



Recommended Best Management Practices for Bacteria

Total Maximum Daily Load Fact Sheet

About Bacteria as an Indicator

Water quality degradation due to bacteria pathogen pollution is a major concern in the United States. Bacteria coliforms live in the intestines of warm-blooded animals (humans, pets, farm animals, and wildlife). Fecal coliform bacteria are a kind of coliform associated with human or animal wastes. Escherichia coli (E. coli) are part of the group of fecal coliforms. Coliforms generally do not pose a danger to people or animals, but they indicate the presence of other disease-causing bacteria, such as those that cause typhoid, dysentery, hepatitis A, and cholera. Both coliforms and disease-causing bacteria live in water, but unlike coliforms, disease-causing bacteria generally do not survive long enough in the water, outside the body of animals, to be detected. Sampling and testing for the presence of disease-causing bacteria is therefore difficult; instead, scientists and public health officials consider the presence of coliforms as an indicator of disease bacteria in recreational, drinking, and flood waters.

Fecal coliform and E. coli bacteria originate in human, pet, livestock, and wildlife waste. Amounts tend to be lower in forested and wetland-rich areas and higher in agricultural and more heavily populated urbanized areas. Pathways include direct routes to surface waters (illicit septic systems connections, wastewater treatment facility discharge points, cross connections, and urban stormwater systems), spills or runoff from mismanaged animal waste, runoff or movement through soil from agricultural lands that receive manure applications, runoff of wildlife droppings, and direct deposition into waterways by wildlife or grazing animals. Manure management practices including manure storage and pretreatment (e.g. composting), timing and rate of application, and application method, all have the potential to reduce bacteria contamination of surface and groundwater. Bacteria levels do not necessarily decrease as a watershed develops from rural to urban. Instead, urbanization usually generates new sources of bacteria.

Sources of Bacteria

The primary sources of bacteria coliforms, fecal coliform, and E. coli are:

- **Household, Small Flow On-site (SFOSTS) and Commercial Sewage Treatment System Effluent**

Household, Small Flow On-site, and commercial sewage treatment systems (STS)¹ are needed to treat wastewater in areas that are not accessible to a sanitary sewer. Many of these existing systems may not be capable of properly treating sewage leaving the property because of the system has reached its useful life, antiquated design, or system malfunction (operation and maintenance). Proper system sizing and design, STS owner education, and operation inspections

1 - STS also includes home sewage treatment systems (HSTS) as referenced by the MS4 NPDES OHQ000003.

and maintenance of systems are essential to help prevent future contamination to waterways and public health nuisances. The possibility of direct or indirect exposure to human waste increases considerably when an STS is not functioning properly. Human waste contains high amounts of pathogens/bacteria that often lead to illness upon exposure. Proper functioning of STS is important to limit the environmental impact of human waste. The most commonly identified impact from failing STSs has been contamination to surface water, particularly in areas with large numbers of discharging STSs.

- **Wastewater**

Properly designed, operated, and maintained sanitary sewer systems are meant to collect and transport all of the sewage that flows into a publicly owned treatment works (POTW) facility. However, occasional unintentional discharges of raw sewage from municipal sanitary sewers occur in almost every system. These types of discharges are called sanitary sewer overflows (SSOs). SSOs have a variety of causes, including but not limited to blockages, line breaks, sewer defects that allow storm water and groundwater to overload the system, lapses in sewer system operation and maintenance, power failures, inadequate sewer design, etc.

- **Storm Water**

Traditional drainage systems concentrate runoff from land surfaces and remove it as quickly as possible by a system of gutters, curbs, pipes, sewers, ditches, and channels. The result is large amounts of fast-moving and sometimes highly polluted water discharging into local streams and rivers, causing erosion, flooding, and unstable stream channels. In urbanized areas, bacteria pollution in stream waters comes from failing or malfunctioning STS, cross-connections, infiltration and inflow (I & I), improper solid waste management, and pet waste. As a result, untreated sewage along with storm water is discharged directly into rivers and streams. Storm water runoff also picks up bacteria pollution as it travels overland from domestic pets, wildlife, farm animals, and agricultural land uses.

Best Management Practices that Address Bacteria 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 Bacteria 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 5 different storm water themes or messages over the permit term, at least one of which must be targeted to the development community.

To address Bacteria, choose at least one of the following themes:
<ul style="list-style-type: none">• Protection and maintenance of natural vegetative buffers along waterways• Management of manure and pet wastes• Reduction of impervious surfaces and the increase of on-site infiltration• Composting and management of grass clippings and yard wastes• Operation & Maintenance of discharging and non-discharging sewage treatments systems• Open or illegal dumping

MCM 2: Public Participation and Involvement

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

To address Bacteria, implement at least one of the following activities:
<ul style="list-style-type: none">• Identify locations for riparian restoration activities, engage the public in the planting of native vegetation• Storm drain stenciling• Establish “pick-up pet waste” stations for residents on public property, parks, city buildings, cemeteries, etc.• Host agricultural best management practices workshops for manure management and application• Work with local health department to educate property owners on sewage treatment system operation and maintenance• Open or illegal dumping• Establish public reporting mechanism (complaint hotline, webpage, etc.) to identify non-compliance from construction sites,

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 Bacteria:
<ul style="list-style-type: none">• Maintain and continue updating the MS4 map on an annual basis (i.e., outfalls, names and locations of surface waters that receive discharges from those outfalls, catch basins, pipes, ditches, flood control facilities (retention/detention ponds), post-construction water quality BMPs and private post-construction water quality BMPs which have been installed to satisfy Ohio EPA’s NPDES Construction Storm Water general permit and/or your local storm water management code requirements)
<ul style="list-style-type: none">• Work with local health department to routinely inspect Sewage Treatment Systems¹ (STS) to ensure the proper operation and maintenance
<ul style="list-style-type: none">• Develop and maintain a list and map of STS that discharge to your MS4; work with the local health department to identify and prioritize solutions to failing STS
<ul style="list-style-type: none">• Work with your local health department to eliminate illicit discharges from failing sewage treatment systems (i.e., installation of sanitary sewer, convert to on-lot STS (non-discharging), or replacement of STS with coverage under residential NPDES permit (discharging))
<ul style="list-style-type: none">• Develop, implement, and eliminate confirmed cross connections that are contributing to illicit discharges
<ul style="list-style-type: none">• Based upon data collected from previous screenings, establish a prioritization schedule for ongoing dry-weather screening of outfalls
<ul style="list-style-type: none">• Develop an IDDE plan that clearly defines the department(s) and/or agency(s) responsible for investigating and resolving confirmed sources of illicit discharges
<ul style="list-style-type: none">• Develop an enforcement escalation plan that outlines how your community will address illicit discharges<ul style="list-style-type: none">○ Clearly define escalation enforcement roles between affected agencies○ Work with local health department to identify and eliminate failing sewage treatment systems○ Establish timeframes for investigation and elimination
<ul style="list-style-type: none">• Document in the SWMP how community emergency spill response and cleanup plans are communicated and coordinated between applicable agencies and/or departments

<ul style="list-style-type: none"> • Train street, service, public works, building, and parks and recreation staff to identify sources of illicit discharge
<p>BMPs that will enhance your community’s ability to address Bacteria:</p>
<ul style="list-style-type: none"> • Establish an IDDE surveillance plan focused on sources of Bacteria such as: <ul style="list-style-type: none"> ○ Sewage treatment systems ○ Cross-connections ○ Infiltration and Inflow (I & I) ○ Animal waste (agricultural and pet) ○ Grass clippings and yard waste
<ul style="list-style-type: none"> • Establish a schedule for regular meetings or other communications between third-party service providers (e.g., health department, SWCD, etc.) and the MS4 manager
<ul style="list-style-type: none"> • Ensure that your IDDE surveillance program includes commitments to perform annual dry weather screening in areas where at least one previous test indicated elevated bacteria levels
<ul style="list-style-type: none"> • Perform at least one screening of all outfalls per permit term

1 - STS also includes home sewage treatment systems (HSTS) as referenced by the MS4 NPDES OHQ000003.

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.

<p>Required BMPs that directly address Bacteria:</p>
<ul style="list-style-type: none"> • Update your existing construction runoff control code to meet or exceed the requirements of the NPDES Construction General Permit (OHC000004), including the federal effluent limitations in Part II
<ul style="list-style-type: none"> • Protect and maintain wetlands in their natural states - wetlands filter nitrogen as well as other nutrients and pollutants
<ul style="list-style-type: none"> • Protect and maintain natural vegetative buffers to filter storm water runoff
<ul style="list-style-type: none"> • Ensure portable toilets are maintained and emptied without spills
<ul style="list-style-type: none"> • Establish a standard operating procedure to respond to complaints
<p>BMPs that will enhance your community’s ability to address Bacteria:</p>
<ul style="list-style-type: none"> • Ensure proper storage of landscape materials on construction sites
<ul style="list-style-type: none"> • Develop an enforcement escalation plan that outlines how and when your community will address noncompliance with approved erosion, sediment and non-sediment control plans
<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

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 Bacteria:
<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
<ul style="list-style-type: none">• Ensure the most current post-construction BMP standards are required to be utilized (e.g., Rainwater & Land Development)
<ul style="list-style-type: none">• 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.
<ul style="list-style-type: none">• 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
<ul style="list-style-type: none">• Establish a program to ensure long-term maintenance of post-construction BMPs, including a protocol for enforcement escalation of your storm water management code
<ul style="list-style-type: none">• Prior to commencing earth disturbing activities, ensure 100% of applicable sites have a fully executed Maintenance Agreement for the site, including an approved Maintenance Plan for each post-construction BMP
BMPs that will enhance your community's ability to address Bacteria:
<ul style="list-style-type: none">• Select post construction BMPs that eliminate or minimize bacteria, such as bioretention and constructed wetlands (as recommended by ODNR's Rainwater Manual)
<ul style="list-style-type: none">• Allow or require vegetative practices around storm water management ponds that discourage waterfowl
<ul style="list-style-type: none">• Develop an enforcement escalation plan that outlines how and when your community will address noncompliance with approved storm water management plans
<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">• Consider adopting any 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)
<ul style="list-style-type: none">• Incentivize the following within existing developed areas:<ul style="list-style-type: none">○ Retrofitting of storm water management ponds to function as constructed wetlands○ Implement practices that deter waterfowl around storm water ponds
<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 Bacteria:
<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
<ul style="list-style-type: none">• Complete an annual training for applicable employees on any combination of the topics listed below
<ul style="list-style-type: none">• Maintain and operate community owned sewage treatment systems
<ul style="list-style-type: none">• Ensure community-sponsored portable toilets are maintained and emptied without spills
<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
BMPs that will enhance your community's ability to address Bacteria:
<ul style="list-style-type: none">• Programs which can be implemented to address Bacteria from the above sources include:<ul style="list-style-type: none">○ Street and parking lot sweeping○ Catch basin cleaning○ Ditch cleaning or trash collection program for open channel MS4s○ Waste storage in lidded or covered containers○ Protection of catch basins and other appropriate catch basin inlets when conducting road repairs, waterline repairs, and other maintenance activities of the Service Department or Department of Public Works○ Establish wash stations directed to sanitary sewers or utilize dry cleanup methods for lawn care equipment, golf carts, and other community vehicles and equipment used in parks and golf course maintenance○ Locate snow disposal areas where there are wide vegetative buffers or within berms
<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">• Establish "pick-up pet waste" stations for residents on public property, parks, community buildings, cemeteries, etc.

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| <ul style="list-style-type: none">• Relocate stockpiles of waste materials and erodible materials away from stream banks and steep slopes and/or install appropriate sediment controls around such materials |
| <ul style="list-style-type: none">• Implement a road-kill program and properly store collected carcasses or take to a compost facility licensed to accept |



Recommended Best Management Practices for Dissolved Oxygen & Organic Enrichment

Total Maximum Daily Load Fact Sheet

About Dissolved Oxygen & Organic Enrichment

Dissolved Oxygen (DO) in surface water is used by all forms of aquatic life and is typically measured to assess the “health” of lakes and streams; too much or too little DO can result in unhealthy aquatic conditions. In addition, large fluctuations in DO levels over a relatively short period of time can impair or kill fish and invertebrates. The two main sources of dissolved oxygen are the atmosphere and aquatic plants. Atmospheric oxygen is mixed into turbulent stream water as it flows along rocks and riffles in the stream. Atmospheric oxygen can also enter a stream through ground water recharge. Oxygen is also produced by aquatic plants and algae as a product of photosynthesis. Photosynthesis is the process by which green plants and certain bacteria synthesize carbon dioxide (using light as an energy source) and hydrogen (usually water) to produce necessary carbohydrates for development. Most forms of photosynthesis release oxygen as a byproduct.

The amount of oxygen that can dissolve in water is also limited by physical conditions such as temperature, atmospheric pressure, low flow and organic enrichment. Aquatic life can have a hard time in stagnant water that has a lot of rotting, organic material (organic enrichment), especially in the summer. The concentration of DO is inversely related to water temperature; when ambient air temperatures increase, the amount of available DO decreases. Conditions may be especially serious during periods of hot, calm weather and may result in summertime fish kills. Photosynthesis is the primary process affecting the dissolved oxygen/temperature relationship. Water clarity and duration of sunlight affects the rate of photosynthesis. Bacteria in water can also consume oxygen as organic matter decays. Thus, excess organic material in lakes and rivers can cause eutrophic conditions that result in an oxygen-deficient situation that can impact a water body and create a “dead zone.”

Sources of Dissolved Oxygen & Organic Enrichment

DO & Organic Enrichment are related to a wide variety of sources of pollution, such as stream bank and streambed erosion, sediment conveyed by storm water runoff, decaying plant and animal matter, industrial discharges, waste and sewage. TMDL reports for DO, organic enrichment and low flow are often developed for localized water quality conditions that can be addressed through the adoption of best management practices.

Best Management Practices that Address Dissolved Oxygen & Organic Enrichment

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 dissolved oxygen and organic enrichment 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 DO/OE, choose at least one of the following themes:
<ul style="list-style-type: none"> • Protection and maintenance of natural vegetative buffers along waterways • Management of manure and pet wastes • Reduction and management of residential and agricultural fertilizers • Reduction of soil erosion on residential and agricultural land uses • Composting and management of grass clippings and yard wastes • Operation & Maintenance of on-site sewage treatments systems • Construction site erosion and sediment control practices • Pond maintenance education (e.g., manage waterfowl, install aerators, maintain vegetative buffers, etc.)

MCM 2: Public Participation and Involvement

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

To address DO/OE, implement at least one of the following activities:
<ul style="list-style-type: none"> • Streamside plantings and cleanups • Storm drain stenciling • Construct a rain garden with assistance from the public • Allow residents to provide input on new proposed ordinances that reduce TSS (i.e., downspout disconnection, conservation development, riparian and wetland setbacks, etc.) • Conduct a charity car wash that implements best management practices and promotes environmental responsibility • Establish public reporting mechanism (complaint hotline, webpage, etc.) to identify non-compliance from construction sites • Have residents pledge to a “no-fertilizer” lawn program • Construct a rain garden with assistance from the public • “Green” workshops where residents make environmentally-friendly lawn care and cleaning supplies

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 DO/OE:
<ul style="list-style-type: none"> • Maintain and continue updating the MS4 map on an annual basis (i.e., outfalls, names and locations of surface waters that receive discharges from those outfalls, catch basins, pipes, ditches, flood control facilities (retention/detention ponds), post-construction water quality BMPs and private post-construction water quality BMPs which have been installed to satisfy Ohio EPA’s NPDES Construction Storm Water general permit and/or your local storm water management code requirements) • Develop and maintain a list and map of Sewage Treatment Systems¹ that discharge to your MS4; work with the local health department to identify and prioritize solutions to failing STS

<ul style="list-style-type: none"> • Based upon data collected from previous screenings, establish a prioritization schedule for ongoing dry-weather screening of outfalls
<ul style="list-style-type: none"> • Develop an IDDE plan that clearly defines the department(s) and/or agency(s) responsible for investigating and resolving confirmed sources of illicit discharges
<ul style="list-style-type: none"> • Develop an enforcement escalation plan that outlines how your community will address illicit discharges <ul style="list-style-type: none"> ○ Clearly define escalation enforcement roles between affected agencies ○ Work with local health department to identify and eliminate failing sewage treatment systems ○ Establish timeframes for investigation and elimination
<ul style="list-style-type: none"> • Document in the SWMP how community emergency spill response and cleanup plans are communicated and coordinated between applicable agencies and/or departments
<ul style="list-style-type: none"> • Train street, service, public works, building, and parks and recreation staff to identify sources of illicit discharge
<p>BMPs that will enhance your community’s ability to address DO/OE:</p>
<ul style="list-style-type: none"> • Establish an IDDE surveillance plan focused on sources of DO/OE such as: <ul style="list-style-type: none"> ○ Sewage treatment systems ○ Cross-connections and infiltration & inflow (I/I) ○ Animal waste (agricultural and pet) ○ Grass clippings and yard waste
<ul style="list-style-type: none"> • Establish a schedule for regular meetings or other communications between third-party service providers (e.g., health department, SWCD, etc.) and the MS4 manager

1 - STS also includes home sewage treatment systems (HSTS) as referenced by the MS4 NPDES OHQ000003.

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.

<p>Required BMPs that directly address nutrients:</p>
<ul style="list-style-type: none"> • Update your existing construction runoff control code to meet or exceed the requirements of the NPDES Construction General Permit (OHC000004), including the federal effluent limitations in Part II
<ul style="list-style-type: none"> • Ensure most current erosion, sediment and non-sediment control BMP standards are required to be utilized (e.g., Rainwater & Land Development)
<ul style="list-style-type: none"> • Complete Storm Water Pollution Prevention Plan (SWP3) reviews and approvals prior to construction commencement
<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
<ul style="list-style-type: none"> • Develop an enforcement escalation plan that outlines how and when your community will address noncompliance with approved erosion, sediment and non-sediment control plans
<ul style="list-style-type: none"> • Establish a standard operating procedure to respond to complaints
<p>BMPs that will enhance your community’s ability to address nutrients:</p>
<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 ○ Maintain wetlands in their natural states wherever feasible
<ul style="list-style-type: none"> • Ensure portable toilets are maintained and emptied without spills

<ul style="list-style-type: none"> • Ensure proper storage of landscape materials on construction sites
<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
<ul style="list-style-type: none"> • Establish a Sediment and Erosion Control bond equivalent to the cost to stabilize (vegetate) disturbed areas of the sites in cases of nonperformance (i.e. developer foreclosure/bankruptcy)

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 DO/OE:
<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
<ul style="list-style-type: none"> • Ensure the most current post-construction BMP standards are required to be utilized (e.g., Rainwater & Land Development)
<ul style="list-style-type: none"> • 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.
<ul style="list-style-type: none"> • 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
<ul style="list-style-type: none"> • Establish a program to ensure long-term maintenance of post-construction BMPs, including a protocol for enforcement escalation of your storm water management code
<ul style="list-style-type: none"> • Prior to commencing earth disturbing activities, ensure 100% of applicable sites have a fully executed Maintenance Agreement for the site, including an approved Maintenance Plan for each post-construction BMP
BMPs that will enhance your community’s ability to address DO/OE:
<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 ▪ Permeable pavement ▪ Tree box filters
<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 and/or conduct a physical inspection of BMPs at least once during the NPDES permit term
<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) ○ Revised parking codes (e.g., decrease overall number of spaces, allow alternative pervious materials, shared parking, etc.)
<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.

<p>Required BMPs that directly address DO/OE:</p> <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 DO/OE:</p> <ul style="list-style-type: none"> • Programs which can be implemented to address TSS from the above sources include: <ul style="list-style-type: none"> ○ Street and parking lot sweeping ○ Catch basin cleaning

<ul style="list-style-type: none"> ○ Ditch cleaning or trash collection program for open channel MS4s ○ Timely stabilization of disturbed soils and soil stockpiles at the service yard, landfills and on municipal construction activity ○ Protection of catch basins and other appropriate sediment controls when conducting road repairs, waterline repairs and other maintenance activities of the Service Department or Department of Public Works ○ BMPs for granular fertilizer storage and application ○ Establish wash stations directed to sanitary sewers or utilize dry cleanup methods for lawn care equipment, golf carts, boats, and other municipal vehicles and equipment used in parks and golf course maintenance ○ Locate snow disposal areas where there are wide vegetative buffers or within berms ○ Integrated Pest Management (IPM) and reduction of fertilizer use ○ Implement low-mow or no-mow practices that preserve buffer areas around streams, wetlands and storm water basins
<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"> ● Relocate stockpiles of waste materials and erodible materials away from stream banks and steep slopes and/or install appropriate sediment controls around such materials
<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"> ● Vegetate open areas at maintenance and storage yards to reduce TSS production



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



Recommended Best Management Practices for **HABITAT**

Total Maximum Daily Load Fact Sheet

About Habitat Degradation and Loss

Natural habitats are the physical, chemical and biological systems that support living things (i.e. plants, animals, fungi and microbes). More simply put, habitats are the places where these organisms live. Healthy and diverse habitats result in sustainable and prosperous populations of animals and fish. A natural and abundant habitat is critical to the health of any ecosystem which, in turn, is inextricably linked to quality of life. Aquatic habitats can be described in many ways including:

- the natural materials that comprise the habitat (e.g. rocks, gravel, sand and mud),
- the type of vegetation present (e.g. woody and herbaceous vegetation),
- the shape and nature of the habitat (e.g. runs, pools and riffles), or
- the overall ecosystem (e.g. wetlands, floodplains, streams, estuaries, lakes, beaches).

The aquatic health of streams is directly related to the existence of streamside vegetation and stable stream banks. The preservation of undisturbed ground cover, trees, shrubs and other native vegetation within the riparian buffer areas bordering streams is essential for maintaining the integrity of aquatic habitats. Aquatic habitats can be degraded or lost when natural or human-caused activities affect and alter the integrity of stream banks.

Stream bank erosion is a dynamic and natural process as streams meander across the landscape, but the continued encroachment of stream riparian buffers has accelerated this process. The extensive clearing of deep-rooted, natural vegetation from stream riparian areas by agricultural and urban land uses leads to increased stream sedimentation, stream channel instability, land loss, habitat loss and poor water quality and in-stream habitat. Stream bank erosion and flashy flows are often symptoms of larger, more complex problems and the long-term solutions often involve more than just bank stabilization, e.g. addressing upstream land use impacts to reduce flashy flows.

Best Management Practices that Address Habitat 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 Habitat 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 Habitat, choose at least one of the following themes:

- Protection and maintenance of natural vegetative buffers along waterways
- Reduction and management of residential and agricultural fertilizers
- Reduction of soil erosion on residential, agricultural and construction sites
- Reduction of impervious surfaces and the increase of on-site infiltration
- Riparian and wetland setbacks
- Conservation development practices
- USDA-Natural Resources Conservation Service (NRCS) Programs supporting BMPs for agri-businesses, i.e. Conservation Reserve Program (CRP), Conservation Reserve Enhancement Program (CREP), and the Environmental Quality Incentives Program (EQIP)

MCM 2: Public Participation and Involvement

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

To address Habitat, implement at least one of the following activities:

- Streamside plantings and cleanups
- Stream or wetland restoration projects
- Construct a rain garden with assistance from the public
- Allow residents to provide input on new proposed codes (i.e., downspout disconnection, conservation development, riparian and wetland setbacks, etc.)
- Tree plantings; achieve Tree City status
- Conduct a charity car wash that implements best management practices and promotes environmental responsibility
- Establish public reporting mechanism (complaint hotline, webpage, etc.) to identify non-compliance from construction sites

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 Habitat::

- Maintain and continue updating the MS4 map on an annual basis (i.e., outfalls, names and locations of surface waters that receive discharges from those outfalls, catch basins, pipes, ditches, flood control facilities (retention/detention ponds), post-construction water quality BMPs and private post-construction water quality BMPs which have been installed to satisfy Ohio EPA's NPDES Construction Storm Water general permit and/or your local storm water management code requirements)
- Develop and maintain a list and map of Sewage Treatment Systems (STS)¹ that discharge to your MS4; work with the local health department to identify and prioritize solutions to failing STS
- Based upon data collected from previous screenings, establish a prioritization schedule for ongoing dry-weather screening of outfalls
- Develop an IDDE plan that clearly defines the department(s) and/or agency(s) responsible for investigating and resolving confirmed sources of illicit discharges

BMPs that will enhance your community's ability to address Habitat:

¹ - STS also includes home sewage treatment systems (HSTS) as referenced by the MS4 NPDES OHQ000003.

<ul style="list-style-type: none"> • Establish an IDDE surveillance plan focused on sources of Habitat such as: <ul style="list-style-type: none"> ○ Sewage treatment systems ○ Construction sites ○ Animal wastes (agricultural and pets) ○ Grass clippings and yard wastes
<ul style="list-style-type: none"> • Develop an enforcement escalation plan that outlines how your community will address illicit discharges <ul style="list-style-type: none"> ○ Clearly define escalation enforcement roles between affected agencies ○ Work with local health department to identify and eliminate failing sewage treatment systems ○ Establish timeframes for investigation and elimination
<ul style="list-style-type: none"> • Establish a schedule for regular meetings or other communications between third-party service providers (e.g., health department, SWCD, etc.) and the MS4 manager
<ul style="list-style-type: none"> • Document in the SWMP how community emergency spill response and cleanup plans are communicated and coordinated between applicable agencies and/or departments
<ul style="list-style-type: none"> • Train street, service, public works, building, and parks and recreation staff to identify sources of illicit discharge

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 Habitat:
<ul style="list-style-type: none"> • Update your existing construction runoff control code to meet or exceed the requirements of the NPDES Construction General Permit (OHC000004), including the federal effluent limitations in Part II
<ul style="list-style-type: none"> • Ensure most current erosion, sediment and non-sediment control BMP standards are required to be utilized (e.g., Rainwater & Land Development)
<ul style="list-style-type: none"> • Complete Storm Water Pollution Prevention Plan (SWP3) reviews and approvals prior to construction commencement
<ul style="list-style-type: none"> • Conduct site inspections to ensure SWP3 implementation
<ul style="list-style-type: none"> • Establish a protocol for enforcement escalation of your community’s construction runoff control code
<ul style="list-style-type: none"> • Establish a standard operating procedure to respond to complaints
<ul style="list-style-type: none"> • 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 Habitat:
<ul style="list-style-type: none"> • Consider including 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
<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 deadlines for corrective action
<ul style="list-style-type: none"> • Maintain a map of active construction sites to more easily identify watersheds being impacted by construction site runoff and prioritize sites in those watersheds for inspections more frequently than once per month
<ul style="list-style-type: none"> • Establish a Sediment and Erosion Control bond equivalent to the cost to stabilize (vegetate) disturbed areas of the sites in cases of nonperformance (i.e. developer foreclosure/bankruptcy)

- Establish a schedule for regular meetings or other communications between third-party service providers (e.g., health department, SWCD, etc.) and the MS4 manager

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 Habitat:
<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
<ul style="list-style-type: none"> • Ensure most-current post-construction BMP standards are required to be utilized (e.g., Rainwater & Land Development)
<ul style="list-style-type: none"> • 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.
<ul style="list-style-type: none"> • Conduct monthly site inspections throughout construction and a final site inspection to ensure implementation of post-construction BMPs in the approved SWP3
<ul style="list-style-type: none"> • Establish a program to ensure long-term maintenance of post-construction BMPs including a protocol for enforcement escalation of your storm water management code
Additional recommended BMPs that will enhance your community’s ability to address Habitat
<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 micro pools ▪ 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"> • 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 community Engineer (or Engineering Department) to generate documentation of acceptance before releasing bond
<ul style="list-style-type: none"> • Establish a Sediment and Erosion Control bond equivalent to the cost to stabilize (vegetate) disturbed areas of the sites in cases of nonperformance (i.e. developer foreclosure/bankruptcy)
<ul style="list-style-type: none"> • Require submittal of as-built drawings for post-construction BMPs to ensure installation and/or conduct a physical inspection of BMPs at least once during the NPDES permit term
<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

<ul style="list-style-type: none"> channels and/or filter strips) <ul style="list-style-type: none"> ○ Revised parking codes (e.g., decrease overall number of spaces, allow alternative pervious materials, shared parking, etc.)
<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 Habitat:
<ul style="list-style-type: none"> ● Implement pollution prevention and good housekeeping practices at community operations ● 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"> ○ 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
BMPs that will enhance your community’s ability to address Habitat:
<ul style="list-style-type: none"> ● Reduce turf grass on municipal parks and open spaces ● Establish a protection program to obtain riparian development rights, e.g. conservation easements, ● Utilize Integrated Pest Management (IPM) on community-owned and operated properties ● Locate snow disposal areas where there are wide vegetative buffers or within berms ● 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 ● Relocate stockpiles of waste materials and erodible materials away from stream banks and steep slopes and/or install appropriate sediment controls around such materials ● Install green infrastructure such as bioretention, permeable pavement, cisterns, green roofs, and

infiltration trenches or basins can be installed at municipal facilities

- Minimize number and width of stream crossings when planning transportation routes
- Adopt a “Complete Streets” code
- Retrofit existing community-owned parking lots to incorporate natural habitat, vegetation and pervious surfaces
- When contract services are utilized for community services, require contract language that ensures BMPs for pollution prevention and good housekeeping
- Incorporate leachate management for maintenance and storage yards, including municipal composting facilities and leaf collection yards
- Integrated Pest Management (IPM) and reduction of fertilizer use
- Implement low-mow or no-mow practices that preserve buffer areas around streams, wetlands and storm water basins



Recommended Best Management Practices for Nutrients (Includes Phosphorus, Nitrogen, & Ammonia)

Total Maximum Daily Load Fact Sheet

About Nutrients

Nutrients like phosphorus, nitrogen, and ammonia are needed by all plants and animals, but excessive amounts of nutrients in our water harm ecosystems, economies, and community health.

In Ohio, nutrient pollution causes many problems such as:

- Harmful algal blooms in Lake Erie and inland lakes
- Public health warnings to avoid swimming
- Widespread nuisance growths of aquatic vegetation
- Increased water treatment costs for clean public water supplies
- Changes in aquatic ecosystems and declining fisheries
- Renewed concern over the increased size of anoxic areas or “dead zones” in Lake Erie
- Fewer dollars being spent on water based recreation and tourism

Approximately 48% of Ohio's watersheds are degraded by nutrient loading.

Sources of Nutrients

Excessive nutrients wash into waterbodies and are often the direct result of human activities. The primary sources of nutrient pollution are:

- **Agriculture**
Animal manure, over-application of fertilizer, and soil erosion are some of the largest sources of nitrogen, phosphorus, and ammonia pollution in the country.
- **Storm Water**
Storm water is precipitation from rain or snowmelt that flows over the ground. Impervious surfaces like driveways, roofs, sidewalks and streets prevent storm water from soaking into the ground where it is filtered and cleaned naturally. Instead, storm water flows over impervious surfaces, picks up pollutants like phosphorus, nitrogen, or ammonia and carries them into a storm sewer system or directly to a lake, stream, river, wetland, or other waterway. Anything that enters a storm sewer system flows untreated into waterbodies that may be used for swimming, fishing and drinking water. Nutrients in storm water comes from many sources like pet waste, lawn fertilizers, failing home sewage treatment systems, combined sewer overflows, and construction activities.

- **Wastewater**

Properly designed, operated, and maintained sanitary sewer systems are meant to collect and transport all of the sewage that flows into a publicly owned treatment works (POTW) facility. However, occasional unintentional discharges of raw sewage from municipal sanitary sewers occur in almost every system. These types of discharges are called sanitary sewer overflows (SSOs). SSOs have a variety of causes, including but not limited to blockages, line breaks, sewer defects that allow storm water and groundwater to overload the system, lapses in sewer system operation and maintenance, power failures, inadequate sewer design, etc. Our sewer and septic systems are responsible for treating large quantities of waste, and these systems do not always operate properly or remove enough nutrients before discharging into waterways.

Best Management Practices that Address Nutrient 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, and suggests means by which a community can tailor their SWMP to specifically address nutrient TMDLs.

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 nutrients, choose at least one of the following themes:
<ul style="list-style-type: none">• Protection and maintenance of natural vegetative buffers along waterways• Management of manure and pet wastes• Reduction and management of residential and agricultural fertilizers• Reduction of soil erosion on residential and agricultural land uses• Reduction of impervious surfaces and increase on-site infiltration• Composting and management of grass clippings and yard wastes• Operation & Maintenance of on-site sewage treatment systems• Construction site erosion and sediment control practices• Pond maintenance education (e.g., manage waterfowl, install aerators, maintain vegetative buffers, etc.)

MCM 2: Public Participation and Involvement

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

To address nutrients, implement at least one of the following activities:
<ul style="list-style-type: none">• Streamside plantings and cleanups• Have residents pledge to a “no-fertilizer” lawn program• Construct a rain garden with assistance from the public• “Green” workshops where residents make environmentally-friendly lawn care and cleaning supplies

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 nutrients:
<ul style="list-style-type: none">• Maintain and continue updating the MS4 map on an annual basis (i.e., outfalls, names and locations of surface waters that receive discharges from those outfalls, catch basins, pipes, ditches, flood control facilities (retention/detention ponds), post-construction water quality BMPs and private post-construction water quality BMPs which have been installed to satisfy Ohio EPA's NPDES Construction Storm Water general permit and/or your local storm water management code requirements)
<ul style="list-style-type: none">• Develop and maintain a list and map of Sewage Treatment Systems (STS)¹ that discharge to your MS4; work with the local health department to identify and prioritize solutions to failing
<ul style="list-style-type: none">• Based upon data collected from previous screenings, establish a prioritization schedule for ongoing dry-weather screening of outfalls
<ul style="list-style-type: none">• Develop an IDDE plan that clearly defines the department(s) and/or agency(s) responsible for investigating and resolving confirmed sources of illicit discharges
<ul style="list-style-type: none">• Develop an enforcement escalation plan that outlines how your community will address illicit discharges<ul style="list-style-type: none">○ Clearly define escalation enforcement roles between affected agencies○ Work with local health department to identify and eliminate failing sewage treatment systems○ Establish timeframes for investigation and elimination
<ul style="list-style-type: none">• Document in the SWMP how community emergency spill response and cleanup plans are communicated and coordinated between applicable agencies and/or departments
<ul style="list-style-type: none">• Train street, service, public works, building, and parks and recreation staff to identify sources of illicit discharge
BMPs that will enhance your community's ability to address nutrients:
<ul style="list-style-type: none">• Establish an IDDE surveillance plan focused on sources of nutrients such as:<ul style="list-style-type: none">○ Sewage treatment systems○ Cross-connections and infiltration & inflow (I/I)○ Animal waste (agricultural and pet)○ Grass clippings and yard waste
<ul style="list-style-type: none">• Ensure that your IDDE surveillance program includes commitments to perform annual dry-weather screening in areas where at least one previous test indicated elevated bacteria levels
<ul style="list-style-type: none">• Perform at least one screening of all outfalls per permit term
<ul style="list-style-type: none">• Establish a schedule for regular meetings or other communications between third-party service providers (e.g., health department, SWCD, etc.) and the MS4 manager

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.

¹ STS also includes home sewage treatment systems (HSTS) as referenced by the MS4 NPDES OHQ000003.

Required BMPs that directly address nutrients:
<ul style="list-style-type: none"> • Update your existing construction runoff control code to meet or exceed the requirements of the NPDES Construction General Permit (OHC000004), including the federal effluent limitations in Part II
<ul style="list-style-type: none"> • Ensure most current erosion, sediment and non-sediment control BMP standards are required to be utilized (e.g., Rainwater & Land Development)
<ul style="list-style-type: none"> • Complete Storm Water Pollution Prevention Plan (SWP3) reviews and approvals prior to construction commencement
<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
<ul style="list-style-type: none"> • Develop an enforcement escalation plan that outlines how and when your community will address noncompliance with approved erosion, sediment and non-sediment control plans
<ul style="list-style-type: none"> • Establish a standard operating procedure to respond to complaints
BMPs that will enhance your community's ability to address nutrients:
<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 ○ Maintain wetlands in their natural states wherever feasible
<ul style="list-style-type: none"> • Ensure portable toilets are maintained and emptied without spills
<ul style="list-style-type: none"> • Ensure proper storage of landscape materials on construction sites
<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
<ul style="list-style-type: none"> • Establish a Sediment and Erosion Control bond equivalent to the cost to stabilize (vegetate) disturbed areas of the sites in cases of nonperformance (i.e. developer foreclosure/bankruptcy)

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 nutrients:
<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
<ul style="list-style-type: none"> • Ensure most-current post-construction BMP standards are required to be utilized (e.g., Rainwater & Land Development)
<ul style="list-style-type: none"> • 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
<ul style="list-style-type: none"> • 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
<ul style="list-style-type: none"> • Establish a program to ensure long-term maintenance of post-construction BMPs including a protocol for enforcement escalation of your storm water management codes
<ul style="list-style-type: none"> • Prior to commencing earth disturbing activities, ensure 100% of applicable sites have a fully

executed Maintenance Agreement for the site, including an approved Maintenance Plan for each post-construction BMP
BMPs that will enhance your community's ability to address nutrients:
<ul style="list-style-type: none"> • Update the design specification for bioretention to require internal water storage whenever feasible for additional nitrogen treatment (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"> ▪ Infiltration basins and trenches ▪ Dry extended detention basins ▪ Bioretention with internal water storage ▪ Constructed wetlands ▪ Permeable pavement with internal water storage
<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 community Engineer (or Engineering Department) 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 and/or conduct a physical inspection of BMPs at least once during the NPDES permit term
<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, and/or filter strips)
<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 increase infiltration and to function as constructed wetlands ○ 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, etc.
<ul style="list-style-type: none"> • Allow or require vegetative practices (taller native grasses, etc.) around storm water management ponds that discourage waterfowl
<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 nutrients:
<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
<ul style="list-style-type: none"> ○ 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
BMPs that will enhance your community's ability to address nutrients:
<ul style="list-style-type: none"> ● Programs which can be implemented to address nutrients from the above sources include: <ul style="list-style-type: none"> ○ Street and parking lot sweeping ○ Catch basin cleaning ○ Ditch cleaning or trash collection program for open channel MS4s ○ Timely stabilization of disturbed soils and soil stockpiles at the service yard, landfills and on municipal construction activity ○ BMPs for fertilizer storage and application, reduction of overall fertilizer use ○ Establish wash stations directed to sanitary sewers or utilize dry cleanup methods for lawn care equipment, golf carts, and other community vehicles and equipment used in parks and golf course maintenance ○ Locate snow disposal areas where there are wide vegetative buffers or within berms ○ Integrated Pest Management (IPM) and reduction of fertilizer use ○ Implement low-mow or no-mow practices that preserve buffer areas around streams, wetlands and storm water basins
<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"> ● Relocate stockpiles of waste materials and erodible materials away from stream banks and steep slopes
<ul style="list-style-type: none"> ● Establish "pick-up pet waste" stations in community parks and open space
<ul style="list-style-type: none"> ● Identify locations where green infrastructure such as bioretention, permeable pavement, cisterns, and infiltration trenches or basins can be installed at municipal facilities
<ul style="list-style-type: none"> ● Implement a road-kill program and properly store collected carcasses or take to a compost facility licensed to accept road-kill



Recommended Best Management Practices for Total Suspended Solids (Includes Sediment and Siltation)

Total Maximum Daily Load Fact Sheet

About Total Suspended Solids

Total Suspended Solids (TSS) are solids in water that can be trapped by a filter. The term TSS should not be confused with the term "total solids", which refers to the amount of matter suspended and dissolved in water or wastewater, and is related to both specific conductance and turbidity. Total Solids includes both total suspended solids (TSS): the portion of total solids retained by a filter; and total dissolved solids: the portion that passes through a filter. TSS can include a wide variety of material, such as silt, decaying plant and animal matter, industrial wastes, and sewage.

High concentrations of suspended solids causes many problems for stream health and aquatic life. High TSS can block light from reaching submerged vegetation. As the amount of light passing through the water is reduced, photosynthesis slows down. Reduced rates of photosynthesis causes less dissolved oxygen (DO) to be released into the water by plants. If light is completely blocked from bottom dwelling plants, the plants will stop producing oxygen and will die. Bacteria use up most of the remaining oxygen during plant decomposition, causing low levels of DO in the water. Low DO can lead to fish kills. High TSS can also cause an increase in surface water temperature, because the suspended particles absorb heat from sunlight. This can cause DO levels to fall even further (warmer waters naturally hold less DO), and can harm aquatic life in many other ways, as discussed in the temperature section.

Decreases in water clarity caused by TSS can affect the ability of fish to see and catch food. Suspended sediment can also clog fish gills, reduce growth rates, decrease resistance to disease, and prevent egg and larval development. When suspended solids settle to the bottom of a water body, they can smother the eggs of fish and aquatic insects, as well as suffocate newly hatched insect larvae. Settling sediments can fill in spaces between rocks which could have been used by aquatic organisms for homes.

High TSS in a water body can often mean higher concentrations of bacteria, nutrients, pesticides, and metals in the water. These pollutants may attach to sediment particles on the land and be carried into water bodies with storm water. In the water, the pollutants may be released from the sediment or travel farther downstream. Furthermore, High TSS can cause problems for industrial use, because the solids may clog or scour pipes and machinery.

Sources of Total Suspended Solids

TSS can come from a wide variety of sources, such as sediment conveyed by storm water runoff, streambank and streambed erosion, decaying plant and animal matter, industrial wastes, and sewage. The primary sources of TSS pollution include:

- **High Flow Rates**

The flow rate of the watercourse is a primary factor in TSS concentrations. Fast running water is more erosive and can carry more particles and larger-sized sediment. Heavy rains can pick up sand, silt, clay, and organic particles (such as leaves, soil, tire particles, etc.) from the land and carry it to surface water. A change in flow rate can also affect TSS; if the speed or direction of the water current increases, particulate matter from bottom sediments may be re-suspended in the water column, and streambank or streambed erosion may accelerate.

- **Soil Erosion and Disturbance**

Soil erosion is caused by disturbance of a land surface. Soil erosion can be caused by building and road construction, farming and agricultural activities, streambank hydromodification, logging, and mining. The eroded soil particles can be carried by storm water to surface water and will increase the TSS of the adjacent water body. In-stream soil disturbance from bottom-feeding fish or dredging activities can also contribute to TSS.

- **Storm Water Runoff**

During storm events, soil particles and debris from streets and industrial, commercial, agricultural and residential areas can be washed into streams. Large amounts of pavement in urban areas increases storm water runoff volume and velocity and decreases opportunities for infiltration as natural settling areas are removed. Sediment is carried through storm drains directly to creeks and rivers.

- **Wastewater and Septic System Effluent**

The effluent from Wastewater Treatment Plants (WWTPs) can add suspended solids to a stream. The wastewater from our houses contains food residue, human waste, and other solid material that we put down our drains. Most of the solids are removed from the water at the WWTP before being discharged to the stream, but treatment can't eliminate everything.

- **Organic Materials and Excess Nutrients**

As plants and animals decay within the water column, suspended organic particles are released and can contribute to the TSS concentration. Excess nutrients can result in increased algae and vegetation within water columns that will ultimately decay and contribute to TSS.

Best Management Practices that Address Total Suspended Solid 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 TSS 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 5 different storm water themes or messages over the permit term, at least one of which must be targeted to the development community.

To address TSS, choose at least one of the following themes:

- | |
|--|
| <ul style="list-style-type: none">• Protection and maintenance of natural vegetative buffers along waterways |
|--|

- Management of manure and pet wastes
- Reduction and management of residential and agricultural fertilizers
- Reduction of soil erosion on residential and agricultural land uses
- Reduction of impervious surfaces and the increase of on-site infiltration
- Composting and management of grass clippings and yard wastes
- Operation & Maintenance of on-site sewage treatments systems
- Construction site erosion and sediment control practices

MCM 2: Public Participation and Involvement

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

- To address TSS, implement at least one of the following activities:**
- Streamside plantings and cleanups
 - Storm drain stenciling
 - Construct a rain garden with assistance from the public
 - Allow residents to provide input on new proposed ordinances that reduce TSS (i.e., downspout disconnection, conservation development, riparian and wetland setbacks, etc.)
 - Conduct a charity car wash that implements best management practices and promotes environmental responsibility
 - Establish public reporting mechanism (complaint hotline, webpage, etc.) to identify non-compliance from construction sites,

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 TSS:**
- Maintain and continue updating the MS4 map on an annual basis (i.e., outfalls, names and locations of surface waters that receive discharges from those outfalls, catch basins, pipes, ditches, flood control facilities (retention/detention ponds), post-construction water quality BMPs and private post-construction water quality BMPs which have been installed to satisfy Ohio EPA's NPDES Construction Storm Water general permit and/or your local storm water management code requirements)
 - Develop and maintain a list and map of Sewage Treatment Systems¹ that discharge to your MS4; work with the local health department to identify and prioritize solutions to failing STS
 - Based upon data collected from previous screenings, establish a prioritization schedule for ongoing dry-weather screening of outfalls
 - Develop an IDDE plan that clearly defines the department(s) and/or agency(s) responsible for investigating and resolving confirmed sources of illicit discharges
 - Develop an enforcement escalation plan that outlines how your community will address illicit discharges
 - Clearly define escalation enforcement roles between affected agencies
 - Work with local health department to identify and eliminate failing sewage treatment systems
 - Establish timeframes for investigation and elimination
 - Document in the SWMP how community emergency spill response and cleanup plans are communicated and coordinated between applicable agencies and/or departments
 - Train street, service, public works, building, and parks and recreation staff to identify sources of illicit discharge

BMPs that will enhance your community's ability to address TSS:
<ul style="list-style-type: none"> • Establish an IDDE surveillance plan focused on sources of TSS such as: <ul style="list-style-type: none"> ○ Sewage treatment systems ○ Construction sites ○ Animal wastes (agricultural and pets) ○ Grass clippings and yard wastes
<ul style="list-style-type: none"> • Establish a schedule for regular meetings or other communications between third-party service providers (e.g., health department, SWCD, etc.) and the MS4 manager

1 - STS also includes home sewage treatment systems (HSTS) as referenced by the MS4 NPDES OHQ000003.

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 TSS:
<ul style="list-style-type: none"> • Update your existing construction runoff control code to meet or exceed the requirements of the NPDES Construction General Permit (OHC000004), including the federal effluent limitations in Part II
<ul style="list-style-type: none"> • Ensure the most current erosion, sediment and non-sediment control BMP standards are required to be utilized (e.g., Rainwater & Land Development)
<ul style="list-style-type: none"> • Complete Storm Water Pollution Prevention Plan (SWP3) reviews and approvals prior to construction commencement
<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
<ul style="list-style-type: none"> • Develop an enforcement escalation plan that outlines how and when your community will address noncompliance with approved erosion, sediment and non-sediment control plans
<ul style="list-style-type: none"> • Establish a standard operating procedure to respond to complaints
BMPs that will enhance your community's ability to address TSS:
<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
<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 deadlines for corrective action
<ul style="list-style-type: none"> • Maintain a map of active construction sites to more easily identify watersheds being impacted by construction site runoff and prioritize sites in those watersheds for inspections more frequently than once per month
<ul style="list-style-type: none"> • Establish a Sediment and Erosion Control bond equivalent to the cost to stabilize (vegetate) disturbed areas of the sites in cases of nonperformance (i.e. developer foreclosure/bankruptcy)

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 TSS:
<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
<ul style="list-style-type: none">• Ensure the most current post-construction BMP standards are required to be utilized (e.g., Rainwater & Land Development)
<ul style="list-style-type: none">• 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.
<ul style="list-style-type: none">• 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
<ul style="list-style-type: none">• Establish a program to ensure long-term maintenance of post-construction BMPs, including a protocol for enforcement escalation of your storm water management code
<ul style="list-style-type: none">• Prior to commencing earth disturbing activities, ensure 100% of applicable sites have a fully executed Maintenance Agreement for the site, including an approved Maintenance Plan for each post-construction BMP
BMPs that will enhance your community's ability to address TSS:
<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">• 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">• Establish a Sediment and Erosion Control bond equivalent to the cost to stabilize (vegetate) disturbed areas of sites in cases of non-performance
<ul style="list-style-type: none">• Require submittal of as-built drawings for post-construction BMPs to ensure installation and/or conduct a physical inspection of BMPs at least once during the NPDES permit term
<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

<ul style="list-style-type: none"> channels and/or filter strips) <ul style="list-style-type: none"> ○ Revised parking codes (e.g., decrease overall number of spaces, allow alternative pervious materials, shared parking, etc.)
<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 TSS:
<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
<ul style="list-style-type: none"> ● 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
BMPs that will enhance your community’s ability to address TSS:
<ul style="list-style-type: none"> ● Programs which can be implemented to address TSS from the above sources include: <ul style="list-style-type: none"> ○ Street and parking lot sweeping ○ Catch basin cleaning ○ Ditch cleaning or trash collection program for open channel MS4s ○ Timely stabilization of disturbed soils and soil stockpiles at the service yard, landfills and on municipal construction activity ○ Protection of catch basins and other appropriate sediment controls when conducting road repairs, waterline repairs and other maintenance activities of the Service Department or Department of Public Works

<ul style="list-style-type: none"> ○ BMPs for granular fertilizer storage and application ○ Establish wash stations directed to sanitary sewers or utilize dry cleanup methods for lawn care equipment, golf carts, boats, and other municipal vehicles and equipment used in parks and golf course maintenance ○ Locate snow disposal areas where there are wide vegetative buffers or within berms
<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"> ● Relocate stockpiles of waste materials and erodible materials away from stream banks and steep slopes and/or install appropriate sediment controls around such materials
<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"> ● Vegetate open areas at maintenance and storage yards to reduce TSS production