

COMPENDIUM OF MS4 PERMITTING APPROACHES



Photo credit: Alisha Goldstein, EPA

PART 3: WATER QUALITY-BASED REQUIREMENTS



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Water Quality-Based Requirements

This compendium serves as a snapshot of MS4 permit provisions focused on water quality-based requirements for specific pollutant parameters that are consistent with approved TMDLs. It also includes provisions to protect impaired waters prior to TMDL development or to achieve other water quality objectives, such as protecting high quality waters. To develop this compendium, EPA reviewed all state and EPA-issued individual and general small MS4 final permits issued up to January 2017 and compiled examples of permit language. This compendium provides examples of permit language for permitting authorities' consideration as they undertake implementation of the General Permit Remand Rule, particularly with respect to establishing permit terms and conditions that are "clear, specific, and measurable." These permit excerpts are intended to help permitting authorities develop appropriate permit terms and conditions, and do not address compliance with the procedural and other requirements of the General Permit Remand Rule.

The review of existing state and EPA permits for this compendium identified different ways of implementing TMDLs through quantitative requirements or pollutant-specific management measures, or a combination of both. EPA also reviewed MS4 permits to glean examples of how permitting authorities measured progress of implementation of water quality-based requirements through review and approval of implementation plans, monitoring and modeling, and reporting requirements. Finally, EPA reviewed MS4 permits for water quality-based requirements related to discharges to impaired waters without approved TMDL(s).

Overall, EPA found that nearly all MS4 permits include at least some language addressing impaired waters. For the purposes of presenting the different permitting approaches found in EPA's permit review, this compendium organizes the examples into the following categories:

1. Listing of applicable TMDLs, Wasteload Allocations (WLAs), and/or the affected MS4s
2. Numeric limits and other quantifiable approaches for the specific pollutants of concern¹
3. Required implementation of specific stormwater controls or management measures
4. Other types of water quality-based requirements
 - a. Permitting Authority Review and Approval of TMDL Plans
 - b. Monitoring & Modeling Requirements
 - c. TMDL-Related Annual Reporting Requirements
5. Requirements for discharges to impaired waters prior to TMDL approval

EPA notes that this compendium is intended to serve as a snapshot of existing permit provisions. EPA anticipates that as permits are reissued in the coming months and years, the information in this compendium will need to be updated to include newer examples or

¹ The use of the term *pollutant of concern* in this compendium refers to the pollutant parameter(s) for which a waterbody is listed as impaired under section 303(d) of the Clean Water Act or for which a TMDL has been approved or established by EPA.

Water Quality-Based Requirements

modified information. EPA has an interest in ensuring the accuracy of the information contained in this document, and therefore welcomes input on any aspect of this compendium at any time.

The Agency will update the compendium as needed based on comments received and new information. EPA notes that the inclusion of any particular permit example should not be read as an Agency endorsement of the entire approach taken in that permit, nor should it be read as EPA's independent determination that the permit terms meet the regulatory requirements. This includes the permit standard for regulated small MS4s "to reduce the discharge of pollutants from [the] MS4 to the maximum extent practicable, to protect water quality, and to satisfy the appropriate water quality requirements of the Clean Water Act" 40 CFR 122.34(a).

In addition, this document does not contain or impose any legally binding requirements on EPA, states, or the regulated community, and does not confer legal rights or impose legal obligations upon any member of the public. EPA made every attempt to ensure the accuracy of the examples included in this document; however, in the event of a conflict between this compendium and any statute, regulation, or permit, the statute, regulation or permit controls.

For more information about the NDPEs Stormwater Program visit www.epa.gov/npdes/stormwater.

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1 Listing of TMDLs, WLAs, and the Affected MS4s

A first step in determining whether additional permit requirements are necessary as a result of an approved or established TMDL is to establish whether any TMDLs or WLAs apply to the MS4s being permitted.

Although many permits have placed the responsibility for making this determination on the MS4 permittee, several permits have instead

included information on which TMDLs and WLAs apply and which MS4s are affected directly in the permit. This approach reduces the amount of work required of the permittee in interpreting TMDL documents, and provides greater clarity for the permittee in understanding what water quality-related requirements may apply. The following are examples of this approach.



Photo credit: Tetra Tech

1 Listing of TMDLs, WLAs, and the Affected MS4s

General Permits

California

The [2013 California small MS4 permit](#) includes tables showing applicable TMDLs, the MS4s covered by WLAs, the applicable WLA, and individualized TMDL implementation requirements for each affected MS4. See [Attachment G](#).

Massachusetts

The [2016 \(Effective 2017\) Massachusetts small MS4 general permit](#) identifies in Part 2.2.1 the list of municipalities subject to nine different TMDLs, including TMDLs in other states that are impacted by municipalities in Massachusetts.

Minnesota

The Minnesota Pollution Control Agency (MPCA) includes on its website the [Master List MS4 Permit TMDLs Spreadsheet](#) that identifies TMDLs and associated WLAs that apply to its regulated MS4s. See “Application Items” under the Permit tab.

New Hampshire

The [2017 \(Effective 2018\) New Hampshire small MS4 general permit](#) identifies in Part 2.2.1 the list of municipalities subject to approved TMDLs for chlorides, bacteria, pathogens, and phosphorus.

Pennsylvania

The [2016 \(Effective 2018\) Pennsylvania small MS4 general permit](#) identifies two “MS4 Requirements Tables” for municipal MS4s and non-municipal MS4s that identify, for each MS4 subject to the permit, the impaired waters to which they discharge, the permit appendix that applies to them (separate appendices address metals, pathogens, PCBs, Chesapeake Bay watershed, and waters impaired for nutrients and/or sediment), and any other causes of impairment.

Washington

The [2013 Western Washington small MS4 permit](#) identifies each TMDL within the permit area and all affected MS4 permittees. [See Appendix 2](#).

1 Listing of TMDLs, WLAs, and the Affected MS4s

Individual Permits

Anchorage, AK

The [2015 Anchorage, Alaska, MS4 permit](#) includes in Table 2 (Part 1.4.4) a list of impaired receiving waters within the municipality's jurisdiction that includes both completed TMDLs and impaired waters without TMDLs. The table identifies the pollutants of concern and receiving waters.

Menomonee Watershed, WI

The [2012 Menomonee Watershed Permit](#) for Milwaukee, Wisconsin, and 10 other MS4 permittees includes a table that lists all of the impaired waterbodies in the Menomonee River Watershed, the pollutants of concern, and the contributing MS4. See Table 1.

Prince George's County, MD

The [2014 Prince George's County, Maryland, MS4 permit](#) provides an attachment, which includes a three-page list of EPA-approved TMDLs in the County. See Attachment B.

Portland, OR

The [2011 City of Portland and Port of Portland MS4 permit](#) lists on the cover page that WLAs are included for urban stormwater for the Willamette River Basin, Columbia River Basin, Tualatin River Sub-basin, and the Columbia Slough.

2 Numeric Limits for Pollutants of Concern



Photo credit: Tetra Tech

Several MS4 permits include numeric water quality-based requirements for specific pollutant parameters that are consistent with approved Total Maximum Daily Loads (TMDLs). These permits often combine numeric limitations with specific control measure requirements. Examples of such MS4 permits are included in this section.

2 Numeric Limits for Pollutants of Concern

General Permits

California

The [2013 California general permit](#) for discharges from small MS4s incorporates numeric WLAs that apply to individual permittees.

See [Attachment G](#). For example, for the Pajaro River sediment TMDL, four MS4 permittees are prohibited from discharging sediment to the listed waterbodies in excess of the WLAs shown in the Table below. The allocations represent a 90% reduction in sediment loading to each waterbody from urban roads. The permit implements numeric WLAs by also requiring near-term actions, in the form of specific management measures, which constitute the bulk of what the permittee must do to be consistent with the WLAs. These requirements are individualized for each pollutant of concern, impaired watershed and contributing MS4 discharger. For example, for the Napa River pathogens WLA for municipal stormwater, the permit requires the six affected MS4s to educate the public about pathogen impacts and ways to reduce pathogen discharges, and to develop and implement programs to reduce/eliminate fecal coliform loading from pet wastes, among other requirements.

The blue boxes accompanying each example provide a list of pollutants with numeric limits or other quantifiable approaches consistent with the approved TMDLs for each identified MS4 permit.



2013 CA MS4 General Permit – Pollutants with Numeric Limits

- Sediment
- Pathogens
- Nitrogen
- Phosphorus
- Pesticides (Diazinon, Chlorpyrifos)
- Methyl-mercury
- Dissolved Oxygen
- Metals (Cu, Pb, Zn)

| Pajaro River TMDL WLA and LA for Sediment ² | | |
|---|-----------------------|----------------------------------|
| Applicable MS4s | Major Subwatershed | Metric Tons of Sediment Per Year |
| City of Morgan Hill City of Gilroy City of Hollister City of Watsonville | Tres Pinos | 1 |
| | San Benito | 100 |
| | Llagas | 787 |
| | Uvas | 139 |
| | Upper Pajaro | 161 |
| | Corralitos | 284 |
| | Mount of Pajaro River | 191 |

² CA Phase II Small MS4 General Permit. [Appendix G](#).

2 Numeric Limits for Pollutants of Concern

Virginia

The [2013 Virginia general permit](#) for discharges from small MS4s requires permittees discharging to the Chesapeake Bay watershed to reduce loadings of nitrogen, phosphorus, and total suspended solids from existing developed lands (pre-June 30, 2009) by 5% of its total load reduction by the permit expiration date. The permit also requires a 5% offset of increased loads from new and grandfathered construction projects disturbing one or more acres for which an average land cover condition greater than 16% impervious cover was used in the design of post-development stormwater facilities. The general permit includes tables with loading rates and reduction rates to be used by the permittee to calculate required 5% load reductions from existing sources. Load reductions are to be accomplished through the implementation of a Chesapeake Bay TMDL Action Plan that outlines the means and methods by which the permittee will achieve the required reductions. For this permit term, the permit states that compliance with these requirements “represents adequate progress for this state permit term towards achieving TMDL WLAs consistent with the assumptions and requirements of the TMDL.” See Sections I.C, I.C.2.a.5, Tables 3.a–3.d, I.C.2.a.7 and 8, and I.C.3. In the Watershed Implementation Plan for the Chesapeake Bay TMDL, Virginia committed to a phased approach to reducing nitrogen, phosphorus, and TSS from the MS4 and will include additional loading reductions in the next two permits terms.

2013 VA MS4 General Permit – *Pollutants with Numeric Limits*

- Nitrogen
- Phosphorus
- Sediment

2 Numeric Limits for Pollutants of Concern

Massachusetts

The [2016 \(Effective 2017\) Massachusetts small MS4 general permit](#), in Appendix F, identifies specific load reductions, milestones, and completion dates for individual permittees for the Charles River Phosphorus TMDL and the Lake and Pond Phosphorus TMDLs. For example, the table below illustrates the phosphorus reductions for several permittees in the Charles River Watershed.

2016 (Effective 2017) MA MS4 General Permit
– Pollutants with Numeric Limits

- Phosphorus

| Annual Stormwater Phosphorus Load Reduction by Permittee, Charles River Watershed | | | | |
|---|---------------------------------|--|----------------------------------|---|
| Community | Baseline Phosphorus Load, kg/yr | Stormwater Phosphorus Load Reduction Requirement kg/yr | Allowable Phosphorus Load, kg/yr | Stormwater Percent Reduction in Phosphorus Load (%) |
| Arlington | 106 | 57 | 49 | 53% |
| Ashland | 67 | 23 | 44 | 34% |
| Bellingham | 947 | 331 | 616 | 35% |
| Belmont | 202 | 86 | 116 | 42% |
| Brookline | 1,635 | 789 | 846 | 48% |
| Cambridge | 512 | 263 | 249 | 51% |
| Dedham | 805 | 325 | 480 | 40% |
| Dover | 831 | 137 | 694 | 17% |

2 Numeric Limits for Pollutants of Concern

New Hampshire

The [2017 \(Effective 2018\) New Hampshire small MS4 general permit](#), in Appendix F, identifies percentage load reductions for individual MS4s subject to an approved phosphorus TMDL to be consistent with the assumptions and requirements of the applicable WLA, as shown in Table below. Appendix F also includes detailed methods and annual phosphorus load export rates for measuring load reductions for various stormwater BMPs treating runoff from different site conditions (i.e., impervious or pervious) and land uses (e.g., commercial, industrial, residential, etc.). The estimates of annual phosphorus loads and load reductions due to BMPs are intended for use by MS4 operators to measure compliance with their respective phosphorus reduction requirements.

2017 (Effective 2018) NH MS4 General Permit
– Pollutants with Numeric Limits

- Phosphorus

| Waterbodies and Primary Municipalities subject to a Lake or Pond Phosphorus TMDL | | | |
|---|------------------------|---|----------------------------------|
| Towns | Water Body name | % Reduction in TP Load for All Sources | TMDL |
| Amherst; Merrimack | Baboosic Lake | 44 % | Baboosic TMDL |
| Merrimack | Horseshoe Pond | 76 % | Horshoe TMDL |
| Manchester | Nutt Pond | 71 % | Nutt TMDL |
| Manchester | Pine Island Pond | 64% | Pine Island TMDL |
| Hudson | Robinson Pond | 48 % | Robinson TMDL |
| Bedford | Sebbins Pond | 64 % | Sebbins TMDL |
| Sandown | Showell Pond | 69 % | Showell TMDL |
| Manchester | Stevens Pond | 50 % | Stevens TMDL |
| Derry | Hoods Pond | 76 % | Hoods TMDL |
| Kingston | Halfmoon Pond | 74 % | Halfmoon TMDL |
| Kingston | Greenwood Pond | 69 % | Greenwood TMDL |
| Hollis | Flints Pond | 40 % | Flints TMDL |
| Manchester | Dorrs Pond | 62 % | Dorrs TMDL |
| Kingston; Newton | Country Pond | 52 % | Country TMDL |
| Raymond | Governors Lake | 47 % | Governors TMDL |
| Bedford | Sandy Pond | 51 % | Sandy TMDL |

2 Numeric Limits for Pollutants of Concern

Pennsylvania

The [2016 \(Effective 2018\) Pennsylvania small MS4 general permit](#) requires, for MS4s discharging to waters within the Chesapeake Bay, that pollutant load reductions (lbs/year) be achieved within 5 years of permit coverage. The MS4s is required to identify pollutant reductions in a Pollutant Reduction Plan, with minimum percent reductions of 10% for pollutant loadings of sediment, 5% for pollutant loadings of Total Phosphorus and 3% pollutant loadings of Total Nitrogen. See Appendix D. Similar loading reductions are required in Appendix E for discharges to waters impaired by sediment or Total Phosphorus outside of the Chesapeake Bay watershed.

2016 (Effective 2018) PA MS4 General Permit

– Pollutants with Numeric Limits

- Nitrogen
- Phosphorus
- Sediment

New York

The [2015 New York small MS4 general permit](#) in Part IX includes pollutant load reductions for specific watersheds. Each watershed includes deadlines for the development of a watershed improvement strategy, retrofit plan, and pollutant load reduction. An example from the permit for several watersheds is below.

2015 NY MS4 General Permit

– Pollutants with Numeric Limits

- Phosphorus
- Pathogen
- Nitrogen

| Pollutant Load Reduction and Timetable for Pathogen Impaired Watershed Improvement Strategy Areas – NY Small MS4 Permit. | | | | |
|--|---|-----------------------------------|--|-----------------------------------|
| Watershed | Watershed Improvement Strategy Deadline | Retrofit Plan Submission Deadline | Pollutant Load Reduction (Waste Load Allocation %) | Pollutant Load Reduction Deadline |
| Richmond Creek | 05/01/2013 | 09/30/2012 | 71 | 09/30/2022 |
| Deep Hole Creek | 05/01/2013 | 09/30/2012 | 29 | 09/30/2022 |
| James Creek | 05/01/2013 | 09/30/2012 | 51 | 09/30/2022 |
| Flanders Bay | 05/01/2012 | 03/09/2012 | 98 | 03/09/2021 |
| Reeves Bay | 05/01/2012 | 03/09/2012 | 97 | 03/09/2021 |

2 Numeric Limits for Pollutants of Concern

Middle Rio Grande Watershed, NM

The [2014 Middle Rio Grande Watershed MS4 permit](#) includes approved TMDL tables in Appendix B with flow conditions and associated WLAs for the 2010 bacteria TMDL for two stream segments, as provided below, and with determinations for calculating quantifiable WLAs for E. coli. The appendix also provides a mechanism to calculate, based on acreage within a drainage area, a target loading value for a particular monitoring location by determining the base loading for subwatershed areas consistent with the TMDL, setting subwatershed targets, and ensuring overall compliance with the TMDL WLA allocation.

2014 Middle Rio Grande Watershed MS4 Permit
– Pollutants with Numeric Limits

- Bacteria

| TMDL Waste Load Allocations (WLAs) ² for E. coli: Rio Grande ¹ | | | | | | | |
|--|---|----------------------|---|---------------------------|---------------------------|---------------------------|---------------------------|
| Stream Segment | Stream Name | Permittee Class | FLOW CONDITIONS & ASSOCIATED WLA (cfu/day) ³ | | | | |
| | | | High | Moist | Mid-Range | Dry | Low |
| 2105_50 | Isleta Pueblo boundary to Alameda Street Bridge (based on flow at USGS Station NM08330000) | Class A ⁴ | 3.36 x10 ¹⁰ | 8.41 x10 ¹⁰ | 5.66 x10 ¹⁰ | 2.09 x10 ¹⁰ | 4.67 x10 ⁹ |
| | | Class B ⁵ | 3.73 x10 ⁹ | 9.35 x10 ⁹ | 6.29 x10 ⁹ | 2.32 x10 ⁹ | 5.19 x10 ⁸ |
| | | Class C ⁶ | | | | | |
| 2105.1_00 | non-Pueblo Alameda Bridge to Angostura Diversion (based on flow at USGS Station NM08329928) | Class A | 5.25 x10 ¹⁰ | 1.52 x10 ¹⁰ | - | 5.43 x10 ⁹ | 2.8 x10 ⁹ |
| | | Class B | 2.62 x10 ¹¹ | 7.59 x10 ¹⁰ | - | 2.71 x10 ¹⁰ | 1.40 x10 ¹⁰ |
| | | Class C | | | | | |

¹ Total Maximum Daily Load for the Middle Rio Grande Watershed, NMED, 2010.

² The WLAs for the stormwater MS4 permit was based on the percent jurisdiction area approach. Thus, the MS4 WLAs area percentage of the available allocation for each hydrologic zone, where the available allocation = TMDL – WLA – MOS.

³ Flow conditions relate to percent of days the flow in the Rio Grande at a USGS Gauge exceeds a particular level: High 0-10%; Moist 10-40%; Mid-Range 40-60%; Dry 60-90%; and Low 90-100% (Source: Figures 4.3 and 4.4 in 2010 Middle Rio Grande TMDL)

⁴ Phase II MS4s

⁵ Phase II MS4s (2000 Census)

⁶ New Phase II MS4s (2010 Census or MS4s designated by the Director)

2 Numeric Limits for Pollutants of Concern

Individual Permits

Arlington County, VA

The [2013 Arlington County, Virginia, MS4 permit](#) has the same pollutant reduction requirements for nitrogen, phosphorus, and TSS as the 2013 Virginia small MS4 general permit (described above). The Arlington County MS4 permit also requires the permittee to identify and submit to the state at least seven retrofit projects within its watershed retrofit plans that will be implemented within County rights-of-way or on County property within 60 months of permit issuance. The MS4 is also required to:

- Plant a minimum of 2,000 trees on County lands and develop a program to distribute a minimum of 2,000 trees to private property owners.
- Have funding to accommodate a minimum of 200 participants in the StormwaterWise Landscape program, which provides cost-sharing and technical assistance for the installation of small-scale best management practices (BMPs) to reduce stormwater runoff from private properties.

See Parts I.B.2.c and I.D.1.b.

2013 Arlington, VA MS4 Permit

– Pollutants with Numeric Limits

- Nitrogen
- Phosphorus
- Sediment

Lake Tahoe, CA

The [2011 Lake Tahoe, California, MS4 permit](#), covering the City of South Lake Tahoe, and portions of El Dorado County and Placer County in the Lake Tahoe Hydrologic Unit, requires each permittee to reduce fine sediment particle (FSP), TP and total nitrogen (TN) loads by 10%, 7%, and 8%, respectively, by September 30, 2016. These percentage reduction requirements were applied to each of the permittee's baseline load of FSP, TP, and TN to determine the maximum load allowance for each permittee to meet the 5-year load reduction requirements. See Section IV.B and Table IV.B.1.

2011 Lake Tahoe, CA MS4 Permit

– Pollutants with Numeric Limits

- Fine Sediment Particles
- Phosphorus
- Nitrogen

2 Numeric Limits for Pollutants of Concern

Los Angeles County, CA

The [2012 \(Amended 2016\) Los Angeles County, California, systemwide permit](#) requires permittees to comply with numeric WQBELs based on WLAs in approved TMDLs. The permit includes comprehensive provisions to achieve WLAs from applicable TMDLs, including interim and final WQBELs and corresponding compliance schedules consistent with the state-adopted TMDL Implementation Plan, compliance monitoring, and reporting requirements, and for each pollutant of concern. For example, Attachment L of the permit prescribes final and interim WQBELs that apply to MS4s discharging to the Santa Clara River. The attachment includes WQBELs for nitrogen, chloride, trash, and *E. coli* that are consistent with the WLAs from approved TMDLs for the Santa Clara River watershed.

For the interim WQBELs, the permit includes several alternatives from which the permittees can choose to demonstrate compliance. A permit can demonstrate compliance with the applicable interim WQBEL in any of the following ways:

- There are no violations of the interim WQBEL for the pollutant of concern at the permittee's applicable MS4 outfalls;
- There are no exceedances of the applicable receiving water limitation for the pollutant of concern in the receiving water at or downstream of the permittee's outfalls;
- There is no direct or indirect discharge from the permittee's MS4 to the receiving water subject to the interim WQBEL and/or the receiving water limitation for the pollutant of concern;
- The permittee has submitted and is fully implementing an approved Watershed Management Program (WMP) or an Enhanced Watershed Management Program (EWMP), which requires among other things that the permittee include multi-benefit regional projects that retain through infiltration or capture and reuse the stormwater volume from the 85th percentile, 24-hour storm for the drainage areas tributary to these projects.

See Parts VI.C and E, and Attachments L – R.

2012 (Amended 2016) LA County, CA MS4 Permit – *Pollutants with Numeric Limits*

- Nitrogen
- Chloride
- Trash
- Bacteria
- Marine debris
- DDTs and PCBs
- Phosphorus
- Toxics
- Metals
- Pesticides
- Selenium
- Mercury
- Sediment
- PAHs

2 Numeric Limits for Pollutants of Concern

North Orange County, CA

The [2009 Orange County, California, MS4 permit](#) establishes a number of different numeric water quality-based requirements that affect MS4s discharging to certain watersheds. For instance, for MS4s discharging to the Newport Watershed, the permit requires compliance with WLAs for metals (cadmium, copper, lead, zinc, mercury, and chromium), organochlorine compounds, and selenium. See Section XVIII.B.4. Note that the original TMDLs for these constituents included no implementation plans or compliance schedules for attainment. During development of the modified TMDL, which will include an implementation plan, the permittees are required to continue working towards meeting the WLAs. In addition, for TMDLs with implementation plans, the permit includes WLAs that are required to be met as soon as 2013 (e.g., recreational standards for fecal coliform), but by no later than 2019 (e.g., shellfish standards for fecal coliform). See Section XVIII.C. Other numeric WLAs are required in Section XVIII.D for diazinon, chlorpyrifos, TN, TP, and sediment. Compliance with the WLAs is to be determined by receiving water monitoring. Where monitoring reveals that the WLAs are exceeded, the permittees are required to evaluate and submit to the permitting authority within 12 months of the exceedances a proposal for implementing additional BMPs. See Section XVIII.E.

2009 Orange County, CA MS4 Permit

– *Pollutants with Numeric Limits*

- Metals
- Organochlorine Compounds (DDT, PCBs, Chlordane, Dieldrin)
- Selenium
- Sediment
- Fecal Coliform
- Diazinon and Chlorpyrifos
- Nutrients

San Diego, CA

The [2013 San Diego Regional MS4 permit](#) contains numeric effluent limitations for diazinon, dissolved copper, TN, TP, lead, zinc, and indicator bacteria, which are consistent with applicable TMDL WLAs. The permit identifies for each applicable TMDL information about the TMDL (waterbodies, adoption dates); which MS4 co-permittees are affected; final compliance requirements (final compliance dates, receiving water and/or effluent limitations, BMP requirements, and final TMDL compliance determination); interim compliance requirements; and specific monitoring and assessment requirements. See Attachment E.

2013 San Diego, CA MS4 Permit

– *Pollutants with Numeric Limits*

- Diazinon
- Metals (Cu, Pb, Zn)
- Nitrogen
- Phosphorus
- Bacteria

2 Numeric Limits for Pollutants of Concern

San Francisco Bay Region, CA

The [2015 San Francisco Municipal Regional Stormwater Permit](#) requires the permittees to implement programs to address pesticides toxicity, trash, mercury, PCBs, copper, and bacteria. For pesticides toxicity, mercury, PCBs and bacteria, specific TMDL WLAs are included. For trash, load reduction control actions are required to reduce trash loads from the MS4 by 70% by 2017 and 80% by 2019; these requirements are based on the permitting authority's best professional judgment in implementing a narrative water quality objective absent a TMDL. See Provision C.10. The permit also includes various specific control measures for copper.

2015 San Francisco, CA MS4 Permit

– Pollutants with Numeric Limits

- Trash
- Mercury
- PCBs
- Pesticides
- Bacteria

Prince George's County, MD

The [2014 Prince George's County, Maryland, MS4 permit](#) requires the County to develop a work plan within one year to address the Anacostia Trash TMDL, which estimates that 170,628 pounds of trash will need to be removed annually. The work plan must include a detailed schedule, trash reduction benchmarks in years two and four, and methods of implementation. The County must also develop accounting methods to quantify annual trash reductions.

The permit also requires restoration plans for waters with approved TMDLs. The restoration plans must address the stormwater WLA for all EPA-approved TMDLs in the County. An annual TMDL assessment report is required to be submitted to the permitting authority. In addition, the permit requires the County, within the 5-year permit term, to achieve reductions in discharges consistent with the Chesapeake Bay TMDL by restoring 20% of the previously developed impervious land with little or no controls. See similar requirements in the [2014 Anne Arundel County, Maryland, MS4 permit](#) (Parts IV.E.2.a and VI.A).

Note that Maryland has five other [Phase I MS4 permits](#) [Charles County (2014), Carroll County (2014), Frederick County (2014), Harford County (2014), and Howard County (2014)] that are required to restore 20% of the County's impervious surface area based on the Maryland Department of Environment's 2014 Guidance "[Accounting for Stormwater Wasteload Allocation and Impervious Acres Treated](#)." The permit further requires monitoring to determine the effectiveness of the restoration efforts toward achieving water quality.

See Parts IV.D.4, IV.E, and VI.A. See similar requirements in Parts IV.E and VI of both the [2013 Baltimore County, Maryland, MS4 permit](#) and the [2013 Baltimore City, Maryland, MS4 permit](#).

2014 Prince George's MD MS4 Permit

– Pollutants with Numeric Limits

- Trash/Debris
- Nitrogen
- Phosphorus
- Sediment
- Bacteria
- Mercury
- PCBs

2 Numeric Limits for Pollutants of Concern

Honolulu, HI

The [2015 Honolulu City/County MS4 permit](#) requires compliance with the “urban source wasteload allocation” based on different TMDLs in table format including applicable allocations; existing loads; and reductions needed for TN, TP, and TSS. See Sections F.3.b and F.3.b.1 through F.3.b.6.

2015 Honolulu, HI MS4 Permit

– Pollutants with Numeric Limits

- Nitrogen
- Phosphorus
- Sediment

Washington, DC

The [2011 DC MS4 permit](#) requires the permittee to remove 103,188 pounds of trash annually. Reductions must be made through a combination of the following approaches:

- Direct removal from waterbodies (e.g., stream cleanups, skimmers)
- Direct removal from the MS4 (e.g., catch basin cleanout, trash racks)
- Direct removal prior to entry to the MS4 (e.g., street sweeping)
- Prevention through additional disposal alternatives (e.g., public trash/recycling collection)
- Prevention through waste reduction practices, regulations, and/or incentives (e.g., bag fees)

2011 Washington, DC MS4 Permit

– Pollutants with Numeric Limits

- Trash

See Section 4.10.

2 Numeric Limits for Pollutants of Concern

New Castle County, DE

The [2013 New Castle County/Delaware Department of Transportation Individual Phase I MS4 permit](#) includes in Appendix A, WLAs assigned to the permittees for each watershed. Annual baseline loads, annual TMDL loads, and load reductions are included for each listed pollutant in each watershed. An example for two waterbodies are included below:

2013 New Castle County, DE MS4 Permit

– Pollutants with Numeric Limits

- Nitrogen
- Phosphorus
- Bacteria
- PCBs
- Sediment

| Wasteload Allocations Assigned to the New Castle County/DeIDOT MS4 | | | | |
|--|-----------|---|------------------|----------------|
| Waterbody | Pollutant | MS4 Wasteload Allocation Specified in Approved TMDL | | |
| | | Annual Baseline Load | Annual TMDL Load | Load Reduction |
| Appoquinimink River Dissolved Oxygen and Nutrients (updated Dec 2003) Bacteria (Dec 2006) | Total N | 131,326 lb/yr | 70,251 lb/yr | 60% |
| | Total P | 23,300 lb/yr | 8,860 lb/yr | 60% |
| | Bacteria | 7.52E+12 CFU/yr | 6.32+12 CFU/yr | 15% (1) |
| | | 7.03E+10 CFU/yr | 6.06+10 CFU/yr | 73% (2) |
| Army Creek TMDL Analysis for the Watersheds of Army Creek, Red Lion Creek and Dragon Run Creek, Delaware (August 2006) | Total N | 14,782.5 lb/yr | 8,833 lb/yr | 40% |
| | Total P | 1241 lb/yr | 730 lb/yr | 40% |
| | Bacteria | 1.1E+13 CFU/hr | 5.037E+12 CFU/yr | 39% |

3 Specific Control Measures for Pollutants of Concern



Photo credit: Tetra Tech

EPA found several examples of permits that require their MS4 permittees to implement specific control measures or best management practices (BMPs) to ensure consistency with the applicable TMDLs. This approach provides both the permitting authority and the permittee with measurable performance measures that can be readily tracked, and it provides both parties with the ability to understand what actions constitute reasonable further progress towards achieving the TMDL and protecting water quality.

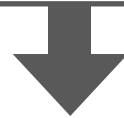
3 Specific Control Measures for Pollutants of Concern

General Permits

Pennsylvania

The [2016 \(Effective 2018\) Pennsylvania general permit](#) for discharges from small MS4s requires that permittees implement pollutant control measures for waters impaired by metals, pathogens, or priority organic compounds (see Appendix A-C). For each of these pollutants, the permittee is required to develop a sewershed map with outfalls that discharge to the impaired water, an inventory of sources of that pollutant in the sewersheds, and an investigation of each suspected source. For pathogens, the permittee is required to enact an ordinance that requires proper management of animal wastes on property owned by the permittee. See Appendix B.

The gray boxes provide a list of pollutants for which the MS4 permit requires implementation of specific control measures consistent with approved TMDLs.



2016 (Effective 2018) PA MS4 General Permit

– Pollutants with specific control measures

- Metals (Fe, Mn, Al)
- Acidity (Acid Mine Drainage)
- Pathogens
- Priority Organic Compounds (PCBs, pesticides)

Massachusetts

The [2016 \(Effective 2017\) Massachusetts small MS4 general permit](#), in Appendix F, identifies enhanced best management practice requirements for individual permittees for each listed TMDL. For example, for MS4s in one of the 16 approved bacteria or mixed pathogen TMDLs (see Appendix F section A.III), the permit requires enhanced public education measures (including annual messages about proper management of pet waste) and elevated priority ranking of catchments draining to impaired waters for IDDE.

2016 (Effective 2017) MA MS4 General Permit

– Pollutants with specific control measures

- Bacteria or Mixed Pathogen
- Nitrogen
- Phosphorus
- Metals (Cd, Pb, Al, Fe)

3 Specific Control Measures for Pollutants of Concern

New Hampshire

The [2017 \(Effective 2018\) New Hampshire small MS4 general permit](#), in [Appendix F](#), identifies specific actions that individual permittees must take to address approved TMDLs for chlorides and bacteria, and phosphorus. For instance, among other requirements, affected MS4 operators are required to undertake as part of their Chloride Reduction Plan the tracking of the amount of salt applied to all municipally owned and maintained surfaces and reporting of salt use using the UNH Technology Transfer Center online tool, and to implement certain planned activities, such as pre-wetting, pre-treating the salt stockpile, increasing plowing prior to de-icing, and monitoring of road surface temperatures. See Sections I and II of Appendix F.

2017 (Effective 2018) NH MS4 General Permit

– *Pollutants with specific control measures*

- Bacteria or Pathogen
- Chloride
- Phosphorus

Washington

The [2013 Western Washington Phase II Municipal Stormwater Permit](#) includes tables that establish additional watershed-specific actions that are required of each named MS4. The actions are differentiated based on the applicable TMDL and pollutant of concern. For example, for the Stillaguamish River TMDL for fecal coliform and dissolved oxygen, Appendix 2 lists the permittees that the requirements apply to, and specific actions. Some of these actions include inspections of commercial animal handling and commercial composting facilities at least every three years, installation of animal waste collection stations at municipal parks, and screening of all MS4 sub-basin outfalls for bacteria sources. See Appendix 2.

2013 Western WA MS4 General Permit

– *Pollutants with specific control measures*

- Bacteria
- Dissolved oxygen
- pH
- Temperature

3 Specific Control Measures for Pollutants of Concern

Connecticut

The [2016 \(Effective 2017\) Connecticut small MS4 general permit](#) requires that MS4s discharging to waters for which nitrogen, phosphorus, or bacteria are stormwater pollutants of concern to implement control measures, screen outfalls and conduct monitoring. For example, under the public education minimum control measure (Section 6(a)(1)(C)), educational materials must be specifically tailored and targeted to educate the public about sources, impacts, and available pollution reduction practices for sources of the pollutant of concern, such as septic systems, fertilizer use, or grass clippings and leaves management. See Section 6(k).

2016 (Effective 2017) CT General Permit

= *Pollutants with specific control measures*

- Phosphorus
- Nitrogen
- Bacteria
- Mercury

New York

The [2015 New York small MS4 general permit](#) in Part IX requires detailed controls to address specific impaired waterbodies. For example, the New York City phosphorus watershed strategy requires public education materials that specifically address phosphorus by focusing on septic systems as a source of phosphorus, phosphorus concerns with fertilizer use, and phosphorus concerns with grass clippings and leaves entering storm drains. Part IX.A also requires inspection of on-site sanitary systems designed for less than 1,000 gallons per day be inspected at least once every five years.

2016 NY MS4 General Permit

– *Pollutants with specific control measures*

- Phosphorus
- Bacteria
- Nitrogen

3 Specific Control Measures for Pollutants of Concern

Individual Permits

Washington, DC

The [2011 DC MS4 permit](#) requires the permittee to implement several different stormwater controls with numeric targets:

- Implement retrofits for stormwater discharges from a minimum of 18,000,000 square feet of impervious surfaces during the permit term. A minimum of 1,500,000 square feet of this objective must be in transportation rights-of-way;
- Achieve a minimum net annual tree planting rate of 4,150 plantings annually within the DC MS4 area, with the objective of a District-wide urban tree canopy coverage of 40% by 2035. The annual total tree planting shall be calculated as a net increase, such that annual mortality is also included in the estimate. Trees must be planted in accordance with the Planting Specifications issued by the International Society of Arboriculture as appropriate to the site conditions; and
- Install at a minimum 350,000 square feet of green roofs on District properties during the term of the permit (including schools and school administration buildings).

See Sections 4.1.5.4, 4.1.6.2, and 4.1.7.2.

2011 Washington, DC MS4 Permit

– *Pollutants with specific control measures*

- Total organics
- Nitrogen
- Phosphorus
- Sediment
- Dissolved oxygen
- Metals (As, Cu, Pb, Zn)
- Oil & grease
- PCB
- Bacteria

3 Specific Control Measures for Pollutants of Concern

Denver, CO

The 2009 Denver, Colorado, MS4 permit identifies specific requirements that apply to discharges to Segment 14 of the Upper South Platte River Basin associated with WLAs from the approved *E. coli* TMDL. The permit requires the permittee to identify outfalls with dry weather flows and to identify outfalls of concern; to monitor priority outfalls of concern for flow rates and *E. coli* densities; to implement a system maintenance program for listed priority basins (which includes storm sewer cleaning and sanitary sewer investigations); to install markers at least 90% of storm drain inlets in areas with public access; and to conduct a public outreach program focused on sources that contribute *E. coli* loads to the MS4. See Part I.B.1.f.

2009 Denver, CO MS4 Permit

– Pollutants with specific control measures

- Bacteria

The permit also requires the permittee to develop and implement new programs and BMPs, in addition to the activities described above, to reduce dry weather discharges of *E. coli* to the extent necessary so that by the end of the compliance period, dry weather discharges from MS4 outfalls of concern do not contribute to an exceedance of the *E. coli* standard (do not exceed an *E. coli* density of 126 cfu per 100 ml for a geometric mean of all samples collected at a specific outfall in a 30-day period). The permit includes a compliance schedule for meeting this requirement by November 30, 2018. See Part I.B.1.f. Contact [state](#) for permit.

Florida Phase I MS4 Permits

[Florida's Phase I MS4](#) permits require permittees that discharge to waterbodies with an approved TMDL and a Basin Management Action Plan (BMAP) to comply with the provisions of the BMAP and report on the status of BMAP implementation with each annual report. For waterbodies with an approved TMDL, but no BMAP, the MS4 permittee is required to submit for review and approval a TMDL prioritization schedule within 6 months of the permit effective date. At a minimum, the highest priority TMDL is to have a plan to address the pollutant of concern by the end of the permit cycle. See, for example, Parts VIII. B.2 and B.3.a of the Pinellas and Miami-Dade permits.

FL Phase I MS4 Permit

– Pollutants with specific control measures

- Bacteria

Florida's permits also include specific requirements for fecal coliform TMDL waters that do not have a BMAP. In these cases, the MS4 permittee is required to develop and submit a bacterial pollution control plan with specific elements such as bacteria source tracking and a pet waste management program. The bacteria pollution control plan is to be implemented in accordance with the schedule within the approved plan. The permittees are required to submit a status report with each annual report. See, for example, Part VIII.B.4 of the Pinellas and Miami-Dad permits. [Contact state for permits.](#)

3 Specific Control Measures for Pollutants of Concern

San Francisco Bay Region, CA

In addition to the numeric requirements for trash in the [2015 San Francisco Bay Regional Stormwater MS4 Permit](#) as described in Section 2 of this compendium, this permit includes specific control measures that are required to achieve water quality-based requirements for trash, mercury, polychlorinated biphenyls, pesticides, copper, polybrominated diphenyl ether, and selenium. The permit requires interim milestones and pollutant-specific control measures that are consistent with the implementation actions identified in an applicable WLA. (For “urban stormwater,” see pages 15–16 of the Basin Plan Amendments to the [San Francisco Basin Water Quality Control Plan](#)). For example, the San Francisco Basin Water Quality Control Plan for mercury includes interim and final milestones of 120 kilograms per year (kg/yr) loading by February 2018 and 82 kg/yr by February 2028. The permit incorporates both the aggregate WLA and the interim loading milestone, as well as implementation requirements that are identified in the TMDL Implementation Plan, including requirements to:

1. Implement a mercury source control program;
2. Implement a monitoring system to quantify mercury loads and loads reduced;
3. Monitor methylmercury in discharges;
4. Conduct a fate and transport study; and
5. Develop an allocation sharing mechanism.

As another example, fecal indicator bacteria controls are required for San Pedro Creek and Pacifica State Beach. The permit includes numeric targets for allowable exceedances depending on dry or wet weather and frequency of sampling. The permit also requires bacterial control strategies including inspections of commercial horse and dog kennel facilities, installation of new dog waste clean-up signs and bag dispensers, and enhanced pet waste public outreach.

See Sections C.9 through C.14.

2015 San Francisco Bay Regional MS4 Permit
– Pollutants with specific control measures

- Mercury
- Copper
- Trash
- PCBs
- Bacteria
- Pesticides

4 Other Types of Water Quality-Based Requirements

A number of permits exhibit alternative means of ensuring consistency with applicable TMDLs, other than by adopting numeric requirements or implementing specific



Photo credit: Tetra Tech

stormwater controls. Permitting authorities measure the progress of implementing water quality-based requirements through review and approval of implementation plans, as well as the use of monitoring and modeling provisions, and reporting requirements. The following permitting approaches are illustrative of these types of requirements.

4.1 Permitting Authority Review and Approval of TMDL Plans

Several permitting authorities require that their permittees develop a TMDL Plan (or the TMDL component of the overall stormwater management program document) and submit it for review and/or approval. The benefit of this type of approach is that through the permitting authority review there is a level of assurance that the proposed plan will be consistent with the assumptions and requirements of any available WLA in an approved TMDL.

4.1 Permitting Authority Review and Approval of TMDL Plans

General Permits

Vermont

The [2012 Vermont general permit](#) for discharges from small MS4s requires permittees that discharge to a stormwater-impaired water with an approved TMDL to submit, within 3 years of the permit issuance date, a **Flow Restoration Plan** for state review and approval. The permit specifies six elements that must be addressed in the Flow Restoration Plan (Sec. IV.C.1(e)).

Pennsylvania

The [2016 \(Effective 2018\) Pennsylvania general permit](#) for discharges from small MS4s requires permittees discharging to impaired waters to submit a **Pollutant Reduction Plan (PRP)** with their notice of intent (NOI) for review and approval by the permitting authority if the MS4 is in the Chesapeake Bay or discharging to a nutrient or sediment impaired water. A PRP is a planning document prepared by the permittee, which guides the selection and implementation of specific BMPs to reduce pollutant loading to surface waters. The objective of a PRP is to improve the condition of surface waters such that the waters eventually attain water quality standards and its designated and existing uses in accordance with 25 Pa. Code Chapter 93. See Part C.II and Appendix D and E.

4.1 Permitting Authority Review and Approval of TMDL Plans

Virginia

The [2013 Virginia general permit](#) for discharges from small MS4s requires that permittees discharging to the Chesapeake Bay watershed submit a **Chesapeake Bay TMDL Action Plan** within 24 months of the permit effective date for review and approval by the permitting authority. The Chesapeake Bay TMDL Action Plans must include the following:

- A review of the current MS4 program to identify new or modified legal authorities to meet these requirements;
- An estimate of the annual pollutant of concern loads discharged from the existing sources based loading rates specified in the permit;
- A determination of the total pollutant load reductions necessary to reduce the annual pollutant of concern loads from existing sources;
- The management practices and retrofit programs that will be utilized to meet the required load reductions and a schedule to achieve those reductions. The schedule should include annual benchmarks to demonstrate the ongoing progress in meeting the reductions; and
- The means and methods to offset the increased loads from new sources that disturb one or more acres as a result of the utilization of an average land cover condition greater than 16% impervious cover for the design of post-development stormwater management facilities. The permittee must use tables in the permit to develop the equivalent pollutant load for nitrogen and TSS.

See Table 1 and Section I.C.2.

4.1 Permitting Authority Review and Approval of TMDL Plans

Georgia

The [2012 Georgia general permit](#) for discharges from small MS4s requires existing permittees discharging to impaired waters with an approved TMDL to develop and submit for review and approval to the permitting authority an **Impaired Waters Plan** (for MS4s with a population of < 10,000) or a **Monitoring and Implementation Plan** (for MS4s with a population of > 10,000).

- The Impaired Waters Plan, which must be submitted by a specific date, must include a list of the impaired waters and the pollutant(s) of concern, a map showing the locations of the impaired waters and all MS4 outfalls discharging to those waters, BMPs that will be implemented to address each pollutant of concern, and a schedule for implementing the BMPs.
- The Monitoring and Implementation Plan, which also must be submitted by a specified date, must identify where wet weather monitoring will occur, sample type, frequency, schedule to begin monitoring, and a description of the BMPs that will be implemented to address each pollutant of concern.

See Sections 4.4.1 and 4.4.2.

Minnesota

The [2013 Minnesota general permit](#) for discharges from small MS4s requires each applicant to submit its Stormwater Pollution Prevention Program (SWPPP) document to the permitting authority, including a compliance schedule for addressing applicable WLAs with the following required elements:

- Interim milestones, expressed as **BMPs** or progress toward implementation of **BMPs** to be achieved during the term of this permit
- Dates for implementation of interim milestones
- Strategies for continued **BMP** implementation beyond the term of this permit
- Target dates the **applicable WLA(s)** will be achieved

See Sections II.D.6 and III.E.

4.1 Permitting Authority Review and Approval of TMDL Plans

California

The [2013 California general permit](#) for discharges from small MS4s requires some of its permittees, for specific TMDLs (including for pathogens, sediment, temperature, and other pollutants), to submit for review and approval a plan to minimize, control, and preferably prevent the discharge of the pollutant of concern.

New York

The [2015 New York small MS4 general permit](#) in Part III.B.2 requires MS4s in watersheds listed in Appendix 2-10 to develop **Watershed Improvement Strategies** for eight different watersheds, which are described in Part IX of the permit. Part IX lists, for each watershed, specific deadlines for submission of the strategy, retrofit plan, and pollutant load reduction.

Wisconsin

The [2014 Wisconsin small MS4 general permit](#) addresses TMDL requirements in Part 1.5. MS4s discharging to impaired waters must submit to the State an updated storm sewer map showing TMDL watershed boundaries, a tabular summary that shows the percent reduction needed to comply with the WLA for each drainage boundary, and a written plan if tabular summary shows applicable percent reductions is not being achieved. Guidance on [MS4 modeling](#) is available on Wisconsin DNR's website.

4.1 Permitting Authority Review and Approval of TMDL Plans

Individual Permits

Arlington County, VA

The [2013 Arlington County, Virginia, MS4 permit](#) has the same requirement as the 2013 Virginia small MS4 general permit to submit a **Chesapeake Bay TMDL Action Plan** within 24 months of the permit effective date for review and approval by the permitting authority (described above). See Part I.D.1.b. This same requirement is also in all of Virginia's Phase I MS4 individual permits including [2014 Chesterfield County MS4 permit](#), [2014 Prince William County MS4 permit](#), [2015 Fairfax County MS4 permit](#), [2015 Henrico County MS4 permit](#), [2016 City of Chesapeake MS4 permit](#), [2016 City of Hampton MS4 permit](#), [2016 City of Newport News MS4 permit](#), [2016 City of Norfolk MS4 permit](#), [2016 City of Portsmouth MS4 permit](#), and the [2016 City of Virginia Beach MS4 permit](#).

Denver, CO

The 2009 Denver, Colorado, MS4 permit identifies specific requirements that apply to discharges to Segment 14 of the Upper South Platte River basin associated with WLAs from the approved *E. coli* TMDL. The permit requires the permittee to submit to the state an *E. coli* **control plan**, which, among other things, must include requirements for the permittee to identify outfalls with dry weather flows and to identify outfalls of concern; to monitor priority outfalls of concern for flow rates and *E. coli* densities; to implement a system maintenance program for listed "priority basins" (which includes storm sewer cleaning and sanitary sewer investigations); to install markers for at least 90% of storm drain inlets in areas with public access; to conduct a public outreach program focused on sources that contribute *E. coli* loads to the MS4; and to develop and implement additional programs and BMPs as necessary to ensure that dry weather discharges from MS4 outfalls of concern by November 30, 2018, do not contribute to an exceedance of the *E. coli* standard (do not exceed an *E. coli* density of 126 cfu per 100 ml for a geometric mean of all samples collected at a specific outfall in a 30-day period). See Part I.B.1.f. Contact [state](#) for permit.

4.1 Permitting Authority Review and Approval of TMDL Plans

Los Angeles Country, CA

The [2012 \(Amended 2016\) Los Angeles County, California, systemwide permit](#) provides permittees with the option of demonstrating compliance with interim water quality-based effluent limitations (WQBELs) by implementing a state-approved **Watershed Management Program (WMP)** or **Enhanced Watershed Management Program (EWMP)**. The permit specifies what each WMP or EWMP must include to be approvable. For example, each EWMP must, among other things:

- Prioritize water quality issues resulting from stormwater/non-stormwater discharges to the receiving water within each Watershed Management Area;
- Identify and implement strategies, control measures, and BMPs to ensure that discharges (1) achieve applicable WQBELs; (2) do not cause or contribute to exceedances of receiving water limitations; and (3) do not include non-stormwater discharges that are prohibited;
- Demonstrate reasonable assurance (through a peer-reviewed quantitative modeling approach) that implementation of the actions/projects proposed in the WMP or EWMP will achieve WQBELs and receiving water limitations by required deadlines;
- Execute an integrated monitoring program to determine progress towards achieving applicable limitations and/or action levels;
- Modify strategies, control measures, and BMPs as necessary based on analysis of monitoring data to ensure applicable WQBELs and receiving water limitations and other milestones are achieved in the required timeframes;
- Include multi-benefit regional projects to ensure that MS4 discharges achieve compliance with all final WQBELs and do not cause or contribute to exceedances of receiving water limitations by retaining through infiltration or capture and reuse the stormwater volume of the 85th percentile, 24-hour storm for the drainage areas tributary to the multi-benefit regional projects; and
- Maximize the effectiveness of funds through analysis of alternatives and section and sequencing of actions needed to address human health and water quality-related challenges and noncompliance.

The permittee is considered in compliance with the interim WQBELs if it:

- Provides timely notice of its intent to develop a WMP or EWMP;
- Meets all deadlines for development of the WMP or EWMP;
- For the area covered by the program, targets implementation of watershed control measures in its existing SWMP to address known contributions of pollutants from MS4 discharges that cause or contribute to exceedances of receiving water limitations;
- Receives final approval of the WMP or EWMP;
- Fully implements its approved WMP or EWMP, including all proposed actions/projects, per the approved time schedules; and
- Periodically adapts its WMP or EWMP, when necessary, if monitoring data indicate that expected water quality outcomes are not being achieved.

See Parts VI.C and E, and Attachments L –R.

4.1 Permitting Authority Review and Approval of TMDL Plans

Montgomery County, MD

The [2010 Montgomery County, Maryland, MS4 permit](#) requires the permittee to submit to the state for review and approval a plan for each EPA-approved TMDL for the portion of a watershed covered by the permit. The plans must include the actions and deadlines to meet the required pollutant load reduction benchmarks and WLAs within the specified timeframe. See Part III.J.2.

Prince George's Country, MD

The [2014 Prince George's County, Maryland, MS4](#) permit requires the permittee to submit for review and approval by the state a **Restoration Plan** for each WLA approved by EPA prior to the permit's effective date. The permit requires that each Restoration Plan: (1) include the final date for meeting applicable WLAs and a detailed schedule for implementing all structural and nonstructural measures necessary for meeting applicable WLAs; (2) provide detailed cost estimates for individual projects, programs, controls, and plan implementation; (3) evaluate and track implementation of restoration plans toward meeting established benchmarks, deadlines, and stormwater WLAs; and (4) develop an ongoing iterative process for focusing in on areas where the WLAs are not being met according to benchmarks and deadlines established as part of the County's watershed assessments. Note that in another section of the permit, the County is required to specify pollutant load reduction benchmarks for each watershed that demonstrate progress toward meeting all applicable stormwater WLAs. See Sections III.E.1.b.v and E.2.

Washington, DC

The [2011 DC MS4 permit](#) requires the permittee to submit for review and approval no later than 30 months after the effective date of the permit modification a **Consolidated TMDL Implementation Plan** to address all TMDL WLAs applicable to District waters, with a focus on 15 specific TMDLs affecting the MS4's discharge, but also to evaluate other pollutants of concern for which relevant WLAs exist. Further, the permittee is required to submit an annual updated Consolidated TMDL Implementation Plan to account for any new or revised TMDL WLAs. See Section 4.10.

Portland, OR

The [2011 City of Portland and Port of Portland MS4 permit](#) in Schedule D.3 requires the permittee to develop a **WLA Attainment Assessment** for submittal to the State. The assessment must include information on the type and extent of BMPs necessary to achieve pollutant load reductions associated with the TMDL, and the financial costs and other resources needed. The permittee is also required to submit to the State a **TMDL Pollutant Load Reduction Evaluation** which evaluates progress toward achieving TMDL pollutant load reductions. The permit specifies the required elements of the Evaluation report, including the methodology used to evaluate progress, comparison of loadings with and without BMP implementation, estimated effectiveness of BMPs, and a water quality trend analysis. Finally, if the permittee is not achieving the WLA, a TMDL Pollutant Load Reduction Benchmark must be developed with the permit renewal application.

4.2 Monitoring & Modeling Requirements

A number of permits require their MS4s, which are identified and assigned allocations in TMDLs, to monitor² for the associated pollutant(s) of concern or, in others, to model the effects of stormwater controls on the discharge of pollutant(s) of concern. Some of these requirements are specific to the pollutant parameter, while others require the permittee to establish a monitoring program of its own to determine progress towards meeting applicable WLAs.

General Permits

California

The [2013 California general permit](#) for discharges from small MS4s includes tailored requirements for monitoring in certain watersheds. The permit specifies which permittees are affected by the tailored requirements, and the receiving streams where the monitoring must be performed. In some watersheds, the monitoring is intended to establish baseline pollutant loading information, while in a number of others, the monitoring program (which is submitted to the state as part of a Wasteload Allocation Attainment Program) is intended show whether the MS4's program is meeting interim targets or WLA-based limits. In a number of watersheds, in addition to the effluent monitoring requirements, permittees are required to submit a quantifiable numeric analysis demonstrating that the BMPs selected for implementation will likely achieve the applicable WLA according to the schedule for implementing the TMDL, based on modeling, published BMP pollutant removal performance estimates, best professional judgment, and/or other available tools. See, for example, the permit requirements for the San Lorenzo River TMDL for sediment in Appendix G. See Attachment G— Region Specific Requirements, Regional Water Board Approved TMDLs—where urban runoff is listed as a source.

² Note that while many Phase I MS4 permits include monitoring requirements, these have generally not been, until relatively recently, included for the purposes of implementing TMDLs.

4.2 Monitoring & Modeling Requirements

Georgia

The [2012 Georgia general permit](#) for discharges from small MS4s requires permittees with a population of > 10,000 that discharge to an impaired water either with or without an approved TMDL to implement a monitoring plan for all pollutants of concern. The monitoring plan, which must be submitted to the permitting authority for review and approval, is required to specify the sampling locations, sample type and frequency, implementation schedule, and the BMPs that will be implemented to control and reduce the pollutants of concern. Annual reports are required to include an assessment of the data trends for each pollutant of concern. The assessment must initially include a characterization of baseline conditions to determine the effectiveness of the BMPs employed and what, if any, additional adaptive BMP measures may be necessary to return the waters to comply with state water quality standards. See Section 4.4.2.

Washington

The [2013 Western Washington small MS4 general permit](#) requires a number of its permittees to conduct discharge or surface water monitoring for fecal coliform and to electronically submit the results to the state. See Appendix 2.

Connecticut

The [2016 \(Effective 2017\) Connecticut small MS4 general permit](#) requires additional monitoring for MS4s discharging to impaired waters. Outfall screening for nitrogen, phosphorus, and bacteria is required with the permit setting specific thresholds for when a follow-up investigation is required. Screening for other pollutants requires a turbidity sample as an indicator. See Section 6(i).

Tennessee

The [2016 Tennessee Small MS4 permit](#) requires analytical monitoring in impaired waters (called “unavailable parameters” in the permit). For stream segments impaired for siltation, habitat alteration, and/or nutrients, biological stream sampling and habitat assessment must be performed utilizing the Semi-Quantitative Single Habitat (SQSH) Method as identified in the division’s most current version of the [Quality System Standard Operating Procedure for Macroinvertebrate Stream Survey](#). At least one sample per stream segment must be collected, with all segments within the MS4 jurisdiction sampled in a five-year period. For stream segments impaired for pathogens, bacteriological stream sampling must be performed utilizing methods identified in the division’s most current version of the [Quality System Standard Operating Procedure for Chemical and Bacteriological Sampling of Surface Water](#). Monitoring must include the collection of five samples within a thirty-day period (to establish a geometric mean), and be performed during the summer (March through November). At least one series of five samples per stream segment must be collected, with all segments within the MS4 jurisdiction sampled in a five-year period. See Part 5.1.

4.2 Monitoring & Modeling Requirements

Individual Permits

Atlanta, GA

[Georgia's Phase I MS4 permits](#) require MS4s to propose a monitoring and implementation plan for each pollutant of concern. The plan must include a map showing the monitoring locations and must specify the sample type and frequency. Each annual report shall include an assessment of the data trends for each pollutant of concern. The assessment shall initially include a characterization of baseline conditions to determine the effectiveness of the BMPs employed and what, if any, additional adaptive BMP measures may be necessary to return the waterbody to compliance with state water quality standards. See, for example, Part 3.3.7 of the Bibb County, GA MS4 permit and Part III.E of the Atlanta, Georgia, permit.

Permits available upon request: Frances.Carpenter@dnr.state.ga.us

Nashville, TN

The [2012 Nashville, Tennessee, MS4 permit](#) includes specific monitoring instructions for waters impaired for siltation and/or habitat alteration, and pathogens. For example, for siltation and habitat alteration impairments, biological stream sampling must be performed utilizing the Semi-Quantitative Single Habitat Method (October 2006). For pathogen impairments, samples must be performed using methods identified in the permitting authority's *Quality System Standard Operating Procedure for Chemical and Bacteriological Sampling of Surface Waters* (December 2009), and they must include the collection of 5 samples and corresponding flow measurements, within a 30-day period and must be performed between June through September (Summer). The permit also requires Visual Stream Surveys and Impairment Inventories on streams impaired for siltation, habitat alteration, and pathogens immediately upstream and downstream of each MS4 outfall to identify and prioritize MS4 stream impairment sources. See 4.1 and 4.2. For a copy of the permit, go to the [Division of Water Resources Permits Data Viewer](#) website and search for permit TNS068047.

4.2 Monitoring & Modeling Requirements

Florida Phase I Permits

Florida's Phase I MS4 permits require the MS4 for waterbodies with an approved TMDL, but without a Basin Management Action Plan (BMAP), to submit to the state for review and approval a TMDL monitoring and assessment plan within one year. The permits specify the minimum elements of the plan, which include:

- Develop a table showing the annual loadings currently discharged from outfalls into waterbodies with an adopted TMDL;
- Rank the outfalls, based on total annual loading of the pollutant(s) of concern, discharging into each waterbody with an adopted TMDL; and
- Based on a review of sediment and biological monitoring results from the past, validate the results of the loading assessment that identifies the highest priority outfalls.

Once the monitoring and assessment plan is approved, the permits require storm event monitoring for a minimum of seven storm events at the top-ranked outfall identified in the plan to validate the estimates of annual pollutant loadings. A final report summarizing the results must be submitted for review and approval by the state. See, for example, Parts VIII.B.3.b and c of the 2013 Pinellas and 2011 Miami-Dade Phase I MS4 permits. Contact [state](#) for permit.

Prince George's County, MD

The [2014 Prince George's County, Maryland, MS4 permit](#) requires the permittee to conduct monitoring to track progress toward meeting TMDLs, specifically chemical, physical, and biological monitoring in the Bear Branch watershed and an assessment of the effectiveness of stormwater controls for stream channel protection in the Black Branch watershed. The permit includes specific protocols to be followed based on the type of monitoring. For each annual report, the permittee must submit information on the results of the monitoring as well as pollutant load reductions related to applicable WLAs. See Part IV.F and V.A. See also similar requirements in Part IV.F of the [2013 Baltimore County, MD MS4 permit](#).

Tucson, AZ

The 2011 Tucson, Arizona, MS4 permit requires the MS4 to conduct monitoring at least two times during the first year of the permit to evaluate the effectiveness of control measures by comparing the phosphorus loads in stormwater with the applicable WLAs in the TMDL. The target value for ortho-phosphorus based on the WLA in the TMDL is 0.139 lbs/day minus the load contributed by the added ground water. See Part 6.2. Contact [state](#) for permit.

4.3 TMDL-Related Annual Reporting Requirements

Several permits require MS4s that are subject to TMDLs to report on progress made towards implementing required management measures related to the TMDL. These approaches provide the permitting authority with data and other information that can be used to determine what kind of progress is being made towards achievement of the TMDL. The following are examples of this type of requirement.

General Permits

Arkansas

The [2014 Arkansas general permit](#) for discharges from small MS4s requires permittees to report on progress in meeting the permit's milestones and reducing the pollutant of concern. See Section 3.4.5.

California

The [2013 California general permit](#) for discharges from small MS4s requires permittees to report annually on the status of implementation of specific TMDL components. The report must include: (1) A description of BMPs implemented, including types, number, and locations; (2) An assessment of the effectiveness of implemented BMPs in progressing towards attainment of WLAs within the TMDLs' specified timeframes; (3) All monitoring data, including a statistical analysis of the data to assess progress towards attainment of WLAs within the TMDLs' specified timeframes; and (4) Based on results of the effectiveness assessment and monitoring, a description of the additional BMPs that will be implemented to attain WLAs within the TMDLs specified timeframes. See Section E.15.d.

Georgia

The [2012 Georgia general permit](#) for discharges from small MS4s requires MS4 permittees with populations over 10,000 that discharge to impaired waters with or without a TMDL to include an assessment of the data trends for each pollutant of concern in their annual reports. The initial annual report must also include a characterization of baseline conditions to determine the effectiveness of the BMPs employed and what, if any, additional adaptive BMP measures may be necessary to return the waters to compliance with state water quality standards. See Section 4.4.2.

4.3 TMDL-Related Annual Reporting Requirements

Minnesota

The [2013 Minnesota general permit](#) for discharges from small MS4s requires the following to be included in the annual report: (1) a list of all BMPs being applied to achieve the applicable WLA (including a unique identifier and geographic coordinate); (2) stage of implementation for each BMP; (3) updated estimate of the cumulative reductions in loading achieved for each pollutant of concern; and (4) updated narrative describing any adaptive management strategies used for making progress to achieve applicable WLA. See Part III.E and IV.B. The state also provides specific [TMDL reporting forms](#) and training for using the forms.

Individual Permits

Prince George's Country, MD

The 2014 [Prince George's County, Maryland, MS4 permit](#) requires the permittee to submit an annual TMDL assessment report that includes complete descriptions of the analytical methodology used to evaluate the effectiveness of the County's restoration plans toward achieving implementation of EPA-approved TMDLs. The County is also required to provide: (1) estimated net changes in pollutant load reductions from all completed water quality improvement projects, enhanced stormwater management programs, and alternative stormwater control initiatives; (2) a comparison of the net change in pollutant load reductions with the established benchmarks, deadlines, and applicable stormwater WLAs; (3) itemized costs for completed projects, programs, and initiatives to meet established pollutant reduction benchmarks and deadlines; (4) cost estimates for completing all projects, programs, and alternatives necessary for meeting applicable stormwater WLAs; and (5) a description of additional watershed restoration actions that can be enforced when benchmarks, deadlines, and applicable stormwater WLAs are not being met or when projected funding is inadequate. See Section III.E.4.

5 Discharges to Impaired Waters Prior to TMDL Approval



Photo credit: Tetra Tech

Several permits identified specific actions that must be taken to address impaired waters prior to completion of an approved TMDL. The following examples exhibited this approach.

5 Discharges to Impaired Waters Prior to TMDL Approval

General Permits

Arkansas

The [2014 Arkansas general permit](#) for discharges from small MS4s specifies required actions that must be taken by permittees that discharge to impaired waters for nutrients, bacteria, or other pollutants of concern prior to the completion of the TMDL. For instance, for bacteria impairments, the permittee is required to take the following actions:

- Within 1 year, identify potential significant sources of bacteria entering the MS4;
- Within 2 years, develop and implement a public education program to reduce the discharge of bacteria in municipal stormwater contributed by: (1) pets, recreation and exhibition livestock, and zoos; and (2) on-site wastewater treatment systems;
- Within 2 years, review results from the Illicit Discharge Detection and Elimination (IDDE) program and modify as necessary to prioritize the detection and elimination of discharges contributing bacteria to the MS4; and
- Include in annual reports updates to measurable goals for bacteria reduction program elements.

See Sections 3.4.5 and 3.4.5.2.

California

The [2013 California general permit](#) for discharges from small MS4s requires permittees to implement additional procedures for discharges to impaired waters:

- For the construction site inventory, provide the location of the project with respect to all waterbodies listed as impaired for sediment and turbidity (Section E.10.a); and
- For the post-construction BMP condition assessment, the permittee is required to give higher priority for maintenance to BMPs designed to remove pollutants for which the receiving water is impaired (Section E.12.ii.b).

In addition, permittees that discharge to waters listed as impaired where urban runoff is listed as a source must consult with the permitting authority within one year of permit coverage to assess whether monitoring is necessary and, if so, the appropriate monitoring plan. Section E.13.c.

5 Discharges to Impaired Waters Prior to TMDL Approval

Georgia

The [2012 Georgia general permit](#) for discharges from small MS4s requires existing permittees discharging to impaired waters to develop and submit for review and approval to the permitting authority an Impaired Waters Plan (for MS4s with a population of < 10,000) or a Monitoring and Implementation Plan (for MS4s with a population of > 10,000).

- The Impaired Waters Plan, which must be submitted by a specific date, must include a list of the impaired waters and the pollutant(s) of concern, a map showing the locations of the impaired waters and all MS4 outfalls discharging to those waters, BMPs that will be implemented to address each pollutant of concern, and a schedule for implementing the BMPs.
- The Monitoring and Implementation Plan, which also must be submitted by a specified date, must identify where wet weather monitoring will occur, sample type, frequency, schedule to begin monitoring, and a description of the BMPs that will be implemented to address each pollutant of concern.

The permittee is also required to annually check whether an impaired water within its permitted area has been added to the latest 305(b)/303(d) list. Newly listed waters must be addressed in the plan and the SWMP must be revised accordingly. See Section 4.4.2.

5 Discharges to Impaired Waters Prior to TMDL Approval

Massachusetts

The [2016 \(Effective 2017\) Massachusetts small MS4 general permit](#) identifies in Part 2.2.2 the requirements for discharges to impaired waters without an approved TMDL. The pollutants specifically identified include nutrients (Total Nitrogen or Total Phosphorus), solids (TSS or Turbidity), bacteria/pathogens (E. Coli, Enterococcus or Fecal Coliform), chloride, metals (Cadmium, Copper, Iron, Lead or Zinc) and oil and grease. The permit lists municipalities that discharge to waterbodies impaired due to nitrogen and phosphorus. The permit also lists requirements for waterbodies where bacteria or pathogens, chloride, oil and grease, solids or metals are the cause of impairment. These permittees must meet the requirements in Appendix H.

Appendix H identifies additional, specific BMPs designed to reduce the pollutant discharges in the impaired catchments. Specific BMPs are identified where nitrogen, phosphorus, pathogens, chloride, or solids/oil and grease/metals are the cause of impairment. For example, for phosphorus, Appendix H requires supplemental public education on disposal of grass clippings and proper use of fertilizers.

New Hampshire

The [2017 New Hampshire small MS4 general permit](#) identifies in Part 2.2.2 the MS4s that discharge to impaired waters without an approved TMDL and requires them to meet the applicable requirements of [Appendix H](#). The pollutants for which these requirements apply include nutrients (Total Nitrogen and Total Phosphorus), bacteria/pathogens (E. Coli, Enterococcus or Fecal Coliform), chloride, solids (TSS or Turbidity), metals (Cadmium, Copper, Iron, Lead or Zinc) and oil and grease. [Appendix H](#) identifies additional or enhanced BMPs designed to reduce the specific impairment pollutant. For example, for nitrogen, Appendix H requires, among other requirements, MS4 operators to establish requirements for use of slow release fertilizers on property owned by the operator in addition to reducing and managing fertilizer as already required in the permit. Supplemental public education on disposal of grass clippings and proper use of fertilizers is also required.

Individual Permits

Baton Rouge, LA

The 2009 Baton Rouge, Louisiana, permit requires the MS4 to develop an Interim Pollutant Reduction Plan for discharges of a pollutant on a 303(d) list prior to completion of a TMDL. Specific activities and dates are specified when the pollutant is a nutrient constituent, bacteria, or another pollutant (for example, identify potential sources of nutrient pollutant within 1 year, develop a public education program for residential/commercial uses of fertilizers within 2 years, develop a program to reduce discharge of nutrients from municipal facilities within 2 years, etc.). See Part II.B.1. Contact [state](#) for permit.