



Recommended Best Management Practices for **FLOW**

Total Maximum Daily Load Fact Sheet

About Flow

An essential component of developing a Total Maximum Daily Load for a stream is the need to establish a relationship between the pollution source loadings and the resulting water quality. Correctly identifying this relationship is dependent on a thorough understanding of a watershed's hydrology, because pollutants can be transported to surface waters by a variety of mechanisms (e.g., runoff, snow melt, ground water infiltration). Furthermore, imperviousness and flow alterations have been identified as high-priority stressors in many watersheds.

Ohio EPA has identified urban/suburban runoff and storm sewers as potential sources that might cause aquatic life use impairments (ALU) that result in a TMDL for flow. Impervious surfaces such as roads, roofs, and parking lots alter the natural hydrology of the watershed. In addition, artificial drainage can also have a similar effect on hydrology. Biological communities are impacted by changes in the hydrologic regime and associated pollutant loadings that result from flow alteration.

Flow TMDLs are developed to address ALU and recreation use impairments in watersheds. Flow regime protection strategies include the protection, preservation and reestablishment of flow conditions in streams that support ALU attainment. Too much or too little flow may be associated with local conditions where the too much or too little stream flow exacerbates the impacts of pollution on the water body.

Sources of Flow Changes

The primary sources of flow alteration are:

- Urban & Suburban Development (Increase in Impervious Surfaces)

Development alters the hydrologic regime of surface waters by changing the way water cycles through a drainage basin. In undeveloped areas, natural flow regimes are present where portions the precipitation are intercepted by vegetation and is stored in soils and waterbody features (i.e., topographic depressions). Water that is not intercepted or stored will evapotranspire, infiltrate to ground water, or flow overland or through the shallow subsurface to streams or other topographic low-lying areas. Components of the hydrologic cycle are also altered in urban environments: natural plant communities are removed or replaced, topography is changed to fit anthropogenic

needs, soils are disturbed and altered, impervious structures are built, and storm water conveyance systems are installed. The combination of impervious cover, storm drain pipes, compacted soils, and altered flood plains dramatically change the hydrology of urban streams.” Generally, flow regimes that are affected by increased storm water will have higher flow rates per unit area during high-flow events and lower flow rates per unit area during low-flow conditions.

Best Management Practices that Address Flow TMDLs

The following summarizes BMPs your community will be required to include in your revised Storm Water Management Program (SWMP) to meet the minimum performance standards of NPDES Permit #OHQ000003. Furthermore, it suggests means by which a community can tailor their SWMP to specifically address the Flow TMDL.

MCM 1: Public Education and Outreach BMPs

Your program must reach at least 50% of your population. To do so, your community is required to implement more than one mechanism and target at least five different storm water themes or messages over the permit term, at least one of which must be targeted to the development community.

To address Flow, choose at least one of the following themes:
<ul style="list-style-type: none">• Protection and maintenance of natural vegetative buffers along waterways• Reduction of impervious surfaces and the increase of on-site infiltration• Homeowner BMPs (e.g., rain gardens, rain barrels, disconnection of downspouts, permeable pavers, soil amendments and aeration)• Alternative landscaping (e.g., turf reduction and replacement with deep-rooted native species)• Introduction to Green Infrastructure: what it is and what are its values

MCM 2: Public Participation and Involvement

Your program shall include a minimum of five public involvement activities over the permit term.

To address Flow, implement at least one of the following activities:
<ul style="list-style-type: none">• Host a community streamside planting day• Construct a rain garden with assistance from the public• Allow residents to provide input on new proposed ordinances that reduce flow (i.e., downspout disconnection, conservation development, riparian and wetland setbacks, etc.)• Organize a build your own rain barrel workshops for homeowners• Convert publicly owned turf to deep-rooted native plant area through a public planting activity• Hold a “buy a paver” fundraiser to retrofit a public parking lot with permeable pavers• Tree planting activity centered around runoff reduction

MCM 3: Illicit Discharge Detection and Elimination (IDDE)

All communities should have an applicable IDDE code in place and have developed an MS4 map, as required by previous generations of the MS4 permit.

Required BMPs that directly address Flow:
<ul style="list-style-type: none">• Develop, implement, and eliminate confirmed cross connections that are contributing to illicit discharges

BMPs that will enhance your community’s ability to address Flow:
<ul style="list-style-type: none"> • Utilize green infrastructure when correcting cross-connections and inflow/infiltration problems • Accelerate the implementation of your SSO elimination plan

MCM 4: Construction Site Runoff

All communities should have an applicable construction runoff control code in place as required by previous generations of the MS4 permit.

Required BMPs that directly address Flow:
<ul style="list-style-type: none"> • Conduct monthly site inspections throughout construction, as well as a final site inspection to ensure correct implementation of erosion, sediment and non-sediment control BMPs in the approved SWP3 • Develop an enforcement escalation plan that outlines how and when your community will address noncompliance with approved erosion, sediment and non-sediment control plans
BMPs that will enhance your community’s ability to address Flow:
<ul style="list-style-type: none"> • Include the following in your code: <ul style="list-style-type: none"> ○ Require on-site protected areas (i.e., wetlands, riparian areas, other valuable resources) to be physically marked in the field prior to commencement of earth disturbing activities ○ Require 50-ft natural vegetative buffers to be maintained between the limits of disturbance and water resources ○ Send out reminder notices to construction site operators to complete temporary stabilization prior to the onset of winter ○ Hold pre-construction meetings to discuss time frames for implementation of E&S controls • Require MS4 compliance inspectors to provide a written report of findings to construction site operators for every site inspection; the report would summarize compliance and non-compliance matters and establish deadlines for corrective action

MCM 5: Post-Construction Runoff Control

All communities should have an applicable storm water management code in place as required by previous generations of the MS4 permit.

Required BMPs that directly address Flow:
<ul style="list-style-type: none"> • Update your existing storm water management code to meet or exceed the requirements of NPDES OHC000004, including the federal effluent limitations in Part II • Ensure the most current post-construction BMP standards are required to be utilized (e.g., Rainwater & Land Development) • Complete Storm Water Pollution Prevention Plan (SWP3) reviews and approvals prior to construction commencement <ul style="list-style-type: none"> ○ Ensure SWP3 includes an executed Maintenance Agreement and Long-Term Maintenance Plan for post-construction BMPs ○ Review 100% of SWP3s where the larger common plan of development/sale disturbs one or more acres • Conduct monthly site inspections throughout construction, as well as a final site inspection to ensure correct implementation of post-construction BMPs in the approved SWP3 • Establish a program to ensure long-term maintenance of post-construction BMPs, including a protocol for enforcement escalation of your storm water management code
BMPs that will enhance your community’s ability to address Flow:
<ul style="list-style-type: none"> • Update the design specification for bioretention to require internal water storage whenever feasible (as recommended by ODNR’s Rainwater Manual)

<ul style="list-style-type: none"> • Include at least one of the following in your storm water management code: <ul style="list-style-type: none"> ○ Require on-site protected areas (i.e., wetlands, riparian areas, other valuable resources) to be physically marked in the field prior to commencement of earth disturbing activities ○ Prioritize and incentivize the following types of post-construction BMPs: <ul style="list-style-type: none"> ▪ Wet extended detention basins ▪ Dry extended detention basins with forebays and micropools ▪ Infiltration basins and trenches with appropriate pretreatment, e.g. vegetated swales, filter strips, etc. ▪ Bioretention areas ▪ Constructed wetlands that provide extended detention of the water quality volume (WQv) ▪ Permeable pavement ▪ Tree box filters
<ul style="list-style-type: none"> • Adopt at least one of the following planning and development codes: <ul style="list-style-type: none"> ○ Conservation development ○ Riparian and wetland setbacks ○ Downspout disconnections (redirect flow to rain gardens, rain barrel systems, open vegetated channels and/or filter strips) ○ Revise parking codes (e.g., decrease overall number of spaces, allow alternative pervious materials, shared parking, etc.)
<ul style="list-style-type: none"> • Require MS4 compliance inspectors to provide a written report of findings to construction site operators for every site inspection; the report would summarize compliance and non-compliance matters and establish a deadline for corrective action
<ul style="list-style-type: none"> • Establish a performance bond for post-construction BMPs and require the community engineer to generate documentation of acceptance before releasing bond
<ul style="list-style-type: none"> • Require submittal of as-built drawings for post-construction BMPs to ensure installation
<ul style="list-style-type: none"> • Incentivize the following within existing developed areas: <ul style="list-style-type: none"> ○ Retrofitting of storm water management control systems to treat the WQv and/or increase infiltration ○ Encourage commercial, industrial and institutional land owners to reduce impervious surfaces and replace them with storm water practices that infiltrate, capture and reuse, or otherwise reduce storm water runoff such as permeable pavement, cisterns, infiltration basins and trenches, bioretention with internal water storage, open channel swales, etc.
<ul style="list-style-type: none"> • Require an applicable community department (e.g., service, engineering) to annually inspect public and private post-construction BMPs, or require private property owners to submit an annual maintenance report. Ensure corrective actions are performed as needed by the applicable party.

MCM 6: Pollution Prevention/Good Housekeeping

As required by previous generations of the MS4 permit, all applicable community-operated facilities should have an SWPPP developed in accordance with the requirements of Ohio EPA’s Industrial Storm Water General Permit.

Required BMPs that directly address Flow:
<ul style="list-style-type: none"> • Update and implement facility SWPPPs to reflect minimum requirements of the Ohio EPA General NPDES Permit for Storm Water Associated with Industrial Activities (OHR000005) <ul style="list-style-type: none"> ○ Perform inspection requirements <ul style="list-style-type: none"> ▪ quarterly routine facility inspections, quarterly visual assessment of storm water discharges, and an annual comprehensive site inspection with annual report • Complete an annual training for applicable employees on any combination of the topics listed below

<ul style="list-style-type: none"> • Your community is required to implement Pollution Prevention & Good Housekeeping practices at the following municipally-operated facilities: <ul style="list-style-type: none"> ○ Streets, roads and highways ○ Municipal parking lots ○ Maintenance and storage yards, including, but not limited to, municipal composting facilities and leaf collection yards ○ Golf courses, parks, and related maintenance facilities ○ Waste transfer stations, compost facilities, solid waste facilities (e.g. municipal solid waste (MSW) landfills, and construction and demolition (C&D) landfills) ○ Marinas ○ Fleet and/or maintenance shops ○ Salt/sand storage locations ○ Snow disposal areas
<p>BMPs that will enhance your community’s ability to address Flow:</p>
<ul style="list-style-type: none"> • Programs which can be implemented to address Flow from the above sources include: <ul style="list-style-type: none"> ○ Locate snow disposal areas where there are wide vegetative buffers or within berms ○ Inspection and replacement program for separator plates, common manholes and other devices that physically separate your storm sewer system from your sanitary system (SSO)
<ul style="list-style-type: none"> • At community-owned and operated facilities (maintenance garages, golf courses, parks, community gardens, cemeteries, etc.) maintain, protect and restore permanent natural vegetative buffers between developed areas and water resources
<ul style="list-style-type: none"> • Install green infrastructure such as bioretention, permeable pavement, cisterns, green roofs, and infiltration trenches or basins at municipal facilities and/or retrofit existing storm water management ponds to treat the WQv
<ul style="list-style-type: none"> • Retrofit road ditches to include a bioretention function
<ul style="list-style-type: none"> • Daylighting of enclosed channels and/or stream restoration to increase floodplain and riparian zone storage capacity