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December 3, 2008

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Dave Dorgan, MS, P.E., FMA, Facilities Engineer
University of Wisconsin-Whitewater
Facilities Planning & Management
General Services Building, Room 117
800 W. Main Street
Whitewater, WI 53190-1790

Re: University of Wisconsin-Whitewater
Stormwater Quality Management Plan

www.strand.com

Dear Mr. Dorgan:

The UW-Whitewater is currently regulated by the Wisconsin Department of Natural Resources (WDNR) under a Wisconsin Pollutant Discharge Elimination System (WPDES) General Permit for stormwater discharges to Waters of the State. The permit requires UW-Whitewater to prepare a stormwater management program to be administered by the UW-Whitewater. This program must include the following: Public Education and Outreach, Public Involvement and Participation, Illicit Discharge Detection and Elimination, Construction Site Pollution Control, Postconstruction Site Stormwater Management, and Municipal Pollution Prevention.

As part of the Municipal Pollution Prevention, the permit requires that the UW-Whitewater document and implement achievement of a 20 percent reduction in total suspended solids (TSS) running off UW-Whitewater lands and entering Waters of the State as compared to no controls by March 10, 2008. In addition, NR 151 requires that the UW-Whitewater document and implement achievement of a 40 percent reduction in TSS running off UW-Whitewater lands and entering Waters of the State as compared to no controls by March 10, 2013.

This report provides an overview of the TSS loading calculations performed for the baseline (no controls) and the existing conditions for comparison toward the above-mentioned TSS reduction goals.

Stormwater Quality Modeling Analysis

The baseline and existing conditions were analyzed using the computer model WinSLAMM (Source Loading and Management Model) according to WDNR guidelines. WinSLAMM is a planning-level tool that enables municipalities to make decisions regarding best management practices (BMPs) necessary to achieve nonpoint



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source runoff standards described in NR 151. WinSLAMM specifically analyzes BMPs including street sweeping, wet detention ponds, catch basin and inlet sumps, infiltration devices, porous pavements, and grass swales. WinSLAMM also predicts relative contributions from "source areas" including rooftops, parking lots, driveways, streets, sidewalks, and pervious space.

Guidance included a June 6, 2005, memorandum with subject line *Developed Urban Area and the 20% and 40% TSS Reductions Sections NR 151.13(2) and NR 216.07(6), Wis. Adm. code* (see Appendix A). Integral to this guidance are the following sections:

1. Areas Required to be Included in the Calculations
2. Areas Prohibited from Inclusion in the Calculations
3. Optional Areas to Include in the Calculations
4. Model Inputs
5. Further Clarifications
6. *Attached 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).*

Following this guidance allowed a portion of the UW-Whitewater lands to be exempted from inclusion in the lands required to be modeled in WinSLAMM.

A. Baseline Conditions (No Controls)

The UW-Whitewater campus has approximately 380 acres of land that drain toward Whitewater Creek, with the remaining 29 acres draining toward Galloway Creek. The breakdown of pervious and impervious areas can be seen in Figure B-1. These pervious and impervious areas were input into the WinSLAMM model to develop the baseline analysis.



The baseline condition results show that with no BMPs, the nonexempt areas on the UW-Whitewater property contribute approximately 79,000 pounds of TSS annually. The area modeled within the UW-Whitewater totaled approximately 271 acres, resulting in an average unit load of 291 lb/ac. Table 1 lists the loadings from each UW-Whitewater subbasin. Results indicate that the highest loadings are in subbasins with dense impervious areas such as parking lots, sidewalks, and streets. The baseline loading results are also summarized in Figure B-2. This figure helps identify potential "hot spots" that may be good locations for BMPs to help reduce TSS loads.

Drainage Basin	Total Drainage Area (AC)	Exempt Area (AC)	Modeled Area (AC)	5-yr TSS (lbs)	Annual TSS (lbs)	TSS Concentration (lbs/acre)
GC-12	4.08	4.08	0.00	0	0	0
GC-13	24.75	11.33	13.42	7,091	1,418	106
WC-1	51.24	3.28	47.96	90,563	18,113	378
WC-15	21.79	14.52	7.27	7,971	1,594	219
WC-2	6.63	0.00	6.63	11,558	2,312	349
WC-5	16.76	0.97	15.79	28,380	5,676	359
WC-57	22.32	0.00	22.32	32,389	6,478	290
WC-58	101.51	14.83	86.68	112,389	22,478	259
WC-59	37.27	0.00	37.27	46,330	9,266	249
WC-62	88.40	87.15	1.25	697	139	112
WC-63	18.10	0.00	18.10	34,535	6,907	382
WC-64	9.33	0.00	9.33	12,464	2,493	267
WC-65	5.37	0.00	5.37	10,401	2,080	387
Totals	407.55	136.16	271.39	394,768	78,954	291

Table 1 Baseline Condition TSS Loadings



B. Existing Conditions

Existing BMPs were input into the baseline condition model to develop the existing conditions model. The only BMP the University currently implements is the use of street sweeping. A mechanical sweeper is used to sweep the following campus streets once each year in April:

1. Prairie Street from Starin Road to Schwager Drive
2. Schwager Drive
3. Warhawk Drive
4. Koshkonong Drive
5. Lauderdale Street from Fremont Street to Prairie Street and from Prairie Street to Calvary Cemetery

The University also sweeps campus sidewalks and parking lots once each April; however, the SLAMM model does not provide credit for the sweeping of parking lots or sidewalks. The results of the existing conditions modeling can be seen in Table 2. Results indicate that only a 0.80 percent TSS reduction is currently achieved by the annual sweeping of the University streets, which falls short of both the 20 percent and 40 percent TSS reduction goals.

Drainage Basin	5-yr TSS (lbs)	Annual TSS (lbs)	TSS Concentration (lbs/acre)	% Reduction
GC-12	0	0	0	---
GC-13	7,091	1,418	106	0.00%
WC-1	89,306	17,861	372	1.39%
WC-15	7,971	1,594	219	0.00%
WC-2	11,558	2,312	349	0.00%
WC-5	28,380	5,676	359	0.00%
WC-57	32,389	6,478	290	0.00%
WC-58	110,905	22,181	256	1.32%
WC-59	46,330	9,266	249	0.00%
WC-62	697	139	112	0.00%
WC-63	34,360	6,872	380	0.51%
WC-64	12,387	2,477	266	0.62%
WC-65	10,246	2,049	382	1.49%
Totals	391,620	78,324	289	0.80%

Table 2 Existing Condition Loadings



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Figure B-3 also shows the existing condition loadings by subbasin; however the loadings are very similar to those in the baseline condition figure because of limited TSS reduction achieved by existing street sweeping practices.

Conclusions

Results indicate the current TSS reductions are minimal. This can be attributed to the lack of existing BMPs being in place throughout UW-Whitewater lands. Currently 600 pounds of TSS are captured annually in the existing conditions, and an additional 31,600 pounds of TSS solids must be captured annually in order meet the 40 percent TSS reduction requirement. Approximately 51 percent of the loading for the UW-Whitewater's institutional area comes from drainage areas mostly north of Starin Road (WC-1 and WC-58). The installation of BMPs in this area would have the greatest TSS reduction for the UW-Whitewater.

Recommendations

The University has indicated that new bioswales and detention basins are currently being constructed or are planned to be constructed. These BMPs, if properly designed, should account for greater TSS reductions and can be credited toward the 40 percent TSS reduction goal in a "Proposed Conditions" analysis. This analysis would provide an investigation on how the UW-Whitewater can become compliant with the 40 percent TSS reduction goal and may be included in an annual report to the DNR showing the UW-Whitewater's progress toward the achievement of these TSS reduction goals.

Please contact us if you have any questions regarding this letter.

Sincerely,

STRAND ASSOCIATES, INC.


Andrew Luehmann

Enclosure(s)

c: Dean Fischer, City of Whitewater
Mark Fisher, Strand Associates

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:

- 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 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 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.

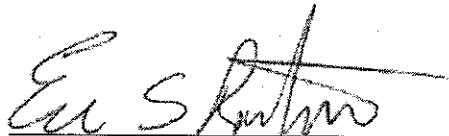
Further clarifications

- 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