

Kentucky Division of Water

Phase II Stormwater Quality Management Plan

Preparation Guidance



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1.0 INTRODUCTION

1.0 INTRODUCTION

1.1 Background

The 1972 amendments to the Federal Water Pollution Control Act (also referred to as the Clean Water Act) prohibit the discharge of any pollutant to waters of the United States from a point source unless the discharge is authorized by a National Pollutant Discharge Elimination System (NPDES) permit. Efforts to improve water quality under the NPDES program traditionally have focused on reducing pollutants in discharges of industrial process wastewater and from municipal sewage treatment plants. Efforts to address stormwater discharges under the NPDES program have generally been limited to certain industrial categories with effluent limitations for stormwater. Congress amended the Clean Water Act (CWA) in 1987 to require the EPA to establish phased NPDES requirements for stormwater discharges. To implement these requirements, on November 16, 1990, EPA published (55 Federal Register 47990) the initial permit application requirements for (a) 11 categories of stormwater discharges associated with industrial activity, and (b) discharges from municipal separate storm sewer systems (MS4s or public drainage systems) serving a population of 100,000 or more. The November 16, 1990 regulation established requirements of a two-part permit application designed to facilitate development of site-specific permit conditions for MS4s serving a population of 100,000 or more (e.g., the city of Lexington and the city of Louisville/MSD). The CWA requires that NPDES permits for stormwater discharges from MS4s include a requirement to effectively prohibit non-stormwater discharges into the MS4 and to include controls to reduce the discharge of pollutants to the maximum extent practicable by implementation of management practices, control techniques, engineering methods, and other provisions appropriate for the control of such pollutants.

Additional regulatory developments in stormwater quality include Phase II regulations, which address MS4s serving less than 100,000 in population, and construction sites that disturb one or more acres but less than five acres. EPA has separate requirements and guidance for the stormwater management programs of Phase II entities. Pursuant to a timetable published by EPA, Phase II entities were required to seek permit coverage by March 2003. Accordingly, small construction sites that disturb one or more acres but less than five acres are not addressed in this manual at this time. Further information on the upcoming regulations can be found at the EPA Phase II and Construction Permit webpages at the following addresses:

<https://www.epa.gov/npdes/stormwater-discharges-municipal-sources#overview>

<https://www.epa.gov/npdes/stormwater-discharges-construction-activities-2017-cgp#overview>

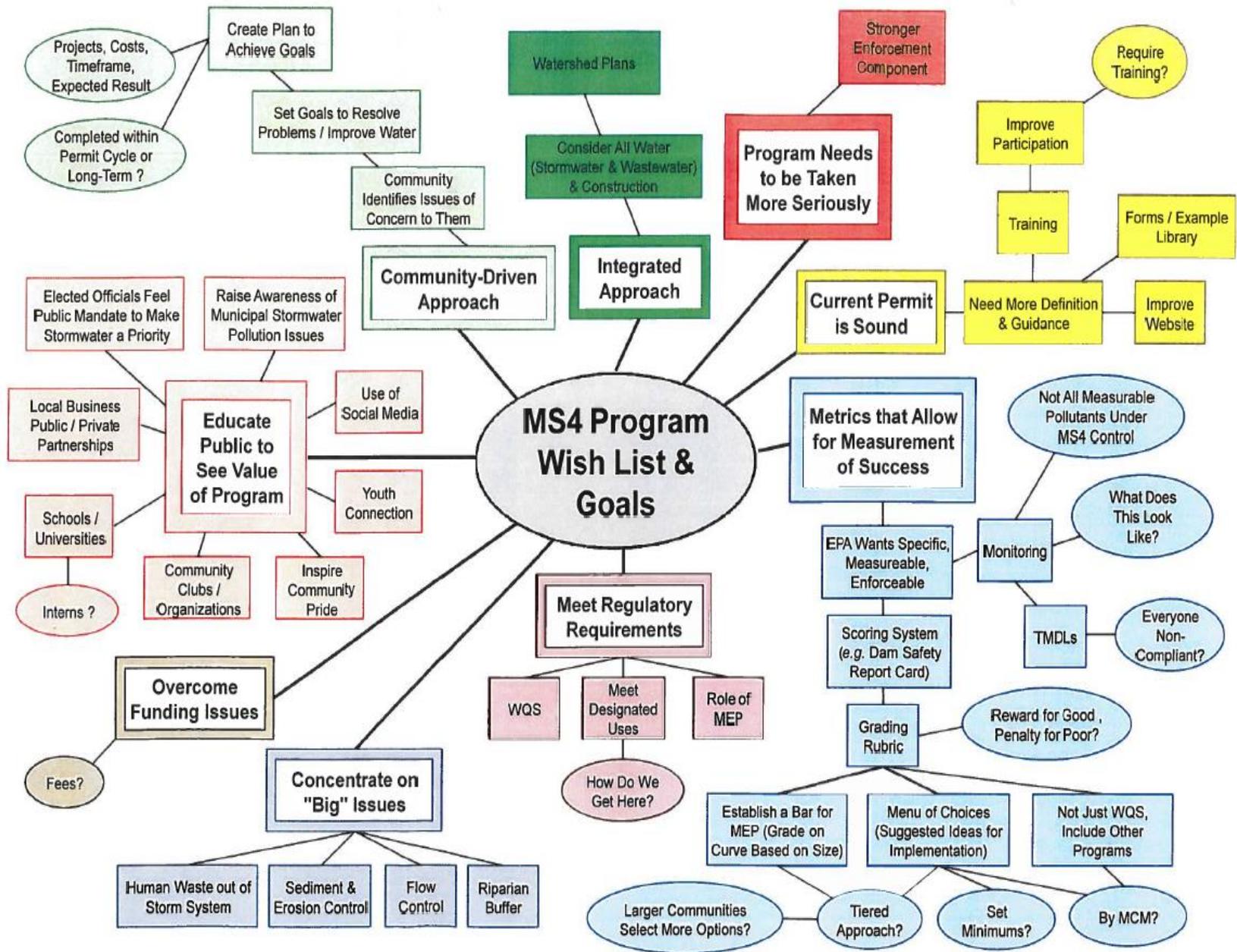
1.2 Purpose of this Guidance

This guidance manual has been prepared to provide guidance and criteria related to nonstructural and structural controls to reduce pollutants in stormwater runoff to the MS4. This is not a regulatory document and the suggestions herein are not legally binding.

The technical guidance and best management practices (BMP) described in this manual will provide information to the permittee. It should be noted that the manual is not intended to be exhaustive, but to provide an overview of the generally available options for stormwater quality management. Other options which may be applicable, depending on the site, are given in the sources cited. As a general guide, the manual discusses the considerations for selecting non-structural and structural controls, design and maintenance criteria, and plan requirements.

1.3 Mind Map of MS4 Program Wish List & Goals

A mind map is a diagram used to visually organize information. A mind map is often created around a single concept, drawn as an image in the center of a blank page, to which associated representations of ideas such as images, words and parts of words are added. Major ideas are connected directly to the central concept, and other ideas branch out from those. Mind maps can be drawn by hand, either as "rough notes" during a lecture, meeting or planning session, for example, or as higher quality pictures when more time is available. The following page is a Mind Map that the MS4 Permit Stakeholder Group developed during one of the meetings.



2.0 WATER QUALITY IMPACTS OF STORMWATER RUNOFF

2.0 WATER QUALITY IMPACTS OF STORMWATER RUNOFF

2.1 Urbanization and Surface Water Quality

Urbanization tends to increase runoff from previously undeveloped areas. Surface area for infiltration is reduced by removing vegetation and increasing the extent of impervious areas. Reduced vegetation also reduces evapotranspiration. Natural surface depressions which previously provided stormwater storage are cleared and graded smooth. As a result, runoff volumes, flow rates and flow velocities may increase significantly.

Urban development generates short-term land disturbance and long-term land use intensification. These factors can contribute to reduced water quality. Stormwater pollutants can be generated during construction and after construction from the operation and activities of urban land use. Urban land uses include residential, commercial, industrial, transportation, public and other uses. Urban land use activities may generate wastes and residuals that, if handled improperly, can pollute stormwater runoff. Increased runoff volumes and velocities from impervious areas also can increase offsite pollutant transport, further impacting receiving waters. This guidance manual focuses on the stormwater quality impacts of urban land use activities after site stabilization, and the development of appropriate control measures.

2.2 Types of Stormwater Pollutants

Pollutants generated by urban land uses can be classified as floatables, sediment, nutrients, oxygen demand, oil and grease, heavy metals, toxic chemicals and bacteria. The causes and effects of these pollutants are summarized below.

Floatables: Floatable debris includes plastic and paper products, yard refuse, metal and glass containers, tires, etc. These pollutants are relatively large, decompose slowly and degrade the visual aesthetics of the receiving waters and shorelines. They present a physical danger to vegetation and wildlife, through habitat congestion, entangling or ingestion. These pollutants originate from litter and improperly disposed refuse.

Sediment: Suspended sediment in high concentrations can cause multiple impacts. Impacts in receiving streams may include increased turbidity, reduced light penetration, reduced prey capture for sight feeding predators, clogging of gills/filters of fish and aquatic invertebrates, and reduced angling success. Impacts in slower receiving waters such as lakes and estuaries include siltation, with subsequent smothering of benthic communities, changes in bottom substrate composition, and decreased depth (creating a need for dredging). Sediment with high clay or organic content efficiently carries trace metals and toxicants, posing a risk to benthic life upon resuspension. Sedimentation impacts are affected by a number of interrelated site factors, including soil types, topography, surface cover and climate.

Nutrients: Increased phosphorus and nitrogen levels can accelerate eutrophication in downstream fresh and tidal waters. Eutrophication can lead to surface algal scums, water discoloration, odors, depressed oxygen levels, and release of toxins. Nutrients tend to build-up on impervious surfaces. Runoff from these areas can lead to high nutrient loads. Intensively landscaped areas and wash water from outdoor cleaning activities are also potential sources of nutrients.

Oxygen Demand: Dissolved oxygen (DO) is an indicator of water quality impact. To support aquatic life, sufficient DO must be available. Decomposition of organic matter by microorganisms depletes DO levels, especially in slower moving streams, lakes and estuaries. Rising temperature from changing weather can also deplete DO by decreasing the solubility of oxygen in water.

The degree of potential DO depletion from organic matter and microorganisms is measured by either the biochemical oxygen demand (BOD) test or the chemical oxygen demand (COD) test. Urban runoff can depress DO levels after large storms. BOD solids can accumulate in bottom sediment during storms causing anoxic (zero oxygen) conditions in shallow, slow-moving or poorly flushed receiving waters.

Generally, the greatest export of BOD is from leaking sanitary sewer systems (i.e., sewage overflow) and is therefore more often found in highly populated areas with older infrastructure. Even newer, low density suburban residential development can export moderate levels of BOD.

Oil and Grease: Oil and grease contain a wide variety of hydrocarbons, some of which are toxic to aquatic life at low concentrations. Surface sheen is usually an indication of the presence of hydrocarbons. However, some hydrocarbons,

especially weathered crankcase oil, appear in solution or emulsion and have no sheen. Hydrocarbons have a strong affinity for sediment, and much of the hydrocarbon load adsorbs onto particles and settles out. If not captured, hydrocarbons tend to accumulate in bottom sediments of lakes and estuaries.

The major source of hydrocarbons is leakage from crankcase oil and other lubricating agents from the automobile. Hydrocarbon levels generally are highest in runoff from parking lots, roads and service stations. Residential land uses typically generate less hydrocarbon export, with the exception of illegal dumping of used oil in storm sewers.

Heavy Metals: Trace heavy metals are a concern because of their toxicity to aquatic life and the possibility of water supply contamination. The heavy metals with the highest concentrations in urban runoff are copper, lead, zinc, and cadmium. Other heavy metals may be found when inappropriate connections between sanitary and storm sewers are present. Most heavy metals adsorb to particulates, which settle out and reduce the metals immediately available for biological uptake.

Substantial sources of lead in the past have been leaded gasoline and lead-based paints. As alternative fuels and paints have been developed, lead has become less common.

Toxic Chemicals: Other toxic chemicals present in urban runoff include pesticides, herbicides and synthetic organic compounds. Concentrations of these substances in runoff from residential and commercial areas rarely exceed current safety criteria. However, relatively little sampling of runoff has been reported from industrial areas, which might be a greater source of toxicants. Sources of pesticides, herbicides and other toxic compounds include illegally disposed or applied household hazardous wastes, such as waste oil, paint thinners, pesticides, herbicides and preservatives. (USEPA 1992a, MWCOG 1987)

Bacteria: Bacteria levels in undiluted urban runoff usually exceed public health standards for water contact recreation. Bacteria multiply faster during warm weather, and substantial differences in bacteria populations are to be expected between summer and winter. The bacteria test, however, is a count of coliform bacteria, which are an indirect and often imprecise indicator of pathogens and viruses which may be present. Thus, the health implications may be unclear. Nonetheless, while most urban land uses export enough bacteria to exceed health standards, older and more intensively developed urban areas generally produce the greatest export. The problem is especially significant in areas that experience sanitary sewer overflows that export bacteria derived from human wastes. Areas with improperly maintained or failed septic tank systems are also potentially significant.

Sources: USEPA 1992a, MWCOG 1987, Wanielista, GBNEP 1991, Harris County, Harris County Flood Control District, City of Houston, USEPA 1980 and Winslow & Associates (1986)

3.0 STORMWATER QUALITY MANAGEMENT PLANS

3.0 STORMWATER QUALITY MANAGEMENT PLAN (SWQMP)

The overall goal of the SWQMP is to reduce the discharge of pollutants into the municipal separate storm sewer system to the Maximum Extent Practicable (MEP). This manual is intended to provide guidance on the preparation of SWQMPs.

All regulated MS4s must include best management practices (BMPs) in the SWQMP to address minimum requirements and performance standards. This section describes the general planning and implementation of the BMPs utilized by the MS4.

3.1 SWQMP Requirements

The SWQMP should describe the activities you will conduct in the implementation of your community's stormwater quality management program. The SWQMP may use the following outline:

3.2 SWQMP Outline

- Title Page
- Community Background
- Local Water Resources
- Minimum Control Measures (MCMs) Structure
- MCM 1: Public Education and Outreach
- MCM 2: Public Involvement/Participation
- MCM 3: Illicit Discharge Detection and Elimination
- MCM 4: Construction Site Runoff Control
- MCM 5: Post-Construction Stormwater Management in New Development and Redevelopment
- MCM 6: Pollution Prevention/Good Housekeeping for Municipal Operations
- References

Notes:

SWQMP Format: Plans may be submitted in an electronic format with the certification statement.

Map Format: If mapping is completed using GIS or CAD software, it is requested that MS4s provide at a minimum the MS4 boundary and the mapped storm sewer infrastructure - please consult with the Division to make sure you are using compatible formats.

GPS Standards: Point source data may be geo-referenced, using latitude, and longitude (aka lat/long), collected by GPS receivers. If geo-referenced, the Division recommends the GPS receiver use the following navigation settings:

- Position Format: decimal degrees
- Datum: NAD 83 (most GPS receivers are set to WGS 84, by default)
- Units (of measurement): Statute

GPS coordinates are to be recorded in decimal degrees (accuracy to 5 decimal places). Under no circumstances are the GPS coordinates to be rounded.

3.2.1 Title Page

It is recommended that the Title Page contain the name of the MS4, the words "Stormwater Quality Management Plan" and the year of submission (example: 2008 *Smithtown Stormwater Quality Management Plan*). Identify any co-permittees in a subtitle (example: Co-permittee: Jones County).

The Title Page may also list the name of the MS4 submitting the Plan and its contact information, to include a specific contact name, their title, agency mailing address, telephone number, website and email. The Division of Water "Agency Interest Number" (also known as AI#) is also recommended to be included beneath the contact information. For assistance with obtaining the AI#, contact the Division of Water's Stormwater Coordinator.

3.2.2. Community Background

The MS4s may provide the community background information as a point of reference for the reader.

Identify the MS4 and any copermittees and include the following:

- 1) Provide a description of the location of the county or community
- 2) Describe nearby large communities and distance between them (e.g. 15 mi W of Lexington)
- 3) Identify the County seat
- 4) Describe major transportation corridors or significant landmarks
- 5) Predominate land uses
- 6) Describe any pertinent history or trends including population changes, land use changes, etc.

3.2.3. Local Water Resources

- 1) It is recommended that the SWQMP provide a narrative description of local water resources that includes a narrative description of the water quality conditions of waterways in your MS4; include surrounding waterways that receive runoff from your MS4 area. This site contains valuable information that may assist you: <http://watermaps.ky.gov/>
 - a. Approved Total Maximum Daily Loads (TMDLs) and the specific pollutant(s) and Wasteload Allocation(s) (WLA) for the MS4.
Resource: The Kentucky Division of Water's TMDL webpage
<http://water.ky.gov/waterquality/Pages/TMDLProgram.aspx>
 - b. Impaired waterbodies and the specific pollutant(s) with a TMDL actively under development and the specific pollutant.
Resource: The Division's current Integrated Report – Volume II (also known as 303(d) List of Waters). Check the DOW webpage for the current document:
<http://water.ky.gov/waterquality/Pages/303dList.aspx>
 - c. Impaired waterbodies (e.g. waterbodies that do not meet water quality standards and therefore, do not support their designated uses) and the specific pollutant(s) identified as causing the impairment.
Resource: The Division's current Integrated Report – Volume I (also known as 305(b) Report). Check the DOW webpage for the current document:
<http://water.ky.gov/waterquality/Pages/IntegratedReport.aspx>
 - d. Un-impaired waterbodies (e.g. waterbodies that have been assessed as meeting their water quality standards, and therefore, supporting their designated uses.)
Resource: The Division's current Integrated Report – Volume I (also known as 305(b) Report). Check the DOW webpage for the current document:
<http://water.ky.gov/waterquality/Pages/IntegratedReport.aspx>
 - e. Special Use Waters. Special use waters are rivers, streams and lakes that are worthy of additional protection and are listed in Kentucky Administrative Regulations or the *Federal Register* as cold water aquatic habitat, exceptional waters, reference reach waters, outstanding state resource waters, outstanding national resource waters, state wild rivers and federal wild and scenic rivers. Not included as special use waters are water bodies designated by default as warm water aquatic habitat, primary contact recreation and secondary contact recreation
Resource: The Division's Special Use Waters webpage:
<http://water.ky.gov/waterquality/Pages/SpecialUseWaters.aspx>
- 2) MS4s may include a narrative on water quantity issues such as drought, flooding and water withdrawal sites.

- 3) May include additional information on unique features such as karst features, reservoirs, wetlands and altered stream channels.
- 4) May describe the location of drinking water intakes, KPDES permitted facilities, etc.
- 5) May include the status of recent, ongoing or planned restoration activities that are helping to protect or improve water quality.
- 6) The SWQMP should include a map(s) (both hardcopy and electronic format) that depicts geo-locational and hydrologic information. Your MS4 map should contain the following elements, if feasible.
 - a. Title
 - b. Scale Bar
 - c. Legend
 - d. North Arrow
 - e. MS4 Boundary
 - f. Transportation Corridors (major roads, railroads, etc.)
 - g. Political boundaries (county, city, service area, etc.)
 - h. Streams, rivers, reservoir, sinkholes, etc.
 - i. Watershed and sub watershed boundaries.
 - j. Color code and/or label streams/lakes to distinguish TMDL status, level of impairment, special use designation, etc.
 - k. Relevant points (KPDES discharges, drinking water intakes, water withdrawal locations, monitoring sites, etc.)
 - l. Include citations that identify the data source and date.

Note: Some MS4s may find it necessary to prepare multiple hardcopy maps to incorporate all elements listed above.

The following resources may provide useful information for drafting the Local Water Resource section of your plan.

- 1) Geospatial data and imagery is available via the Watershed Viewer and KYGeonet. However, please be advised that these visual tools may not contain the most up-to-date information contained in Kentucky's 2012 Integrated Report. Check the Metadata of any GIS information you use to ensure that you are using the most current information. For information on accessing water quality related data, visit: <http://watermaps.ky.gov/waterhealthportal/>

The Watershed Viewer can be accessed at <http://water.ky.gov/watershed/Pages/default.aspx>

The Kentucky Geography Network (www.kygeonet.ky.gov/) houses GIS coverages for the state that can be downloaded for free. You can search for individual coverages at kygeonet.ky.gov/metadataexplorer/.

3.2.4. Minimum Control Measure Structure/Format

It is recommended that each MCM be clearly identified in its own section/chapter and should contain the following format and structure.

- 1) Summary: May include past accomplishments, challenges, and issues from prior permit cycle.
- 2) Narrative: May explain what needs to be accomplished during this permit cycle to satisfy the requirements of this MCM, including each requirement as well as other measures. Describe how the measurable goals will be evaluated for success (i.e., what approach will be used) and the mechanism for revising the program based on the results of the evaluation.
- 3) BMPs: Describe the BMPs that will be implemented to address each specific MCM, including descriptive information on methods or actions, intended outcomes of implementation, and timeframes. Non-structural and structural BMPs can be used to satisfy the requirements of the MCMs. Examples of non-structural BMPs include development of ordinances, planning and outreach activities.

EPA's National Menu of Stormwater Best Management Practices, found at <https://www.epa.gov/npdes/national-menu-best-management-practices-bmps-stormwater#edu> is an excellent resource for BMP information.

- 4) **Measurable Goals:** Measurable goals, which are required for each minimum control measure, are intended to gauge permit compliance and program effectiveness. Measurable goals should be clear and measurable and should be chosen using an integrated approach that fully addresses the requirements and intent of the minimum control measure.

EPA has developed a *Measurable Goals Guidance for Phase II MS4s* that is designed to help program managers comply with the requirement to develop measurable goals and can be found at <https://www.epa.gov/npdes/developing-ms4-resources>.

It is recommended that the measurable goals be presented in the provided table format that includes (attached at the end of guidance):

- ✓ BMP or Activity Description
- ✓ Quantifiable/Measurable Goal
- ✓ Targets/Measure of Success
- ✓ Coordinating Parties
- ✓ Yearly Tracking Milestones

3.2.5. MCM 1: Public Education and Outreach

The objective of this measure is to inform citizens about their roles and responsibilities in maintaining stormwater systems to improve and protect water quality. As citizens gain a greater understanding of why the program is necessary and how they fit in, their level of support and willingness to participate and comply with the program should increase. This EPA fact sheet provides additional information: <https://www.epa.gov/sites/production/files/2015-11/documents/fact2-3.pdf>.

It is recommended that the following be included in the SWQMP for MCM 1.

- 1) **Summary:** May provide an overview of Public Education and Outreach measures to date in the MS4 area. Include past accomplishments, challenges, and issues from prior permit cycle.
- 2) **Narrative:** May identify the topics your community will use for a public education program, the target audience you expect to reach with each activity, the tools you intend to use to deliver your message, and how you will evaluate the success of your overall public education program and the mechanism for revising the program based on the results of the evaluation.

Requirements for MCM 1

- 1) Implement a public education program to raise awareness about the impacts of stormwater discharges on local waterbodies and the steps that can be taken to reduce stormwater pollution.
- 2) Determine the appropriate best management practices (BMPs) and measurable goals for this minimum control measure.

Other Important Measures

- 1) MS4s could utilize the information gathered for the Local Water Resource section of your plan to tailor your education and outreach efforts to focus on priority pollutants impairing or threatening your waterways.
- 2) MS4s should ensure that the education and outreach efforts are targeted to the appropriate audiences and balanced between policy makers, local citizens and other stakeholders.

Getting in Step: Engaging and Involving Stakeholders in Your Watershed (found here: <https://www.epa.gov/npdes/national-menu-best-management-practices-bmps-stormwater-documents>) is an EPA publication that helps communities develop a public education and outreach campaign and discusses ways to get the public involved.

- 3) MS4 operators are strongly encouraged to take advantage of EPA’s FREE stormwater webcasts. They not only address the six minimum control measures, but provide specific examples and case studies of successful stormwater program strategies. These archived webcasts can be downloaded at <https://www.epa.gov/npdes/npdes-stormwater-webcasts>.

BMPs

Operators of regulated small MS4s may use stormwater educational information provided by their State, Tribe, EPA Region, or environmental, public interest, or trade organizations instead of developing their own materials. Operators should strive to make their materials and activities relevant to local situations and issues, and incorporate a variety of strategies to ensure maximum coverage. Some examples include:

- a. Brochures or fact sheets for general public and specific audiences;
- b. Recreational guides to educate groups such as golfers, hikers, paddlers, climbers, fishermen, and campers;
- c. Alternative information sources, such as web sites, bumper stickers, refrigerator magnets, posters for bus and subway stops, movie theaters, and restaurant placemats;
- d. A library of educational materials for community and school groups;
- e. Volunteer citizen educators to staff a public education task force;
- f. Event participation with educational displays at home shows and community festivals;
- g. Educational programs for school-age children;
- h. Storm drain stenciling of storm drains with messages such as “Do Not Dump - Drains Directly to Stream”;
- i. Stormwater hotlines for information and for citizen reporting of polluters;
- j. Economic incentives to citizens and businesses (e.g., rebates to homeowners purchasing mulching lawnmowers or biodegradable lawn products); and
- k. Tributary signage to increase public awareness of local water resources.

The Public Education Program may use a mix of appropriate local strategies to address the viewpoints and concerns of a variety of audiences and communities, including minority and disadvantaged communities as well as children in an effort to reach a diverse audience. Directing materials or outreach programs toward specific groups of commercial, industrial, and institutional entities likely to have significant stormwater impacts is also recommended.

Measurable Goals

Clear and measurable goals should be provided to gauge permit compliance and program effectiveness for MCM 1.

Measurable Goals should be presented in the provided table format that includes (attached at the end of guidance):

- ✓ BMP or Activity Description
- ✓ Quantifiable/Measurable Goal
- ✓ Targets/Measure of Success
- ✓ Coordinating Parties
- ✓ Yearly Tracking Milestones

3.2.6. MCM 2: Public Involvement/Participation

It is recommended that the SWQMP describe the activities you will conduct to allow public participation in development and implementation of your community’s stormwater quality management program. The public can provide valuable input and assistance to a regulated MS4’s SWQMP. An active and involved community is crucial to the success of a stormwater management program because it allows for broader public support, shorter implementation schedules, a broader base of expertise and economic benefits and a conduit to other programs. The EPA fact sheet located at <https://www.epa.gov/sites/production/files/2015-11/documents/fact2-3.pdf> provides additional details.

It is recommended that the following be included in the SWQMP for MCM 2.

- 1) Summary: May provide an overview of public involvement/participation measures to date in the MS4 area. Include accomplishments, challenges, and issues from the prior permit cycle.
- 2) Narrative: May explain what needs to be accomplished during this permit cycle to satisfy the requirements of this MCM, including each requirement as well as any other intended measures. Describe how the measurable goals will be evaluated for success (i.e., what approach will be used) and the mechanism for

revising the program based on the results of the evaluation. EPA and KDOW recommend developing and implementing MCM 1 and MCM 2 concurrently.

Requirements for MCM 2

- 1) Implement a public involvement/participation program that complies with the applicable Kentucky and local public notice requirements.
- 2) Provide public notice of program participation opportunities by methods designed to reach the intended audience.

BMPs

There are a variety of practices that can be incorporated into a public participation and involvement program, such as:

- a. MS4s may use public meetings/stormwater advisory councils (SWACs) that allow citizens to discuss various viewpoints and provide input concerning appropriate stormwater management policies and BMPs;
- b. MS4s could offer volunteer water quality monitoring gives citizens firsthand knowledge of the quality of local water bodies and provides a cost-effective means of collecting water quality data;
- c. MS4s can engage volunteer educators/speakers who can conduct workshops, encourage public participation, and staff special events;
- d. MS4s may find storm drain stenciling is an important and simple activity that concerned citizens, especially students, can do;
- e. MS4s could sponsor community clean-ups along local waterways, beaches, and around storm drains;
- f. MS4s could engage citizen watch groups that can aid local enforcement authorities in the identification of polluters; and
- g. MS4s could sponsor “Adopt-a-Storm Drain” programs that encourage individuals or groups to keep storm drains free of debris and to monitor what is entering local waterways through storm drains.

Measurable Goals

Clear and measurable goals should be provided to gauge permit compliance and program effectiveness for MCM 2.

Measurable Goals should be presented in the provided table format that includes (attached at the end of guidance):

- ✓ BMP or Activity Description
- ✓ Quantifiable/Measurable Goal
- ✓ Targets/Measure of Success
- ✓ Coordinating Parties
- ✓ Yearly Tracking Milestones

3.2.7. MCM 3: Illicit Discharge Detection and Elimination

As a requirement of the MS4 program regulations, all communities were required to adopt ordinances or other legal mechanisms to prohibit illicit discharges to the MS4. In addition, all communities were required to complete a map of the MS4 outfalls. The objective of this measure is to have MS4s gain a thorough awareness of their storm sewers systems. This awareness allows them to determine the types and sources of illicit discharges entering their system, and establish legal, technical, and educational means needed to eliminate these discharges. EPA’s Illicit Discharge Detection and Elimination Minimum Control Measure Fact Sheet may be accessed at <https://www.epa.gov/sites/production/files/2015-11/documents/fact2-5.pdf>

It is recommended that the following be included the SWQMP for MCM 3.

- 1) Summary: May provide an overview of IDDE efforts which have occurred to date in the MS4 area. Include ordinances passed, accomplishments, challenges and issues from the prior permit cycle.
- 2) Narrative: May explain what needs to be accomplished during this permit cycle to satisfy the requirements of this MCM, including each requirement as well as any other intended measures. Describe how measurable goals will be evaluated for success (i.e., what approach will be used) and the mechanism for revising the program based on the results of the evaluation.

Requirements for MCM 3

- 1) Continue to implement and enforce an ordinance or other regulatory mechanism that prohibits illicit discharge to the small MS4. Include a copy of the ordinance or regulatory mechanism that you will utilize to prohibit illicit discharges to the MS4.
- 2) Develop and maintain a storm sewer system map showing the location of all known major outfalls and the names and locations of all surface waters that receive discharges from those outfalls.
 - a. The storm sewer system wide map shall also include the permittee's small MS4 system, including catch basins, pipes, ditches, flood control facilities (retention/detention ponds), post-construction
 - b. water quality BMPs. Depict stormwater infrastructures such as inlets, outfalls, conveyance, detention basins, retrofits, etc. Include citations and references for all data shown on the map.
 - c. Map Format: If mapping is completed using GIS or CAD software, provide at a minimum the MS4 boundary and the mapped storm sewer infrastructure (please consult DOW about an acceptable format for maps.)
- 3) Develop and implement a written plan to address illicit discharges including illegal dumping to the MS4.

BMPs

There are a variety of practices that could be incorporated into the IDDE program, such as:

- a. MS4s could target educational outreach for public employees, businesses, and the general public about the hazards associated with illegal discharges and improper disposal of waste should be developed. Reporting of inappropriate discharges is significantly increased when public employees, citizens and businesses have been educated in their identification, and a mechanism for notifying authorities is in place.
- b. MS4s could benefit from designing a program to publicize and facilitate public reporting of illicit discharges using the stormwater hotline, and publicize resulting investigations and illicit discharge eliminations.
- c. MS4s may consider instituting a voluntary residential stormwater diversion program (e.g. rain barrels, rain gardens, etc.).
- d. MS4s could coordinate volunteers for locating, and visually inspecting, outfalls or to stencil storm drains.
- e. MS4s could initiate recycling programs for commonly dumped wastes, such as motor oil, antifreeze, and pesticides.

Measurable Goals

Clear and measurable goals should be provided to gauge permit compliance and program effectiveness for MCM 3.

Measurable Goals should be presented in the provided table format that includes (attached at the end of guidance):

- ✓ BMP or Activity Description
- ✓ Quantifiable/Measurable Goal
- ✓ Targets/Measure of Success
- ✓ Coordinating Parties
- ✓ Yearly Tracking Milestones

3.2.8. MCM 4: Construction Site Runoff Control

As a requirement of the MS4 program regulations, all communities were required to adopt ordinances or other legal mechanisms to require erosion and sediment controls, as well as sanctions to ensure compliance, to the extent allowable under State, Tribal, or local law. Sediment remains the primary cause of water quality impairments in Kentucky. Sources of sedimentation include agriculture, urban runoff, construction, and forestry. Sediment runoff rates from construction sites, however, are typically 10 to 20 times greater than those of agricultural lands, and 1,000 to 2,000 times greater than those of forest lands. The EPA fact sheet located at <https://www.epa.gov/sites/production/files/2015-11/documents/fact2-6.pdf> provides additional details.

The following information should be included in the SWQMP for MCM 4.

- 1) Summary: May provide an overview of Construction Site Runoff Control efforts which have occurred to date in the MS4 area. Include accomplishments, challenges and issues from the prior permit cycle, including citing ordinances passed.

- 2) Narrative: May explain what needs to be accomplished during this permit cycle to satisfy the requirements of this MCM, including each requirement as well as any other intended measures.

Requirements for MCM 4

MS4s shall implement and enforce a program that reduces pollutants in any stormwater runoff to the small MS4 from construction activities that disturb one acre or more, and active construction sites less than one acre in size that are part of a larger common plan of development or sale, located within the small MS4 upon issuance of this permit. Program shall include, at a minimum:

- 1) Enforcement of an ordinance or other regulatory mechanism to require erosion and sediment controls and sanctions to ensure compliance. Include a copy of the regulatory mechanism used to require the implementation of sediment and erosion controls on a construction site.
- 2) Requirements for construction site operators to implement erosion and sediment control best management practices (BMPs) that shall be as protective as Kentucky's General Permit for Stormwater Discharges Associated with Construction Activities (KYR100000).
- 3) Requirements for construction site operators to control waste such as discarded building materials, concrete truck washout, chemicals, litter, and sanitary waste at the construction site that may cause adverse impacts to water quality.
- 4) Establishment of authority for site-plan review which incorporates consideration of potential water-quality impacts.
- 5) Establishment of authority for receipt and consideration of information submitted by the public.
- 6) Establishment of authority for site inspections and enforcement of control measures.

BMPs

There are a variety of practices that can be incorporated into a successful construction site runoff control program, such as:

- a. It is recommended that MS4s develop a permitting process with plan review to affirm compliance with local ordinances, inspection, and enforcement capability.
- b. MS4s should develop and implement an enforcement strategy that includes escalating enforcement remedies to respond to issues of non-compliance.
- c. MS4s should develop a procedure to inventory projects and prioritize sites for inspection. The inventory should track the results of inspections, enforcement procedures taken, if any.
- d. MS4s should develop a training program for MS4 staff in the fundamentals of erosion prevention and sediment control and in how to review erosion and sediment control plans or Stormwater Pollution Prevention Plans.
- e. MS4s should have pre-construction meetings with contractor/developers to explain the expectations of the erosion prevention and sediment control program;
- f. MS4s should develop an inspection schedule based on the amount of disturbed area.
- g. MS4s should provide contractor/developer training about the regulatory mechanism and the requirements it contains.
- h. EPA's National Menu of Stormwater Best Management Practices found here: <https://www.epa.gov/npdes/national-menu-best-management-practices-bmps-stormwater#edu> is an excellent resource for MCM4 BMP information.
- i. For additional resources, see the Construction Industry Compliance Assistance website which provides information on environmental rules, including stormwater, for the construction industry at www.cicacenter.org/

Measurable Goals

Clear and measurable goals should be provided to gauge permit compliance and program effectiveness for MCM 4.

Measurable Goals should be presented in the provided table format that includes (attached at the end of guidance):

- ✓ BMP or Activity Description
- ✓ Quantifiable/Measurable Goal
- ✓ Targets/Measure of Success
- ✓ Coordinating Parties
- ✓ Yearly Tracking Milestones

3.2.9. MCM 5: Post-Construction Stormwater Management in New Development and Redevelopment

As a requirement of the MS4 program regulations, all communities were required to establish requirements to install post-construction water quality BMPs on new development and redevelopment sites where the site was one acre or more or smaller than one acre if part of a larger common plan of development or sale. Early planning and design for the minimization of pollutants in post-construction stormwater discharges is the most cost-effective approach to stormwater quality management. The EPA fact sheet located at <https://www.epa.gov/sites/production/files/2015-11/documents/fact2-7.pdf>

It is recommended that the following be included in the SWQMP for MCM 5.

- 1) Summary: May provide an overview of post-construction management measures which have occurred to date in the MS4 area. Include accomplishments including any ordinances passed, challenges, and issues from the prior permit cycle.
- 2) Narrative: May explain what needs to be accomplished during this permit cycle to satisfy the requirements of this MCM, including each requirement as well as any other intended measures. Requirements of this measure are closely tied to the requirements of MCM 4. EPA and DOW recommend developing and implementing these measures concurrently.

Requirements for MCM 5

- 1) Small MS4s shall develop, implement, and enforce a program to address stormwater runoff from new development and redevelopment projects that disturb greater than or equal to one acre, including projects less than one acre that are part of a larger common plan of development or sale, that discharge into the small MS4. The program must ensure that controls are in place that would prevent or minimize water quality impacts. Newly-designated small MS4s must complete these requirements within twenty-four (24) months from permit coverage. The program must:
 - a. Include development and implementation of strategies that include a combination of structural and/or non-structural BMPs appropriate for the community;
 - b. Enforcement of an ordinance or other regulatory mechanism to address post-construction runoff from new development and redevelopment projects to the extent allowable under Kentucky and local law. Include a copy of the ordinance or other regulatory mechanism used to require the implementation of post-construction water quality BMPs on new development or redevelopment where the common plan of development or sale disturbs 1 or more acre; and
 - c. Ensure adequate long-term operation and maintenance of BMPs.
- 2) Post-Construction Stormwater Management refers to the practices implemented to control runoff from the site after construction is complete, and includes structural and non-structural BMPs to obtain permanent stormwater management over the life of the property's use, with the goal of minimizing water quality impacts by attempting to maintain stream stability and pre-development runoff conditions. Additionally, adherence to design specifications, proper operation and maintenance of BMPs, and enforcement procedures are integral parts of stormwater management. The post-construction BMPs chosen should be site specific and take into consideration the condition of the receiving waterbody, and designed to contribute to the goal of minimizing the impact of stormwater discharges on the water quality and stability of local receiving streams.
 - a. Permittees shall develop, adopt, and implement an ordinance or other regulatory mechanism that addresses post-construction stormwater runoff from new and redevelopment projects that disturb at least one acre, and projects less than one acre that are part of a larger common plan of development or sale, located within the small MS4.

- b. Current small MS4 programs should review and update, if necessary, local requirements for post-construction controls for all new and redevelopment projects. Post-construction control requirements should include an on-site stormwater runoff standard as part of the ordinance.
 - c. The local standard should require, in combination or alone, management measures that are designed, built, and maintained to treat, filter, flocculate, infiltrate, screen, evapotranspire, harvest, and/or reuse stormwater runoff, or otherwise manage stormwater runoff quality. The locally-based water quality standard should specify design parameters (e.g. a design storm) for the sizing of post-construction controls that will require, at a minimum, that the 80th percentile of the annual runoff occurring in a typical year from the site is managed through water quality control practices. Additionally, the permittee should develop an appropriate water quality-based standard for redevelopment projects that reflect local community issues, including water quality impairments.
 - d. For those areas of development and re-development that result in a new or expanded discharge from the small MS4 to high-quality waters, the ordinance or other regulatory mechanism should include standards for runoff control that are considered sufficient to protect existing designated water uses.
- 3) The permittee should develop and implement project review, approval, and enforcement procedures for new development and redevelopment projects that disturb greater than one acre, and projects less than one acre that are part of a larger common plan of development or sale. Requirements for project review and approval include:
- a. Procedures for the site-plan review and approval process, and a required re-approval process when changes to stormwater management measures are required.
 - b. Procedures for a post-construction process to demonstrate and document that post-construction stormwater measures have been installed per design specifications, including enforceable procedures for bringing noncompliant projects into compliance.

BMPs

There are a variety of practices that can be incorporated into a successful post-construction stormwater management program, such as:

- a. Integrated planning on a regional and watershed scale to control post-construction stormwater impacts – Post-construction stormwater impacts are not likely to be controlled entirely with site-level BMPs. Integrating post-construction controls in regional and watershed scale planning is vital to ensure that growth occurs in a manner that supports the community needs while reducing overall impacts to the local water resources. Information on integrated planning can be found here: <https://www.epa.gov/npdes/stormwater-planning>.
- b. Low Impact Development and Green Infrastructure, is strongly encouraged by EPA and KDOW. These practices are effective in addressing water quality and quantity issues while providing cost savings over traditional practices. EPA has developed guidance on incorporating these practices into stormwater programs. These document can be found at <https://www.epa.gov/nps/urban-runoff-low-impact-development>
- c. Numerous post-construction management measures are planned and designed during the planning process for new construction or redevelopment. Therefore it's important that MCM 4 and MCM 5 are developed and implemented in tandem. Post-Construction management measures identified in construction plans (BMP Plans, SWPPP) for construction sites should be reviewed to ensure that the measures meet all of the requirements of the MS4. More details can be found at cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=factsheet_results&view=specific&bmp=123.
- d. Educating the local community (local officials, developers, contractors, landowners) about post construction management measures is vital for a successful program. Many communities have demonstrated that early education results in greater acceptance and support of this program. It's important to incorporate information about post-construction stormwater management in MCM 1 and MCM 2.
- e. Non-Structural BMPs
 - i. Planning Procedures. Runoff problems can be addressed efficiently with sound planning procedures. Local master plans, comprehensive plans, and zoning ordinances can promote improved water quality in many ways, such as guiding the growth of a community away from sensitive areas to areas that can support it without compromising water quality.
 - ii. Site-Based BMPs. These BMPs can include buffer strip and riparian zone preservation, minimization of disturbance and imperviousness, and maximization of open space.

- f. Structural BMPs
 - i. Infiltration BMPs. Infiltration BMPs are designed to facilitate the percolation of runoff through the soil to ground water, and, thereby, result in reduced stormwater runoff quantity and reduced mobilization of pollutants. Examples include infiltration basins/trenches, dry wells, and porous pavement.
 - ii. Vegetative BMPs. Vegetative BMPs are landscaping features that, with optimal design and good soil conditions, remove pollutants, and facilitate percolation of runoff, thereby maintaining natural site hydrology, promoting healthier habitats, and increasing aesthetic appeal. Examples include grassy swales, filter strips, artificial wetlands, and rain gardens.
 - iii. Stormwater Retention/Detention BMPs. Retention or detention BMPs control stormwater by gathering runoff in wet ponds, dry basins, or multi-chamber catch basins and slowly releasing it to receiving waters or drainage systems. These practices can be designed to both control stormwater volume and settle out particulates for pollutant removal.
- g. For projects that cannot meet the water-quality treatment standard, the permittee may adopt two alternatives: off-site mitigation and payment-in-lieu.
 - i. The off-site mitigation option entails infiltration/evapotranspiration/reuse measures that may be implemented at another location in the same sewershed/watershed as the original project, approved by the permittee(s). The permittee shall identify priority areas within the sewershed or watershed in which mitigation projects can be completed.
 - ii. The payment-in-lieu option allows the owner/operator of a construction site that disturbs at least one acre or a project that is less than one acre but is part of larger common plan of development or sale to choose to make a payment to the permittee, in lieu of implementing post-construction BMPs. The permittee will apply these in-lieu funds to a public stormwater project.
- h. Stormwater Retrofits – Stormwater retrofits are stormwater management practices in locations where stormwater controls did not previously exist or were ineffective. These retrofits can provide effective stormwater solutions in developed or redevelopment areas. The Center for Watershed Protection has developed an Urban Stormwater Retrofit Practices manual. This publication is available at <http://owl.cwp.org/mdocs-posts/urban-subwatershed-restoration-manual-series-manual-3/>. Retrofit practices can also help fulfill MCM 1, 2, 3, and 6.
- i. Educating the local community (local officials, developers, contractors, landowners) about post construction management measures is vital for a successful program. Many communities have demonstrated that early education results in greater acceptance and support of this program. It's important to incorporate information about post-construction stormwater management in MCM 1 and MCM 2.

Measurable Goals

Clear and measurable goals should be provided to gauge permit compliance and program effectiveness for MCM 5.

Measurable Goals should be presented in the provided table format that includes (attached at the end of guidance):

- ✓ BMP or Activity Description
- ✓ Quantifiable/Measurable Goal
- ✓ Targets/Measure of Success
- ✓ Coordinating Parties
- ✓ Yearly Tracking Milestones

3.2.10. MCM 6: Pollution Prevention/Good Housekeeping For Municipal Operations

Communities are required to implement pollution prevention practices at all municipal operations. MS4 managers should focus on municipal operations such as parks, open space, fleet management, building management, new construction, etc. The EPA fact sheet provides additional details <https://www.epa.gov/sites/production/files/2015-11/documents/fact2-8.pdf>.

It is recommended that the following be included in the SWQMP for MCM 6.

- 1) Summary: May provide a written overview of pollution prevention/good housekeeping measures to date in the MS4 area. Include accomplishments, challenges, and issues from the prior permit cycle.
- 2) Narrative: May explain what needs to be accomplished during this permit cycle to satisfy the requirements of this MCM, including each requirement as well as any other intended measures.

Requirements for MCM 6

- 1) Develop and implement a written operation and maintenance plan that shall include an inventory of municipally-owned facilities with the ultimate goal of preventing or reducing pollutant runoff from municipal operations into the storm sewer system.
- 2) Using training materials available from the EPA, the Division, or other organizations, the O & M program should include employee training to prevent and reduce stormwater pollution resulting from activities such as parks and open space maintenance, fleet and building maintenance, new construction and land disturbances, stormwater system maintenance, and green infrastructure maintenance.

BMPs

Describe the BMPs that will be implemented to address MCM 6, including descriptive information on methods or actions, intended outcomes of implementation, and timeframes.

- a. **Inventory:** Inventory all municipal operations within the MS4 area, identify potential stormwater pollution sources and document existing controls that are already in place. Both the types of municipal properties and the potential sources of pollution may be quite different. Examples include, but are not limited to, salt storage runoff, pesticide storage and application, maintenance facility runoff, dog waste runoff, parking lot runoff. MS4 managers may discover a host of pollution control actions that are already underway. Examples include pesticide spill prevention procedures, pet waste clean up initiatives, tree plantings in riparian areas. Conducting an inventory and developing a prioritization process will assist MS4 managers with identifying existing pollution control efforts and with targeting the most critical actions needed to manage stormwater runoff.
- b. **Prioritize:** Utilizing your Municipal Operations Inventory, prioritize stormwater controls and retrofits that are needed to improve stormwater management for these operations. Pollutants that are impairing or threatening local waterways should be prioritized. For example, if your MS4 area has identified stream pollution problems from nutrients and organic enrichment, priority should be placed on reducing these sources. Actions that reduce runoff from impervious areas and increase infiltration will help to reduce nutrients and organic enrichment. Examples include implementing stormwater retrofits (e.g. swales, rain gardens) in parking lots, establishing riparian buffers along streams and waterways, not mowing to the edge of the creek in parks, schools and open spaces.
- c. **Implement:** Stormwater retrofits are stormwater management practices in locations where stormwater controls did not previously exist or were ineffective. Retrofits can provide effective stormwater solutions in developed or redevelopment areas. Stormwater retrofits may be small (a grassed swale in a school parking lot) or large (modifying a dry pond to a wetpond). Stormwater retrofits provide tangible, measurable and quantifiable goals for SWQMPs and can include public participation (e.g. planting rain gardens). The Center for Watershed Protection has developed an Urban Stormwater Retrofit Practices manual. This publication is available at <http://owl.cwp.org/mdocs-posts/urban-subwatershed-restoration-manual-series-manual-3/>. Retrofit practices can also help fulfill MCM 1, 2, 3 and 5.
- d. Use the following examples to guide you with developing MCM 6 BMPs specific for your area:
 - i. Inventory municipal operations (See description above)
 - ii. Prioritize actions (See description above)
 - iii. Implement stormwater controls and retrofits that are targeted to the priority pollutants that are impairing or threatening local waterways. (See description above)
 - iv. Develop and implement an operations and maintenance program with the goal of preventing or reducing pollutant runoff from municipal operations into the storm sewer system.
 - v. Schedule and conduct maintenance activities and long-term inspection procedures for structural and non-structural controls to reduce floatables and other pollutants discharged from the separate storm sewers.
 - vi. Implement controls for reducing or eliminating the discharge of pollutants from areas such as roads and parking lots, maintenance and storage yards (including salt/sand storage and snow disposal areas) and waste transfer stations. These controls include programs that promote recycling (to reduce litter) minimize pesticide use, and ensure the proper disposal of animal waste.

- vii. Implement procedures for the proper disposal of waste removed from the separate storm sewer systems and the areas listed above, including dredge spoil, accumulated sediments, floatables, and other debris.
- viii. Develop ways to ensure that new flood management projects assess the impacts on water quality and examine existing projects for incorporation of additional water quality protection devices or practices. MS4 managers should coordinate with state water managers for the purpose of identifying and addressing environmental impacts from such projects. The Division of Water has a variety of staff that can provide appropriate technical support and guidance.

Measurable Goals

Clear and measurable goals should be provided to gauge permit compliance and program effectiveness for MCM 6.

Measurable Goals should be presented in the provided table format that includes (attached at the end of guidance):

- ✓ BMP or Activity Description
- ✓ Quantifiable/Measurable Goal
- ✓ Targets/Measure of Success
- ✓ Coordinating Parties
- ✓ Yearly Tracking Milestones

3.2.11 References

Your SWQMP should include a reference section. This section should include citations for factual information you refer to in your plan such as water quality data, sources of mapping information, and any documents referenced. Any source from which information is “borrowed” or excerpted should be listed in the Reference section.

For referencing literature or sources of geographic information within the text of your report, there are two primary styles:

- 1) Name & Year System - the last name of the author(s) and the year of publication are given.

Example: “...runoff is known to be significantly correlated with discharge (Smith 1989).”

Example: “...Smith (1989) found that runoff and discharge are significantly correlated.”

- 2) Alphabet-Number System - an alphabetical list of references is constructed and each reference is assigned a number, which appears in the text of the document.

Example: “...runoff is known to be significantly correlated with discharge (2).”

Example: “...Smith (2) found that runoff and discharge are significantly correlated.”

You may follow any international, national or statewide-published journal for the proper citation of literature sources. However, you should be consistent throughout the document.

4.0 MS4 MONITORING PROGRAM

4.0 MS4 Monitoring Program

4.1 Implementation of a small MS4 Monitoring Plan

An effective MS4 program monitoring plan may include one or more of the following options:

- a. Effluent monitoring of pollutants and conditions of concern at selected outfalls that are representative of particular land uses or geographical areas that contribute to pollutant loading before and after implementation of stormwater control measures;
- b. Monitoring of pollutants and conditions of concern in receiving waterbodies, both upstream and downstream of MS4 discharges, over an extended period of time;
- c. In-stream biological monitoring at appropriate locations to demonstrate the recovery of biological communities after implementation of stormwater control measures; or
- d. The MS4 program monitoring plan included in the MS4 permit.

5.0 Measurable Goals Tables

5.0 SWQMP Measurable Goals Table

Task	BMP- Activity Description	Milestone Product/Measurable Goal	Measure(s) of Success	Contributing Parties	Year 1 PY 18-19	Year 2 PY 19-20	Year 3 PY 21-22	Year 4 PY 22-23	Year 5 PY 23-24
1. MCM1 PUBLIC EDUCATION AND OUTREACH									
	A. Local MS4 Activities								
	B. Cooperative Efforts with copermittees or other partners								
2. MCM2 PUBLIC INVOLVEMENT/PARTICIPATION									
	A. Local MS4 Activities								
	B. Cooperative Efforts with copermittees or other partners								
3. MCM3 ILLICIT DISCHARGE DETECTION AND ELIMINATION (IDDE)									
	A. Local MS4 Activities								
	B. Cooperative Efforts with copermittees or other partners								
4. MCM4 CONSTRUCTION SITE STORMWATER RUNOFF CONTROL									

