Appendix E

Stormwater Permitting Requirements and Presumptive Best Management Practices (BMPs) Approach

Draft

Lake Fort Gibson TMDL Report

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By

Dynamic Solutions, LLC

Dynamic Solutions LLC

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E-1 BACKGROUND

The National Pollutant Discharge Elimination System (NPDES) permitting program for stormwater discharges was established under the Clean Water Act as the result of a 1987 amendment. The Act specifies the level of control to be incorporated into the NPDES stormwater permitting program depending on the source (industrial versus municipal stormwater). These programs contain specific requirements for the regulated communities/facilities to establish a comprehensive stormwater management program (SWMP) or stormwater pollution prevention plan (SWPPP) to implement any requirements of the total maximum daily load (TMDL) allocation. [See 40 CFR §130.]

Stormwater discharges are highly variable both in terms of flow and pollutant concentration, and the relationships between discharges and water quality can be complex. For municipal stormwater discharges in particular, the current use of system-wide permits and a variety of jurisdiction-wide BMPs, including educational and programmatic BMPs, does not easily lend itself to the existing methodologies for deriving numeric water quality-based effluent limitations. These methodologies were designed primarily for process wastewater discharges which occur at predictable rates with predictable pollutant loadings under low flow conditions in receiving waters.

EPA has recognized these problems and developed permitting guidance for stormwater permits. [See "Interim Permitting Approach for Water Quality-Based Effluent Limitations in Stormwater Permits" (EPA-833-D-96-00, Date published: 09/01/1996)] Due to the nature of stormwater discharges, and the typical lack of information on which to base numeric water quality-based effluent limitations (expressed as concentration and mass), EPA recommends an interim permitting approach for NPDES stormwater permits which is based on BMPs. "The interim permitting approach uses best management practices (BMPs) in first-round stormwater permits, and expanded or better-tailored BMPs in subsequent permits, where necessary, to provide for the attainment of water quality standards." (*ibid.*)

A monitoring component is also included in the recommended BMP approach. "Each storm water permit should include a coordinated and cost-effective monitoring program to gather necessary information to determine the extent to which the permit provides for attainment of applicable water quality standards and to determine the appropriate conditions or limitations for subsequent permits." (*ibid.*)

This approach was further elaborated in a guidance memo issued in 2002. [See Memorandum from Robert Wayland, Director of OWOW and James Hanlon, Director of OWM to Regional Water Division Directors: "Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Storm Water Sources and NPDES Permit requirements Based on Those WLAs " (Date published: 11/22/2002)] "The policy outlined in this memorandum affirms the appropriateness of an iterative, adaptive management BMP approach, whereby permits include effluent limits (e.g., a combination of structural and non-structural BMPs) that address stormwater discharges, implement mechanisms to evaluate the performance of such controls, and make adjustments (i.e., more stringent controls or specific BMPs) as necessary to protect water quality. …… If it is determined that a BMP approach (including an iterative BMP approach) is appropriate to meet the stormwater component of the TMDL, EPA recommends that the TMDL reflect this." This BMP-based approach to stormwater sources in TMDLs is also recognized and described in the most recent EPA guidance. [See "TMDLs To Stormwater Permits Handbook" (DRAFT; EPA, November 2008[1])]

[1] http://www.epa.gov/owow/tmdl/pdf/tmdl-sw_permits11172008.pdf (as of November 28, 2012)

This TMDL adopts the EPA recommended approach and relies on appropriate BMPs for implementation. No numeric effluent limitations are required or anticipated for stormwater discharge permits. All three categories of stormwater permits are covered in this Appendix: Municipal Separate Storm Sewer System (MS4) Discharges (Permit number OKR04), Storm Water Discharges from Construction Activities (Permit number OKR10), and Storm Water Discharges from Industrial Facilities under the Multi-Sector Industrial General Permit Permit number OKR05). The provisions of this appendix apply only to OPDES/NPDES regulated stormwater discharges. Agricultural activities and other nonpoint sources of TSS, nutrients and organic matters are unregulated. Voluntary measures and incentives should be used and encouraged wherever possible and such sources should strive to attain the reduction goals established in this TMDL.

E-2 SPECIFIC REQUIREMENTS FOR MS4 STORMWATER PERMITS

As noted in Section 3 of this report, stormwater runoff from the Phase 1 and 2 Municipal Separate Storm Sewer Systems (MS4s) is likely to contain elevated TSS, nutrients (TN and TP) and organic matters (BOD and TOC). Since the MS4 areas of Wagoner County and Tahlequah combined account for only a very small contribution to the total area of the watershed model domain, the MS4 permits for Wagoner County and Tahlequah will, therefore, not be included as WLAs determined for this TMDL study. The small MS4 area for Wagoner County and the even smaller portion of the MS4 area for Tahlequah in the HSPF model domain will be accounted for by the Load Allocation (LA) estimated for the watershed. Table E-1 provides a list of the Phase II MS4s that are affected by this TMDL report.

Table E-1 Phase II MS4 Permits affected by this TMDL Report

City Name	Permit-ID	MS4 Phase	Date Issued
Wagoner County	OKR040020	Phase II	10/31/2005
Tahlequah	OKR040035	Phase II	07/24/2006

To ensure compliance with the TMDL requirements under the permit, MS4 permittees must develop strategies designed to achieve progress toward meeting the reduction goals established in the TMDL. Relying primarily upon a Best Management Practices (BMP) approach, permittees should take advantage of existing information on BMP performance and select a suite of BMPs appropriate to the local community that are expected to result in progress toward meeting the reduction goals established in the TMDL. The permittee should provide its local community guidance on BMP installation and maintenance, as well as a monitoring and/or inspection schedule.

Table E–2 at the end of this appendix provides a summary description of some BMPs with reported effectiveness in reducing TSS, nutrients and organic matters. Permittees may choose different BMPs to meet the permit requirements, as long as the permittees demonstrate that these practices will result in progress toward attaining water quality standards. Permittees are particularly encouraged to consult Section 5.3 of the "TMDLs To Stormwater Permits Handbook" (DRAFT; EPA, November 2008[2]). That section provides technical resources on the availability, performance, and applicability of BMPs, in addition to monitoring approaches, computer models and stormwater program evaluation methods.

The watershed model (HSPF) and the lake model (EFDC) developed for this TMDL study will be made available to stakeholders in the watershed. These models are particularly useful in predicting and assessing the overall watershed pollutant load reductions and their effect on lake water quality. Stakeholders may also consider other modeling tools for specific BMP selection and evaluation. Table 12 of the "TMDLs To Stormwater Permits Handbook" (DRAFT; EPA, November 2008[2]) describes a range of modeling tools available for BMP selection, sizing, and siting decision making.

After EPA approval of the final TMDL, existing MS4 permittees will be notified of the TMDL provisions and schedule. Compliance with the following specific provisions will constitute compliance with the requirements of this TMDL.

[2] http://www.epa.gov/owow/tmdl/pdf/tmdl-sw_permits11172008.pdf (as of November 28, 2012)

E-2.1 Develop a TMDL Compliance Plan

Each permittee shall adopt their WLAs specified in the TMDL as measurable goals within their permit. Each permittees shall submit an approvable TMDL Compliance Plan to the DEQ within 24 months of EPA approval of this TMDL. Unless disapproved by the Director within 60 days of submission, the plan shall be approved and then implemented by the permittee. This plan shall, at a minimum, include the following:

A. An evaluation to identify potential significant sources of TSS, nutrients and organic matters entering your MS4. Such an evaluation should include an enhanced plan for illicit discharge screening and remediation. Following the evaluation and using guidelines outlined below, permittee shall develop (or modify an existing program as necessary) and implement a program to reduce the discharge of TSS, nutrients and organic matters in municipal stormwater contributed by all significant sources identified in the evaluation.

B. Selecting a General Strategy for the plan: An MS4 should demonstrate, in the TMDL Compliance Plan that it understands the TMDL requirement and that it has a strategy for meeting the WLA. There are several ways for a MS4 to meet a TMDL waste load allocation (WLA) using BMPs and other approaches, including but not limited to:

   a. Retrofitting developed areas and other suitable sites with structural stormwater BMPs (e.g. infiltration BMPs in built out areas);
   b. Implementing BMPs that prevent additional stormwater TSS, nutrients and organic matters pollution associated with new development and re-development; (e.g. promoting Low Impact Development and green infrastructure, installing infiltration BMPs in areas converting from one land use to another);
   c. Implementing non-structural BMPs designed for source control (e.g. fertilizer application restrictions or soil nutrient testing requirements, and riparian buffer protection requirements) by considering ordinances or other regulatory mechanisms to require TSS, nutrients and organic matters pollution control, as well as enforcement procedures for noncompliance;
   d. Implementing non-structural BMPs designed to treat existing loads (e.g. more frequent street sweeping); and
   e. Developing and implementing water quality trading: water quality trading among the MS4 permittees may be considered as a tool to achieve the overall WLA of the TMDLs. As the authorization and enforcement agency of Oklahoma's MS4 permits, the DEQ reserves the authority for the final approval of any trades or trading programs that may be considered in the Lake Fort Gibson watershed.

C. Implementing enhanced or more frequent construction site stormwater compliance inspections and considering adopting ordinance that allows "stop work" orders and other enhanced enforcement for construction permit violators.

D. Determining a schedule for achieving the WLA: This schedule can be general in nature, discussing groups of activities to be implemented within permit cycles or based on funding cycles. Specific activities need not be included in this section of the TMDL Compliance Plan. For example:

"MS4 X" will achieve necessary pollutant reductions within four permit cycles. During the first permit cycle, "MS4 X" will evaluate its existing stormwater program in relation to the TMDL compliance plan, determine if the program requires modification, outline a process for develop the TMDL compliance plan, and implement BMPs if opportunities arise. In the second permit cycle, "MS4 X" will modify its stormwater program as necessary, implement non-structural BMPs, develop a system to evaluate the effectiveness of these BMPs and implement structural BMPs if opportunities arise. In the third permit cycle, "MS4 X" will evaluate the effectiveness of non-structural BMPs, determine if structural BMPs (through retrofits) are needed, identify where and which structural BMPs will achieve the needed pollutant load reductions, and implement structural BMPs if opportunities arise. In the fourth permit cycle, "MS4 X" will implement structural BMPs as needed.

E. Implementing and Tracking BMPs

BMP Summary Sheets should be prepared for both structural and non-structural BMPs. For BMPs for which pollutant reductions can be calculated or modeled, BMP sheets should include any information used to make the calculations, BMP efficiencies, and maintenance information for the BMP (e.g. to ensure the efficiency used in the calculation is valid into the future or determine if it needs to be adjusted). Include references to support the calculations or modeling.

BMP Sheets can be prepared for ordinances, resources, or other tools needed for implementation of BMPs. Load reductions may be difficult to quantify with these BMPs, but these tools may be needed to implement BMPs that reduce loading.

F. Educational programs directed at reducing TSS, nutrients and organic matters pollution. Implement a public education program to reduce the discharge of TSS, nutrients and organic matters in municipal stormwater contributed (if applicable) by construction activities, recreational and agricultural activities, etc.

E-2.2 Develop or Participate In a Pollutant Monitoring and Tracking Program

As noted above, when a BMP approach is selected a coordinated monitoring program is necessary to establish the effectiveness of the selected BMPs and demonstrate progress toward achieving the reduction goals of the TMDL and eventually attaining water quality standards in Lake Fort Gibson. The monitoring results should also be used to refine TSS, nutrient and organic matters controls in the future. With three permitted MS4 entities in the watershed, it is likely that a cooperative monitoring program would be more cost effective than three individual programs. Individual permittees are not required to participate in a coordinated program and are free to develop their own program if desired. Specific requirements for an effective monitoring and tracking program are as follows.

A. Within 24 months of EPA approval of this TMDL, each permittee shall prepare and submit to the DEQ either a TMDL monitoring plan or a commitment to participate in a coordinated regional monitoring program. Unless disapproved by the Director within 60 days of submission, the plan shall be approved and then implemented by the permittee. The plan or program shall include:

   a. Evaluation of any existing storm water monitoring program in relation to TMDL reduction goals;

b. A detailed description of the goals, monitoring, and sampling and analytical methods;
c. A map that identifies discharge points, stormwater drainage areas contributing to discharge points, and within each such drainage area, mapping the conveyance system;
d. A list and map of the selected TMDL monitoring sites, which may include sites on receiving water bodies;
e. Consideration of methods for evaluating pollutant loading in stormwater discharges from construction and industrial sites, such as monitoring requirements for site operators or small drainage monitoring for multiple construction sites;
f. The frequency of sample collection to occur at each station or site: at a minimum, sample collection shall include at least one representative sample of a storm water discharge from at least 50 percent of the major discharge points discharging directly to surface waters of the state within the portion of the TMDL watershed in the urbanized area. A major discharge point is a pipe or open conveyance measuring 36 inches or more at its widest cross section;
g. The parameters to be measured, as appropriate for and relevant to the TMDL: at a minimum, the sample shall be analyzed for total phosphorus (TP), total nitrogen (TN), total suspended solids(TSS), and $CBOD_{20}$;
h. A Quality Assurance Project Plan that complies with EPA requirements [EPA Requirements for QA Project Plans (QA/R-5)].

B. The monitoring program shall be fully implemented within three years of EPA approval of this TMDL.

C. With the obtained monitoring and tracking data, periodically evaluate the effectiveness of individual BMPs if possible and the effectiveness of the overall TMDL compliance plan to ensure progress toward attainment of the waste load allocations. If progress cannot be shown, the MS4 permittee must revise its TMDL compliance plan to further its load reduction efforts.

E-2.3 Annual Reporting

The permittee shall include a TMDL implementation report as part of their annual report. The TMDL implementation report shall include the status and actions taken by the permittee to implement the TMDL compliance plan and monitoring program. The TMDL implementation report shall document relevant actions taken by the permittee that affect MS4 stormwater discharges to the waterbody segments that are the subject of the TMDL. This TMDL implementation report also shall identify the status of any applicable TMDL implementation schedule milestones.

E-3 SPECIFIC REQUIREMENTS FOR CONSTRUCTION STORMWATER PERMITS

In addition to the general provisions of the OKR10 General Permit (General Permit for Storm Water Discharges from Construction Activities within the State Of Oklahoma), construction activities authorized after EPA approval of this TMDL which are located in the Lake Fort Gibson watershed will be required to:

A. Comply with any additional pollutant prevention or discharge monitoring requirements established by the local MS4 municipalities; and
B. Submit to the DEQ all Storm Water Pollution Prevention Plans (SWP3) for sites of five acres or larger.

After EPA approval of this TMDL, the following provisions will be included as site-specific requirements in all authorizations issued by DEQ for construction activities located in the Lake Fort Gibson watershed:

A. Vegetated buffer. You must ensure that a vegetated buffer of at least 100 feet is retained or successfully established/planted between the area disturbed and all receiving streams. If the nature of the construction activity or the construction site makes a buffer impossible, you must provide equivalent controls. There are exceptions from this requirement for water crossings, limited water access, and stream restoration authorized under a CWA Section 404 permit.
B. Sediment basins. For all drainage locations serving 5 or more acres disturbed at one time, you must use a temporary or permanent sediment basin and/or sediment traps to minimize sediment discharges
C. Site inspections. You must conduct site inspections once every 7 calendar days at a minimum, and within 24 hours of a storm event of 0.5 inches or greater and within 24 hours of a discharge caused by snowmelt.
D. Corrective actions. You must implement the corrective actives (e.g., repair, modify, or replace any stormwater control used at the site, clean up and dispose of spills, releases, or other deposits, or remedy a permit violation) by no later than 7 calendar days from the time of discovery. If it is infeasible to complete the installation or repair within 7 calendar days, you must document in your records why it is infeasible to complete the installation or repair within the 7 calendar day timeframe and document your schedule for installing the stormwater controls and making it operational as soon as practicable after the 7 day timeframe.
E. Stabilization. You must initiate stabilization measures immediately whenever earth-disturbing activities have permanently or temporarily ceased on any portion of the site and will not resume for a period exceeding 14 calendar days. You are required to complete the stabilization activities within 7 calendar days after the permanent or temporary cessation.
F. Soil nutrient testing. You are required to conduct a soil nutrient test to determine actual nutrient needs before applying fertilizer on your site. Fertilizer application must be limited to that necessary to meet actual needs on the site.

E-4 SPECIFIC REQUIREMENTS FOR MSGP (INDUSTRIAL) STORMWATER PERMITS

In addition to the general provisions of the OKR05 General Permit (General Permit for Storm Water Discharges from Industrial Facilities under the Multi-Sector Industrial General Permit [MSGP] within the State Of Oklahoma), specific requirements will be added to existing and future permits for MSGP permittees in the Lake Fort Gibson Watershed engaged in activities specified by the Standard Industrial Classification (SIC) Code or Activity Code as:

- 2951,2952: Asphalt Paving and Roofing Materials (production);
- 3271-3275: Concrete, Gypsum and Plaster Products (production);
- 1442,1446: Sand and Gravel (mineral mining and dressing); and
- Other activities deemed to be potential sources of nutrients and sediment to the Lake as determined by the DEQ on a case-by-case basis.

After EPA approval of this TMDL, the following provisions will be included as site-specific requirements in existing and future authorizations under OKR05 specified above:

A. Revise the SWP3 for additional TSS and nutrient reduction measures within 12 months of notification and submit the SWP3 for DEQ review;
B. Perform monthly inspection and maintenance of stormwater management devices, facility equipment and systems to avoid breakdowns or failures.
C. If the permit is for an activity that includes numeric effluent limits (See Table 1-3 of the MSGP), monitoring and reporting of the discharge is required once per month rather than once per year.
D. Comply with any additional pollutant prevention or discharge monitoring requirements established by the local MS4 municipalities.

Compliance with these specific requirements must be reflected in the permittee's annual Comprehensive Site Compliance Evaluation Report.

Table E-2 Some BMPs Applicable to TSS, Nutrients and Organic Matter

BEST MANAGEMENT PRACTICE	Reported Removal Efficiency	Note
Sediment Forebay	Required to achieve TP, TN and organic matters removal efficiency for structural practices	Sediment should be removed every 3-5 years or when 6-12 inches have accumulated.
Grassed Swale	TSS: ~50%; TP: ~35%; TN: 0-40%	Maintain thick vegetation at 3-6 inches, remove debris and sediment and re-establish vegetation if needed
Urban Nutrient Management	TSS: 0%; TP: 10-22%; TN: ~15%	Urban nutrient management involves the reduction of fertilizer to grass lawn and other urban areas. Public education and awareness is needed to avoid excessive fertilizer use.
Constructed Wetlands	TSS: 10-80%; TP: 12-45%; TN: ~20%	Second season reinforcement plantings are often needed. Mow biannually to reduce woody growth on outer boundary. Maintain sediment forebay. Remove sediment from forebay every 3-5 year or when 6-12 inches have accumulated.
Extended Detention-Enhanced	TSS: 60-80%; TP: 20-50%; TN: ~20%	Mow two times per year; remove debris from spill way and trash rack at control structure; and maintain sediment forebay
Retention Basin	TSS: ~80%; TP: ~50%; TN: ~25%	Mow two times per year; remove debris from spill way and trash rack at control structure; and maintain sediment forebay. Aeration may be needed in Oklahoma.
Riparian Buffers	TSS: 50-90%; TP: 18-80%; TN: 10-75%	Require proper slope and width of the buffer zone to achieve typical removal efficiency. Width typically varies from 4.6 to 27.4 m and slope varies from 4 to 16%

E-5 Sources

1. Geosyntec Consultants, Inc. and Wright Water Engineers, Inc., International Stormwater Best Management Practices (BMP) Database (www.bmpdatabase.org)- Pollutant Category Summary, Statistical Addendum: TSS, Bacteria, Nutrients, and Metals, July 2012.

2. Wenger, S. A Review of the Scientific Literature on Riparian Buffer Width, Extent and Vegetation, Office of Public Service & Outreach, Institute of Ecology, University of Georgia, March, 1999.

3. Simpson, T. W., and S. E. Weammert, Riparian Forest Buffer Practice (Agriculture) and Riparian Grass Buffer Practice, Definition and Nutrient and Sediment Reduction Efficiencies for Use in Calibration of the Phase 5.0 of Chesapeake Bay Program Watershed Model, 2007.

4. Birch, G. F., C. Matthai, M. S. Fazeli, and J. Y. Suh, Efficiency of a Constructed Wetland in Removing Contaminants from Stormwater, Wetlands, Vol. 24. No. 2, June 2004.

5. National Pollutant Removal Performance Database, Version 3, September, 2007.