268	53.7%	12.58	7.54		7.54	40.0%
N7e9a	Neenah Slough		33.98	5,227	1,348		1,348	74.2%	21.55	7.35		7.35	65.9%
N7e9b	Neenah Slough		26.12	4,549	3,024		3,024	33.5%	15.73	10.46		10.46	33.5%
N8a4	Neenah Slough		13.47	2,179	841		841	61.4%	9.35	4.73		4.73	49.4%
N8b1a	Neenah Slough		34.04	3,836	966		966	74.8%	19.52	5.83		5.83	70.1%
S5b	Neenah Slough		6.16	570	570		570	0.0%	2.54	2.54		2.54	0.0%
S6a2	Neenah Slough		28.60	7,750	7,750		7,750	0.0%	17.43	17.43		17.43	0.0%
S7e4	Neenah Slough		23.77	6,250	6,250		6,250	0.0%	13.61	13.61		13.61	0.0%
S8a2	Neenah Slough		9.34	1,111	774		774	30.3%	4.60	2.48		2.48	46.1%
S8a5b	Neenah Slough		12.66	5,463	5,463		5,463	0.0%	8.22	8.22		8.22	0.0%
S8b3	Neenah Slough		36.16	14,524	10,992		10,992	24.3%	25.74	20.40		20.40	20.7%
S8b4b	Neenah Slough		23.20	9,596	7,738		7,738	19.4%	17.59	14.16		14.16	19.5%
EBMP W6b1	Lake Winnebago	Hidden Acres Pond	13.29	2,398	2,398	86.8%	317	86.8%	9.03	9.03	56.2%	3.95	56.2%
EBMP W7a3	Lake Winnebago	Herzinger Pond	49.50	8,217	8,217	83.2%	1,384	83.2%	34.26	34.26	57.2%	14.66	57.2%
Other Drainage System	Lake Winnebago		109.64	15,151	5,132		5,132	66.1%	65.31	26.24		26.24	59.8%
W4e	Lake Winnebago		60.64	11,127	923		923	91.7%	43.62	4.42		4.42	89.9%
W7c2	Lake Winnebago		43.58	5,004	2,743		2,743	45.2%	23.10	15.69		15.69	32.1%
W8a1	Lake Winnebago		29.33	3,815	631		631	83.5%	17.36	3.52		3.52	79.7%

2012 Condition: (Entire Study Area)

	Town - Within UPB (Excludes areas outside UPB, other MS4 jurisdictions and land owned by others)										
		Total Suspended Solids (TSS) Provided					Total Phosphorus (TP) Provided				
Sub-Watershed	Area (acres)	Before Drain System (lbs/yr)	After Drain System (lbs/yr)	BMP Reduct (%)	After Outfall Control (lbs/yr)	Load Reduct (%)	Before Drain System (lbs/yr)	After Drain System (lbs/yr)	BMP Reduct (%)	After Outfall Control (lbs/yr)	Load Reduct (%)
Fox River	318.27	100,779			59,165	41.3%	220.40			137.54	37.6%
Neenah Slough	989.28	197,976			127,642	35.5%	632.96			430.13	32.0%
Lake Winnebago	305.97	45,712			11,131	75.6%	192.67			68.48	64.5%
	1,613.52	344,467			197,939	42.5%	1,046.03			636.15	39.2%

Allocation Adjustments to Urban (MS4) Allocations in TMDL Report

	Town - Within UPB (Excludes areas outside UPB, other MS4 jurisdictions and land owned by others)									
		Extra Total Suspended Solids (TSS) Allocated				Extra Total Phosphorus (TP) Allocated				
Sub-Watershed				Agric, Quarry, Forest, Wetlnd (acres)	Agric, Quarry, Forest, Wetlnd (lb/yr)				Agric, Quarry, Forest, Wetlnd (acres)	Agric, Quarry, Forest, Wetlnd (lb/yr)	
Fox River				67.25	11,911				67.25	21.40	
Neenah Slough				278.62	47,323				278.62	90.09	

Urban (MS4) Allocations Including Adjustments (Baseline Load Method) (Entire Study Area)

	Town - Within UPB (Excludes areas outside UPB, other MS4 jurisdictions and land owned by others)									
		Total Suspended Solids (TSS) Allocation					Total Phosphorus (TP) Allocation				
Sub-Watershed	Area (acres)	Allocate (%)			Allocate (lbs/yr)		Allocate (%)			Allocate (lbs/yr)	
Fox River	318.27	70.5%			40,411		66.9%			112.28	
Neenah Slough	989.28	68.8%			159,874		71.9%			371.78	
	1,307.55				200,284					484.05	

2012 Condition: (Baseline Load Method) (Excludes Town-Outside UPB, ROW County HWY, ROW State STH

		Total Suspended Solids (TSS)						Total Phosphorus (TP)			
Sub-Watershed	Area (acres)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)	Allocate (lbs/yr)	Satisfy TSS?	Differ. (lbs/yr)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)	Allocate (lbs/yr)
Fox River	319.47	100,938	59,324	41.2%	40,455	NO	18,869	221.2	138.3	37.5%	112.6
Neenah Slough	994.45	198,902	128,537	35.4%	160,400	YES	-31,863	635.7	432.7	31.9%	373.0
Lake Winnebago	310.78	46,554	11,444	75.4%	-	-	-	196.0	70.5	64.0%	-
	1,624.71	346,395	199,306	42.5%	200,856			1,052.8	641.5	39.1%	485.6

2012 Condition: (2012 Land Use, No Parking Control Ordinance, High Efficiency St

			Town - Outside UPB							ROW County HWY - Within UPB						
				TSS Provided			TP Provided				TSS Provided			TP Provided		
Drainage System	Watershed	BMP Name	Area (acres)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduc (%)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduc (%)	Area (acres)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduc (%)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduc (%)
EBMP G4a1b	Fox River	Tuckaway Storage Pond														
EBMP G8b2d	Fox River	Gibson Salvage Pond														
EBMP G8b3c	Fox River	Ogden Pond								0.04	21	5	78.7%	0.06	0.03	54.9%
EBMP G8b3d	Fox River	Tushsherer Self-Storage Pond														
EBMP G8c1b	Fox River	Rockwood Warehouse North Pond														
EBMP G8c1c	Fox River	Rockwood Warehouse South Pond														
EBMP G8c1d	Fox River	4C Storage Pond														
EBMP G9c2	Fox River	Dermatology Associates Pond														
Other Drainage System	Fox River		35.34	11,637	8,889	23.6%	34.44	28.36	17.6%	18.12	13,768	13,452	2.3%	32.86	32.40	1.4%
G8b3a	Fox River									14.29	11,257	11,236	0.2%	26.34	26.30	0.2%
G9a3	Fox River		1.05	592	12	97.9%	1.77	0.04	97.7%	1.65	923	923	0.0%	2.79	2.79	0.0%
EBMP N4c5	Neenah Slough	Sunset Terrace Pond								0.05	33	8	76.4%	0.09	0.04	49.0%
EBMP N4d6	Neenah Slough	White Tail Run South Pond														
EBMP N4d7	Neenah Slough	White Tail Run West Pond														
EBMP N7e8	Neenah Slough	Woodside Acres Pond								0.48	265	30	88.5%	0.80	0.38	52.1%
EBMP S8a1b	Neenah Slough	Spring Meadows Pond	15.02	2,347	195	91.7%	9.19	4.14	55.0%							
Other Drainage System	Neenah Slough		46.35	9,272	4,215	54.5%	36.63	21.55	41.2%	12.29	8,627	8,519	1.2%	22.04	21.83	1.0%
N2b6	Neenah Slough		0.12	73	48	34.3%	0.22	0.15	32.3%							
N2e5	Neenah Slough									1.78	1,220	1,220	0.0%	3.26	3.26	0.0%
N2e7	Neenah Slough															
N3d2	Neenah Slough															
N4b4	Neenah Slough									4.16	2,461	2,460	0.0%	7.14	7.14	0.0%
N5c3	Neenah Slough															
N7e1b	Neenah Slough		0.01	1	1	0.0%	0.01	0.01	0.0%	1.26	851	851	0.0%	2.16	2.16	0.0%
N7e1c	Neenah Slough									1.08	650	650	0.0%	1.93	1.93	0.0%
N7e9a	Neenah Slough									2.59	1,507	1,507	0.0%	4.53	4.53	0.0%
N7e9b	Neenah Slough		0.46	252	23	91.0%	0.78	0.08	89.9%	0.40	229	229	0.0%	0.69	0.69	0.0%
N8a4	Neenah Slough															
N8b1a	Neenah Slough															
S5b	Neenah Slough		0.14	12	12	0.0%	0.07	0.07	0.0%							
S6a2	Neenah Slough		0.33	30	30	0.0%	0.16	0.16	0.0%							
S7e4	Neenah Slough		0.62	57	57	0.0%	0.31	0.31	0.0%	5.36	3,953	3,953	0.0%	9.82	9.82	0.0%
S8a2	Neenah Slough		16.89	3,294	760	76.9%	12.65	4.26	66.4%							
S8a5b	Neenah Slough															
S8b3	Neenah Slough		1.31	1,099	818	25.6%	2.55	2.03	20.4%							
S8b4b	Neenah Slough		7.12	410	410	0.0%	2.58	2.58	0.0%							
EBMP W6b1	Lake Winnebago	Hidden Acres Pond														
EBMP W7a3	Lake Winnebago	Herzinger Pond	0.02	10	2	83.2%	0.03	0.01	57.2%	1.78	1,107	186	83.2%	3.08	1.32	57.2%
Other Drainage System	Lake Winnebago		201.18	22,143	18,648	15.8%	107.87	95.03	11.9%	0.63	410	410	0.0%	1.07	1.07	0.0%
W4e	Lake Winnebago															
W7c2	Lake Winnebago		0.59	38	38	0.0%	0.23	0.23	0.0%	0.87	551	551	0.0%	1.51	1.51	0.0%
W8a1	Lake Winnebago		1.84	524	29	94.5%	1.84	0.16	91.4%							

2012 Condition: (Entire Study Area)

	Town - Outside UPB							ROW County HWY - Within UPB						
		TSS Provided			TP Provided				TSS Provided			TP Provided		
Sub-Watershed	Area (acres)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduc (%)	Area (acres)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduc (%)
Fox River	36.39	12,229	8,902	27.2%	36.21	28.40	21.6%	34.09	25,968	25,615	1.4%	62.06	61.52	0.9%
Neenah Slough	88.37	16,847	6,569	61.0%	65.15	35.33	45.8%	29.45	19,796	19,428	1.9%	52.45	51.78	1.3%
Lake Winnebago	203.63	22,715	18,717	17.6%	109.96	95.43	13.2%	3.28	2,067	1,147	44.5%	5.67	3.90	31.2%
	328.38	51,791	34,188	34.0%	211.32	159.16	24.7%	66.82	47,831	46,190	3.4%	120.18	117.20	2.5%

Allocation Adjustments to Urban (MS4) Allocations in TMDL Report

	Town - Outside UPB						ROW County HWY - Within UPB					
		Extra TSS Allocated			Extra TP Allocated			Extra TSS Allocated			Extra TP Allocated	
Sub-Watershed		Agric, Quarry, Forest, Wetlnd (acres)	Agric, Quarry, Forest, Wetlnd (lb/yr)		Agric, Quarry, Forest, Wetlnd (acres)	Agric, Quarry, Forest, Wetlnd (lb/yr)		Agric, Quarry, Forest, Wetlnd (acres)	Agric, Quarry, Forest, Wetlnd (lb/yr)		Agric, Quarry, Forest, Wetlnd (acres)	Agric, Quarry, Forest, Wetlnd (lb/yr)	
Fox River		21.50	3,010		21.50	5.69			5.14	1,056		5.14	1.85	
Neenah Slough		31.52	6,019		31.52	10.99			9.69	2,144		9.69	3.94	

Urban (MS4) Allocations Including Adjustments (Baseline Load Method) (Entire Study Area)

	Town - Outside UPB						ROW County HWY - Within UPB					
		TSS Allocation			TP Allocation			TSS Allocation			TP Allocation	
Sub-Watershed	Area (acres)	Allocate (%)	Allocate (lbs/yr)		Allocate (%)	Allocate (lbs/yr)	Area (Acres)	Allocate (%)	Allocate (lbs/yr)		Allocate (%)	Allocate (lbs/yr)
Fox River	36.39	8.6%	6,468		11.0%	20.62	34.09	18.2%	8,400		18.8%	27.44
Neenah Slough	88.37	5.9%	15,596		7.4%	39.98	29.45	6.9%	13,398		6.0%	27.28
	124.76		22,065			60.60	63.54		21,797			54.72

2012 Condition: (Baseline Load Method) (Excludes Town-Outside UPB, ROW County HWY, ROW State STH

Sub-Watershed	Satisfy TP?	Differ. (lbs/yr)
Fox River	NO	25.7
Neenah Slough	NO	59.7
Lake Winnebago	-	-

2012 Condition: (2012 Land Use, No Parking Control Ordinance, High Efficiency St

			ROW County HWY - Outside UPB							ROW State STH - Within UPB						
				TSS Provided			TP Provided				TSS Provided			TP Provided		
Drainage System	Watershed	BMP Name	Area (acres)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduc (%)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduc (%)	Area (acres)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduc (%)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduc (%)
EBMP G4a1b	Fox River	Tuckaway Storage Pond														
EBMP G8b2d	Fox River	Gibson Salvage Pond														
EBMP G8b3c	Fox River	Ogden Pond														
EBMP G8b3d	Fox River	Tushsherer Self-Storage Pond														
EBMP G8c1b	Fox River	Rockwood Warehouse North Pond														
EBMP G8c1c	Fox River	Rockwood Warehouse South Pond														
EBMP G8c1d	Fox River	4C Storage Pond														
EBMP G9c2	Fox River	Dermatology Associates Pond														
Other Drainage System	Fox River		4.21	2,993	2,993	0.0%	7.70	7.70	0.0%							
G8b3a	Fox River															
G9a3	Fox River		1.28	749	749	0.0%	2.23	2.23	0.0%							
EBMP N4c5	Neenah Slough	Sunset Terrace Pond														
EBMP N4d6	Neenah Slough	White Tail Run South Pond														
EBMP N4d7	Neenah Slough	White Tail Run West Pond														
EBMP N7e8	Neenah Slough	Woodside Acres Pond														
EBMP S8a1b	Neenah Slough	Spring Meadows Pond														
Other Drainage System	Neenah Slough		2.73	1,624	1,624	0.0%	4.89	4.89	0.0%	41.29	48,607	48,607	0.0%	117.98	117.98	0.0%
N2b6	Neenah Slough															
N2e5	Neenah Slough															
N2e7	Neenah Slough															
N3d2	Neenah Slough															
N4b4	Neenah Slough															
N5c3	Neenah Slough															
N7e1b	Neenah Slough		0.23	138	138	0.0%	0.41	0.41	0.0%							
N7e1c	Neenah Slough															
N7e9a	Neenah Slough															
N7e9b	Neenah Slough															
N8a4	Neenah Slough															
N8b1a	Neenah Slough															
S5b	Neenah Slough															
S6a2	Neenah Slough															
S7e4	Neenah Slough		1.04	710	710	0.0%	1.93	1.93	0.0%	0.81	952	952	0.0%	2.32	2.32	0.0%
S8a2	Neenah Slough															
S8a5b	Neenah Slough															
S8b3	Neenah Slough															
S8b4b	Neenah Slough															
EBMP W6b1	Lake Winnebago	Hidden Acres Pond														
EBMP W7a3	Lake Winnebago	Herzinger Pond														
Other Drainage System	Lake Winnebago		14.77	8,649	8,649	0.0%	26.04	26.04	0.0%							
W4e	Lake Winnebago															
W7c2	Lake Winnebago		0.39	231	231	0.0%	0.69	0.69	0.0%							
W8a1	Lake Winnebago															

2012 Condition: (Entire Study Area)

	ROW County HWY - Outside UPB							ROW State STH - Within UPB						
		TSS Provided			TP Provided				TSS Provided			TP Provided		
Sub-Watershed	Area (acres)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)	Area (acres)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)
Fox River	5.49	3,742	3,742	0.0%	9.93	9.93	0.0%	0.00	0	0	-	0.00	0.00	-
Neenah Slough	4.01	2,472	2,472	0.0%	7.24	7.24	0.0%	42.10	49,560	49,560	0.0%	120.29	120.29	0.0%
Lake Winnebago	15.16	8,879	8,879	0.0%	26.73	26.73	0.0%	0.00	0	0	-	0.00	0.00	-
	24.66	15,094	15,094	0.0%	43.90	43.90	0.0%	42.10	49,560	49,560	0.0%	120.29	120.29	0.0%

Allocation Adjustments to Urban (MS4) Allocations in TMDL Report

	ROW County HWY - Outside UPB						ROW State STH - Within UPB					
		Extra TSS Allocated			Extra TP Allocated			Extra TSS Allocated			Extra TP Allocated	
Sub-Watershed		Agric, Quarry, Forest, Wetlnd (acres)	Agric, Quarry, Forest, Wetlnd (lb/yr)		Agric, Quarry, Forest, Wetlnd (acres)	Agric, Quarry, Forest, Wetlnd (lb/yr)		Agric, Quarry, Forest, Wetlnd (acres)	Agric, Quarry, Forest, Wetlnd (lb/yr)		Agric, Quarry, Forest, Wetlnd (acres)	Agric, Quarry, Forest, Wetlnd (lb/yr)
Fox River		5.08	1,044		5.08	1.83		0.00	0		0.00	0.00
Neenah Slough		2.45	509		2.45	0.91		0.00	0		0.00	0.00

Urban (MS4) Allocations Including Adjustments (Baseline Load Method) (Entire Study Area)

	ROW County HWY - Outside UPB						ROW State STH - Within UPB					
		TSS Allocation			TP Allocation			TSS Allocation			TP Allocation	
Sub-Watershed	Area (Acres)	Allocate (%)	Allocate (lbs/yr)		Allocate (%)	Allocate (lbs/yr)		Area (Acres)	Allocate (%)	Allocate (lbs/yr)		Allocate (%)	Allocate (lbs/yr)	
Fox River	5.49	2.6%	2,102		3.0%	5.92		0.00	0.0%	0		0.0%	0.00	
Neenah Slough	4.01	0.9%	1,915		0.8%	4.13		42.10	17.2%	28,175		13.7%	53.53	
	9.50		4,017			10.05		42.10		28,175			53.53	

2012 Condition: (Baseline Load Method) (Excludes Town-Outside UPB, ROW County HWY, ROW State STH

Sub-Watershed
Fox River
Neenah Slough
Lake Winnebago

Town of Neenah Stormwater Management Plan
McM No. N0003-900379 December 14, 2012

2012 Condition: (2012 Land Use, No Parking Control Ordinance, High Efficiency St

			Neenah Sanitary District - Within UPB							Other Municipal Owned Lands - Within UPB						
				TSS Provided			TP Provided				TSS Provided			TP Provided		
Drainage System	Watershed	BMP Name	Area (acres)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduc (%)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduc (%)	Area (acres)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduc (%)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduc (%)
EBMP G4a1b	Fox River	Tuckaway Storage Pond														
EBMP G8b2d	Fox River	Gibson Salvage Pond														
EBMP G8b3c	Fox River	Ogden Pond														
EBMP G8b3d	Fox River	Tushsherer Self-Storage Pond														
EBMP G8c1b	Fox River	Rockwood Warehouse North Pond														
EBMP G8c1c	Fox River	Rockwood Warehouse South Pond														
EBMP G8c1d	Fox River	4C Storage Pond														
EBMP G9c2	Fox River	Dermatology Associates Pond														
Other Drainage System	Fox River									1.21	159	159	0.0%	0.76	0.76	0.0%
G8b3a	Fox River															
G9a3	Fox River															
EBMP N4c5	Neenah Slough	Sunset Terrace Pond														
EBMP N4d6	Neenah Slough	White Tail Run South Pond														
EBMP N4d7	Neenah Slough	White Tail Run West Pond														
EBMP N7e8	Neenah Slough	Woodside Acres Pond														
EBMP S8a1b	Neenah Slough	Spring Meadows Pond														
Other Drainage System	Neenah Slough		3.40	387	387	0.0%	1.69	1.69	0.0%	0.36	44	44	0.0%	0.20	0.20	0.0%
N2b6	Neenah Slough															
N2e5	Neenah Slough															
N2e7	Neenah Slough															
N3d2	Neenah Slough															
N4b4	Neenah Slough															
N5c3	Neenah Slough															
N7e1b	Neenah Slough															
N7e1c	Neenah Slough															
N7e9a	Neenah Slough															
N7e9b	Neenah Slough															
N8a4	Neenah Slough									0.34	36	5	86.8%	0.18	0.03	84.6%
N8b1a	Neenah Slough															
S5b	Neenah Slough															
S6a2	Neenah Slough															
S7e4	Neenah Slough									1.07	460	460	0.0%	0.69	0.69	0.0%
S8a2	Neenah Slough															
S8a5b	Neenah Slough															
S8b3	Neenah Slough															
S8b4b	Neenah Slough															
EBMP W6b1	Lake Winnebago	Hidden Acres Pond														
EBMP W7a3	Lake Winnebago	Herzinger Pond	2.62	636	107	83.2%	2.31	0.99	57.2%							
Other Drainage System	Lake Winnebago		2.19	205.95	205.95	0.0%	0.98	0.98	0.0%							
W4e	Lake Winnebago															
W7c2	Lake Winnebago															
W8a1	Lake Winnebago															

2012 Condition: (Entire Study Area)

	Neenah Sanitary District - Within UPB							Other Municipal Owned Lands - Within UPB						
		TSS Provided			TP Provided				TSS Provided			TP Provided		
Sub-Watershed	Area (acres)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)	Area (acres)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)
Fox River	0.00	0	0	-	0.00	0.00	-	1.21	159	159	0.0%	0.76	0.76	0.0%
Neenah Slough	3.40	387	387	0.0%	1.69	1.69	0.0%	1.77	539	508	5.8%	1.07	0.92	14.5%
Lake Winnebago	4.81	842	313	62.8%	3.30	1.97	40.1%	0.00	0	0	-	0.00	0.00	-
	8.21	1,229	700	43.0%	4.98	3.66	26.6%	2.98	698	667	4.5%	1.84	1.68	8.5%

Allocation Adjustments to Urban (MS4) Allocations in TMDL Report

		Neenah Sanitary District - Within UPB						Other Municipal Owned Lands - Within UPB					
		Extra TSS Allocated			Extra TP Allocated				Extra TSS Allocated			Extra TP Allocated	
Sub-Watershed		Agric, Quarry, Forest, Wetlnd (acres)	Agric, Quarry, Forest, Wetlnd (lb/yr)		Agric, Quarry, Forest, Wetlnd (acres)	Agric, Quarry, Forest, Wetlnd (lb/yr)			Agric, Quarry, Forest, Wetlnd (acres)	Agric, Quarry, Forest, Wetlnd (lb/yr)		Agric, Quarry, Forest, Wetlnd (acres)	Agric, Quarry, Forest, Wetlnd (lb/yr)	
Fox River		0.00	0		0.00	0.00			0.00	0		0.00	0.00	
Neenah Slough		0.00	0		0.00	0.00			0.00	0		0.00	0.00	

Urban (MS4) Allocations Including Adjustments (Baseline Load Method) (Entire Study Area)

	Neenah Sanitary District - Within UPB						Other Municipal Owned Lands - Within UPB					
		TSS Allocation			TP Allocation							
Sub-Watershed	Area (Acres)	Allocate (%)	Allocate (lbs/yr)		Allocate (%)	Allocate (lbs/yr)		Area (Acres)	Allocate (%)	Allocate (lbs/yr)		Allocate (%)	Allocate (lbs/yr)	
Fox River	0.00	0.0%	0		0.0%	0.00		1.21	0.1%	45		0.2%	0.31	
Neenah Slough	3.40	0.1%	220		0.2%	0.75		1.77	0.2%	307		0.1%	0.48	
	3.40		220			0.75		2.98		352			0.79	

2012 Condition: (Baseline Load Method) (Excludes Town-Outside UPB, ROW County HWY, ROW State STH

Sub-Watershed
Fox River
Neenah Slough
Lake Winnebago

2012 Condition: (2012 Land Use, No Parking Control Ordinance, High Efficiency St

Drainage System	Watershed	BMP Name	Totals/Sums for Comparison						
				TSS Provided			TP Provided		
			Area (acres)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduc (%)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduc (%)
EBMP G4a1b	Fox River	Tuckaway Storage Pond	7.75	2,483	327	86.8%	6.12	1.81	70.5%
EBMP G8b2d	Fox River	Gibson Salvage Pond	43.98	17,717	5,910	66.6%	25.15	11.37	54.8%
EBMP G8b3c	Fox River	Ogden Pond	10.53	3,656	779	78.7%	8.94	4.03	54.9%
EBMP G8b3d	Fox River	Tushsherer Self-Storage Pond	3.52	1,219	232	81.0%	2.98	1.30	56.3%
EBMP G8c1b	Fox River	Rockwood Warehouse North Pond	4.55	1,831	128	93.0%	3.16	0.71	77.4%
EBMP G8c1c	Fox River	Rockwood Warehouse South Pond	7.24	2,814	342	87.8%	5.27	1.42	73.1%
EBMP G8c1d	Fox River	4C Storage Pond	1.33	462	92	80.0%	1.13	0.37	67.0%
EBMP G9c2	Fox River	Dermatology Associates Pond	1.21	371	72	80.6%	0.92	0.33	64.3%
Other Drainage System	Fox River		186.94	60,015	44,066	26.6%	168.00	124.34	26.0%
G8b3a	Fox River		112.26	46,102	40,977	11.1%	87.93	77.03	12.4%
G9a3	Fox River		16.15	6,209	4,657	25.0%	19.78	15.45	21.9%
EBMP N4c5	Neenah Slough	Sunset Terrace Pond	167.08	25,367	5,976	76.4%	101.74	51.85	49.0%
EBMP N4d6	Neenah Slough	White Tail Run South Pond	17.04	2,887	722	75.0%	11.29	5.82	48.5%
EBMP N4d7	Neenah Slough	White Tail Run West Pond	11.70	2,046	316	84.6%	7.88	3.90	50.5%
EBMP N7e8	Neenah Slough	Woodside Acres Pond	13.97	2,424	279	88.5%	9.56	4.58	52.1%
EBMP S8a1b	Neenah Slough	Spring Meadows Pond	15.02	2,347	195	91.7%	9.19	4.14	55.0%
Other Drainage System	Neenah Slough		503.95	149,189	126,900	14.9%	441.74	379.27	14.1%
N2b6	Neenah Slough		20.39	4,319	2,020	53.2%	15.26	7.88	48.4%
N2e5	Neenah Slough		17.73	4,536	2,957	34.8%	13.22	9.31	29.5%
N2e7	Neenah Slough		18.59	3,500	387	88.9%	12.99	1.95	85.0%
N3d2	Neenah Slough		1.41	344	329	4.6%	1.27	1.24	2.9%
N4b4	Neenah Slough		26.76	5,898	5,890	0.1%	21.29	21.27	0.1%
N5c3	Neenah Slough		0.84	66	66	0.0%	0.40	0.40	0.0%
N7e1b	Neenah Slough		35.11	7,207	2,969	58.8%	25.38	9.58	62.3%
N7e1c	Neenah Slough		22.80	3,391	1,918	43.4%	14.51	9.47	34.7%
N7e9a	Neenah Slough		36.57	6,734	2,855	57.6%	26.07	11.87	54.5%
N7e9b	Neenah Slough		26.98	5,030	3,275	34.9%	17.20	11.23	34.7%
N8a4	Neenah Slough		13.82	2,215	846	61.8%	9.54	4.76	50.1%
N8b1a	Neenah Slough		34.04	3,836	966	74.8%	19.52	5.83	70.1%
S5b	Neenah Slough		6.30	582	582	0.0%	2.60	2.60	0.0%
S6a2	Neenah Slough		28.93	7,780	7,780	0.0%	17.59	17.59	0.0%
S7e4	Neenah Slough		32.66	12,382	12,382	0.0%	28.68	28.68	0.0%
S8a2	Neenah Slough		26.22	4,404	1,534	65.2%	17.25	6.73	61.0%
S8a5b	Neenah Slough		12.66	5,463	5,463	0.0%	8.22	8.22	0.0%
S8b3	Neenah Slough		37.47	15,623	11,810	24.4%	28.29	22.44	20.7%
S8b4b	Neenah Slough		30.31	10,006	8,148	18.6%	20.17	16.74	17.0%
EBMP W6b1	Lake Winnebago	Hidden Acres Pond	13.29	2,398	317	86.8%	9.03	3.95	56.2%
EBMP W7a3	Lake Winnebago	Herzinger Pond	53.91	9,969	1,679	83.2%	39.69	16.98	57.2%
Other Drainage System	Lake Winnebago		328.42	46,558	33,045	29.0%	201.27	149.37	25.8%
W4e	Lake Winnebago		60.64	11,127	923	91.7%	43.62	4.42	89.9%
W7c2	Lake Winnebago		45.42	5,824	3,563	38.8%	25.52	18.12	29.0%
W8a1	Lake Winnebago		31.17	4,340	660	84.8%	19.20	3.68	80.8%

2012 Condition: (Entire Study Area)

Sub-Watershed	Totals/Sums for Comparison						
		TSS Provided			TP Provided		
	Area (acres)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)
Fox River	395.45	142,878	97,583	31.7%	329.37	238.16	27.7%
Neenah Slough	1,158.37	287,577	206,566	28.2%	880.85	647.37	26.5%
Lake Winnebago	532.85	80,216	40,188	49.9%	338.32	196.51	41.9%
	2,086.67	510,670	344,337	32.6%	1,548.54	1,082.03	30.1%

Allocation Adjustments to Urban (MS4) Allocations in TMDL Report

Sub-Watershed	Totals/Sums for Comparison						
		Extra TSS Allocated			Extra TP Allocated		
		Agric, Quarry, Forest, Wetlnd (acres)	Agric, Quarry, Forest, Wetlnd (lb/yr)		Agric, Quarry, Forest, Wetlnd (acres)	Agric, Quarry, Forest, Wetlnd (lb/yr)	
Fox River		99	17,021		99	30.76	
Neenah Slough		322	55,994		322	105.94	

Urban (MS4) Allocations Including Adjustments (Baseline Load Method) (Entire Study Area)

Sub-Watershed	Totals/Sums for Comparison						
		TSS Allocation			TP Allocation		
	Area (Acres)	Allocate (%)	Allocate (lbs/yr)	Reduct (%)	Allocate (%)	Allocate (lbs/yr)	Reduct (%)
Fox River	395.45	100.0%	57,425	59.8%	100.0%	166.56	49.4%
Neenah Slough	1,158.37	100.0%	219,484	23.7%	100.0%	497.94	43.5%
	1,553.82		276,910			664.50	

2012 Condition: (Baseline Load Method) (Excludes Town-Outside UPB, ROW County HWY, ROW State STH

Sub-Watershed	Satisfy TSS Allocation?		Satisfy TP Allocation?	
Fox River	NO	40,157	NO	71.59
Neenah Slough	YES	-12,918	NO	149.43
Lake Winnebago				

Town of Neenah Stormwater Management Plan
McM No. N0003-900379 December 14, 2012

Alternative #1: (2012 Land Use - Excludes Quarries, No Parking Ordinance, HE Street Sweeping once per year, [1]Obtain agreement with County for grass swale credit in Fox River & Neenah Slough Sub-Watersheds)

			Town - Within UPB (Excludes areas outside UPB, other MS4 jurisdictions and land owned by others)										
				Total Suspended Solids (TSS)					Total Phosphorus (TP)				
Drainage System	Watershed	BMP Name	Area (acres)	Before Drain System (lbs/yr)	After Drain System (lbs/yr)	BMP Reduct (%)	After Outfall Control (lbs/yr)	Total Load Reduc (%)	Before Drain System (lbs/yr)	After Drain System (lbs)	BMP Reduct (%)	After Outfall Control (lbs/yr)	Total Load Reduc (%)
EBMP G4a1b	Fox River	Tuckaway Storage Pond	7.75	2,483	2,483	86.8%	327	86.8%	6.12	6.12	70.5%	1.81	70.5%
EBMP G8b2d	Fox River	Gibson Salvage Pond	43.98	17,717	17,717	66.6%	5,910	66.6%	25.15	25.15	54.8%	11.37	54.8%
EBMP G8b3c	Fox River	Ogden Pond	10.50	3,635	3,635	78.7%	775	78.7%	8.87	8.87	54.9%	4.00	54.9%
EBMP G8b3d	Fox River	Tushsherer Self-Storage Pond	3.52	1,219	1,219	81.0%	232	81.0%	2.98	2.98	56.3%	1.30	56.3%
EBMP G8c1b	Fox River	Rockwood Warehouse North Pond	4.55	1,831	1,831	93.0%	128	93.0%	3.16	3.16	77.4%	0.71	77.4%
EBMP G8c1c	Fox River	Rockwood Warehouse South Pond	7.24	2,814	2,814	87.8%	342	87.8%	5.27	5.27	73.1%	1.42	73.1%
EBMP G8c1d	Fox River	4C Storage Pond	1.33	462	462	80.0%	92	80.0%	1.13	1.13	67.0%	0.37	67.0%
EBMP G9c2	Fox River	Dermatology Associates Pond	1.21	371	371	80.6%	72	80.6%	0.92	0.92	64.3%	0.33	64.3%
Other Drainage System	Fox River		128.05	31,458	13,108		13,108	58.3%	92.23	44.72		44.72	51.5%
G8b3a	Fox River		97.97	34,845	15,089		15,089	56.7%	61.58	27.99		27.99	54.5%
G9a3	Fox River		12.17	3,945	2,589		2,589	34.4%	12.99	9.22		9.22	29.0%
EBMP N4c5	Neenah Slough	Sunset Terrace Pond	167.03	25,334	25,334	76.4%	5,969	76.4%	101.66	101.66	49.0%	51.80	49.0%
EBMP N4d6	Neenah Slough	White Tail Run South Pond	17.04	2,887	2,887	75.0%	722	75.0%	11.29	11.29	48.5%	5.82	48.5%
EBMP N4d7	Neenah Slough	White Tail Run West Pond	11.70	2,046	2,046	84.6%	316	84.6%	7.88	7.88	50.5%	3.90	50.5%
EBMP N7e8	Neenah Slough	Woodside Acres Pond	13.49	2,159	2,159	88.5%	248	88.5%	8.76	8.76	52.1%	4.19	52.1%
EBMP S8a1b	Neenah Slough	Spring Meadows Pond	0.00	0	0	91.7%	0	-	0.00	0.00	55.0%	0.00	-
Other Drainage System	Neenah Slough	Promote Infiltration via Rain Gardens	397.53	80,629	56,716		56,716	29.7%	258.31	188.16		188.16	27.2%
N2b6	Neenah Slough		20.26	4,246	1,972		1,972	53.6%	15.04	7.73		7.73	48.6%
N2e5	Neenah Slough		15.96	3,315	997		997	69.9%	9.96	3.84		3.84	61.4%
N2e7	Neenah Slough		18.59	3,500	387		387	88.9%	12.99	1.95		1.95	85.0%
N3d2	Neenah Slough	*Westowne Pond	1.41	344	329	80.0%	69	80.0%	1.27	1.24	60.0%	0.51	60.0%
N4b4	Neenah Slough		22.60	3,436	754		754	78.1%	14.15	3.52		3.52	75.1%
N5c3	Neenah Slough	*Tuller Pond	0.84	66	66	80.0%	13	80.0%	0.40	0.40	60.0%	0.16	60.0%
N7e1b	Neenah Slough		33.61	6,217	1,825		1,825	70.6%	22.80	6.50		6.50	71.5%
N7e1c	Neenah Slough		21.71	2,741	1,229		1,229	55.2%	12.58	7.31		7.31	41.9%
N7e9a	Neenah Slough		33.98	5,227	1,309		1,309	75.0%	21.55	7.20		7.20	66.6%
N7e9b	Neenah Slough		26.12	4,549	3,024		3,024	33.5%	15.73	10.46		10.46	33.5%
N8a4	Neenah Slough		13.47	2,179	841		841	61.4%	9.35	4.73		4.73	49.4%
N8b1a	Neenah Slough		34.04	3,836	733		733	80.9%	19.52	4.66		4.66	76.1%
S5b	Neenah Slough	*Commerce Ct Pond	6.16	570	570	60.0%	228	60.0%	2.54	2.54	45.0%	1.39	45.0%
S6a2	Neenah Slough		28.60	7,750	7,750		7,750	0.0%	17.43	17.43		17.43	0.0%
S7e4	Neenah Slough	**Green Valley Pond	23.77	6,250	5,918	80.0%	1,250	80.0%	13.61	12.08	60.0%	5.45	60.0%
S8a2	Neenah Slough	*Dixie Pond	9.34	1,111	774	80.0%	222	80.0%	4.60	2.48	60.0%	1.84	60.0%
S8a5b	Neenah Slough		12.66	5,463	5,463		5,463	0.0%	8.22	8.22		8.22	0.0%
S8b3	Neenah Slough	N&M Transfer North Pond	36.16	14,524	10,992	80.0%	2,905	80.0%	25.74	20.40	65.0%	9.01	65.0%
S8b4b	Neenah Slough		23.20	9,596	7,738		7,738	19.4%	17.59	14.16		14.16	19.5%
EBMP W6b1	Lake Winnebago	Hidden Acres Pond	13.29	2,398	2,398	86.8%	317	86.8%	9.03	9.03	56.2%	3.95	56.2%
EBMP W7a3	Lake Winnebago	Herzinger Pond	49.50	8,217	8,217	83.2%	1,384	83.2%	34.26	34.26	57.2%	14.66	57.2%
Other Drainage System	Lake Winnebago		109.64	15,151	5,132		5,132	66.1%	65.31	26.24		26.24	59.8%
W4e	Lake Winnebago		60.64	11,127	923		923	91.7%	43.62	4.42		4.42	89.9%
W7c2	Lake Winnebago		43.58	5,004	2,743		2,743	45.2%	23.10	15.69		15.69	32.1%
W8a1	Lake Winnebago		29.33	3,815	631		631	83.5%	17.36	3.52		3.52	79.7%

[1]Water quality benefits provided by County grass swales are approximate. Would require detailed analysis of County grass swale performance.

*City of Neenah Pond (water quality benefits approximate) - Town to obtain agreement with City for water quality credit

**WisDOT Pond (water quality benefits approximate) - Town to obtain agreement with WisDOT for water quality credit

2012 Condition: (Entire Study Area)

	Town - Within UPB (Excludes areas outside UPB, other MS4 jurisdictions and land owned by others)										
		Total Suspended Solids (TSS) Provided					Total Phosphorus (TP) Provided				
Sub-Watershed	Area (acres)	Before Drain System (lbs/yr)	After Drain System (lbs/yr)	BMP Reduct (%)	After Outfall Control (lbs/yr)	Load Reduct (%)	Before Drain System (lbs/yr)	After Drain System (lbs/yr)	BMP Reduct (%)	After Outfall Control (lbs/yr)	Load Reduct (%)
Fox River	318.27	100,779			38,664	61.6%	220.40			103.24	53.2%
Neenah Slough	989.28	197,976			102,681	48.1%	632.96			369.96	41.5%
Lake Winnebago	305.97	45,712			11,131	75.6%	192.67			68.48	64.5%
	1,613.52	344,467			152,477	55.7%	1,046.03			541.69	48.2%

Allocation Adjustments to Urban (MS4) Allocations in TMDL Report

	Town - Within UPB (Excludes areas outside UPB, other MS4 jurisdictions and land owned by others)										
		Extra Total Suspended Solids (TSS) Allocated					Extra Total Phosphorus (TP) Allocated				
Sub-Watershed				Agric, Quarry, Forest, Wetlnd (acres)	Agric, Quarry, Forest, Wetlnd (lb/yr)				Agric, Quarry, Forest, Wetlnd (acres)	Agric, Quarry, Forest, Wetlnd (lb/yr)	
Fox River				67.25	11,911				67.25	21.40	
Neenah Slough				278.62	47,323				278.62	90.09	

Urban (MS4) Allocations Including Adjustments (Baseline Load Method) (Entire Study Area)

	Town - Within UPB (Excludes areas outside UPB, other MS4 jurisdictions and land owned by others)										
		Total Suspended Solids (TSS) Allocation					Total Phosphorus (TP) Allocation				
Sub-Watershed	Area (acres)	Allocate (%)			Allocate (lbs/yr)		Allocate (%)			Allocate (lbs/yr)	
Fox River	318.27	70.5%			40,411		66.9%			112.28	
Neenah Slough	989.28	68.8%			159,874		71.9%			371.78	
	1,307.55				200,284					484.05	

Alternative #1: (Excludes Town-Outside UPB, ROW County HWY, ROW State STH)

	Town - Within UPB (Excludes areas outside UPB, other MS4 jurisdictions and land owned by others)										
		Total Suspended Solids (TSS) Provided					Total Phosphorus (TP) Provided				
Sub-Watershed	Area (acres)	Before Drain System (lbs/yr)	After Drain System (lbs/yr)	BMP Reduct (%)	After Outfall Control (lbs/yr)	Load Reduct (%)	Before Drain System (lbs/yr)	After Drain System (lbs/yr)	BMP Reduct (%)	After Outfall Control (lbs/yr)	Load Reduct (%)
Fox River	318.27	100,779		0.0%	38,664	61.6%	220.40			103.24	53.2%
Neenah Slough	989.28	197,976		0.0%	102,681	48.1%	632.96			369.96	41.5%
Lake Winnebago	305.97	45,712		0.0%	11,131	75.6%	192.67			68.48	64.5%
	1,613.52	344,467			152,477	55.7%	1,046.03			541.69	48.2%

Urban (MS4) Allocations Including Adjustments (Baseline Load Method) (Excludes Town-Outside UPB, ROW County HWY, ROW State STH)

	Town - Within UPB (Excludes areas outside UPB, other MS4 jurisdictions and land owned by others)										
		Total Suspended Solids (TSS) Allocation					Total Phosphorus (TP) Allocation				
Sub-Watershed	Area (acres)	Allocate (%)			Allocate (lbs/yr)		Allocate (%)			Allocate (lbs/yr)	
Fox River	318.27	70.5%			40,411		66.9%			112.28	
Neenah Slough	989.28	68.8%			159,874		71.9%			371.78	
	1,307.55				200,284					484.05	

Alternative #1: (Baseline Load Method) (Excludes Town-Outside UPB, ROW County HWY, ROW State STH)

		Total Suspended Solids (TSS)						Total Phosphorus (TP)			
Sub-Watershed	Area (acres)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)	Allocate (lbs/yr)	Satisfy TSS?	Differ. (lbs/yr)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)	Allocate (lbs/yr)
Fox River	319.47	100,938	38,823	61.5%	40,455	YES	-1,632	221.16	104.01	53.0%	112.59
Neenah Slough	994.45	198,902	103,208	48.1%	160,400	YES	-57,192	635.72	372.15	41.5%	373.01
Lake Winnebago	310.78	46,554	11,444	75.4%	-	-	-	195.97	70.46	64.0%	-
	1,624.71	346,395	153,476	55.7%	200,856			1,052.85	546.61	48.1%	485.60

Town of Neenah Stormwater Management Plan
McM No. N0003-900379 December 14, 2012

Alternative #1: (2012 Land Use - Excludes Quarries, No Parking Ordinance, HE St

			Town - Outside UPB							ROW County HWY - Within UPB						
				TSS Provided			TP Provided				TSS Provided			TP Provided		
Drainage System	Watershed	BMP Name	Area (acres)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduc (%)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduc (%)	Area (acres)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduc (%)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduc (%)
EBMP G4a1b	Fox River	Tuckaway Storage Pond														
EBMP G8b2d	Fox River	Gibson Salvage Pond														
EBMP G8b3c	Fox River	Ogden Pond								0.04	21	5	78.7%	0.06	0.03	54.9%
EBMP G8b3d	Fox River	Tushsherer Self-Storage Pond														
EBMP G8c1b	Fox River	Rockwood Warehouse North Pond														
EBMP G8c1c	Fox River	Rockwood Warehouse South Pond														
EBMP G8c1d	Fox River	4C Storage Pond														
EBMP G9c2	Fox River	Dermatology Associates Pond														
Other Drainage System	Fox River		35.34	11,637	8,889	23.6%	34.44	28.36	17.6%	18.12	13,768	13,452	2.3%	32.86	32.40	1.4%
G8b3a	Fox River									14.29	11,257	11,236	0.2%	26.34	26.30	0.2%
G9a3	Fox River		1.05	592	12	97.9%	1.77	0.04	97.7%	1.65	923	923	0.0%	2.79	2.79	0.0%
EBMP N4c5	Neenah Slough	Sunset Terrace Pond								0.05	33	8	76.4%	0.09	0.04	49.0%
EBMP N4d6	Neenah Slough	White Tail Run South Pond														
EBMP N4d7	Neenah Slough	White Tail Run West Pond														
EBMP N7e8	Neenah Slough	Woodside Acres Pond								0.48	265	30	88.5%	0.80	0.38	52.1%
EBMP S8a1b	Neenah Slough	Spring Meadows Pond	15.02	2,347	195	91.7%	9.19	4.14	55.0%							
Other Drainage System	Neenah Slough	Promote Infiltration via Rain Gardens	46.35	9,272	4,215	54.5%	36.63	21.55	41.2%	12.29	8,627	8,519	1.2%	22.04	21.83	1.0%
N2b6	Neenah Slough		0.12	73	48	34.3%	0.22	0.15	32.3%							
N2e5	Neenah Slough									1.78	1,220	1,220	0.0%	3.26	3.26	0.0%
N2e7	Neenah Slough															
N3d2	Neenah Slough	*Westowne Pond														
N4b4	Neenah Slough									4.16	2,461	2,460	0.0%	7.14	7.14	0.0%
N5c3	Neenah Slough	*Tuller Pond														
N7e1b	Neenah Slough		0.01	1	1	0.0%	0.01	0.01	0.0%	1.26	851	851	0.0%	2.16	2.16	0.0%
N7e1c	Neenah Slough									1.08	650	650	0.0%	1.93	1.93	0.0%
N7e9a	Neenah Slough									2.59	1,507	1,507	0.0%	4.53	4.53	0.0%
N7e9b	Neenah Slough		0.46	252	23	91.0%	0.78	0.08	89.9%	0.40	229	229	0.0%	0.69	0.69	0.0%
N8a4	Neenah Slough															
N8b1a	Neenah Slough															
S5b	Neenah Slough	*Commerce Ct Pond	0.14	12	5	60.0%	0.07	0.04	45.0%							
S6a2	Neenah Slough		0.33	30	30	0.0%	0.16	0.16	0.0%							
S7e4	Neenah Slough	**Green Valley Pond	0.62	57	11	80.0%	0.31	0.13	60.0%	5.36	3,953	791	80.0%	9.82	3.93	60.0%
S8a2	Neenah Slough	*Dixie Pond	16.89	3,294	659	80.0%	12.65	5.06	60.0%							
S8a5b	Neenah Slough															
S8b3	Neenah Slough	N&M Transfer North Pond	1.31	1,099	220	80.0%	2.55	0.89	65.0%							
S8b4b	Neenah Slough		7.12	410	410	0.0%	2.58	2.58	0.0%							
EBMP W6b1	Lake Winnebago	Hidden Acres Pond														
EBMP W7a3	Lake Winnebago	Herzinger Pond	0.02	10	2	83.2%	0.03	0.01	57.2%	1.78	1,107	186	83.2%	3.08	1.32	57.2%
Other Drainage System	Lake Winnebago		201.18	22,143	18,648	15.8%	107.87	95.03	11.9%	0.63	410	410	0.0%	1.07	1.07	0.0%
W4e	Lake Winnebago															
W7c2	Lake Winnebago		0.59	38	38	0.0%	0.23	0.23	0.0%	0.87	551	551	0.0%	1.51	1.51	0.0%
W8a1	Lake Winnebago		1.84	524	29	94.5%	1.84	0.16	91.4%							

[1]Water quality benefits provided by County grass swales are approximate. Would require detailed analysis of County grass

*City of Neenah Pond (water quality benefits approximate) - Town to obtain agreement with City for water quality credit

**WisDOT Pond (water quality benefits approximate) - Town to obtain agreement with WisDOT for water quality credit

2012 Condition: (Entire Study Area)

	Town - Outside UPB							ROW County HWY - Within UPB						
		TSS Provided			TP Provided				TSS Provided			TP Provided		
Sub-Watershed	Area (acres)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)	Area (acres)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)
Fox River	36.39	12,229	8,902	27.2%	36.21	28.40	21.6%	34.09	25,968	25,615	1.4%	62.06	61.52	0.9%
Neenah Slough	88.37	16,847	5,818	65.5%	65.15	34.77	46.6%	29.45	19,796	16,265	17.8%	52.45	45.89	12.5%
Lake Winnebago	203.63	22,715	18,717	17.6%	109.96	95.43	13.2%	3.28	2,067	1,147	44.5%	5.67	3.90	31.2%
	328.38	51,791	33,436	35.4%	211.32	158.60	24.9%	66.82	47,831	43,027	10.0%	120.18	111.31	7.4%

Allocation Adjustments to Urban (MS4) Allocations in TMDL Report

	Town - Outside UPB						ROW County HWY - Within UPB					
		Extra TSS Allocated			Extra TP Allocated			Extra TSS Allocated			Extra TP Allocated	
Sub-Watershed		Agric, Quarry, Forest, Wetlnd (acres)	Agric, Quarry, Forest, Wetlnd (lb/yr)		Agric, Quarry, Forest, Wetlnd (acres)	Agric, Quarry, Forest, Wetlnd (lb/yr)		Agric, Quarry, Forest, Wetlnd (acres)	Agric, Quarry, Forest, Wetlnd (lb/yr)		Agric, Quarry, Forest, Wetlnd (acres)	Agric, Quarry, Forest, Wetlnd (lb/yr)	
Fox River		21.50	3,010		21.50	5.69			5.14	1,056		5.14	1.85	
Neenah Slough		31.52	6,019		31.52	10.99			9.69	2,144		9.69	3.94	

Urban (MS4) Allocations Including Adjustments (Baseline Load Method) (Entire Study Area)

	Town - Outside UPB						ROW County HWY - Within UPB					
		TSS Allocation			TP Allocation			TSS Allocation			TP Allocation	
Sub-Watershed	Area (acres)	Allocate (%)	Allocate (lbs/yr)		Allocate (%)	Allocate (lbs/yr)	Area (Acres)	Allocate (%)	Allocate (lbs/yr)		Allocate (%)	Allocate (lbs/yr)	
Fox River	36.39	8.6%	6,468		11.0%	20.62	34.09	18.2%	8,400		18.8%	27.44	
Neenah Slough	88.37	5.9%	15,596		7.4%	39.98	29.45	6.9%	13,398		6.0%	27.28	
	124.76		22,065			60.60	63.54		21,797			54.72	

Alternative #1: (Excludes Town-Outside UPB, ROW County HWY, ROW State STH)

	Town - Outside UPB						ROW County HWY - Within UPB					
		TSS Provided			TP Provided			TSS Provided			TP Provided	
Sub-Watershed	Area (acres)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Area (acres)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)
Fox River													
Neenah Slough													
Lake Winnebago													
	0.00	0	0	-	0.00	0.00	0.00	0	0	-	0.00	0.00	-

Urban (MS4) Allocations Including Adjustments (Baseline Load Method) (Excludes Town-Outside UPB, ROW County HWY, ROW State STH)

	Town - Outside UPB						ROW County HWY - Within UPB					
		TSS Allocation			TP Allocation			TSS Allocation			TP Allocation	
Sub-Watershed	Area (acres)	Allocate (%)	Allocate (lbs/yr)		Allocate (%)	Allocate (lbs/yr)	Area (Acres)	Allocate (%)	Allocate (lbs/yr)		Allocate (%)	Allocate (lbs/yr)	
Fox River													
Neenah Slough													
	0.00		0			0.00	0.00		0			0.00	

Alternative #1: (Baseline Load Method) (Excludes Town-Outside UPB, ROW County HWY, ROW State STH)

Sub-Watershed	Satisfy TP?	Differ. (lbs/yr)
Fox River	YES	-8.59
Neenah Slough	YES	-0.85
Lake Winnebago	-	-

Town of Neenah Stormwater Management Plan
McM No. N0003-900379 December 14, 2012

Alternative #1: (2012 Land Use - Excludes Quarries, No Parking Ordinance, HE St

			ROW County HWY - Outside UPB							ROW State STH - Within UPB						
				TSS Provided			TP Provided				TSS Provided			TP Provided		
Drainage System	Watershed	BMP Name	Area (acres)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduc (%)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduc (%)	Area (acres)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduc (%)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduc (%)
EBMP G4a1b	Fox River	Tuckaway Storage Pond														
EBMP G8b2d	Fox River	Gibson Salvage Pond														
EBMP G8b3c	Fox River	Ogden Pond														
EBMP G8b3d	Fox River	Tushsherer Self-Storage Pond														
EBMP G8c1b	Fox River	Rockwood Warehouse North Pond														
EBMP G8c1c	Fox River	Rockwood Warehouse South Pond														
EBMP G8c1d	Fox River	4C Storage Pond														
EBMP G9c2	Fox River	Dermatology Associates Pond														
Other Drainage System	Fox River		4.21	2,993	2,993	0.0%	7.70	7.70	0.0%							
G8b3a	Fox River															
G9a3	Fox River		1.28	749	749	0.0%	2.23	2.23	0.0%							
EBMP N4c5	Neenah Slough	Sunset Terrace Pond														
EBMP N4d6	Neenah Slough	White Tail Run South Pond														
EBMP N4d7	Neenah Slough	White Tail Run West Pond														
EBMP N7e8	Neenah Slough	Woodside Acres Pond														
EBMP S8a1b	Neenah Slough	Spring Meadows Pond														
Other Drainage System	Neenah Slough	Promote Infiltration via Rain Gardens	2.73	1,624	1,624	0.0%	4.89	4.89	0.0%	41.29	48,607	48,607	0.0%	117.98	117.98	0.0%
N2b6	Neenah Slough															
N2e5	Neenah Slough															
N2e7	Neenah Slough															
N3d2	Neenah Slough	*Westowne Pond														
N4b4	Neenah Slough															
N5c3	Neenah Slough	*Tuller Pond														
N7e1b	Neenah Slough		0.23	138	138	0.0%	0.41	0.41	0.0%							
N7e1c	Neenah Slough															
N7e9a	Neenah Slough															
N7e9b	Neenah Slough															
N8a4	Neenah Slough															
N8b1a	Neenah Slough															
S5b	Neenah Slough	*Commerce Ct Pond														
S6a2	Neenah Slough															
S7e4	Neenah Slough	**Green Valley Pond	1.04	710	142	80.0%	1.93	0.77	60.0%	0.81	952	190	80.0%	2.32	0.93	60.0%
S8a2	Neenah Slough	*Dixie Pond														
S8a5b	Neenah Slough															
S8b3	Neenah Slough	N&M Transfer North Pond														
S8b4b	Neenah Slough															
EBMP W6b1	Lake Winnebago	Hidden Acres Pond														
EBMP W7a3	Lake Winnebago	Herzinger Pond														
Other Drainage System	Lake Winnebago		14.77	8,649	8,649	0.0%	26.04	26.04	0.0%							
W4e	Lake Winnebago															
W7c2	Lake Winnebago		0.39	231	231	0.0%	0.69	0.69	0.0%							
W8a1	Lake Winnebago															

[1]Water quality benefits provided by County grass swales are approximate. Would require detailed analysis of County grass

*City of Neenah Pond (water quality benefits approximate) - Town to obtain agreement with City for water quality credit

**WisDOT Pond (water quality benefits approximate) - Town to obtain agreement with WisDOT for water quality credit

2012 Condition:
(Entire Study Area)

	ROW County HWY - Outside UPB							ROW State STH - Within UPB						
		TSS Provided			TP Provided				TSS Provided			TP Provided		
Sub-Watershed	Area (acres)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)	Area (acres)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)
Fox River	5.49	3,742	3,742	0.0%	9.93	9.93	0.0%	0.00	0	0	-	0.00	0.00	-
Neenah Slough	4.01	2,472	1,905	23.0%	7.24	6.08	16.0%	42.10	49,560	48,798	1.5%	120.29	118.90	1.2%
Lake Winnebago	15.16	8,879	8,879	0.0%	26.73	26.73	0.0%	0.00	0	0	-	0.00	0.00	-
	24.66	15,094	14,526	3.8%	43.90	42.74	2.6%	42.10	49,560	48,798	1.5%	120.29	118.90	1.2%

Allocation Adjustments to Urban (MS4) Allocations in TMDL Report

	ROW County HWY - Outside UPB						ROW State STH - Within UPB					
		Extra TSS Allocated			Extra TP Allocated			Extra TSS Allocated			Extra TP Allocated	
Sub-Watershed		Agric, Quarry, Forest, Wetlnd (acres)	Agric, Quarry, Forest, Wetlnd (lb/yr)		Agric, Quarry, Forest, Wetlnd (acres)	Agric, Quarry, Forest, Wetlnd (lb/yr)		Agric, Quarry, Forest, Wetlnd (acres)	Agric, Quarry, Forest, Wetlnd (lb/yr)		Agric, Quarry, Forest, Wetlnd (acres)	Agric, Quarry, Forest, Wetlnd (lb/yr)	
Fox River		5.08	1,044		5.08	1.83		0.00	0		0.00	0.00	
Neenah Slough		2.45	509		2.45	0.91		0.00	0		0.00	0.00	

Urban (MS4) Allocations Including Adjustments (Baseline Load Method) (Entire Study Area)

	ROW County HWY - Outside UPB						ROW State STH - Within UPB					
		TSS Allocation			TP Allocation			TSS Allocation			TP Allocation	
Sub-Watershed	Area (Acres)	Allocate (%)	Allocate (lbs/yr)		Allocate (%)	Allocate (lbs/yr)	Area (Acres)	Allocate (%)	Allocate (lbs/yr)		Allocate (%)	Allocate (lbs/yr)	
Fox River	5.49	2.6%	2,102		3.0%	5.92	0.00	0.0%	0		0.0%	0.00	
Neenah Slough	4.01	0.9%	1,915		0.8%	4.13	42.10	17.2%	28,175		13.7%	53.53	
	9.50		4,017			10.05	42.10		28,175			53.53	

Alternative #1:
(Excludes Town-Outside UPB, ROW County HWY, ROW State STH)

	ROW County HWY - Outside UPB							ROW State STH - Within UPB						
		TSS Provided			TP Provided				TSS Provided			TP Provided		
Sub-Watershed	Area (acres)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)	Area (acres)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)
Fox River														
Neenah Slough														
Lake Winnebago														
	0.00	0	0	-	0.00	0.00	-	0.00	0	0	-	0.00	0.00	-

Urban (MS4) Allocations Including Adjustments (Baseline Load Method) (Excludes Town-Outside UPB, ROW County HWY, ROW State STH)

	ROW County HWY - Outside UPB						ROW State STH - Within UPB					
		TSS Allocation			TP Allocation			TSS Allocation			TP Allocation	
Sub-Watershed	Area (Acres)	Allocate (%)	Allocate (lbs/yr)		Allocate (%)	Allocate (lbs/yr)	Area (Acres)	Allocate (%)	Allocate (lbs/yr)		Allocate (%)	Allocate (lbs/yr)	
Fox River													
Neenah Slough													
	0.00		0			0.00	0.00		0			0.00	

Alternative #1:
(Baseline Load Method)
(Excludes Town-Outside UPB, ROW County HWY, ROW State STH)

Sub-Watershed
Fox River
Neenah Slough
Lake Winnebago

Alternative #1: (2012 Land Use - Excludes Quarries, No Parking Ordinance, HE St

			Neenah Sanitary District - Within UPB							Other Municipal Owned Lands - Within UPB						
				TSS Provided			TP Provided				TSS Provided			TP Provided		
Drainage System	Watershed	BMP Name	Area (acres)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduc (%)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduc (%)	Area (acres)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduc (%)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduc (%)
EBMP G4a1b	Fox River	Tuckaway Storage Pond														
EBMP G8b2d	Fox River	Gibson Salvage Pond														
EBMP G8b3c	Fox River	Ogden Pond														
EBMP G8b3d	Fox River	Tushsherer Self-Storage Pond														
EBMP G8c1b	Fox River	Rockwood Warehouse North Pond														
EBMP G8c1c	Fox River	Rockwood Warehouse South Pond														
EBMP G8c1d	Fox River	4C Storage Pond														
EBMP G9c2	Fox River	Dermatology Associates Pond														
Other Drainage System	Fox River									1.21	159	159	0.0%	0.76	0.76	0.0%
G8b3a	Fox River															
G9a3	Fox River															
EBMP N4c5	Neenah Slough	Sunset Terrace Pond														
EBMP N4d6	Neenah Slough	White Tail Run South Pond														
EBMP N4d7	Neenah Slough	White Tail Run West Pond														
EBMP N7e8	Neenah Slough	Woodside Acres Pond														
EBMP S8a1b	Neenah Slough	Spring Meadows Pond														
Other Drainage System	Neenah Slough	Promote Infiltration via Rain Gardens	3.40	387	387	0.0%	1.69	1.69	0.0%	0.36	44	44	0.0%	0.20	0.20	0.0%
N2b6	Neenah Slough															
N2e5	Neenah Slough															
N2e7	Neenah Slough															
N3d2	Neenah Slough	*Westowne Pond														
N4b4	Neenah Slough															
N5c3	Neenah Slough	*Tuller Pond														
N7e1b	Neenah Slough															
N7e1c	Neenah Slough															
N7e9a	Neenah Slough															
N7e9b	Neenah Slough															
N8a4	Neenah Slough									0.34	36	5	86.8%	0.18	0.03	84.6%
N8b1a	Neenah Slough															
S5b	Neenah Slough	*Commerce Ct Pond														
S6a2	Neenah Slough															
S7e4	Neenah Slough	**Green Valley Pond								1.07	460	92	80.0%	0.69	0.28	60.0%
S8a2	Neenah Slough	*Dixie Pond														
S8a5b	Neenah Slough															
S8b3	Neenah Slough	N&M Transfer North Pond														
S8b4b	Neenah Slough															
EBMP W6b1	Lake Winnebago	Hidden Acres Pond														
EBMP W7a3	Lake Winnebago	Herzinger Pond	2.62	636	107	83.2%	2.31	0.99	57.2%							
Other Drainage System	Lake Winnebago		2.19	205.95	205.95	0.0%	0.98	0.98	0.0%							
W4e	Lake Winnebago															
W7c2	Lake Winnebago															
W8a1	Lake Winnebago															

[1]Water quality benefits provided by County grass swales are approximate. Would require detailed analysis of County gras

*City of Neenah Pond (water quality benefits approximate) - Town to obtain agreement with City for water quality credit

**WisDOT Pond (water quality benefits approximate) - Town to obtain agreement with WisDOT for water quality credit

2012 Condition:
(Entire Study Area)

	Neenah Sanitary District - Within UPB							Other Municipal Owned Lands - Within UPB						
		TSS Provided			TP Provided				TSS Provided			TP Provided		
Sub-Watershed	Area (acres)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)	Area (acres)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)
Fox River	0.00	0	0	-	0.00	0.00	-	1.21	159	159	0.0%	0.76	0.76	0.0%
Neenah Slough	3.40	387	387	0.0%	1.69	1.69	0.0%	1.77	539	140	74.0%	1.07	0.50	53.1%
Lake Winnebago	4.81	842	313	62.8%	3.30	1.97	40.1%	0.00	0	0	-	0.00	0.00	-
	8.21	1,229	700	43.0%	4.98	3.66	26.6%	2.98	698	299	57.2%	1.84	1.27	31.1%

Allocation Adjustments to Urban (MS4) Allocations in TMDL Report

	Neenah Sanitary District - Within UPB						Other Municipal Owned Lands - Within UPB					
		Extra TSS Allocated		Extra TP Allocated				Extra TSS Allocated		Extra TP Allocated		
Sub-Watershed		Agric, Quarry, Forest, Wetlnd (acres)	Agric, Quarry, Forest, Wetlnd (lb/yr)	Agric, Quarry, Forest, Wetlnd (acres)	Agric, Quarry, Forest, Wetlnd (lb/yr)			Agric, Quarry, Forest, Wetlnd (acres)	Agric, Quarry, Forest, Wetlnd (lb/yr)	Agric, Quarry, Forest, Wetlnd (acres)	Agric, Quarry, Forest, Wetlnd (lb/yr)	
Fox River		0.00	0	0.00	0.00			0.00	0	0.00	0.00	
Neenah Slough		0.00	0	0.00	0.00			0.00	0	0.00	0.00	

Urban (MS4) Allocations Including Adjustments (Baseline Load Method) (Entire Study Area)

	Neenah Sanitary District - Within UPB						Other Municipal Owned Lands - Within UPB					
		TSS Allocation		TP Allocation				TSS Allocation		TP Allocation		
Sub-Watershed	Area (Acres)	Allocate (%)	Allocate (lbs/yr)	Allocate (%)	Allocate (lbs/yr)		Area (Acres)	Allocate (%)	Allocate (lbs/yr)	Allocate (%)	Allocate (lbs/yr)	
Fox River	0.00	0.0%	0	0.0%	0.00		1.21	0.1%	45	0.2%	0.31	
Neenah Slough	3.40	0.1%	220	0.2%	0.75		1.77	0.2%	307	0.1%	0.48	
	3.40		220		0.75		2.98		352		0.79	

Alternative #1:
(Excludes Town-Outside UPB, ROW County HWY, ROW State STH)

	Neenah Sanitary District - Within UPB							Other Municipal Owned Lands - Within UPB						
		TSS Provided			TP Provided				TSS Provided			TP Provided		
Sub-Watershed	Area (acres)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)	Area (acres)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)
Fox River	0.00	0	0	-	0.00	0.00	-	1.21	159	159	0.0%	0.76	0.76	0.0%
Neenah Slough	3.40	387	387	0.0%	1.69	1.69	0.0%	1.77	539	140	74.0%	1.07	0.50	53.1%
Lake Winnebago	4.81	842	313	62.8%	3.30	1.97	40.1%	0.00	0	0	-	0.00	0.00	-
	8.21	1,229	700	43.0%	4.98	3.66	26.6%	2.98	698	299	57.2%	1.84	1.27	31.1%

Urban (MS4) Allocations Including Adjustments (Baseline Load Method) (Excludes Town-Outside UPB, ROW County HWY, ROW State STH)

	Neenah Sanitary District - Within UPB						Other Municipal Owned Lands - Within UPB					
		TSS Allocation		TP Allocation				TSS Allocation		TP Allocation		
Sub-Watershed	Area (Acres)	Allocate (%)	Allocate (lbs/yr)	Allocate (%)	Allocate (lbs/yr)		Area (Acres)	Allocate (%)	Allocate (lbs/yr)	Allocate (%)	Allocate (lbs/yr)	
Fox River	0.00	0.0%	0	0.0%	0.00		1.21	0.1%	45	0.2%	0.31	
Neenah Slough	3.40	0.1%	220	0.2%	0.75		1.77	0.2%	307	0.1%	0.48	
	3.40		220		0.75		2.98		352		0.79	

Alternative #1:
(Baseline Load Method)
(Excludes Town-Outside UPB, ROW County HWY, ROW State STH)

Sub-Watershed
Fox River
Neenah Slough
Lake Winnebago

Alternative #1: (2012 Land Use - Excludes Quarries, No Parking Ordinance, HE St

Drainage System	Watershed	BMP Name	Totals/Sums for Comparison						
				TSS Provided			TP Provided		
			Area (acres)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduc (%)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduc (%)
EBMP G4a1b	Fox River	Tuckaway Storage Pond	7.75	2,483	327	86.8%	6.12	1.81	70.5%
EBMP G8b2d	Fox River	Gibson Salvage Pond	43.98	17,717	5,910	66.6%	25.15	11.37	54.8%
EBMP G8b3c	Fox River	Ogden Pond	10.53	3,656	779	78.7%	8.94	4.03	54.9%
EBMP G8b3d	Fox River	Tushsherer Self-Storage Pond	3.52	1,219	232	81.0%	2.98	1.30	56.3%
EBMP G8c1b	Fox River	Rockwood Warehouse North Pond	4.55	1,831	128	93.0%	3.16	0.71	77.4%
EBMP G8c1c	Fox River	Rockwood Warehouse South Pond	7.24	2,814	342	87.8%	5.27	1.42	73.1%
EBMP G8c1d	Fox River	4C Storage Pond	1.33	462	92	80.0%	1.13	0.37	67.0%
EBMP G9c2	Fox River	Dermatology Associates Pond	1.21	371	72	80.6%	0.92	0.33	64.3%
Other Drainage System	Fox River		186.94	60,015	38,601	35.7%	168.00	113.96	32.2%
G8b3a	Fox River		112.26	46,102	26,324	42.9%	87.93	54.29	38.3%
G9a3	Fox River		16.15	6,209	4,273	31.2%	19.78	14.28	27.8%
EBMP N4c5	Neenah Slough	Sunset Terrace Pond	167.08	25,367	5,976	76.4%	101.74	51.85	49.0%
EBMP N4d6	Neenah Slough	White Tail Run South Pond	17.04	2,887	722	75.0%	11.29	5.82	48.5%
EBMP N4d7	Neenah Slough	White Tail Run West Pond	11.70	2,046	316	84.6%	7.88	3.90	50.5%
EBMP N7e8	Neenah Slough	Woodside Acres Pond	13.97	2,424	279	88.5%	9.56	4.58	52.1%
EBMP S8a1b	Neenah Slough	Spring Meadows Pond	15.02	2,347	195	91.7%	9.19	4.14	55.0%
Other Drainage System	Neenah Slough	Promote Infiltration via Rain Gardens	503.95	149,189	120,113	19.5%	441.74	356.29	19.3%
N2b6	Neenah Slough		20.39	4,319	2,020	53.2%	15.26	7.88	48.4%
N2e5	Neenah Slough		17.73	4,536	2,217	51.1%	13.22	7.10	46.3%
N2e7	Neenah Slough		18.59	3,500	387	88.9%	12.99	1.95	85.0%
N3d2	Neenah Slough	*Westowne Pond	1.41	344	69	80.0%	1.27	0.51	60.0%
N4b4	Neenah Slough		26.76	5,898	3,215	45.5%	21.29	10.66	49.9%
N5c3	Neenah Slough	*Tuller Pond	0.84	66	13	80.0%	0.40	0.16	60.0%
N7e1b	Neenah Slough		35.11	7,207	2,816	60.9%	25.38	9.08	64.2%
N7e1c	Neenah Slough		22.80	3,391	1,879	44.6%	14.51	9.24	36.3%
N7e9a	Neenah Slough		36.57	6,734	2,817	58.2%	26.07	11.72	55.0%
N7e9b	Neenah Slough		26.98	5,030	3,275	34.9%	17.20	11.23	34.7%
N8a4	Neenah Slough		13.82	2,215	846	61.8%	9.54	4.76	50.1%
N8b1a	Neenah Slough		34.04	3,836	733	80.9%	19.52	4.66	76.1%
S5b	Neenah Slough	*Commerce Ct Pond	6.30	582	233	60.0%	2.60	1.43	45.0%
S6a2	Neenah Slough		28.93	7,780	7,780	0.0%	17.59	17.59	0.0%
S7e4	Neenah Slough	**Green Valley Pond	32.66	12,382	2,476	80.0%	28.68	11.47	60.0%
S8a2	Neenah Slough	*Dixie Pond	26.22	4,404	881	80.0%	17.25	6.90	60.0%
S8a5b	Neenah Slough		12.66	5,463	5,463	0.0%	8.22	8.22	0.0%
S8b3	Neenah Slough	N&M Transfer North Pond	37.47	15,623	3,125	80.0%	28.29	9.90	65.0%
S8b4b	Neenah Slough		30.31	10,006	8,148	18.6%	20.17	16.74	17.0%
EBMP W6b1	Lake Winnebago	Hidden Acres Pond	13.29	2,398	317	86.8%	9.03	3.95	56.2%
EBMP W7a3	Lake Winnebago	Herzinger Pond	53.91	9,969	1,679	83.2%	39.69	16.98	57.2%
Other Drainage System	Lake Winnebago		328.42	46,558	33,045	29.0%	201.27	149.37	25.8%
W4e	Lake Winnebago		60.64	11,127	923	91.7%	43.62	4.42	89.9%
W7c2	Lake Winnebago		45.42	5,824	3,563	38.8%	25.52	18.12	29.0%
W8a1	Lake Winnebago		31.17	4,340	660	84.8%	19.20	3.68	80.8%

[1]Water quality benefits provided by County grass swales are approximate. Would require detailed analysis of County grass

*City of Neenah Pond (water quality benefits approximate) - Town to obtain agreement with City for water quality credit

**WisDOT Pond (water quality benefits approximate) - Town to obtain agreement with WisDOT for water quality credit

2012 Condition: (Entire Study Area)

Sub-Watershed	Totals/Sums for Comparison						
		TSS Provided			TP Provided		
	Area (acres)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)
Fox River	395.45	142,878	77,082	46.1%	329.37	203.86	38.1%
Neenah Slough	1,158.37	287,577	175,994	38.8%	880.85	577.79	34.4%
Lake Winnebago	532.85	80,216	40,188	49.9%	338.32	196.51	41.9%
	2,086.67	510,670	293,263	42.6%	1,548.54	978.17	36.8%

Allocation Adjustments to Urban (MS4) Allocations in TMDL Report

Sub-Watershed	Totals/Sums for Comparison						
		Extra TSS Allocated			Extra TP Allocated		
		Agric, Quarry, Forest, Wetlnd (acres)	Agric, Quarry, Forest, Wetlnd (lb/yr)		Agric, Quarry, Forest, Wetlnd (acres)	Agric, Quarry, Forest, Wetlnd (lb/yr)	
Fox River		99	17,021		99	30.76	
Neenah Slough		322	55,994		322	105.94	

Urban (MS4) Allocations Including Adjustments (Baseline Load Method) (Entire Study Area)

Sub-Watershed	Totals/Sums for Comparison						
		TSS Allocation			TP Allocation		
	Area (Acres)	Allocate (%)	Allocate (lbs/yr)	Reduct (%)	Allocate (%)	Allocate (lbs/yr)	Reduct (%)
Fox River	395.45	100.0%	57,425	59.8%	100.0%	166.56	49.4%
Neenah Slough	1,158.37	100.0%	219,484	23.7%	100.0%	497.94	43.5%
	1,553.82		276,910			664.50	

Alternative #1: (Excludes Town-Outside UPB, ROW County HWY, ROW State STH)

Sub-Watershed	Totals/Sums for Comparison						
		TSS Provided			TP Provided		
	Area (acres)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)
Fox River	319.47	100,938	38,823	61.5%	221.16	104.01	53.0%
Neenah Slough	994.45	198,902	103,208	48.1%	635.72	372.15	41.5%
Lake Winnebago	310.78	46,554	11,444	75.4%	195.97	70.46	64.0%
	1,624.71	346,395	153,476	55.7%	1,052.85	546.61	48.1%

Urban (MS4) Allocations Including Adjustments (Baseline Load Method) (Excludes Town-Outside UPB, ROW County HWY, ROW State STH)

Sub-Watershed	Totals/Sums for Comparison						
		TSS Allocation			TP Allocation		
	Area (Acres)	Allocate (%)	Allocate (lbs/yr)	Reduct (%)	Allocate (%)	Allocate (lbs/yr)	Reduct (%)
Fox River	319.47	100.0%	40,455	59.9%	100.0%	112.59	49.1%
Neenah Slough	994.45	100.0%	160,400	19.4%	100.0%	373.01	41.3%
	1,313.93		200,856			485.60	

Alternative #1: (Baseline Load Method) (Excludes Town-Outside UPB, ROW County HWY, ROW State STH)

Sub-Watershed	Satisfy TSS Allocation?		Satisfy TP Allocation?	
Fox River	YES	-1,632	YES	-8.59
Neenah Slough	YES	-57,192	YES	-0.85
Lake Winnebago				

Town of Neenah Stormwater Management Plan
McM No. N0003-900379 December 14, 2012

Alternative #2: (2012 Land Use - Excludes Quarries, No Parking Control Ordinance, High Efficiency Street Sweeping once per year)

			Town - Within UPB (Excludes areas outside UPB, other MS4 jurisdictions and land owned by others)										
				Total Suspended Solids (TSS)					Total Phosphorus (TP)				
Drainage System	Watershed	BMP Name	Area (acres)	Before Drain System (lbs/yr)	After Drain System (lbs/yr)	BMP Reduct (%)	After Outfall Control (lbs/yr)	Total Load Reduc (%)	Before Drain System (lbs/yr)	After Drain System (lbs)	BMP Reduct (%)	After Outfall Control (lbs/yr)	Total Load Reduc (%)
EBMP G4a1b	Fox River	Tuckaway Storage Pond	7.75	2,483	2,483	86.8%	327	86.8%	6.12	6.12	70.5%	1.81	70.5%
EBMP G8b2d	Fox River	Gibson Salvage Pond (CTH "OO" Pond)	43.98	17,717	17,717	90.0%	1,772	90.0%	25.15	25.15	70.0%	7.54	70.0%
EBMP G8b3c	Fox River	Ogden Pond (CTH "OO" Pond)	10.50	3,635	3,635	90.0%	363	90.0%	8.87	8.87	70.0%	2.66	70.0%
EBMP G8b3d	Fox River	Tushsherer Self-Storage Pond (CTH "OO" Pond)	3.52	1,219	1,219	90.0%	122	90.0%	2.98	2.98	70.0%	0.89	70.0%
EBMP G8c1b	Fox River	Rockwood Warehouse North Pond	4.55	1,831	1,831	93.0%	128	93.0%	3.16	3.16	77.4%	0.71	77.4%
EBMP G8c1c	Fox River	Rockwood Warehouse South Pond	7.24	2,814	2,814	87.8%	342	87.8%	5.27	5.27	73.1%	1.42	73.1%
EBMP G8c1d	Fox River	4C Storage Pond	1.33	462	462	80.0%	92	80.0%	1.13	1.13	67.0%	0.37	67.0%
EBMP G9c2	Fox River	Dermatology Associates Pond	1.21	371	371	80.6%	72	80.6%	0.92	0.92	64.3%	0.33	64.3%
Other Drainage System	Fox River		128.05	31,458	18,572		18,572	41.0%	92.23	55.11		55.11	40.3%
G8b3a	Fox River	CTH "O" Pond	97.97	34,845	29,742	80.0%	6,969	80.0%	61.58	50.73	65.0%	21.55	65.0%
G9a3	Fox River		12.17	3,945	2,973		2,973	24.6%	12.99	10.39		10.39	20.0%
EBMP N4c5	Neenah Slough	Sunset Terrace Pond	167.03	25,334	25,334	76.4%	5,969	76.4%	101.66	101.66	49.0%	51.80	49.0%
EBMP N4d6	Neenah Slough	White Tail Run South Pond (Pendleton Pond)	17.04	2,887	2,887	80.0%	577	80.0%	11.29	11.29	60.0%	4.52	60.0%
EBMP N4d7	Neenah Slough	White Tail Run West Pond (Pendleton Pond)	11.70	2,046	2,046	80.0%	409	80.0%	7.88	7.88	60.0%	3.15	60.0%
EBMP N7e8	Neenah Slough	Woodside Acres Pond	13.49	2,159	2,159	88.5%	248	88.5%	8.76	8.76	52.1%	4.19	52.1%
EBMP S8a1b	Neenah Slough	Spring Meadows Pond	0.00	0	0	91.7%	0	-	0.00	0.00	55.0%	0.00	-
Other Drainage System	Neenah Slough	Promote Infiltration via Rain Gardens	397.53	80,629	57,025		57,025	29.3%	258.31	189.02		189.02	26.8%
N2b6	Neenah Slough		20.26	4,246	1,972		1,972	53.6%	15.04	7.73		7.73	48.6%
N2e5	Neenah Slough		15.96	3,315	1,737		1,737	47.6%	9.96	6.06		6.06	39.2%
N2e7	Neenah Slough		18.59	3,500	387		387	88.9%	12.99	1.95		1.95	85.0%
N3d2	Neenah Slough	*Westowne Pond	1.41	344	329	80.0%	69	80.0%	1.27	1.24	60.0%	0.51	60.0%
N4b4	Neenah Slough	Pendleton Pond	22.60	3,436	3,430	80.0%	687	80.0%	14.15	14.13	60.0%	5.66	60.0%
N5c3	Neenah Slough	*Tuller Pond	0.84	66	66	80.0%	13	80.0%	0.40	0.40	60.0%	0.16	60.0%
N7e1b	Neenah Slough		33.61	6,217	1,978		1,978	68.2%	22.80	7.00		7.00	69.3%
N7e1c	Neenah Slough		21.71	2,741	1,268		1,268	53.7%	12.58	7.54		7.54	40.0%
N7e9a	Neenah Slough		33.98	5,227	1,348		1,348	74.2%	21.55	7.35		7.35	65.9%
N7e9b	Neenah Slough		26.12	4,549	3,024		3,024	33.5%	15.73	10.46		10.46	33.5%
N8a4	Neenah Slough		13.47	2,179	841		841	61.4%	9.35	4.73		4.73	49.4%
N8b1a	Neenah Slough		34.04	3,836	966		966	74.8%	19.52	5.83		5.83	70.1%
S5b	Neenah Slough	*Commerce Ct Pond	6.16	570	570	50.0%	285	50.0%	2.54	2.54	35.0%	1.65	35.0%
S6a2	Neenah Slough		28.60	7,750	7,750		7,750	0.0%	17.43	17.43		17.43	0.0%
S7e4	Neenah Slough	**Green Valley Pond	23.77	6,250	6,250	80.0%	1,250	80.0%	13.61	13.61	60.0%	5.45	60.0%
S8a2	Neenah Slough	*Dixie Pond	9.34	1,111	774	80.0%	222	80.0%	4.60	2.48	60.0%	1.84	60.0%
S8a5b	Neenah Slough	Checker Pond	12.66	5,463	5,463	80.0%	1,093	80.0%	8.22	8.22	60.0%	3.29	60.0%
S8b3	Neenah Slough	N&M Transfer North Pond	36.16	14,524	10,992	80.0%	2,905	80.0%	25.74	20.40	65.0%	9.01	65.0%
S8b4b	Neenah Slough		23.20	9,596	7,738		7,738	19.4%	17.59	14.16		14.16	19.5%
EBMP W6b1	Lake Winnebago	Hidden Acres Pond	13.29	2,398	2,398	86.8%	317	86.8%	9.03	9.03	56.2%	3.95	56.2%
EBMP W7a3	Lake Winnebago	Herzinger Pond	49.50	8,217	8,217	83.2%	1,384	83.2%	34.26	34.26	57.2%	14.66	57.2%
Other Drainage System	Lake Winnebago		109.64	15,151	5,132		5,132	66.1%	65.31	26.24		26.24	59.8%
W4e	Lake Winnebago		60.64	11,127	923		923	91.7%	43.62	4.42		4.42	89.9%
W7c2	Lake Winnebago		43.58	5,004	2,743		2,743	45.2%	23.10	15.69		15.69	32.1%
W8a1	Lake Winnebago		29.33	3,815	631		631	83.5%	17.36	3.52		3.52	79.7%

*City of Neenah Pond (water quality benefits approximate) - Town to obtain agreement with City for water quality credit

**WisDOT Pond (water quality benefits approximate) - Town to obtain agreement with WisDOT for water quality credit

2012 Condition: (Entire Study Area)

	Town - Within UPB (Excludes areas outside UPB, other MS4 jurisdictions and land owned by others)										
		Total Suspended Solids (TSS) Provided					Total Phosphorus (TP) Provided				
Sub-Watershed	Area (acres)	Before Drain System (lbs/yr)	After Drain System (lbs/yr)	BMP Reduct (%)	After Outfall Control (lbs/yr)	Load Reduct (%)	Before Drain System (lbs/yr)	After Drain System (lbs/yr)	BMP Reduct (%)	After Outfall Control (lbs/yr)	Load Reduct (%)
Fox River	318.27	100,779			31,733	68.5%	220.40			102.79	53.4%
Neenah Slough	989.28	197,976			99,762	49.6%	632.96			370.48	41.5%
Lake Winnebago	305.97	45,712			11,131	75.6%	192.67			68.48	64.5%
	1,613.52	344,467			142,627	58.6%	1,046.03			541.76	48.2%

Allocation Adjustments to Urban (MS4) Allocations in TMDL Report

	Town - Within UPB (Excludes areas outside UPB, other MS4 jurisdictions and land owned by others)										
		Extra Total Suspended Solids (TSS) Allocated					Extra Total Phosphorus (TP) Allocated				
Sub-Watershed				Agric, Quarry, Forest, Wetlnd (acres)	Agric, Quarry, Forest, Wetlnd (lb/yr)				Agric, Quarry, Forest, Wetlnd (acres)	Agric, Quarry, Forest, Wetlnd (lb/yr)	
Fox River				67.25	11,911				67.25	21.40	
Neenah Slough				278.62	47,323				278.62	90.09	

Urban (MS4) Allocations Including Adjustments (Baseline Load Method) (Entire Study Area)

	Town - Within UPB (Excludes areas outside UPB, other MS4 jurisdictions and land owned by others)										
		Total Suspended Solids (TSS) Allocation					Total Phosphorus (TP) Allocation				
Sub-Watershed	Area (acres)	Allocate (%)			Allocate (lbs/yr)		Allocate (%)			Allocate (lbs/yr)	
Fox River	318.27	70.5%			40,411		66.9%			112.28	
Neenah Slough	989.28	68.8%			159,874		71.9%			371.78	
	1,307.55				200,284					484.05	

Alternative #2: (Excludes Town-Outside UPB, ROW County HWY, ROW State STH)

	Town - Within UPB (Excludes areas outside UPB, other MS4 jurisdictions and land owned by others)										
		Total Suspended Solids (TSS) Provided					Total Phosphorus (TP) Provided				
Sub-Watershed	Area (acres)	Before Drain System (lbs/yr)	After Drain System (lbs/yr)	BMP Reduct (%)	After Outfall Control (lbs/yr)	Load Reduct (%)	Before Drain System (lbs/yr)	After Drain System (lbs/yr)	BMP Reduct (%)	After Outfall Control (lbs/yr)	Load Reduct (%)
Fox River	318.27	100,779		0.0%	31,733	68.5%	220.40			102.79	53.4%
Neenah Slough	989.28	197,976		0.0%	99,762	49.6%	632.96			370.48	41.5%
Lake Winnebago	305.97	45,712		0.0%	11,131	75.6%	192.67			68.48	64.5%
	1,613.52	344,467			142,627	58.6%	1,046.03			541.76	48.2%

Urban (MS4) Allocations Including Adjustments (Baseline Load Method) (Excludes Town-Outside UPB, ROW County HWY, ROW State STH)

	Town - Within UPB (Excludes areas outside UPB, other MS4 jurisdictions and land owned by others)										
		Total Suspended Solids (TSS) Allocation					Total Phosphorus (TP) Allocation				
Sub-Watershed	Area (acres)	Allocate (%)			Allocate (lbs/yr)		Allocate (%)			Allocate (lbs/yr)	
Fox River	318.27	70.5%			40,411		66.9%			112.28	
Neenah Slough	989.28	68.8%			159,874		71.9%			371.78	
	1,307.55				200,284					484.05	

Alternative #2: (Baseline Load Method) (Excludes Town-Outside UPB, ROW County HWY, ROW State STH)

		Total Suspended Solids (TSS)						Total Phosphorus (TP)			
Sub-Watershed	Area (acres)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)	Allocate (lbs/yr)	Satisfy TSS?	Differ. (lbs/yr)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)	Allocate (lbs/yr)
Fox River	319.47	100,938	31,892	68.4%	40,455	YES	-8,564	221.16	103.55	53.2%	112.59
Neenah Slough	994.45	198,902	100,290	49.6%	160,400	YES	-60,111	635.72	372.67	41.4%	373.01
Lake Winnebago	310.78	46,554	11,444	75.4%	-	-	-	195.97	70.46	64.0%	-
	1,624.71	346,395	143,626	58.5%	200,856			1,052.85	546.68	48.1%	485.60

Town of Neenah Stormwater Management Plan
McM No. N0003-900379 December 14, 2012

Alternative #2: (2012 Land Use - Excludes Quarries, No Parking Control Ordinanc

			Town - Outside UPB							ROW County HWY - Within UPB						
				TSS Provided			TP Provided				TSS Provided			TP Provided		
Drainage System	Watershed	BMP Name	Area (acres)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduc (%)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduc (%)	Area (acres)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduc (%)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduc (%)
EBMP G4a1b	Fox River	Tuckaway Storage Pond														
EBMP G8b2d	Fox River	Gibson Salvage Pond (CTH "OO" Pond)														
EBMP G8b3c	Fox River	Ogden Pond (CTH "OO" Pond)								0.04	21	2	90.0%	0.06	0.02	70.0%
EBMP G8b3d	Fox River	Tushsherer Self-Storage Pond (CTH "OO" Pond)														
EBMP G8c1b	Fox River	Rockwood Warehouse North Pond														
EBMP G8c1c	Fox River	Rockwood Warehouse South Pond														
EBMP G8c1d	Fox River	4C Storage Pond														
EBMP G9c2	Fox River	Dermatology Associates Pond														
Other Drainage System	Fox River		35.34	11,637	8,889	23.6%	34.44	28.36	17.6%	18.12	13,768	13,452	2.3%	32.86	32.40	1.4%
G8b3a	Fox River	CTH "O" Pond								14.29	11,257	2,251	80.0%	26.34	9.22	65.0%
G9a3	Fox River		1.05	592	12	97.9%	1.77	0.04	97.7%	1.65	923	923	0.0%	2.79	2.79	0.0%
EBMP N4c5	Neenah Slough	Sunset Terrace Pond								0.05	33	8	76.4%	0.09	0.04	49.0%
EBMP N4d6	Neenah Slough	White Tail Run South Pond (Pendleton Pond)														
EBMP N4d7	Neenah Slough	White Tail Run West Pond (Pendleton Pond)														
EBMP N7e8	Neenah Slough	Woodside Acres Pond								0.48	265	30	88.5%	0.80	0.38	52.1%
EBMP S8a1b	Neenah Slough	Spring Meadows Pond	15.02	2,347	195	91.7%	9.19	4.14	55.0%							
Other Drainage System	Neenah Slough	Promote Infiltration via Rain Gardens	46.35	9,272	4,215	54.5%	36.63	21.55	41.2%	12.29	8,627	8,519	1.2%	22.04	21.83	1.0%
N2b6	Neenah Slough		0.12	73	48	34.3%	0.22	0.15	32.3%							
N2e5	Neenah Slough									1.78	1,220	1,220	0.0%	3.26	3.26	0.0%
N2e7	Neenah Slough															
N3d2	Neenah Slough	*Westowne Pond														
N4b4	Neenah Slough	Pendleton Pond								4.16	2,461	492	80.0%	7.14	2.86	60.0%
N5c3	Neenah Slough	*Tuller Pond														
N7e1b	Neenah Slough		0.01	1	1	0.0%	0.01	0.01	0.0%	1.26	851	851	0.0%	2.16	2.16	0.0%
N7e1c	Neenah Slough									1.08	650	650	0.0%	1.93	1.93	0.0%
N7e9a	Neenah Slough									2.59	1,507	1,507	0.0%	4.53	4.53	0.0%
N7e9b	Neenah Slough		0.46	252	23	91.0%	0.78	0.08	89.9%	0.40	229	229	0.0%	0.69	0.69	0.0%
N8a4	Neenah Slough															
N8b1a	Neenah Slough															
S5b	Neenah Slough	*Commerce Ct Pond	0.14	12	6	50.0%	0.07	0.04	35.0%							
S6a2	Neenah Slough		0.33	30	30	0.0%	0.16	0.16	0.0%							
S7e4	Neenah Slough	**Green Valley Pond	0.62	57	11	80.0%	0.31	0.13	60.0%	5.36	3,953	791	80.0%	9.82	3.93	60.0%
S8a2	Neenah Slough	*Dixie Pond	16.89	3,294	659	80.0%	12.65	5.06	60.0%							
S8a5b	Neenah Slough	Checker Pond														
S8b3	Neenah Slough	N&M Transfer North Pond	1.31	1,099	220	80.0%	2.55	0.89	65.0%							
S8b4b	Neenah Slough		7.12	410	410	0.0%	2.58	2.58	0.0%							
EBMP W6b1	Lake Winnebago	Hidden Acres Pond														
EBMP W7a3	Lake Winnebago	Herzinger Pond	0.02	10	2	83.2%	0.03	0.01	57.2%	1.78	1,107	186	83.2%	3.08	1.32	57.2%
Other Drainage System	Lake Winnebago		201.18	22,143	18,648	15.8%	107.87	95.03	11.9%	0.63	410	410	0.0%	1.07	1.07	0.0%
W4e	Lake Winnebago															
W7c2	Lake Winnebago		0.59	38	38	0.0%	0.23	0.23	0.0%	0.87	551	551	0.0%	1.51	1.51	0.0%
W8a1	Lake Winnebago		1.84	524	29	94.5%	1.84	0.16	91.4%							

*City of Neenah Pond (water quality benefits approximate) - Town to obtain agreement with City for water quality credit

**WisDOT Pond (water quality benefits approximate) - Town to obtain agreement with WisDOT for water quality credit

2012 Condition:
(Entire Study Area)

	Town - Outside UPB							ROW County HWY - Within UPB						
		TSS Provided			TP Provided				TSS Provided			TP Provided		
Sub-Watershed	Area (acres)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)	Area (acres)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)
Fox River	36.39	12,229	8,902	27.2%	36.21	28.40	21.6%	34.09	25,968	16,628	36.0%	62.06	44.44	28.4%
Neenah Slough	88.37	16,847	5,819	65.5%	65.15	34.78	46.6%	29.45	19,796	14,297	27.8%	52.45	41.60	20.7%
Lake Winnebago	203.63	22,715	18,717	17.6%	109.96	95.43	13.2%	3.28	2,067	1,147	44.5%	5.67	3.90	31.2%
	328.38	51,791	33,437	35.4%	211.32	158.61	24.9%	66.82	47,831	32,072	32.9%	120.18	89.94	25.2%

Allocation Adjustments to Urban (MS4) Allocations in TMDL Report

	Town - Outside UPB						ROW County HWY - Within UPB					
		Extra TSS Allocated			Extra TP Allocated			Extra TSS Allocated			Extra TP Allocated	
Sub-Watershed		Agric, Quarry, Forest, Wetlnd (acres)	Agric, Quarry, Forest, Wetlnd (lb/yr)		Agric, Quarry, Forest, Wetlnd (acres)	Agric, Quarry, Forest, Wetlnd (lb/yr)		Agric, Quarry, Forest, Wetlnd (acres)	Agric, Quarry, Forest, Wetlnd (lb/yr)		Agric, Quarry, Forest, Wetlnd (acres)	Agric, Quarry, Forest, Wetlnd (lb/yr)	
Fox River		21.50	3,010		21.50	5.69			5.14	1,056		5.14	1.85	
Neenah Slough		31.52	6,019		31.52	10.99			9.69	2,144		9.69	3.94	

Urban (MS4) Allocations Including Adjustments (Baseline Load Method) (Entire Study Area)

	Town - Outside UPB						ROW County HWY - Within UPB					
		TSS Allocation			TP Allocation			TSS Allocation			TP Allocation	
Sub-Watershed	Area (acres)	Allocate (%)	Allocate (lbs/yr)		Allocate (%)	Allocate (lbs/yr)	Area (Acres)	Allocate (%)	Allocate (lbs/yr)		Allocate (%)	Allocate (lbs/yr)	
Fox River	36.39	8.6%	6,468		11.0%	20.62	34.09	18.2%	8,400		18.8%	27.44	
Neenah Slough	88.37	5.9%	15,596		7.4%	39.98	29.45	6.9%	13,398		6.0%	27.28	
	124.76		22,065			60.60	63.54		21,797			54.72	

Alternative #2:
(Excludes Town-Outside UPB, ROW County HWY, ROW State STH)

	Town - Outside UPB							ROW County HWY - Within UPB						
		TSS Provided			TP Provided				TSS Provided			TP Provided		
Sub-Watershed	Area (acres)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)	Area (acres)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)
Fox River														
Neenah Slough														
Lake Winnebago														
	0.00	0	0	-	0.00	0.00	-	0.00	0	0	-	0.00	0.00	-

Urban (MS4) Allocations Including Adjustments (Baseline Load Method) (Excludes Town-Outside UPB, ROW County HWY, ROW State STH)

	Town - Outside UPB						ROW County HWY - Within UPB					
		TSS Allocation			TP Allocation			TSS Allocation			TP Allocation	
Sub-Watershed	Area (acres)	Allocate (%)	Allocate (lbs/yr)		Allocate (%)	Allocate (lbs/yr)	Area (Acres)	Allocate (%)	Allocate (lbs/yr)		Allocate (%)	Allocate (lbs/yr)	
Fox River													
Neenah Slough													
	0.00		0			0.00	0.00		0			0.00	

Alternative #2:
(Baseline Load Method)
(Excludes Town-Outside UPB, ROW County HWY, ROW State STH)

Sub-Watershed	Satisfy TP?	Differ. (lbs/yr)
Fox River	YES	-9.04
Neenah Slough	YES	-0.33
Lake Winnebago	-	-

Alternative #2: (2012 Land Use - Excludes Quarries, No Parking Control Ordinanc

			ROW County HWY - Outside UPB							ROW State STH - Within UPB						
				TSS Provided			TP Provided				TSS Provided			TP Provided		
Drainage System	Watershed	BMP Name	Area (acres)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduc (%)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduc (%)	Area (acres)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduc (%)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduc (%)
EBMP G4a1b	Fox River	Tuckaway Storage Pond														
EBMP G8b2d	Fox River	Gibson Salvage Pond (CTH "OO" Pond)														
EBMP G8b3c	Fox River	Ogden Pond (CTH "OO" Pond)														
EBMP G8b3d	Fox River	Tushsherer Self-Storage Pond (CTH "OO" Pond)														
EBMP G8c1b	Fox River	Rockwood Warehouse North Pond														
EBMP G8c1c	Fox River	Rockwood Warehouse South Pond														
EBMP G8c1d	Fox River	4C Storage Pond														
EBMP G9c2	Fox River	Dermatology Associates Pond														
Other Drainage System	Fox River		4.21	2,993	2,993	0.0%	7.70	7.70	0.0%							
G8b3a	Fox River	CTH "O" Pond														
G9a3	Fox River		1.28	749	749	0.0%	2.23	2.23	0.0%							
EBMP N4c5	Neenah Slough	Sunset Terrace Pond														
EBMP N4d6	Neenah Slough	White Tail Run South Pond (Pendleton Pond)														
EBMP N4d7	Neenah Slough	White Tail Run West Pond (Pendleton Pond)														
EBMP N7e8	Neenah Slough	Woodside Acres Pond														
EBMP S8a1b	Neenah Slough	Spring Meadows Pond														
Other Drainage System	Neenah Slough	Promote Infiltration via Rain Gardens	2.73	1,624	1,624	0.0%	4.89	4.89	0.0%	41.29	48,607	48,607	0.0%	117.98	117.98	0.0%
N2b6	Neenah Slough															
N2e5	Neenah Slough															
N2e7	Neenah Slough															
N3d2	Neenah Slough	*Westowne Pond														
N4b4	Neenah Slough	Pendleton Pond														
N5c3	Neenah Slough	*Tuller Pond														
N7e1b	Neenah Slough		0.23	138	138	0.0%	0.41	0.41	0.0%							
N7e1c	Neenah Slough															
N7e9a	Neenah Slough															
N7e9b	Neenah Slough															
N8a4	Neenah Slough															
N8b1a	Neenah Slough															
S5b	Neenah Slough	*Commerce Ct Pond														
S6a2	Neenah Slough															
S7e4	Neenah Slough	**Green Valley Pond	1.04	710	142	80.0%	1.93	0.77	60.0%	0.81	952	190	80.0%	2.32	0.93	60.0%
S8a2	Neenah Slough	*Dixie Pond														
S8a5b	Neenah Slough	Checker Pond														
S8b3	Neenah Slough	N&M Transfer North Pond														
S8b4b	Neenah Slough															
EBMP W6b1	Lake Winnebago	Hidden Acres Pond														
EBMP W7a3	Lake Winnebago	Herzinger Pond														
Other Drainage System	Lake Winnebago		14.77	8,649	8,649	0.0%	26.04	26.04	0.0%							
W4e	Lake Winnebago															
W7c2	Lake Winnebago		0.39	231	231	0.0%	0.69	0.69	0.0%							
W8a1	Lake Winnebago															

*City of Neenah Pond (water quality benefits approximate) - Town to obtain agreement with City for water quality credit

**WisDOT Pond (water quality benefits approximate) - Town to obtain agreement with WisDOT for water quality credit

2012 Condition: (Entire Study Area)

		ROW County HWY - Outside UPB							ROW State STH - Within UPB						
			TSS Provided			TP Provided				TSS Provided			TP Provided		
Sub-Watershed	Area (acres)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)	Area (acres)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)
Fox River	5.49	3,742	3,742	0.0%	9.93	9.93	0.0%	0.00	0	0	-	0.00	0.00	-
Neenah Slough	4.01	2,472	1,905	23.0%	7.24	6.08	16.0%	42.10	49,560	48,798	1.5%	120.29	118.90	1.2%
Lake Winnebago	15.16	8,879	8,879	0.0%	26.73	26.73	0.0%	0.00	0	0	-	0.00	0.00	-
	24.66	15,094	14,526	3.8%	43.90	42.74	2.6%	42.10	49,560	48,798	1.5%	120.29	118.90	1.2%

Allocation Adjustments to Urban (MS4) Allocations in TMDL Report

		ROW County HWY - Outside UPB						ROW State STH - Within UPB					
		Extra TSS Allocated			Extra TP Allocated				Extra TSS Allocated			Extra TP Allocated	
Sub-Watershed		Agric, Quarry, Forest, Wetlnd (acres)	Agric, Quarry, Forest, Wetlnd (lb/yr)		Agric, Quarry, Forest, Wetlnd (acres)	Agric, Quarry, Forest, Wetlnd (lb/yr)			Agric, Quarry, Forest, Wetlnd (acres)	Agric, Quarry, Forest, Wetlnd (lb/yr)		Agric, Quarry, Forest, Wetlnd (acres)	Agric, Quarry, Forest, Wetlnd (lb/yr)	
Fox River		5.08	1,044		5.08	1.83			0.00	0		0.00	0.00	
Neenah Slough		2.45	509		2.45	0.91			0.00	0		0.00	0.00	

Urban (MS4) Allocations Including Adjustments (Baseline Load Method) (Entire Study Area)

		ROW County HWY - Outside UPB						ROW State STH - Within UPB					
		TSS Allocation			TP Allocation				TSS Allocation			TP Allocation	
Sub-Watershed	Area (Acres)	Allocate (%)	Allocate (lbs/yr)		Allocate (%)	Allocate (lbs/yr)		Area (Acres)	Allocate (%)	Allocate (lbs/yr)		Allocate (%)	Allocate (lbs/yr)	
Fox River	5.49	2.6%	2,102		3.0%	5.92		0.00	0.0%	0		0.0%	0.00	
Neenah Slough	4.01	0.9%	1,915		0.8%	4.13		42.10	17.2%	28,175		13.7%	53.53	
	9.50		4,017			10.05		42.10		28,175			53.53	

Alternative #2: (Excludes Town-Outside UPB, ROW County HWY, ROW State STH)

		ROW County HWY - Outside UPB							ROW State STH - Within UPB						
			TSS Provided			TP Provided				TSS Provided			TP Provided		
Sub-Watershed	Area (acres)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)	Area (acres)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)
Fox River														
Neenah Slough														
Lake Winnebago														
	0.00	0	0	-	0.00	0.00	-	0.00	0	0	-	0.00	0.00	-

Urban (MS4) Allocations Including Adjustments (Baseline Load Method) (Excludes Town-Outside UPB, ROW County HWY, ROW State STH)

		ROW County HWY - Outside UPB						ROW State STH - Within UPB					
		TSS Allocation			TP Allocation				TSS Allocation			TP Allocation	
Sub-Watershed	Area (Acres)	Allocate (%)	Allocate (lbs/yr)		Allocate (%)	Allocate (lbs/yr)		Area (Acres)	Allocate (%)	Allocate (lbs/yr)		Allocate (%)	Allocate (lbs/yr)	
Fox River														
Neenah Slough														
	0.00		0			0.00		0.00		0			0.00	

Alternative #2: (Baseline Load Method) (Excludes Town-Outside UPB, ROW County HWY, ROW State STH)

Sub-Watershed
Fox River
Neenah Slough
Lake Winnebago

Town of Neenah Stormwater Management Plan
McM No. N0003-900379 December 14, 2012

Alternative #2: (2012 Land Use - Excludes Quarries, No Parking Control Ordinanc

			Neenah Sanitary District - Within UPB							Other Municipal Owned Lands - Within UPB						
				TSS Provided			TP Provided				TSS Provided			TP Provided		
Drainage System	Watershed	BMP Name	Area (acres)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduc (%)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduc (%)	Area (acres)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduc (%)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduc (%)
EBMP G4a1b	Fox River	Tuckaway Storage Pond														
EBMP G8b2d	Fox River	Gibson Salvage Pond (CTH "OO" Pond)														
EBMP G8b3c	Fox River	Ogden Pond (CTH "OO" Pond)														
EBMP G8b3d	Fox River	Tushsherer Self-Storage Pond (CTH "OO" Pond)														
EBMP G8c1b	Fox River	Rockwood Warehouse North Pond														
EBMP G8c1c	Fox River	Rockwood Warehouse South Pond														
EBMP G8c1d	Fox River	4C Storage Pond														
EBMP G9c2	Fox River	Dermatology Associates Pond														
Other Drainage System	Fox River									1.21	159	159	0.0%	0.76	0.76	0.0%
G8b3a	Fox River	CTH "O" Pond														
G9a3	Fox River															
EBMP N4c5	Neenah Slough	Sunset Terrace Pond														
EBMP N4d6	Neenah Slough	White Tail Run South Pond (Pendleton Pond)														
EBMP N4d7	Neenah Slough	White Tail Run West Pond (Pendleton Pond)														
EBMP N7e8	Neenah Slough	Woodside Acres Pond														
EBMP S8a1b	Neenah Slough	Spring Meadows Pond														
Other Drainage System	Neenah Slough	Promote Infiltration via Rain Gardens	3.40	387	387	0.0%	1.69	1.69	0.0%	0.36	44	44	0.0%	0.20	0.20	0.0%
N2b6	Neenah Slough															
N2e5	Neenah Slough															
N2e7	Neenah Slough															
N3d2	Neenah Slough	*Westowne Pond														
N4b4	Neenah Slough	Pendleton Pond														
N5c3	Neenah Slough	*Tuller Pond														
N7e1b	Neenah Slough															
N7e1c	Neenah Slough															
N7e9a	Neenah Slough															
N7e9b	Neenah Slough															
N8a4	Neenah Slough									0.34	36	5	86.8%	0.18	0.03	84.6%
N8b1a	Neenah Slough															
S5b	Neenah Slough	*Commerce Ct Pond														
S6a2	Neenah Slough															
S7e4	Neenah Slough	**Green Valley Pond								1.07	460	92	80.0%	0.69	0.28	60.0%
S8a2	Neenah Slough	*Dixie Pond														
S8a5b	Neenah Slough	Checker Pond														
S8b3	Neenah Slough	N&M Transfer North Pond														
S8b4b	Neenah Slough															
EBMP W6b1	Lake Winnebago	Hidden Acres Pond														
EBMP W7a3	Lake Winnebago	Herzinger Pond	2.62	636	107	83.2%	2.31	0.99	57.2%							
Other Drainage System	Lake Winnebago		2.19	205.95	205.95	0.0%	0.98	0.98	0.0%							
W4e	Lake Winnebago															
W7c2	Lake Winnebago															
W8a1	Lake Winnebago															

*City of Neenah Pond (water quality benefits approximate) - Town to obtain agreement with City for water quality credit

**WisDOT Pond (water quality benefits approximate) - Town to obtain agreement with WisDOT for water quality credit

2012 Condition:
(Entire Study Area)

	Neenah Sanitary District - Within UPB							Other Municipal Owned Lands - Within UPB						
		TSS Provided			TP Provided				TSS Provided			TP Provided		
Sub-Watershed	Area (acres)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)	Area (acres)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)
Fox River	0.00	0	0	-	0.00	0.00	-	1.21	159	159	0.0%	0.76	0.76	0.0%
Neenah Slough	3.40	387	387	0.0%	1.69	1.69	0.0%	1.77	539	140	74.0%	1.07	0.50	53.1%
Lake Winnebago	4.81	842	313	62.8%	3.30	1.97	40.1%	0.00	0	0	-	0.00	0.00	-
	8.21	1,229	700	43.0%	4.98	3.66	26.6%	2.98	698	299	57.2%	1.84	1.27	31.1%

Allocation Adjustments to Urban (MS4) Allocations in TMDL Report

	Neenah Sanitary District - Within UPB						Other Municipal Owned Lands - Within UPB					
		Extra TSS Allocated		Extra TP Allocated				Extra TSS Allocated		Extra TP Allocated		
Sub-Watershed		Agric, Quarry, Forest, Wetlnd (acres)	Agric, Quarry, Forest, Wetlnd (lb/yr)	Agric, Quarry, Forest, Wetlnd (acres)	Agric, Quarry, Forest, Wetlnd (lb/yr)			Agric, Quarry, Forest, Wetlnd (acres)	Agric, Quarry, Forest, Wetlnd (lb/yr)	Agric, Quarry, Forest, Wetlnd (acres)	Agric, Quarry, Forest, Wetlnd (lb/yr)	
Fox River		0.00	0	0.00	0.00			0.00	0	0.00	0.00	
Neenah Slough		0.00	0	0.00	0.00			0.00	0	0.00	0.00	

Urban (MS4) Allocations Including Adjustments (Baseline Load Method) (Entire Study Area)

	Neenah Sanitary District - Within UPB						Other Municipal Owned Lands - Within UPB					
		TSS Allocation		TP Allocation				TSS Allocation		TP Allocation		
Sub-Watershed	Area (Acres)	Allocate (%)	Allocate (lbs/yr)	Allocate (%)	Allocate (lbs/yr)		Area (Acres)	Allocate (%)	Allocate (lbs/yr)	Allocate (%)	Allocate (lbs/yr)	
Fox River	0.00	0.0%	0	0.0%	0.00		1.21	0.1%	45	0.2%	0.31	
Neenah Slough	3.40	0.1%	220	0.2%	0.75		1.77	0.2%	307	0.1%	0.48	
	3.40		220		0.75		2.98		352		0.79	

Alternative #2:
(Excludes Town-Outside UPB, ROW County HWY, ROW State STH)

	Neenah Sanitary District - Within UPB							Other Municipal Owned Lands - Within UPB						
		TSS Provided			TP Provided				TSS Provided			TP Provided		
Sub-Watershed	Area (acres)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)	Area (acres)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)
Fox River	0.00	0	0	-	0.00	0.00	-	1.21	159	159	0.0%	0.76	0.76	0.0%
Neenah Slough	3.40	387	387	0.0%	1.69	1.69	0.0%	1.77	539	140	74.0%	1.07	0.50	53.1%
Lake Winnebago	4.81	842	313	62.8%	3.30	1.97	40.1%	0.00	0	0	-	0.00	0.00	-
	8.21	1,229	700	43.0%	4.98	3.66	26.6%	2.98	698	299	57.2%	1.84	1.27	31.1%

Urban (MS4) Allocations Including Adjustments (Baseline Load Method) (Excludes Town-Outside UPB, ROW County HWY, ROW State STH)

	Neenah Sanitary District - Within UPB						Other Municipal Owned Lands - Within UPB					
		TSS Allocation		TP Allocation				TSS Allocation		TP Allocation		
Sub-Watershed	Area (Acres)	Allocate (%)	Allocate (lbs/yr)	Allocate (%)	Allocate (lbs/yr)		Area (Acres)	Allocate (%)	Allocate (lbs/yr)	Allocate (%)	Allocate (lbs/yr)	
Fox River	0.00	0.0%	0	0.0%	0.00		1.21	0.1%	45	0.2%	0.31	
Neenah Slough	3.40	0.1%	220	0.2%	0.75		1.77	0.2%	307	0.1%	0.48	
	3.40		220		0.75		2.98		352		0.79	

Alternative #2:
(Baseline Load Method)
(Excludes Town-Outside UPB, ROW County HWY, ROW State STH)

Sub-Watershed
Fox River
Neenah Slough
Lake Winnebago

Town of Neenah Stormwater Management Plan
McM No. N0003-900379 December 14, 2012

Alternative #2: (2012 Land Use - Excludes Quarries, No Parking Control Ordinanc

Drainage System	Watershed	BMP Name	Totals/Sums for Comparison						
				TSS Provided			TP Provided		
			Area (acres)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduc (%)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduc (%)
EBMP G4a1b	Fox River	Tuckaway Storage Pond	7.75	2,483	327	86.8%	6.12	1.81	70.5%
EBMP G8b2d	Fox River	Gibson Salvage Pond (CTH "OO" Pond)	43.98	17,717	1,772	90.0%	25.15	7.54	70.0%
EBMP G8b3c	Fox River	Ogden Pond (CTH "OO" Pond)	10.53	3,656	366	90.0%	8.94	2.68	70.0%
EBMP G8b3d	Fox River	Tushsherer Self-Storage Pond (CTH "OO" Pond)	3.52	1,219	122	90.0%	2.98	0.89	70.0%
EBMP G8c1b	Fox River	Rockwood Warehouse North Pond	4.55	1,831	128	93.0%	3.16	0.71	77.4%
EBMP G8c1c	Fox River	Rockwood Warehouse South Pond	7.24	2,814	342	87.8%	5.27	1.42	73.1%
EBMP G8c1d	Fox River	4C Storage Pond	1.33	462	92	80.0%	1.13	0.37	67.0%
EBMP G9c2	Fox River	Dermatology Associates Pond	1.21	371	72	80.6%	0.92	0.33	64.3%
Other Drainage System	Fox River		186.94	60,015	44,066	26.6%	168.00	124.34	26.0%
G8b3a	Fox River	CTH "O" Pond	112.26	46,102	9,220	80.0%	87.93	30.77	65.0%
G9a3	Fox River		16.15	6,209	4,657	25.0%	19.78	15.45	21.9%
EBMP N4c5	Neenah Slough	Sunset Terrace Pond	167.08	25,367	5,976	76.4%	101.74	51.85	49.0%
EBMP N4d6	Neenah Slough	White Tail Run South Pond (Pendleton Pond)	17.04	2,887	577	80.0%	11.29	4.52	60.0%
EBMP N4d7	Neenah Slough	White Tail Run West Pond (Pendleton Pond)	11.70	2,046	409	80.0%	7.88	3.15	60.0%
EBMP N7e8	Neenah Slough	Woodside Acres Pond	13.97	2,424	279	88.5%	9.56	4.58	52.1%
EBMP S8a1b	Neenah Slough	Spring Meadows Pond	15.02	2,347	195	91.7%	9.19	4.14	55.0%
Other Drainage System	Neenah Slough	Promote Infiltration via Rain Gardens	503.95	149,189	120,422	19.3%	441.74	357.15	19.1%
N2b6	Neenah Slough		20.39	4,319	2,020	53.2%	15.26	7.88	48.4%
N2e5	Neenah Slough		17.73	4,536	2,957	34.8%	13.22	9.31	29.5%
N2e7	Neenah Slough		18.59	3,500	387	88.9%	12.99	1.95	85.0%
N3d2	Neenah Slough	*Westowne Pond	1.41	344	69	80.0%	1.27	0.51	60.0%
N4b4	Neenah Slough	Pendleton Pond	26.76	5,898	1,180	80.0%	21.29	8.52	60.0%
N5c3	Neenah Slough	*Tuller Pond	0.84	66	13	80.0%	0.40	0.16	60.0%
N7e1b	Neenah Slough		35.11	7,207	2,969	58.8%	25.38	9.58	62.3%
N7e1c	Neenah Slough		22.80	3,391	1,918	43.4%	14.51	9.47	34.7%
N7e9a	Neenah Slough		36.57	6,734	2,855	57.6%	26.07	11.87	54.5%
N7e9b	Neenah Slough		26.98	5,030	3,275	34.9%	17.20	11.23	34.7%
N8a4	Neenah Slough		13.82	2,215	846	61.8%	9.54	4.76	50.1%
N8b1a	Neenah Slough		34.04	3,836	966	74.8%	19.52	5.83	70.1%
S5b	Neenah Slough	*Commerce Ct Pond	6.30	582	291	50.0%	2.60	1.69	35.0%
S6a2	Neenah Slough		28.93	7,780	7,780	0.0%	17.59	17.59	0.0%
S7e4	Neenah Slough	**Green Valley Pond	32.66	12,382	2,476	80.0%	28.68	11.47	60.0%
S8a2	Neenah Slough	*Dixie Pond	26.22	4,404	881	80.0%	17.25	6.90	60.0%
S8a5b	Neenah Slough	Checker Pond	12.66	5,463	1,093	80.0%	8.22	3.29	60.0%
S8b3	Neenah Slough	N&M Transfer North Pond	37.47	15,623	3,125	80.0%	28.29	9.90	65.0%
S8b4b	Neenah Slough		30.31	10,006	8,148	18.6%	20.17	16.74	17.0%
EBMP W6b1	Lake Winnebago	Hidden Acres Pond	13.29	2,398	317	86.8%	9.03	3.95	56.2%
EBMP W7a3	Lake Winnebago	Herzinger Pond	53.91	9,969	1,679	83.2%	39.69	16.98	57.2%
Other Drainage System	Lake Winnebago		328.42	46,558	33,045	29.0%	201.27	149.37	25.8%
W4e	Lake Winnebago		60.64	11,127	923	91.7%	43.62	4.42	89.9%
W7c2	Lake Winnebago		45.42	5,824	3,563	38.8%	25.52	18.12	29.0%
W8a1	Lake Winnebago		31.17	4,340	660	84.8%	19.20	3.68	80.8%

*City of Neenah Pond (water quality benefits approximate) - Town to obtain agreement with City for water quality credit

**WisDOT Pond (water quality benefits approximate) - Town to obtain agreement with WisDOT for water quality credit

2012 Condition: (Entire Study Area)

Sub-Watershed	Totals/Sums for Comparison						
		TSS Provided			TP Provided		
	Area (acres)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)
Fox River	395.45	142,878	61,164	57.2%	329.37	186.32	43.4%
Neenah Slough	1,158.37	287,577	171,108	40.5%	880.85	574.04	34.8%
Lake Winnebago	532.85	80,216	40,188	49.9%	338.32	196.51	41.9%
	2,086.67	510,670	272,459	46.6%	1,548.54	956.87	38.2%

Allocation Adjustments to Urban (MS4) Allocations in TMDL Report

Sub-Watershed	Totals/Sums for Comparison						
		Extra TSS Allocated			Extra TP Allocated		
		Agric, Quarry, Forest, Wetlnd (acres)	Agric, Quarry, Forest, Wetlnd (lb/yr)		Agric, Quarry, Forest, Wetlnd (acres)	Agric, Quarry, Forest, Wetlnd (lb/yr)	
Fox River		99	17,021		99	30.76	
Neenah Slough		322	55,994		322	105.94	

Urban (MS4) Allocations Including Adjustments (Baseline Load Method) (Entire Study Area)

Sub-Watershed	Totals/Sums for Comparison						
		TSS Allocation			TP Allocation		
	Area (Acres)	Allocate (%)	Allocate (lbs/yr)	Reduct (%)	Allocate (%)	Allocate (lbs/yr)	Reduct (%)
Fox River	395.45	100.0%	57,425	59.8%	100.0%	166.56	49.4%
Neenah Slough	1,158.37	100.0%	219,484	23.7%	100.0%	497.94	43.5%
	1,553.82		276,910			664.50	

Alternative #2: (Excludes Town-Outside UPB, ROW County HWY, ROW State STH)

Sub-Watershed	Totals/Sums for Comparison						
		TSS Provided			TP Provided		
	Area (acres)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)	Before Drain System (lbs/yr)	After Outfall Control (lbs/yr)	Load Reduct (%)
Fox River	319.47	100,938	31,892	68.4%	221.16	103.55	53.2%
Neenah Slough	994.45	198,902	100,290	49.6%	635.72	372.67	41.4%
Lake Winnebago	310.78	46,554	11,444	75.4%	195.97	70.46	64.0%
	1,624.71	346,395	143,626	58.5%	1,052.85	546.68	48.1%

Urban (MS4) Allocations Including Adjustments (Baseline Load Method) (Excludes Town-Outside UPB, ROW County HWY, ROW State STH)

Sub-Watershed	Totals/Sums for Comparison						
		TSS Allocation			TP Allocation		
	Area (Acres)	Allocate (%)	Allocate (lbs/yr)	Reduct (%)	Allocate (%)	Allocate (lbs/yr)	Reduct (%)
Fox River	319.47	100.0%	40,455	59.9%	100.0%	112.59	49.1%
Neenah Slough	994.45	100.0%	160,400	19.4%	100.0%	373.01	41.3%
	1,313.93		200,856			485.60	

Alternative #2: (Baseline Load Method) (Excludes Town-Outside UPB, ROW County HWY, ROW State STH)

Sub-Watershed	Satisfy TSS Allocation?		Satisfy TP Allocation?	
Fox River	YES	-8,564	YES	-9.04
Neenah Slough	YES	-60,111	YES	-0.33
Lake Winnebago				

Town of Neenah
Storm Water Management Study
McM No. N0003-900379
November 27, 2012

BMP COST EFFECTIVENESS SUMMARY

			Total Suspended Solids (TSS)							Total Phosphorus (TP)						Wet Detention Pond/Other BMP Cost								
PBMP ID	BMP Basins	BMP Name	Area (acres)	Before Drainage System (lbs)	After Drainage System (lbs)	PBMP TSS Removal %	After Outfall Controls (lbs)	Total Load Reduction (lbs)	Net Gain (lbs)	Before Drainage System (lbs)	After Drainage System (lbs)	PBMP TSS Removal %	After Outfall Controls (lbs)	Total Load Reduction (lbs)	Net Gain (lbs)	Water Surface Area (acres) Biofilter Size (SF)	Capital Costs For 2012	Average Annual O&M Costs For 2012	Average Annual O&M Costs Over 20 Years	Capital & Average Annual O&M Costs Over 20 Years	Average Annual TSS Net Gain Over 20 Years For Town (lbs)	Average Annual Total Cost For Town ($/lbs)	TSS Ranking	Average Annual TP Net Gain Over 20 Years For Town (lbs)	Average Annual Total Cost For Town ($/lbs)	TP Ranking
P-BMP-S7e4	P-BMP-S7e4	**Green Valley Pond	23.77	6,250	6,250	80.00%	1,250	5,000	5,000	13.61	13.61	60.00%	5.45	8.17	8.17	0.00	$30,000	$0	$0	$30,000	100,006	$0.30	1	163.36	$183.64	1
P-BMP-N3d2	P-BMP-N3d2	*Westowne Pond	1.41	344	329	80.00%	69	275	260	1.27	1.24	60.00%	0.51	0.76	0.73	0.00	$10,000	$0	$0	$10,000	5,195	$1.93	3	14.55	$687.42	2
P-BMP-N5c3	P-BMP-N5c3	*Tuller Pond	0.84	66	66	80.00%	13	53	53	0.40	0.40	60.00%	0.16	0.24	0.24	0.00	$5,000	$0	$0	$5,000	1,060	$4.72	7	4.85	$1,031.77	3
P-BMP-S5b	E-BMP-S8a1b, P-BMP-S8a2, P-BMP-S5b	*Commerce Ct Pond	15.50	1,681	1,344	60.00%	672	1,008	672	7.13	5.01	45.00%	3.92	3.21	1.09	0.00	$30,000	$0	$0	$30,000	13,438	$2.23	4	21.83	$1,374.41	4
P-BMP-S8a2	E-BMP-S8a1b, P-BMP-S8a2	*Dixie Pond	9.34	1,111	774	80.00%	222	888	552	4.60	2.48	60.00%	1.84	2.76	0.64	0.00	$20,000	$0	$0	$20,000	11,036	$1.81	2	12.80	$1,562.08	5
P-BMP-S8b3	P-BMP-S8b3	N&M Transfer North Pond	36.16	14,524	10,992	80.00%	2,905	11,620	8,087	25.74	20.40	65.00%	9.01	16.73	11.40	1.30	$350,000	$7,113	$142,251	$492,251	161,749	$3.04	5	227.91	$2,159.81	6
P-BMP-W7c2	P-BMP-W7c2	Kappell Pond	43.58	5,004	2,743	80.00%	1,001	4,003	1,742	23.10	15.69	60.00%	9.24	13.86	6.46	0.54	$225,000	$4,288	$85,766	$310,766	34,845	$8.92	12	129.10	$2,407.17	7
P-BMP-C9a3	P-BMP-C9a3	Oakridge Pond	12.17	3,945	2,973	80.00%	789	3,156	2,184	12.99	10.39	60.00%	5.20	7.79	5.20	0.40	$200,000	$3,780	$75,608	$275,608	43,679	$6.31	10	103.93	$2,651.91	8
P-BMP-N4b4	E-BMP-N4d6, E-BMP-N4d7, P-BMP-N4b4	Pendleton Pond	51.34	8,369	4,468	80.00%	1,674	6,695	2,794	33.32	23.86	60.00%	13.33	19.99	10.53	0.90	$450,000	$5,594	$111,888	$561,888	55,873	$10.06	13	210.57	$2,668.45	9
P-BMP-S8a5b	P-BMP-S8a5b	Checker Pond	12.66	5,463	5,463	80.00%	1,093	4,371	4,371	8.22	8.22	60.00%	3.29	4.93	4.93	0.40	$200,000	$3,780	$75,608	$275,608	87,411	$3.15	6	98.66	$2,793.62	10
P-BMP-G8b3a	E-BMP-G8b2d, E-BMP-G8b3c, E-BMP-G8b3d, P-BMP-G8b3a	CTO "O" Pond	155.97	57,416	36,658	80.00%	11,483	45,933	25,175	98.58	67.40	65.00%	34.50	64.08	32.90	5.00	$2,100,000	$21,372	$427,431	$2,527,431	503,506	$5.02	9	657.97	$3,841.25	11
P-BMP-S8b4b	P-BMP-S8b3, P-BMP-S8b4b	N&M Transfer South Pond	59.36	24,120	18,730	60.00%	9,648	14,472	9,082	43.32	34.56	45.00%	23.83	19.50	10.73	2.90	$610,000	$13,274	$265,487	$875,487	181,649	$4.82	8	214.67	$4,078.24	12
P-BMP-S6a2	P-BMP-S6a2	Harrison Pond	28.60	7,750	7,750	80.00%	1,550	6,200	6,200	17.43	17.43	65.00%	6.10	11.33	11.33	1.70	$780,000	$8,653	$173,060	$953,060	123,997	$7.69	11	226.63	$4,205.32	13
P-BMP-N7e9b	E-BMP-N7e8, P-BMP-N7e9b	Klompen Pond	39.61	6,799	3,272	80.00%	1,342	5,367	1,931	24.48	14.66	60.00%	9.79	14.69	4.86	0.90	$450,000	$5,594	$111,888	$561,888	38,614	$14.55	15	97.26	$5,777.17	14
P-BMP-N2e5	P-BMP-N2e5	Sturgis Pond	15.96	3,315	1,737	80.00%	663	2,652	1,074	9.96	6.06	60.00%	3.98	5.98	2.07	0.40	$200,000	$3,780	$75,608	$275,608	21,476	$12.83	14	41.49	$6,643.26	15
P-BMP-N8a4	P-BMP-N8a4	Armstrong Pond	13.47	2,179	841	80.00%	436	1,743	406	9.35	4.73	60.00%	3.74	5.61	0.99	0.30	$150,000	$3,418	$68,351	$218,351	8,112	$26.92	18	19.75	$11,053.24	16
P-BMP-N2b6	P-BMP-N2b6	Rockledge Pond	20.26	4,246	1,972	80.00%	849	3,397	1,122	15.04	7.73	60.00%	6.02	9.02	1.71	1.30	$265,000	$7,113	$142,251	$407,251	22,447	$18.14	16	34.28	$11,880.99	17
P-BMP-N7e1a	E-BMP-N7e8, P-BMP-N7e9a, P-BMP-N7e9b, P-BMP-N7e1a, P-BMP-N7e1b, P-BMP-N7e1c	Breezewood Pond	128.91	20,893	7,867	80.00%	4,179	16,715	3,688	81.41	36.55	60.00%	32.56	48.85	3.98	7.50	$3,100,000	$31,012	$620,233	$3,720,233	73,762	$50.44	19	79.62	$46,722.37	18
P-BMP-N7e1c	P-BMP-N7e1b, P-BMP-N7e1c	Woodside Pond	55.92	8,958	3,247	80.00%	1,792	7,166	1,455	35.38	14.54	60.00%	14.15	21.23	0.39	4.10	$1,718,000	$17,901	$358,022	$2,076,022	29,105	$71.33	21	7.81	$265,938.37	19
P-BMP-W4e	P-BMP-W4e	Bayview Pond	60.64	11,127	923	80.00%	2,225	8,902	-1,302	43.62	4.42	60.00%	17.45	26.17	-13.03	0.62	$270,000	$4,579	$91,571	$361,571	-26,042	-$13.88	23	-260.55	-$1,387.75	20
P-BMP-N2e7	P-BMP-N2e7	Harvard Pond	18.59	3,500	387	80.00%	700	2,800	-313	12.99	1.95	60.00%	5.19	7.79	-3.24	0.30	$150,000	$3,418	$68,351	$218,351	-6,253	-$34.92	24	-64.89	-$3,365.01	21
P-BMP-W8a1	P-BMP-W8a1	Muttart Pond	29.33	3,815	631	80.00%	763	3,052	-132	17.36	3.52	60.00%	6.94	10.42	-3.42	0.46	$235,000	$3,998	$79,961	$314,961	-2,635	-$119.51	25	-68.50	-$4,598.06	22
P-BMP-N8b1a	P-BMP-N8b1a	Hedgeview Pond	34.04	3,836	966	80.00%	767	3,069	199	19.52	5.83	60.00%	7.81	11.71	-1.98	0.40	$200,000	$3,780	$75,608	$275,608	3,980	$69.25	20	-39.59	-$6,961.62	23
P-BMP-N7e1b	P-BMP-N7e1b	Cummings Pond	33.61	6,217	1,978	80.00%	1,243	4,973	735	22.80	7.00	60.00%	9.12	13.68	-2.12	0.60	$300,000	$4,506	$90,120	$390,120	14,702	$26.53	17	-42.46	-$9,188.11	24
P-BMP-N7e9a	P-BMP-N7e9a	Sally Pond	33.98	5,227	1,348	80.00%	1,045	4,181	302	21.55	7.35	60.00%	8.62	12.93	-1.27	2.00	$945,000	$9,608	$196,167	$1,141,167	6,043	$188.83	22	-25.44	-$44,853.16	25

*City of Neenah Pond (water quality benefits approximate) - Would require Town to obtain an agreement &/or 'buy in' for water quality credit

Town of Neenah Stormwater Management Plan
Grass Swale Analysis
McM No N0003-900379.00

Swale ID	Swale Jurisdiction	Drainage Area (acres)	Total Swale Length (ft)	Swale Density (ft/ac)	Typical Bottom Width (ft)	Typical Swale Side Slope (__ft H:1ft V)	*Typical Longitudinal Slope (ft/ft, V/H)	Swale Retardance Factor	Typical Grass Height (in)	Measured Dynamic Infiltration Rate (in/hr)	TSS Load Reduction (%)	TP Load Reduction (%)	Notes
Swale1-C11c2	Town of Neenah	6.11	362	59	1	3	0.005	D	2.5	1.25	77.65%	71.50%	
Swale1-G4a1a	Town of Neenah	2.92	388	133	1	3	0.005	D	2.5	1.94	82.60%	79.36%	
Swale1-G4b2	Town of Neenah	5.86	614	105	1	4	0.005	D	2.5	0.96	53.66%	50.93%	
Swale1-G8b1	Town of Neenah	1.62	699	432	1	4	0.005	D	2.5	1.84	97.86%	97.52%	
Swale1-G8b2a	Town of Neenah	6.77	548	81	1	3	0.005	D	2.5	1.94	70.22%	67.31%	
Swale1-G8b2b	Town of Neenah	9.76	430	44	1	3	0.005	D	2.5	1.94	51.72%	48.40%	
Swale1-G9a1b	Town of Neenah	5.26	1992	379	1	3	0.005	D	2.5	1.64	24.17%	18.58%	**Wetland vegetation in swale, use clay (0.035 in /hr) infiltration rate **
Swale1-G9a3	Town of Neenah	2.97	225	76	1	3	0.03	D	2.5	1.82	45.10%	41.19%	
Swale1-G9b1	Town of Neenah	3.16	127	40	1	3	0.005	D	2.5	1.73	43.81%	40.06%	
Swale1-G9b3	Town of Neenah	2.70	1766	654	1	3	0.015	D	2.5	1.13	90.83%	89.75%	
Swale1-G9c1	Town of Neenah	37.78	1013	27	1	3	0.0075	D	2.5	1.36	73.42%	55.50%	
Swale2-G4a1a	Town of Neenah	1.47	307	208	1	3	0.005	D	2.5	1.94	83.01%	80.31%	
Swale2-G4b2	Town of Neenah	6.88	2315	337	1	4	0.005	D	2.5	0.96	91.04%	89.79%	
Swale2-G8b2a	Town of Neenah	0.77	593	773	1	3	0.005	D	2.5	1.67	97.76%	97.52%	
Swale2-G8b2b	Town of Neenah	1.10	514	468	1	3	0.005	D	2.5	1.94	94.06%	92.70%	
Swale2-G9a3	Town of Neenah	2.88	2970	1031	1	3	0.01	D	2.5	1.94	99.69%	99.63%	
Swale2-G9b3	Town of Neenah	0.66	675	1020	2	3	0.005	D	2.5	1.57	37.26%	28.11%	**Standing water in swale, use clay (0.035 in /hr) infiltration rate **
Swale3-G8b2b	Town of Neenah	4.31	298	69	1	3	0.0075	D	2.5	1.94	74.83%	70.52%	
Swale4-G8b2b	Town of Neenah	0.34	342	1020	1	3	0.0075	D	2.5	1.94	97.78%	97.00%	
Swale-C11d	Town of Neenah	2.75	1690	615	1	3	0.015	D	2.5	1.03	84.66%	82.87%	
Swale-C11f	Town of Neenah	6.49	1252	193	1	4	0.015	D	2.5	1.66	87.00%	84.26%	
Swale-C12a2	Town of Neenah	7.32	1010	138	1	3	0.0125	D	2.5	1.27	78.30%	73.61%	
Swale-G4b1	Town of Neenah	4.05	964	238	1	4	0.0025	D	2.5	0.96	86.85%	84.86%	
Swale-G4b3	Town of Neenah	2.92	443	152	1	3	0.01	D	2.5	0.96	52.18%	48.95%	
Swale-G5c	Town of Neenah	1.93	698	361	1	4	0.0025	D	2.5	0.96	91.67%	90.36%	
Swale-G6b	Town of Neenah	8.64	2608	302	1	4	0.0025	D	2.5	0.96	93.50%	92.74%	
Swale-G7	Town of Neenah	9.27	1842	199	1	4	0.0025	D	2.5	0.96	84.42%	82.43%	
Swale-G9a1a	Town of Neenah	27.46	2877	105	1	3	0.005	D	2.5	1.69	19.14%	13.60%	**Standing water in swale, use clay (0.035 in /hr) infiltration rate **
Swale-G9a2	Town of Neenah	45.97	3360	73	2	3	0.01	D	2.5	1.47	19.92%	8.82%	**Standing water in swale, use clay (0.035 in /hr) infiltration rate **
Swale1-N2b6	Town of Neenah	2.16	461	213	1	3	0.035	D	2.5	1.94	75.76%	72.84%	
Swale1-N2d1	Town of Neenah	0.66	499	750	1	3	0.005	D	2.5	1.35	94.71%	93.27%	
Swale1-N2d3	Town of Neenah	0.45	461	1018	1	3	0.015	D	2.5	0.96	88.07%	85.68%	
Swale1-N2e1	Town of Neenah	5.46	481	88	1	3	0.005	D	2.5	1.29	55.03%	52.23%	
Swale1-N2e5	Town of Neenah	9.63	599	62	1	4	0.01	D	2.5	1.93	74.96%	70.39%	
Swale1-N2e6	Town of Neenah	1.14	309	270	1	4	0.02	D	2.5	1.78	79.24%	76.25%	
Swale1-N7a2	Town of Neenah	2.83	1259	444	1	3	0.005	D	2.5	0.96	88.14%	86.48%	
Swale1-N7a3	Town of Neenah	7.07	658	93	1	3	0.005	D	2.5	0.96	27.62%	13.12%	**Wetland vegetation in swale, use clay (0.035 in /hr) infiltration rate **
Swale1-N7d3	Town of Neenah	0.84	524	624	1	3	0.01	D	2.5	0.96	86.84%	85.09%	
Swale1-N7e1b	Town of Neenah	25.36	5761	227	1	4	0.0075	D	2.5	1.74	97.45%	97.12%	
Swale1-N7e1c	Town of Neenah	0.39	309	792	1	4	0.0125	D	2.5	1.94	95.17%	94.98%	

Swale ID	Swale Jurisdiction	Drainage Area (acres)	Total Swale Length (ft)	Swale Density (ft/ac)	Typical Bottom Width (ft)	Typical Swale Side Slope (__ft H:1ft V)	*Typical Longitudinal Slope (ft/ft, V/H)	Swale Retardance Factor	Typical Grass Height (in)	Measured Dynamic Infiltration Rate (in/hr)	TSS Load Reduction (%)	TP Load Reduction (%)	Notes
Swale1-N7e6	Town of Neenah	2.56	408	160	1	4	0.0125	D	2.5	1.72	89.98%	86.73%	
Swale1-N8a4	Town of Neenah	1.22	767	627	1	4	0.005	D	2.5	0.96	95.42%	94.97%	
Swale1-N8a5	Town of Neenah	0.84	792	947	1	3	0.005	D	2.5	0.96	95.35%	95.06%	
Swale1-N8a7	Town of Neenah	0.62	540	865	1	3	0.005	D	2.5	0.96	94.58%	94.17%	
Swale1-N8a8	Town of Neenah	0.92	590	640	1	3	0.005	D	2.5	0.96	93.29%	92.60%	
Swale1-N8b1b	Town of Neenah	2.47	1270	514	1	3	0.01	D	2.5	0.96	89.80%	88.02%	
Swale1-S8a2	Town of Neenah	0.70	1666	2391	1	3	0.0075	D	2.5	0.96	98.40%	98.30%	
Swale1-S8a3	Town of Neenah	0.84	402	478	1	3	0.005	D	2.5	0.96	92.04%	88.12%	
Swale1-S8b3	Town of Neenah	4.04	464	115	1	3	0.005	D	2.5	0.96	51.13%	47.70%	
Swale1-S8b9	Town of Neenah	3.93	1841	468	1	3	0.075	D	2.5	0.94	89.30%	87.47%	
Swale2-N2b6	Town of Neenah	4.13	1728	418	1	3	0.01	D	2.5	1.05	92.18%	89.24%	
Swale2-N2d2	Town of Neenah	0.52	475	921	1	3	0.005	D	2.5	1.29	95.92%	94.55%	
Swale2-N2e4	Town of Neenah	2.28	1028	451	1	3	0.005	D	2.5	1.38	91.51%	89.61%	
Swale2-N2e5	Town of Neenah	1.11	562	506	1	4	0.01	D	2.5	1.70	95.90%	95.25%	
Swale2-N2e6	Town of Neenah	0.96	347	361	1	4	0.0225	D	2.5	1.94	83.62%	81.17%	
Swale2-N7a2	Town of Neenah	0.44	294	667	1	3	0.005	D	2.5	0.96	90.53%	89.41%	
Swale2-N7a3	Town of Neenah	4.49	737	164	1	3	0.005	D	2.5	0.96	89.18%	83.12%	
Swale2-N7d3	Town of Neenah	4.60	2223	483	1	4	0.01	D	2.5	1.84	98.20%	97.90%	
Swale2-N7e9a	Town of Neenah	3.29	1180	359	1	4	0.02	D	2.5	1.70	88.44%	86.32%	
Swale2-N7e9b	Town of Neenah	1.08	763	706	1	3	0.005	D	2.5	0.96	91.05%	90.11%	
Swale2-N8a4	Town of Neenah	0.78	923	1184	1	3	0.005	D	2.5	0.96	95.43%	94.97%	
Swale2-N8a5	Town of Neenah	1.49	785	528	1	3	0.01	D	2.5	0.96	90.23%	88.62%	
Swale2-N8a7	Town of Neenah	0.29	106	362	1	3	0.01	D	2.5	0.96	77.31%	74.12%	
Swale2-N8a8	Town of Neenah	2.66	440	165	1	3	0.01	D	2.5	0.96	79.13%	73.10%	
Swale2-N8b1a	Town of Neenah	5.86	1958	334	1	4	0.005	D	2.5	0.96	95.84%	94.87%	
Swale2-S7e5	Town of Neenah	0.97	410	423	1	4	0.005	D	2.5	0.96	84.71%	83.38%	
Swale2-S8a2	Town of Neenah	0.64	535	835	1	3	0.0075	D	2.5	0.96	92.09%	91.13%	
Swale2-S8a7	Town of Neenah	3.81	2030	533	1	4	0.005	D	2.5	0.96	94.99%	94.35%	
Swale2-S8b9	Town of Neenah	1.48	562	378	1	3	0.005	D	2.5	0.90	74.19%	71.92%	
Swale3-N2b5	Town of Neenah	0.49	546	1117	1	3	0.0225	D	2.5	1.26	87.04%	85.75%	
Swale3-N2e6	Town of Neenah	2.65	771	291	1	4	0.005	D	2.5	1.29	94.55%	93.41%	
Swale3-N7d3	Town of Neenah	1.08	536	496	1	3	0.015	D	2.5	1.33	87.79%	85.75%	
Swale3-N7e1c	Town of Neenah	1.97	628	318	1	4	0.015	D	2.5	1.91	90.33%	88.81%	
Swale3-N7e9a	Town of Neenah	10.03	1107	110	1	4	0.015	D	2.5	1.73	82.39%	78.71%	
Swale3-N7e9b	Town of Neenah	12.19	1214	100	1	4	0.02	D	2.5	1.27	70.62%	63.13%	
Swale3-N8a4	Town of Neenah	3.44	850	247	1	4	0.005	D	2.5	0.96	86.83%	84.59%	
Swale3-N8a8	Town of Neenah	0.68	599	886	1	4	0.005	D	2.5	0.96	96.03%	95.55%	
Swale3-N8b1a	Town of Neenah	0.72	330	458	1	4	0.005	D	2.5	0.96	92.29%	90.93%	
Swale3-S8b3	Town of Neenah	9.85	2026	206	1	3	0.005	D	2.5	0.95	17.85%	13.31%	**Standing water in swale, use clay (0.035 in /hr) infiltration rate **
Swale4-N7e9a	Town of Neenah	4.97	1497	301	1	4	0.015	D	2.5	1.71	92.18%	91.03%	
Swale4-N7e9b	Town of Neenah	2.93	524	179	1	4	0.02	D	2.5	1.26	65.92%	62.06%	
Swale4-N8b1a	Town of Neenah	22.03	904	41	1	4	0.005	D	2.5	0.96	68.65%	64.57%	
Swale5-N2b5	Town of Neenah	2.36	1022	433	1	3	0.005	D	2.5	0.99	82.05%	79.29%	
Swale5-N7e9a	Town of Neenah	4.58	875	191	1	4	0.015	D	2.5	1.60	85.16%	82.86%	

Swale ID	Swale Jurisdiction	Drainage Area (acres)	Total Swale Length (ft)	Swale Density (ft/ac)	Typical Bottom Width (ft)	Typical Swale Side Slope (__ft H:1ft V)	*Typical Longitudinal Slope (ft/ft, V/H)	Swale Retardance Factor	Typical Grass Height (in)	Measured Dynamic Infiltration Rate (in/hr)	TSS Load Reduction (%)	TP Load Reduction (%)	Notes
Swale5-N8b1a	Town of Neenah	2.82	1287	457	1	4	0.005	D	2.5	0.96	96.12%	95.54%	
Swale-N2b7	Town of Neenah	14.03	985	70	1	3	0.005	D	2.5	1.57	85.73%	80.96%	
Swale-N2d4	Town of Neenah	2.89	1095	379	1	3	0.015	D	2.5	1.44	89.64%	86.97%	
Swale-N2d5	Town of Neenah	26.20	1068	41	1	3	0.015	D	2.5	1.89	77.25%	63.68%	
Swale-N2d6	Town of Neenah	6.86	1098	160	1	3	0.025	D	2.5	1.17	69.13%	63.98%	
Swale-N2e7	Town of Neenah	15.40	4948	321	1	4	0.015	D	2.5	1.92	96.02%	95.37%	
Swale-N6b	Town of Neenah	4.41	1446	328	1	4	0.0025	D	2.5	0.96	93.69%	92.50%	
Swale-N7d1	Town of Neenah	4.99	2856	573	1	3	0.0075	D	2.5	0.96	94.67%	93.56%	
Swale-N7e1a	Town of Neenah	1.89	424	224	1	3	0.0075	D	2.5	0.96	86.98%	81.45%	
Swale-N7e3	Town of Neenah	1.01	732	726	1	3	0.005	D	2.5	1.27	93.58%	93.01%	
Swale-N7e5	Town of Neenah	8.07	522	65	1	3	0.005	D	2.5	1.03	72.53%	65.50%	
Swale-N8b3	Town of Neenah	1.67	1292	774	1	3	0.01	D	2.5	0.96	92.44%	91.37%	
Swale-N8f1	Town of Neenah	1.57	1823	1163	1	3	0.0075	D	2.5	0.96	94.94%	94.48%	
Swale-N8g1	Town of Neenah	1.02	665	650	1	3	0.0075	D	2.5	0.96	91.01%	89.70%	
Swale-N8h1	Town of Neenah	2.11	1660	786	1	3	0.0075	D	2.5	0.96	93.58%	92.76%	
Swale-S8a1a	Town of Neenah	26.15	3085	118	1	3	0.0075	D	2.5	1.20	87.90%	84.16%	
Swale-S8b1	Town of Neenah	2.88	1912	664	1	3	0.005	D	2.5	0.89	92.12%	90.11%	
Swale-S8b2a	Town of Neenah	0.64	1330	2091	1	3	0.005	D	2.5	0.49	94.98%	93.06%	
Swale-S8b2b	Town of Neenah	19.08	800	42	1	3	0.005	D	2.5	0.95	43.40%	37.13%	
Swale-S8b4b	Town of Neenah	15.35	1878	122	1	3	0.005	D	2.5	0.92	16.66%	12.00%	**Standing water in swale, use clay (0.035 in /hr) infiltration rate **
Swale-S8b7	Town of Neenah	7.93	1519	192	1	3	0.005	D	2.5	0.94	74.52%	70.96%	
Swale1-W3d2	Town of Neenah	7.20	1064	148	1	4	0.0025	D	2.5	0.96	86.63%	83.87%	
Swale1-W3d3	Town of Neenah	2.24	334	149	1	4	0.0025	D	2.5	1.67	94.35%	92.88%	
Swale1-W3e1	Town of Neenah	2.79	755	270	1	4	0.005	D	2.5	1.70	97.53%	86.83%	
Swale1-W4e	Town of Neenah	6.65	1729	260	1	4	0.005	D	2.5	1.04	92.11%	90.85%	
Swale1-W4g	Town of Neenah	4.05	1613	399	1	4	0.005	D	2.5	1.33	96.41%	95.84%	
Swale1-W7c2	Town of Neenah	13.11	1336	102	1	3	0.005	D	2.5	1.79	91.32%	88.19%	
Swale1-W8a1	Town of Neenah	5.32	567	107	1	3	0.005	D	2.5	0.97	78.74%	74.80%	
Swale1-W8a4	Town of Neenah	1.94	1480	763	1	3	0.02	D	2.5	1.47	97.38%	97.16%	
Swale2-W3d3	Town of Neenah	2.54	280	110	1	4	0.0025	D	2.5	1.09	84.17%	80.42%	
Swale2-W4e	Town of Neenah	9.41	1878	200	1	4	0.005	D	2.5	1.01	87.65%	85.58%	
Swale2-W4g	Town of Neenah	1.58	617	390	1	4	0.0025	D	2.5	0.96	91.32%	90.02%	
Swale2-W7c2	Town of Neenah	4.02	420	104	1	3	0.005	D	2.5	1.12	67.86%	62.66%	
Swale2-W8a1	Town of Neenah	1.62	364	225	1	3	0.005	D	2.5	0.96	76.28%	72.69%	
Swale3-W4e	Town of Neenah	22.20	4418	199	1	3	0.005	D	2.5	1.24	93.91%	92.64%	
Swale3-W7c2	Town of Neenah	2.02	1881	930	1	3	0.005	D	2.5	1.36	100.00%	100.00%	
Swale3-W8a1	Town of Neenah	7.27	727	100	1	3	0.005	D	2.5	1.40	82.93%	79.31%	
Swale4-W4e	Town of Neenah	2.56	967	378	1	4	0.005	D	2.5	1.82	97.51%	97.28%	
Swale4-W8a1	Town of Neenah	22.08	963	44	1	4	0.005	D	2.5	1.64	83.47%	79.60%	
Swale5-W4e	Town of Neenah	1.16	475	409	1	4	0.0075	D	2.5	1.94	95.86%	95.42%	
Swale5-W8a1	Town of Neenah	21.77	2313	106	1	4	0.01	D	2.5	1.68	94.48%	91.38%	
Swale6-W4e	Town of Neenah	3.22	490	152	1	4	0.0075	D	2.5	1.76	89.06%	86.84%	
Swale7-W4e	Town of Neenah	6.87	1258	183	1	4	0.005	D	2.5	1.61	93.41%	92.19%	
Swale8-W4e	Town of Neenah	2.52	1032	410	1	4	0.005	D	2.5	1.92	98.25%	97.96%	

Swale ID	Swale Jurisdiction	Drainage Area (acres)	Total Swale Length (ft)	Swale Density (ft/ac)	Typical Bottom Width (ft)	Typical Swale Side Slope (__ft H:1ft V)	*Typical Longitudinal Slope (ft/ft, V/H)	Swale Retardance Factor	Typical Grass Height (in)	Measured Dynamic Infiltration Rate (in/hr)	TSS Load Reduction (%)	TP Load Reduction (%)	Notes
Swale9-W4e	Town of Neenah	5.74	1044	182	1	4	0.005	D	2.5	1.78	93.98%	92.86%	
Swale-W3d5	Town of Neenah	2.70	315	117	1	4	0.005	D	2.5	1.90	92.86%	90.89%	
Swale-W3d6	Town of Neenah	3.84	360	94	1	4	0.005	D	2.5	1.56	86.64%	83.52%	
Swale-W3e2	Town of Neenah	1.92	369	192	1	4	0.005	D	2.5	1.50	93.31%	91.61%	
Swale-W4f	Town of Neenah	6.56	846	129	1	3	0.005	D	2.5	0.96	79.60%	75.70%	
Swale-W4h	Town of Neenah	4.67	540	116	1	3	0.005	D	2.5	0.96	61.73%	57.06%	
Swale-W5a	Town of Neenah	2.07	1372	663	1	3	0.01	D	2.5	1.85	96.36%	95.98%	
Swale-W8a2	Town of Neenah	3.38	1428	423	1	4	0.0075	D	2.5	1.84	97.99%	97.64%	
Swale-W8a3	Town of Neenah	8.79	1690	192	1	4	0.0075	D	2.5	1.94	95.84%	94.91%	
	Averages:	5.66	1101	397	1.01	3.41	0.009			1.32	82.79%	80.03%	

*Typical Longitudinal Slope was rounded down to the nearest 0.25%

APPENDIX D

DNR Guidance Documents for NR 151 Compliance

CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: June 6, 2005

TO: Regional Water Leaders, Basin Leader & Experts
Storm Water Permit Staff (via Email)

FROM: Russ Rasmussen, Director
Bureau of Watershed Management

SUBJECT: Developed Urban Areas and the 20% and 40% TSS Reductions
Sections NR 151.13(2) and NR 216.07(6), Wis. Adm. Code

This document is intended solely as guidance, and does not contain any mandatory requirements except where requirements found in statute or administrative rule are referenced. This guidance does not establish or affect legal rights or obligations, and is not finally determinative of any of the issues addressed. This guidance does not create any rights enforceable by any party in litigation with the State of Wisconsin or the Department of Natural Resources. Any regulatory decisions made by the Department of Natural Resources in any matter addressed by this guidance will be made by applying the governing statutes and administrative rules to the relevant facts.

Issue

Under s. NR 151.13 (2), Wis. Adm. Code, a municipality subject to the municipal storm water permit requirements of subch. I of ch. NR 216, Wis. Adm. Code, must, to the maximum extent practicable, implement a 20% and a 40% reduction in total suspended solids in runoff that enters waters of the state as compared to no controls, by March 10, 2008 and March 10, 2013, respectively. Staff who work with affected municipalities need guidance on what areas under the municipalities' jurisdictions will be included in this requirement. They also need to know what is meant by "no controls" and "with controls", and what methods are acceptable for making these calculations.

Discussion

Chapter NR 216, Wis. Adm. Code, is the implementation code for the developed urban area performance standard. Applicability for permit coverage purposes is dictated by s. NR 216.02, Wis. Adm. Code. Under this provision, owners or operators of the following municipal separate storm sewer systems (MS4s) are required to obtain coverage under a WPDES municipal storm water permit:

- MS4s serving populations of 100,000 or more.
- Previously notified owners or operators of municipal separate storm sewer systems.
- MS4s within urbanized areas as identified by EPA.
- MS4s serving populations over 10,000 unless exempted by DNR.

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

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- Owned or operated by a municipality.
- Designed or used for collecting or conveying storm water.
- Not a combined sewer conveying both sanitary and storm water.
- Not part of a publicly owned wastewater treatment works that provides secondary or more stringent treatment.

Under s. NR 216.07(6)(a), Wis. Adm. Code, a municipality must develop a stormwater management program to achieve compliance with the developed urban area performance standard (s. NR 151.12(2), Wis. Adm. Code). Developed areas are generally those that were not subject to the post-construction performance standards (s. NR 151.12 or NR 151.24, Wis. Adm. Code). The total suspended solids control requirements of s. NR 151.13(2)(b)1.b. and 2., Wis. Adm. Code, may be achieved on an individual municipal basis. Control does not have to apply uniformly across the municipality. The control may also be applied on a regional basis by involving several municipalities.

A municipality is required under s. NR 216.07(6)(b), Wis. Adm. Code, to provide an assessment of the actions taken to comply with the performance standards. This assessment may take the form of an annual progress report. The initial assessment must include a pollutant-loading analysis using a model such as SLAMM, P8 or equivalent methodology that is approved by the department. At a minimum, a pollutant-loading analysis must be conducted for total suspended solids and phosphorus. A model would not be run again after the initial assessment unless significant management changes occurred that should be accounted for, or the progress report indicates a re-run is necessary.

DNR Guidance

To comply with the code, the developed urban area must be modeled under a "no control" condition and a "with controls" condition. The 20% and 40% TSS reductions are assessed against the "no control" condition for the entire area served by the MS4 as defined below. They are not applied uniformly across the municipality, nor are they applied drainage area by drainage area within the municipal boundary. In most cases however, a calculation drainage basin by drainage basin will be used to determine the total loading and the achieved reductions.

Areas Required to be Included in the Calculations

A municipality must include the following areas when calculating compliance with the developed urban area standard (s. NR 151.13, Wis. Adm. Code):

1. Any developed area that was not subject to the post-construction performance standards of s. NR 151.12 or 151.24, Wis. Adm. Code, that went into effect October 1, 2004 and that drains to the MS4 owned or operated by the municipality.
2. Any area covered by an NOI submitted prior to October 1, 2004 where development is still underway. The pollutant load shall be based on full build out. If it is known that the future development of some parcels may require compliance with s. NR 151.12 or NR 151.24, Wis. Adm. Code, then these areas may be excluded from the calculation.
3. Any undeveloped (in-fill) areas under 5 acres. These areas must be modeled as fully developed, with a land use similar to the properties around them.
4. For municipalities with large areas of agricultural lands separating areas of development, only the areas within the urbanized area as defined by the U.S. Census Bureau.

5. Non-manufacturing areas of industrial facilities such as customer or employee parking lots. (The manufacturing, outside storage and vehicle maintenance areas of these industrial facilities are covered under a subch. II of ch. NR 216, Wis. Adm. Code, industrial permit.)
6. Any industry that has certified a condition of "no exposure" in accordance with s. NR 216.21(3), Wis. Adm. Code.
7. Any developed urban area where it is already established that the area will be annexed by the municipality prior to March 10, 2008. There must be an agreement with the municipality that will be losing the area, to prevent double counting.

Areas Prohibited from Inclusion in the Calculations

Areas and loadings that shall not be included:

1. Lands zoned for agricultural use and operating as such.
2. Pollutant loadings from an upstream MS4 (independent of whether it is regulated under a ch. NR 216, Wis. Adm. Code, permit)
3. Any internally drained area with natural infiltration. (This does not included engineered or constructed infiltration areas.) However, an internally drained area that discharges to a karst feature is not likely to be receiving adequate treatment prior to any contact with the groundwater. The municipality is encouraged to look at this area for possible treatment options.
4. Undeveloped land parcels over 5 acres within the municipality. These areas will be subject to s. NR 151.12 or 151.24, Wis. Adm. Code, when developed.

Optional Areas to Include in the Calculations

Areas a municipality may, but is not required to, include in the developed urban area load calculation:

1. Property that drains to *waters of the state* without passing through the permittee's MS4. Waters of the state include surface water, wetlands and groundwater and has the meaning given in s. 283.01(20), Stats. Waters of the state may overlap with the definition of MS4. For this purpose, if a waterway meets the definition of an MS4 it will be regulated as an MS4. The definition for MS4 is given in s. NR 216.002(17), Wis. Adm. Code. The significant language in that definition is whether or not the municipality owns or operates the drainage way (i.e., maintains, has easement access for work, etc.). For example, when a "stream" is designed or used for collecting or conveying storm water such as flowing through a municipally owned or operated culvert or bridge restriction, that "stream" is part of the MS4.
2. Any area that discharges to an adjacent municipality's MS4 (Municipality B) without passing through the jurisdictional municipality's MS4 (Municipality A). Municipality B that receives the discharge into their MS4 may choose to be responsible for this area from Municipality A. If Municipality B has a treatment device that serves a portion of A as well as a portion of B, then the practice must be modeled as receiving loads from both areas, independent of who carries the responsibility for the area.
3. Industrial facilities subject to a permit under subch. II of ch. NR 216, Wis. Adm. Code. This exclusion covers the facilities that are required to have permit coverage. Contact the regional stormwater specialist or central office to get a list of permitted facilities within a municipality.
    - The industrial NR 216 permit covers areas with industrial materials and activities, specifically areas with manufacturing, vehicle maintenance, storage of materials, etc.

A municipality may include any of the areas identified above in their developed urban area as part of their load calculation provided the areas are not prohibited from inclusion in the calculation. If they choose to include an area, it must be included in both the "no controls" and "with controls" condition. Inclusion of areas they choose to be responsible for will allow them to take credit for any of those areas that may have

controls in place. For example, if an industrial park would have been excluded because all the industries in the industrial park have an NR 216 industrial permit, but the municipality chooses to keep this area in their "no controls" area, then any best management practices existing or built to serve the industrial park can be included in the "with controls" scenario.

Model Inputs

Model Version:
To model the TSS load in the area served by the MS4 the municipality must select a model that can track particle distribution. Such models include SLAMM and P8. In general, a municipality must use the most current version of a model that is available at the time of the analysis. However, a municipality may use an earlier version of a model if it was previously used to calculate loads in the municipality and these loads were documented in a stormwater management plan, database, or other report. The most current versions of SLAMM and P8 will be accessible through the DNR website with links to the authors. A summary of past versions and the changes made with each SLAMM update will also be posted. The DNR has recently received a grant to help upgrade P8 to a Windows format.

As part of the reporting process, the municipality must identify which version it is using. It must use the same version for both the "no controls" scenario and the "with controls" scenario. If an older version of the model is used, this may mean that as the model is updated a municipality cannot take credit for some practices that are only available in the most recent models. In order to take credit for practices that are in recent versions of the models, both the "no controls" and "with controls" scenario must be run with the latest model. A municipality must run all drainage basins in the developed urban area with the same model and model version.

"No control"
The "no controls" condition can be based on the standard land use files for different land uses in SLAMM. This assumes certain default parameter files, an assumed level of disconnection and an assumed distribution of road smoothness. For the drainage system, the default will be curb and gutter (even if the drainage system is currently swale drainage), in fair condition. For "no controls" there will be no recognition of street sweeping, catch basin cleaning, swale drainage, or the existence of any engineered best management practices. These practices and facilities will be accounted for under the "with controls" condition. A municipality is not required to use the standard land use files if it has surveyed the land uses in its developed urban area and has "real" source area data on which to base the input files.

"With controls"
The "with controls" condition is applied to the developed urban area with the inclusion of the practices and facilities (existing and proposed). Modeling is a means to confirm a device's efficiency for the conditions found in Wisconsin. If the model cannot predict efficiencies for certain practices that the municipality identifies as water quality practices, then a literature review must be conducted to estimate the reduction value. However, proprietary devices that utilize settling as their means of solids reduction should be modeled as catch basins with sumps. The efficiency of proprietary devices that utilize filtration as a means of solids reduction cannot currently be modeled using SLAMM.

Practices on private property that drain to an MS4 can be included in the "with controls" scenario for a municipality, if the municipality is able to ensure that the practice will continue to be maintained. The efficiency of the practice on private property must be modeled using the best information the municipality

can obtain on the design of the practice. For example, permanent pool area is not sufficient information to know the pollutant reduction efficiency of a wet detention basin even if it matches the area requirements identified in Technical Standard 1001 Wet Detention Basin for an 80% reduction. Information on the depth of the sediment storage layer and the outlet design are critical features that determine whether a detention pond is providing 80% TSS reduction.

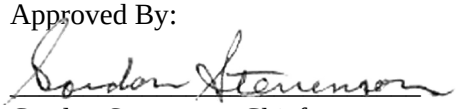
As information on proprietary practices or new stormwater designs becomes available through monitoring, the model will be adjusted to reflect changes in efficiency.

Again, future versions of the model can be used to evaluate the "with controls" condition, but only if the "no controls" scenario is also run with the new version.

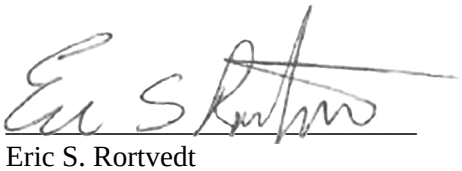
Further clarifications

- If a portion of a municipality's MS4 drains to a stormwater treatment facility in an adjacent municipality, the municipality generating the load will not receive any treatment credit unless there is an inter-municipal agreement for maintenance of the BMP. This contract must be in writing with signatures from both municipalities at the time of the evaluation.
- The model results will be the basis for determining compliance with the permit for "no controls" and "with controls" TSS load. No credit will be given for implementation of ordinances or information and education programs.
- For reporting purposes, the pollutant load must be summarized as the cumulative total for the developed urban area served by the MS4. Additionally pollutant loads for grouped drainage areas as modeled shall also be reported. Drainage areas may be grouped at the discretion of the modeler for such reasons as to emphasize higher priority areas, balance model development with targeting or for cost-effectiveness.

Approved By:



Gordon Stevenson, Chief
Runoff Management Section

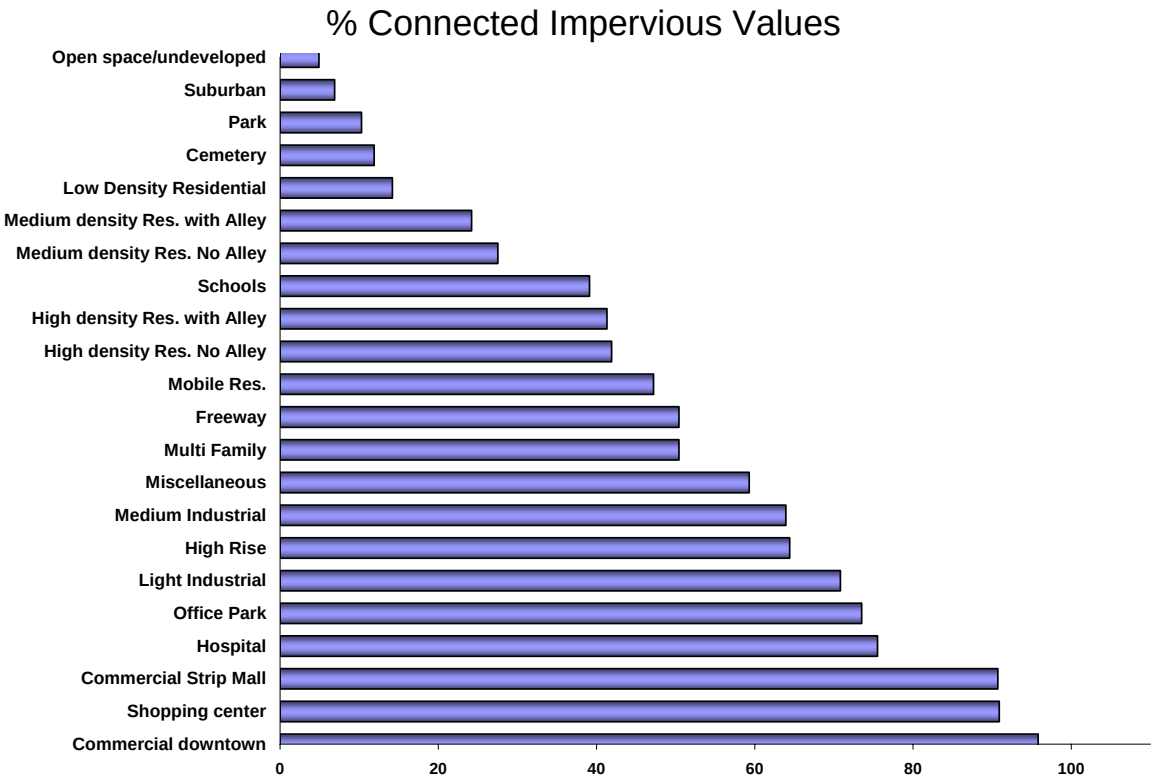


Eric S. Rortvedt
Storm Water Program Coordinator

Errata for Guidance on Developed Urban Areas and the 20% and 40% TSS Reductions (Sections NR 151.13(2) and NR 216.07(6), Wis. Adm. Code)

Clarification under Model Inputs: "No control"

The standard land use files in SLAMM assume a level of impervious surface disconnection. The "no controls" condition for each land use is based on this assumed percent of disconnected imperviousness. (The values from the SLAMM standard land use files are presented in the chart below as percent connected imperviousness). At a minimum, all land uses as modeled must be equal to the connected imperviousness values in the standard land use files. Under the "with controls" condition, land use that has a greater level of disconnection than the values in the standard land use files may take credit for volume and pollutant reduction.



The percent connected imperviousness must be verified in the field. Disconnection may be assumed for residential rooftops where runoff has a flow path of 20 feet or greater over a pervious area in good condition. Disconnection for other impervious surfaces is based on the length of the impervious surface contributing flow and whether the impervious surface and the pervious area receiving the flow are graded for sheet flow. If runoff from the impervious surface travels across a pervious area with a flow path equal to or greater than the length of the impervious flow path, it can be considered disconnected, provided all of the following are met:

- the pervious area is in good condition,
- the pervious surface flow path is at least 20 feet in length,
- the entire pervious area flow path does not exceed 8% slope, and
- the impervious surface flow path is no greater than 75 feet.

CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: April 6, 2009

TO: Regional Water Leaders, Basin Leader
Storm Water Permit Staff (via Email)

FROM: Russ Rasmussen, Director
Bureau of Watershed Management

SUBJECT: Developed Urban Areas and the 20% and 40% TSS Reductions
Internally Drained Areas

This document is intended solely as guidance, and does not contain any mandatory requirements except where requirements found in statute or administrative rule are referenced. This guidance does not establish or affect legal rights or obligations, and is not finally determinative of any of the issues addressed. This guidance does not create any rights enforceable by any party in litigation with the State of Wisconsin or the Department of Natural Resources. Any regulatory decisions made by the Department of Natural Resources in any matter addressed by this guidance will be made by applying the governing statutes and administrative rules to the relevant facts.

Issue

The Department of Natural Resources June 6, 2005 guidance memo, *Developed Urban Areas and the 20% and 40% TSS Reductions*, addresses areas prohibited from inclusion in the municipal modeling calculations including the following on page 3 of the guidance:

3. "Any internally drained area with natural infiltration. (This does not include engineered or constructed infiltration areas). However, an internally drained area that discharges to a karst feature is not likely to be receiving adequate treatment prior to contact with the groundwater. The municipality is encouraged to look at this area for possible treatment options."

Some municipal separate storm sewer systems (MS4s) contain areas that are internally drained, but drain to a constructed pond or quarry with no outlet under observed runoff event conditions. There are questions on how these areas could be included in the municipal analysis to demonstrate compliance with the developed urban area total suspended solids (TSS) performance standard of s. NR 151.13(2), Wis. Adm. Code.

Discussion

An internally drained area is an area where runoff from the MS4 does not enter a surface water of the state including wetlands. Determining if an area is internally drained may be made from aerial photos or historic data. If runoff from storm events up to a 10-year, 24-hour event does not leave the depression area, then this area is considered internally drained and shall not be included in the developed urban area analysis (i.e. not included in the base condition or any subsequent scenarios). If runoff leaves the depression area during lesser storm events, then this area is not internally drained and the drainage area to the depression area must be included in the developed urban area analysis.

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DNR Guidance

Notwithstanding the discussion above, there are situations where an internally drained area may be included in the analysis. For this to happen, all of the following conditions must be met:

1. Consistent with s. NR 151.12(5)(c)8., Wis. Adm. Code, the discharge of runoff from the MS4 into an internally drained area must to the extent technically and economically feasible minimize the level of pollutants infiltrating to groundwater and shall maintain compliance with the preventive action limit at a point of standards application in accordance with ch. NR 140, Wis. Adm. Code. However, if site specific information indicates that compliance with a preventive action limit is not achievable, the infiltration practice may not be installed or shall be modified to prevent infiltration to the maximum extent practicable. The municipality must assess the usual or potential presence of any toxic pollutant, the degradability of the pollutant and the capacity of the soil to remove the pollutant. A discharge to groundwater must remain below the enforcement standard at the point of standards application.

Note: Also consistent with s. NR 151.12(5)(c)5.i., Wis. Adm. Code, the following characteristics are believed to be protective of groundwater for the treatment of storm water: The soils between the bottom of an infiltration practice and the seasonal high groundwater or top of bedrock have at least a 3–foot soil layer with 20% fines or greater; or at least a 5–foot soil layer with 10% fines or greater or where the soil medium within the infiltration system provides an equivalent level of protection. "Percent fines" means the percentage of a given sample of soil, which passes through a # 200 sieve.

2. Any runoff from parking lots or roads in commercial, institutional or industrial areas directed into an internally drained area shall be pretreated to help prevent clogging of the internally drained area.

3. If the area is not owned by the municipality, then the municipality must have a long-term maintenance agreement in place with the property owner to ensure that the internally drained area will be maintained. If the municipality owns the area, then the municipality must include maintenance of the area in its storm water management program.

Where conditions 1-3 are met, internally drained areas can be included in the developed urban area analysis. Additional runoff may be directed to an internally drained area meeting conditions 1-3. One hundred percent credit for TSS removal may be taken for the runoff that stays within the internally drained area.

Department staff will assist in evaluating these determinations prior to allowing credit for TSS reduction from internally drained areas on a case by case basis. There may also need to be a determination regarding natural water features in the depression area prior to the Department's concurrence that these areas can be used toward the TSS removal credit.

Approved By:

Gordon Stevenson, Chief
Runoff Management Section

Mary Anne Lowndes
Storm Water Engineer

CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: November 24, 2010

TO: Regional Water Leaders, Basin Leaders and Experts
Storm Water Permit Staff (via email)

FROM: Russ Rasmussen, Director, Bureau of Watershed Management
DNR Storm Water Permit Engineers

SUBJECT: Process to Assess and Model Grass Swales for ss. NR 151.13(2) and NR 216.07(6), Wis. Adm. Code - Total Suspended Solids Reduction

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Issue

Under s. NR 151.13(2), Wis. Adm. Code, a municipality subject to the municipal storm water permit requirements of s. NR 216.07(6), Wis. Adm. Code, must implement a 20% reduction in total suspended solids (TSS), by March 10, 2008 or 24 months from coverage under the Municipal Separate Storm Sewer System (MS4) general permit, and a 40% TSS reduction by March 10, 2013. This memorandum provides DNR staff with guidance to advise affected municipalities and their consultants on how to evaluate grassed swales in the developed urban area for water quality credit. (This guidance does not address design of grassed swales to serve new development. The Vegetated Infiltration Swale, Interim Technical Standard, No. 1005 provides information on construction of new grassed swales.)

Discussion

To meet the requirements of the MS4 permit and the TSS reduction goal of s. NR 151.13(2), Wis. Adm. Code, a municipality must assess existing best management practices (BMPs) for TSS control and propose additional BMPs if the performance standard cannot be met with existing practices. One BMP available to many permitted municipalities is the grassed swale. This guidance provides a basis for assessing and modeling swales for TSS reduction to foster consistent application of this practice in all permitted municipalities. The goals of this guidance are to:

- Determine which water quality swales in the MS4 are eligible to receive TSS reduction credit, and
- Identify a typical swale geometry that can be considered representative. (It may be appropriate to develop more than one typical swale geometry if the swale characteristics in the MS4 are highly variable.)

DNR Guidance

Step 1. Identify which swales in the municipality can be considered water quality swales for the purpose of meeting the 20% and 40% TSS reduction goal.

The following apply to all swales in the developed urban area if they are to be considered water quality swales:

A. Swales are not required to have pretreatment swales or equivalent pretreatment.
B. The longitudinal slope must be less than 4% unless slope interruption devices are installed in the swales to ensure low flow velocities. Slope interruption devices must be consistent with Ditch Check Technical

Standard, No. 1062. Swales with slope interruption devices will be evaluated using a modified longitudinal slope of 1%.

C. The Department is concerned about channel scouring and re-suspension of previously settled particles in swales that are being used for MS4 pollutant removal credit. To address this concern, all swales should be inspected for visual evidence of scour. Swales with visual evidence of scour, such as channel cuts in the bottom or areas of bare soil, can not be included.

There are two ways of identifying water quality swales within an MS4:

A. If swale survey data is available, determine the locations of water quality swales and arrive at typical swale geometry based on statistical methods.

B. In the absence of survey data, a desktop and field survey would be appropriate. The desktop and field procedure is as follows:

1. Identify potential water quality swale areas by using available topographic, land use and soil information.

2. Based on results of the desktop evaluation, select a representative number of typical swale locations in the MS4 by conducting a field survey. A minimum of five locations should be selected. At each location:

   - Measure the width of the swale bottom using a tape measure.
   - For side slopes, measure the vertical drop over the level length using a carpenter's level and tape measure.
   - Select at least three cross-sections of the swale and average the results to determine the bottom width and side slopes.
   - Determine longitudinal slope using 2-ft contour mapping or other available topographic information.

3. Use the typical swale geometry that best represents each drainage area.

Step 2. Model the swales identified in **Step 1.** using a model such as SLAMM or P8.

When modeling swales in SLAMM or P8 the following must be considered:

How should drainage basins with a mix of swale and storm sewer conveyance systems be evaluated?

Drainage basins with a combination of swales and storm sewer should be subdivided by conveyance system type and the subdivisions modeled separately. In SLAMM, swales need to be modeled separately because drainage system type (e.g., swale vs. storm sewer) cannot be assigned to individual source areas.

Where swale density varies within a modeled area, the swale density should be an area weighted average across the model area. For example, if a 100 acre modeled area has 90 acres of residential land use with an average swale density of 359 ft/acre and 10 acres of strip commercial with an average swale density of 412 ft/acre then the area weighted average across modeled area is [(90 x 359) + (10 x 412)] / 100 = 364 ft/acre.

Table 1 identifies the average swale density used in the standard land use files from SLAMM version 9.2. It is recommended that rather than using these averages, the municipality should identify the actual swale density for each of the representative areas.

TABLE 1

Land use	Swale Density (ft/acre)
Low density residential	238
Medium density residential	359
High density residential	385
Strip commercial	412
Shopping centers	92
Industrial	265
Freeway (Shoulder only)	1309
Freeway (Shoulder and Center)	1964

Note: These average swale density figures are from the SLAMM version 9.2 Standard Land Use files available on the USGS website at: http://wi.water.usgs.gov/slamm/

Should swales be modeled using the "wetted perimeter" or "typical swale geometry" option?

The typical swale geometry option must be used. Both SLAMM and P8 calculate wetted perimeter from the geometry for each storm event, which is more accurate than a user selected defined wetted perimeter.

What Manning's "n" should be used for the typical swale geometry[1]?

A Manning's "n" value of 0.30 or less is recommended, based on type of vegetation, mowing height and depth of flow. Supporting documentation should be provided if Manning's "n" values greater than 0.30 are used

How should the infiltration rate be determined?

The guidance provided in the Site Evaluation for Stormwater Infiltration Technical Standard, No. 1002 should be followed. The swale infiltration rate should be determined based on the representative soil texture identified in the NRCS soil survey or other soil data if available. When the representative soil texture has been determined, the appropriate design infiltration rate should be selected from Table 2 of the Technical Standard, No. 1002. If the infiltration rate is measured in the field using a scientifically credible field test method, the measured value can be used for the static infiltration rate without using the correction factors in Table 3 of Technical Standard, No. 1002. **Prior to entering an infiltration rate in the model, the design infiltration rate from Table 2, or the measured infiltration rate must be reduced by 50%.** The SLAMM default "infiltration rate by soil type" values should not be used.

Existing language in Technical Standard 1002 V. Step C. 4.b indicates that a measured infiltration rate using a double-ring infiltrometer test must follow the requirements of ASTM D3385. While this may be appropriate for designing new swales, is there any flexibility for measuring an existing swale using a double-ring infiltrometer test?

To determine the static infiltration rate of existing swales using a double-ring infiltrometer the following modifications to procedures in ASTM D3385 are allowed:

While the dimension and materials used for the double-ring should be based on the requirements of ASTM D3385, the infiltration rate can be measured in a time frame of a minimum of 2 hours instead of 24 hours and the water level in both rings does not have to stay constant during the test. The following procedure is a more cost-effective

[1] SLAMM version 9.3 will adjust Manning's "n" based on flow, swale geometry and vegetative retardance classifications

approach to obtaining a reasonable estimate of the infiltration rate of existing grass swales. For most soil types the infiltration rate measured by the procedure should represent the soils under more saturated conditions. Sandier soil types might not be represented by saturated conditions, but the higher infiltration rate will probably represent reality for the duration of most storm events. The lowest infiltration rate observed is the one to be used for estimating the TSS reduction for the swales and is considered a static infiltration rate. The static rate should be cut in half to represent the dynamic infiltration rate in the model.

Field Test Procedure for Double-Ring Infiltrometer

1. Select a relatively flat test area so that the double-ring infiltrometer will not be placed at an angle.
2. Cut the grass to a height of between two to four inches.
3. Gently drive the infiltrometer into the ground.
4. Inspect the soil seal around each ring to make sure that it is even and smooth.
5. Pour clean water into the inner chamber and allow it to overflow and fill up the outer ring. Maintain a level in the outer ring approximately equal to the level in the inner ring.
6. Add more water to both rings when the level in the inner ring has dropped a measurable amount. For most soil types this should be less than an inch.
7. Repeat this step until the rate the water level drops begins to decline.
8. When the rate of decline begins to slow, bring the water level up to the top and start timing the decrease in water level.
9. Record the start time.
10. Stop timing when the water level in the inner ring has gone down a measureable level (the ASTM standard requires keeping the water level constant). Timing the rate of decline should probably be started almost immediately for more clayey soils, since it might be difficult to observe when the rate change has slowed.
11. Record the time, elapsed time, and change in water level.
12. Refill both rings and restart the timing.
13. Record the time, elapsed time, change in water level, and the elapsed time since the beginning of the first measurement.
14. Repeat the timing steps until the infiltration rate has become relatively constant or the test has been conducted for a minimum of two hours. (The ASTM standard requires 24 hours).
15. The measured rate of infiltration is considered a static infiltration rate. The dynamic infiltration rate is ½ the static rate. Be aware some models, such as WinSLAMM, call for the dynamic rate for swales.

I have taken a number of measurements along a swale length and have several infiltration rates to average. How do I average the results of my in-field tests?

The geometric mean(s) of infiltration testing results should be used. However, equally important is to consider whether the measured infiltration rates should be 'grouped' in order to apply separate geometric means to different areas in order to provide representative TSS results across a municipality. Grouping of results might be done based on soil type, spatial reasons or simply done as a method to help provide representative results. For instance, if there are several relatively low infiltration rates measured and the geometric mean of the entire data set is quite high, it may be prudent to group the relatively low rates together and assign them to a representative area.

Note: In order to calculate a geometric mean, the data set of values must be greater than zero. Where the infiltration rate is too low to measure, a rate of 0.03 in/hr may be used to calculate a geometric mean of the data set.

Are velocity calculations required?

The swales that were not eliminated by visual inspection should be evaluated for scour and re-suspension using the results of velocity or shear stress calculations conducted at the representative swale locations

from **Step 1**. Velocity or shear stress calculations should be conducted based on the peak discharge rate for a 2-yr, 24-hr design event (or a reasonably equivalent event from the SLAMM or P8 rainfall file for the area) to verify that scour and re-suspension will not be a problem.

Do water quality swales need to meet the slope parameters identified in Vegetated Infiltration Swale, Interim Technical Standard, No. 1005?

If functioning as vegetated conveyance systems, swales with longitudinal slope less than 1% can be used. However, there is concern that swales with slopes less than 1% can clog. Where visual evidence indicates that the infiltration rate has been reduced (e.g., significant duration of ponded water or evidence of wetland vegetation), infiltration rates appropriate for clay soils should be used.

How do I model road runoff that sheet flows off the road and is dispersed with no apparent concentrated flow path?

For roads where runoff sheet flows off to the side of the road and is dispersed into adjacent pervious areas with no concentrated flow path in the vicinity, the roadway would be considered a disconnected impervious surface. Currently, SLAMM does not have the option of disconnecting a roadway, whereas rooftops and driveways can be disconnected. Therefore, an alternative method is needed to give treatment credit for such a system. If there is no concentrated flow path near the roadway and the runoff is dispersed as sheet flow across healthy vegetated areas, model this as a very broad, flat swale unless there is an option to model it as a vegetated filter strip.

Approved By:

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