City of Wilmington
Stormwater Management
& Erosion Control Specifications

Prepared For:
Department of Public Works
Wilmington, Ohio

Approved / ~~Denied~~ by

Board of Control-City of Wilmington

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Table of Contents

Table of Contents

List of Figures

List of Tables

List of Appendices

List of Abbreviations/Acronyms

ASTM	American Society for Testing and Materials
BMP	Best Management Practices
CGP	Construction General Permit
CNs	Curve Numbers
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
HSG	Hydrologic Soil Group
HUC	Hydrologic Unit Code
LID	Low Impact Development
MS4	Municipal Separate Storm Sewer System
NRCS	USDA Natural Resources Conservation Service
NPDES	National Pollutant Discharge Elimination System
ODOT	Ohio Department of Transportation

Table of Contents

OEPA	Ohio Environmental Protection Agency
SCS	USDA Soil Conservation Service (now NRCS)
SWP3	Stormwater Pollution Prevention Plan
TMDL	Total Maximum Daily Load
TSS	Total Suspended Solids
USCS	Unified Soil Classification System
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
WQ_V	Water Quality Volume

Part 1 – General Provisions

Letter of Intent

IT IS HEREBY ORDERED that the *City of Wilmington Stormwater Management and Erosion Control Specifications* is hereby adopted and shall be followed in the processing of subdivision or site plan applications and other private and public land developments under the jurisdiction of the City of Wilmington, Ohio (City) and their Stormwater Administrator pursuant to Chapter 939 – Post-Construction Stormwater Runoff of the City of Wilmington, Ohio *Code of Ordinances*. Updates or revisions to this manual may be published from time-to-time as deemed necessary by the City.

A resolution acknowledging and adopting the *City of Wilmington Stormwater Management and Erosion Control Specifications* was adopted by the Wilmington City Council.

IT IS HEREBY FURTHER ORDERED that the effective date of these specifications shall be the 1st day of June, 2023.

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City of Wilmington Public Works Director

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City of Wilmington Stormwater Administrator

Purpose

These specifications were produced to update stormwater management requirements and unify site plan review procedures within the City of Wilmington, Ohio (City). It is the purpose of these specifications to establish a uniform set of minimum standards for the management of stormwater to be applied citywide. These specifications require owners who develop or redevelop their property within the City of Wilmington to:

1. Control stormwater runoff from their property and ensure that all stormwater management practices are properly designed, constructed, and maintained.
2. Reduce water quality impacts to receiving water resources that may be caused by new development or redevelopment activities.
3. Control the volume, rate, and quality of stormwater runoff originating from their property so that surface water and groundwater are protected, and flooding and erosion potential are not increased.
4. Minimize the need to construct, repair, and replace subsurface storm drain systems.
5. Preserve natural infiltration and groundwater recharge, and maintain subsurface flow that replenishes water resources, except in slippage prone soils.
6. Incorporate stormwater quality and quantity controls into site planning and design at the earliest possible stage in the development process.
7. Reduce the expense of remedial projects needed to address problems caused by inadequate stormwater management.
8. Maximize use of stormwater control measures that serve multiple purposes including, but not limited to, flood control, erosion control, fire protection, water quality protection, recreation, and habitat preservation.
9. Design sites to minimize the number of stream crossings and the width of associated disturbance to minimize future expenses related to the maintenance and repair of stream crossings.
10. Maintain, promote, and re-establish conditions necessary for naturally occurring stream processes that assimilate pollutants, attenuate flood flows, and provide a healthy water resource.

These specifications shall apply to all subdivision or site plan applications for new and redevelopment as outlined in the City's *Code of Ordinances*. The specifications contained herein apply to any construction activity disturbing one acre or more of land or will disturb less than one acre of land but are part of a larger common plan of development or sale that will ultimately disturb one or more acres of land. Activities disturbing less than one acre of land may be required to submit an Abbreviated Stormwater Pollution Prevention Plan (SWP3) and comply with the provisions of Part 3 "Soil Erosion and Sediment Control".

Compliance with State and Federal Stormwater Mandates

In compliance with the provisions of the Federal Water Pollution Control Act, as amended (33 U.S.C. 1251 et. seq.) and the Ohio Water Pollution Control Act (ORC Chapter 611) the regulatory framework for stormwater management in the City is laid out by two Ohio Environmental Protection Agency (OEPA) permits:

- NPDES Permit No.: OHQ000004, *Authorization for Small Municipal Separate Storm Sewer Systems to Discharge Storm Water Under the National Pollutant Discharge Elimination System,* dated April 1, 2021, referred to as the Ohio MS4 NPDES Permit.
- OEPA Permit No.: OHC000005, *General Permit Authorization for Storm Water Discharges Associated with Construction Activity Under the National Pollutant Discharge Elimination System*, dated April 23, 2018, referred to as the Construction General Permit (CGP).

The Ohio MS4 NPDES Permit requires the City to adopt an ordinance or other regulatory mechanism to address construction site stormwater runoff and post-construction stormwater runoff from new development and redevelopment projects that result in a land disturbance of greater than or equal to one acre. At a minimum, these specifications shall be equivalent with the technical requirements set forth in the CGP and shall ensure

adequate long-term operation and maintenance of post-construction runoff controls, including provisions for when property changes ownership.

Total Maximum Daily Loads

The Ohio MS4 NPDES permit requires an additional performance standard if your small MS4 discharges to a watershed with a U.S. Environmental Protection Agency (USEPA) approved Total Maximum Daily Load (TMDL) for any of the following pollutants:

- Total Suspended Solids (includes Sediment and Siltation)
- Nutrients (Includes Phosphorus, Nitrogen, and Ammonia)

The Lower Little Miami River Watershed TMDL report was approved by U.S. Environmental Protect Agency (USEPA) on March 28, 2011. Information about each of the four sub-watersheds the City drains into is included within this report. Detailed TMDL information for the City can be found in the current version of the Stormwater Management Program.

Total Suspended Solids and Nutrient TMDLs have been established for the Lytle Creek (HUC 050902020603) and Headwaters Cowan Creek (HUC 050902020604) watersheds. The majority of the City falls within the Lytle Creek watershed and so these additional performance standards will be applied throughout the City and have been incorporated in these specifications.

Preferred Stormwater Management Strategies

Low Impact Development

Low Impact Development (LID) is the preferred stormwater management strategy to meet the multiple objectives identified previously. LID uses the basic principle modeled after nature to manage rainfall where it lands. The outcome of LID is mimicking existing site hydrology by using design techniques to infiltrate, filter, store, evaporate and detain runoff close to its source. Many of these techniques incorporate the use of vegetation and are collectively referred to as Green Infrastructure. A LID approach offers additional benefits in terms of increased property value and potential cost savings.[1] The size of stormwater storage facilities and infrastructure can often be reduced by incorporating LID principles into a site design up front. Where practical, stormwater should be collected for recycling and used in on-site irrigation systems.

The Ohio MS4 NPDES Permit requires that Infiltration Post-Construction Practices included on Table 4b of the CGP or other Green Infrastructure practices be implemented within the Lytle Creek and Headwaters Cowan Creek watersheds where feasible.

Preferred LID techniques include bioretention, infiltration basins, stormwater disconnection, and preservation of sensitive areas. Permeable pavements are not a preferred strategy due to their high susceptibility to failure.

Preservation of Existing Natural Drainage

Practices that preserve the existing natural drainage shall be used to the maximum extent practicable. Such practices may include minimizing site grading and compaction; protecting and/or restoring water resources, riparian areas, and existing vegetation and vegetative buffer strips; phasing of construction operations in order to minimize the amount of disturbed land at any one time; designation of tree preservation areas or other

[1] United States Environmental Protection Agency (December 2007). *Reducing Stormwater Costs through Low Impact Development (LID) Strategies and Practices*, EPA 841-F-07-006.

protective clearing and grubbing practices; and maintaining unconcentrated stormwater runoff to and through these areas.

Regional Stormwater Management

The management of stormwater on a regional basis is encouraged where practical, particularly where site constraints may preclude effective onsite treatment of stormwater. A regional stormwater management approach allows for the use of superior performing Best Management Practices (BMPs) that require more space, and provides more flexibility for BMPs to be sited strategically to address a known water quality issue.

Specific requirements are provided in Part 2 – Post-Construction Stormwater Management Requirements section "Regional Stormwater Management Facilities".

Applicability

Review Required

These specifications shall be applicable to all subdivision, site plan, or land disturbance applications as outlined in the City's *Code of Ordinances*. The specifications contained herein apply to any construction activity disturbing one acre or more of land or will disturb less than one acre of land but are part of a larger common plan of development or sale that will ultimately disturb one or more acres of land except those explicitly excepted. Sites which disturb more than 0.1 acres shall comply with the provisions of Part 3 – Soil Erosion and Sediment Control and may be required to submit an Abbreviated SWP3 as detailed on page 34 of this report.

Exceptions

The following activities may be exempt from these stormwater performance criteria as outlined in the City's *Code of Ordinances*.

1. Additions or modifications to existing single-family structures.
2. Developments that do not disturb one acre or more, provided they are not part of a larger common plan of development.
3. Repairs to any stormwater treatment practice deemed necessary by the City of Wilmington.
4. Agricultural activity.

Linear construction projects, such as pipeline or utility line installation, that do not result in the installation of impervious surface as determined by the City Engineer or OEPA shall be exempted from the post-construction requirements in Part 2. Such projects must be designed to minimize the number of stream crossings and the width of disturbance. Such projects must comply with the provisions of Part 3 – Soil Erosion and Sediment Control.

Redevelopment

Redevelopment projects are those that change the existing site footprint or offer new opportunities for stormwater control. Projects that disturb the underlying or surrounding soil, remove surrounding vegetation or change the area of impervious surface are considered redevelopment projects if they will alter the stormwater drainage characteristics of the site. For roadway and parking projects, reconstruction of the subbase with a change in drainage is considered redevelopment, whereas an overlay of the pavement surface is not.

Redevelopment and additions requiring site plan review shall comply with the current standards for the redeveloped or newly constructed portion of the site. The City reserves the right to require the entire site be brought up to the current standards.

When the principal structure(s) on the site are retained, the pre-development condition shall be based on the actual site conditions existing prior to the redevelopment. When the principal structure(s) are to be razed, the pre-development condition shall consider the affected area to have grass cover.

Severability

If any part of these specifications is found to be invalid, such invalidity shall not affect the remaining portions of the specifications which can be given effect without the invalid portion, and to this end the specifications are declared to be severable.

Fees

The fees for reviewing a subdivision or site development under these rules are set forth in the Schedule of Fees which can be found online at the City website.

Part 2 – Post-Construction Stormwater Management Requirements

Stormwater Drainage Requirements

General Requirements

1. Every subdivision and land development shall be provided with a stormwater management system which is adequate to serve the area and meets the requirements of the relevant chapters of the City Codified Ordinances and other criteria as specified herein.
2. Stormwater management systems shall be designed for the ultimate use of the land.
3. Applicants are required to design improvements such that during storm events having recurrence intervals as specified herein, the rate and volume of stormwater runoff leaving the development is not more after development than as specified. If necessary, stormwater control measures shall be constructed to ensure that this requirement is met.
4. So that receiving stream's physical, chemical, and biological characteristics are protected, and stream functions are maintained, post-construction storm water practices shall provide long-term management of runoff quality and quantity and shall at a minimum meet the requirements herein and as outlined in the CGP (OHC000005).
5. Stormwater control measures shall be designed with maintenance in mind and a maintenance plan and legal agreement will be required to ensure adequate long-term operation and maintenance of post-construction runoff controls, including provisions for when property changes ownership.
6. On any site development, the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM) should be consulted for the stormwater effect on the development.
7. Development shall comply with the requirements of Chapter 1307 – Flood Damage Protection of the City's *Code of Ordinances*. To further protect buildings against flood damage, the lowest floor or opening elevation, whichever is lowest, shall be a minimum of one (1) foot above the 100-year flood level of nearby waterbodies or conveyances.

Drainage Plan

Drainage Patterns

Proposed drainage for the development shall conform to existing watershed boundaries and natural drainage patterns within the site. The stormwater management requirements contained herein shall be determined independently for each site outfall.

Staged Development

Should the Applicant plan to develop a given area but wish to begin with only a portion of the total area, the comprehensive stormwater management plan shall include the proposed layout of the entire area.

1. Each phase of a staged development shall be self-sufficient from the standpoint of drainage both during and after construction.
2. A phased SWP3 is required for projects which will be completed in stages.
3. The first phase of the development shall be clearly superimposed upon the overall plat or site plan in order to clearly illustrate the method of development that the applicant intends to follow. Each subsequent phase shall follow the same procedure until the entire area controlled by the applicant is developed.

4. Final acceptance by the City Engineer of only one portion or phase of a development does not ensure final acceptance of any subsequent phases or the overall general site plan for the entire area; nor does it mandate that the overall general site plan be followed as originally proposed if deviations or modifications acceptable to the City Engineer are proposed. The approved plan shall be adhered to unless and until a revised plan is approved.

Location of Stormwater Management Facilities

Stormwater management facilities within a development planned to have multiple lot owners shall be located on dedicated outlots, within road rights-of-way, or have separate easements granted to the entity responsible for operation and maintenance of the stormwater management system.

Parking lots, roadways, and pedestrian traffic areas shall not be flooded for use as stormwater detention.

Offsite Stormwater

Surface water flows from offsite land shall be routed around the development's onsite stormwater system whenever possible. An onsite detention basin shall not be used to pass this flow through the site without treatment. If water from offsite is directed through onsite stormwater control measures, these measures must either be designed as a regional stormwater management facility, or treat the existing offsite water to the same standard as the site.

Stormwater Discharge

The rate, volume, concentration, or constitution of stormwater discharged from a site for the specified design storms shall not create adverse impacts to downstream property owners and watercourses. To that end, the following stormwater discharge requirements must be met for all sites:

1. Post-development discharge shall not exceed the capacity of existing infrastructure or the existing discharge rate from the site.
2. Post-development discharge shall not cause adverse impact to offsite property due to concentrated runoff or ponded water of greater height, area and duration.
3. Discharge shall not cause downstream erosion or sedimentation.
4. Discharge to groundwater shall not cause groundwater mounding sufficient to adversely impact structures or adjacent property.
5. Post-development discharge shall not cause impairments by the contribution of pollutants to surface water or groundwater.
6. Post-development discharge shall not cause impairments to cold water streams due to thermal properties of the discharge.
7. For a downstream drainage system that is inadequate to handle any increase to the existing design discharge from the site development, it is the applicant's responsibility to:
    a. Stabilize or upsize the existing conveyance system to provide the needed design level of flood protection.
    b. Obtain flooding easements for increases in water levels determined to cause an adverse impact.
    c. Provide additional onsite stormwater controls.

It is the applicant's obligation to meet these requirements. Should a stormwater system, as built, fail to comply, it is the applicant's responsibility to have constructed at their expense, any necessary additional and/or alternative stormwater management facilities, subject to the City Engineer's review and approval.

Regional Stormwater Management Facilities

Regional stormwater management facilities are designed to serve multiple developments with more than one property owner at the time of development or redevelopment.

The City may pursue projects within a watershed to construct facilities to serve a particular drainage area or may approve facilities proposed to be constructed by individual applicants. Private facilities must have a written agreement between responsible parties with recorded easements to ensure operation and maintenance of the facility in perpetuity. Agreements must specify maximum allowable runoff coefficients for each parcel contributing to the facility.

The regional facility should be constructed first, prior to any development or redevelopment. Written approval is required from the City Engineer if construction is to be delayed. Financial surety and temporary onsite measures must be provided until the facility is constructed.

If this option is exercised, the applicant must agree in writing to participate in the cost of the regional facility whether already constructed or planned. The amount of participation and method of collection will be determined by the City.

Off-site Mitigation and Payment-in-lieu

Off-site Mitigation

Off-site mitigation refers to BMPs implemented at a location other than the proposed development or redevelopment, but within the same jurisdiction and watershed/sewershed as the original project to meet the stormwater management requirements of the MS4 permit. The watershed is the area represented by the 10-digit Hydrologic Unit Code (HUC). The sewershed is the area where stormwater is conveyed by an MS4 to a common outfall or point of discharge.

The City requires that off-site mitigation is protective of the same watercourse or waterbody to which the site discharges and is located downstream of the proposed development or redevelopment if possible.

Payment-in-lieu

Payment-in-lieu refers to the applicant paying a fee to the City, which is then applied toward a public stormwater management project that fulfills the stormwater requirements for the site. The stormwater management project may be either a regional stormwater management facility, a new BMP, or a retrofit to an existing BMP.

The City Engineer will only consider payment-in-lieu if the City has a planned or constructed improvement project meeting the requirements for offsite mitigation. The cost of payment-in-lieu will be determined on a case-by-case basis and will represent the actual cost of implementing water quality enhancements.

Criteria

The determination to approve offsite mitigation or payment-in-lieu will be based on multiple criteria and not solely on the difficulty or cost of implementing BMPs on site. Conditions under which the option to move offsite would become available may include:

1. Limited size of the lot outside of the building footprint to create the necessary infiltration capacity even with amended soils.
2. Soil instability as documented by a thorough geotechnical analysis.
3. A site use that is inconsistent with capture and reuse of stormwater.
4. Too much shade or other physical conditions that preclude adequate use of plants.
5. The potential water quality impact from the original project site and the benefits realized at the offsite location.

The City Engineer may approve offsite mitigation or payment-in-lieu if the applicant demonstrates that site constraints preclude sufficient treatment and restoration of hydrology onsite and the following minimum requirements are met:

1. Offset ratio. The offset ratio for the amount of stormwater not managed onsite in relation to the amount of stormwater required to be mitigated at another site or for which in-lieu payments will be made is as follows:
   a. First Tier: Manage a minimum of 0.4 inches of storm water runoff onsite and provide a 1:1.5 offset ratio for the remaining amount of stormwater managed offsite.
   b. Second Tier: If it is completely infeasible to manage the minimum onsite, provide a 1:2 offset ratio for the amount of stormwater managed offsite.
2. Schedule. Offsite mitigation shall be completed within 24 months after the start of the original site construction.
3. Assurances. Offsite and in-lieu projects shall be preserved and maintained in perpetuity through the procedures and tracking system administered by the City Engineer.

Provisions for Requirements in Addition to Minimum Standards

These specifications provide minimum standards to be complied with by applicants and in no way limit the authority of the City to adopt, publish, or enforce higher standards as a condition of approval of the final plat or site plan. Proposed site plans shall complement any local stormwater master plans that may exist and/or comply with all other ordinances in effect.

The City reserves the right to determine site-specific requirements other than those herein, based upon review of the plans. Any deviations from these standards shall be based on the recommendation of the City Engineer and subject to approval by the Planning Commission.

Maintenance Plan and Covenant

A legally binding maintenance covenant meeting the requirements of Chapter 939 of the City's *Code of Ordinances* is required before approval is granted for sites subject to these specifications. The maintenance covenant must include a maintenance plan and schedule and require tracking of compliance.

The maintenance plan shall adhere to the requirements of the CGP and contain:

1. A designated entity for stormwater inspection and maintenance responsibilities.
2. The routine and non-routine maintenance tasks to be undertaken.
3. A schedule for inspection and maintenance.
4. Any necessary legally binding maintenance easements and agreements.
5. Construction drawings or excerpts showing the plan view, profile, and details of the outlet(s).
6. A map showing all access and maintenance easements.
7. For CGP Table 4a/4b practices, provide relevant elevations and associated volumes that dictate when removal of accumulated sediments must occur.

Easements

Access to stormwater control measures as required by the City Engineer for inspections and maintenance shall be secured by easements. The following conditions shall apply to all easements:

1. Easements shall be included in the Inspection and Maintenance Agreement submitted with the Comprehensive Stormwater Management Plan.
2. Easements shall be approved by the City prior to approval of a final plat or site plan and shall be recorded with the County Auditor and on all property deeds.

3. Unless otherwise required by the City Engineer, access easements between a public right-of-way and all stormwater control measures shall be no less than 25-feet wide. The easement shall also incorporate the entire practice plus an additional 25-foot-wide band around the perimeter of the practice.
4. The easement shall be graded and stabilized as necessary to allow maintenance equipment to access and manipulate around and within each facility, as defined in the Inspection and Maintenance Agreement for the site.
5. Easements to stormwater control measures shall be restricted against the construction therein of buildings, fences, walls, and other structures that may obstruct the free flow of stormwater and the passage of inspectors and maintenance equipment; and against the changing of final grade from that described by the final grading plan approved by the City. Any re-grading and/or obstruction placed within a maintenance easement may be removed by the City at the property owner's expense.

Watershed Policy Statements

Watershed Policy Statements refer to policies of authorities having jurisdiction or policy recommendations from engineering studies or management plans. Watershed policies may be based on the results of hydrogeologic, hydrologic and hydraulic modeling or monitoring. The policy statements identify watershed-specific stormwater management standards and the areas where they must be applied to meet resource protection goals. Watershed policies may address a variety of special stormwater management considerations (e.g., well-head protection areas, flood control zones, buffer overlay zones, water quality thresholds, regional stormwater management districts). Watershed Policy Statements for the City are included in Appendix 3.

Stormwater Management Requirements

Summary

The following stormwater management requirements shall apply to all new and redevelopments in the City.

1. Protection. The design process shall begin by identifying environmentally sensitive areas located on the site and laying out the site to maximize protection of the sensitive areas.
2. Source Controls. Nonstructural BMPs shall be used for protection of environmentally sensitive areas on the site and to reduce the amount of stormwater runoff.
3. Runoff Controls. Stormwater runoff shall be managed onsite using structural BMPs to protect both water resources and real property. Minimum stormwater standards are summarized in Table 1. Higher standards may be required for sites that discharge to areas with known issues.
4. Watershed Policy Statements. Specific stormwater management policies (if any) established for identified watersheds or protection areas must be met in addition to these minimum standards.
5. Offsite Stormwater Management Options. Regional stormwater management facilities are encouraged, particularly where site constraints preclude effective onsite treatment of stormwater. Offsite mitigation and payment-in-lieu programs (if available) may be approved to meet channel protection standards.
6. Adequate Outlet. The design maximum release rate, volume or concentration of stormwater discharged from a site shall not exceed the capacity of downstream infrastructure or cause impairment to the offsite receiving area.
7. BMP Design. BMPs must be designed to meet the minimum criteria provided. BMPs must be sized to meet the technical requirements in the CGP and shall be designed according to the methodology included in the most current edition of *Rainwater and Land Development* or another design manual acceptable for use by the City and OEPA.
8. Groundwater. The highest known groundwater elevation and extent of mounding from infiltration BMPs shall be determined to ensure no adverse impacts internal and external to the development.
9. Soils. Test pits or soil borings and field permeability testing are required for most structural BMPs to determine soil classification, depth to groundwater, infiltration rates and other site constraints.
10. Restrictive Covenants. Plats and site condominium developments must incorporate specific requirements for lot grading, minimum floor and opening elevations, footing drains, stormwater easements for rear and side yard drainage and individual Soil Erosion and Sedimentation Control Permits.
11. Stormwater Easements. Easements are required for drainage systems accepted by the City as a public stormwater system or for private systems with multiple landowners.
12. Operation and Maintenance. Stormwater BMPs must be designed to allow for operation and maintenance, demonstrated in the review submittals. A maintenance covenant shall be approved by the City and recorded into the land record prior to final approval. A maintenance agreement between the applicant and the City is required for stormwater systems established as public stormwater facilities when a private entity or organization wishes to conduct the maintenance.

Table 1 – Minimum Required Stormwater Standards

Standard/Where Required	Criteria
Water Quality and Stream Protection All sites.	Treat the runoff generated from 0.9 inch of rain over the project site according to the criteria in the CGP.
Flood Control All sites unless exception is allowed.	Collection and Conveyance: Design storm sewers and swales for the 10-year storm and open channels for the 25-year storm. Detention and Retention: The peak discharge rate of runoff from the Critical Storm and all more frequent storms shall not exceed the peak discharge rate of runoff from a 1-year, 24-hour storm under pre-development conditions. Storms of less frequent occurrence shall have peak discharge rates no greater than the peak rate from an equivalent storm under pre-development conditions. The 1-, 2-, 5-, 10-, 25-, 50-, and 100-year storms shall be considered in designing a facility to meet this requirement. Overflow Routes for Extreme Flood: Identify overflow routes and the extent of high-water levels for the 100-year flood to ensure no adverse impacts to structures offsite or internal to the site. Where overland flow routes do not exist: 1. Protect buildings with redundant storm sewer system sized for the 100-year storm; and 2. Increase size of detention and retention basins to store 2 times the flood control volume.
Pretreatment Refer to Table 3.	Forebay volume equal to 10% of water quality volume (required for detention/retention basins); vegetated filter strip; vegetated swale; or water quality device.

Water Quality and Stream Protection

Where Required

Treatment of the water quality volume is required for all sites to capture and treat the "first flush" of stormwater runoff that typically carries with it the highest concentration of pollutants.

Standard

Capture and treatment of the runoff from 0.9 inches of rainfall on the project site is required according to the technical criteria in the CGP. The water quality volume, WQ_v, shall be determined using the following equations:

$WQ_v = Rv * P * A/12$ (Equation 1)

Where:
WQ_v = water quality volume in acre-feet
Rv = the volumetric runoff coefficient calculated using Equation 2
P = 0.90 inch precipitation depth
A = area draining into the BMP in acres

$Rv = 0.05 + 0.9i$ (Equation 2)

Where i = fraction of post-construction impervious surface

An additional 20 percent of the WQ_v shall be incorporated into the BMP for sediment storage.

Treatment BMPs

BMPs shall be designed according to the methodology described in the most current edition of *Rainwater and Land Development* by the OEPA. Where feasible practices from Table 4b of the CGP and/or other green infrastructure practices shall be implemented. Alternative post-construction BMPs may be allowed following the criteria in the CGP. The minimum treatment rate for alternative BMPs is 80% Total Suspended Solids (TSS) removal at the design flow rate for the tested BMP.

Table 2 – Infiltration Post-Construction Practices with Maximum Drain Times (CGP Table 4b)

Infiltration Practices	Maximum Drain Time of WQ_v
Bioretention Area/Cell	24 hours
Infiltration Basin	24 hours
Infiltration Trench	48 hours
Permeable Pavement – Infiltration*	48 hours
Underground Storage – Infiltration	48 hours

* Permeable Pavements are not a preferred practice of the City due to their susceptibility to failure. If allowed by the City, permeable pavement installations shall include detailed maintenance plans and funding to ensure their long-term performance.

Flood Control

Where Required

Flood control is required for all sites.

Standard

The critical storm method, as detailed in OEPA's *Rainwater and Land Development*, shall be used to control the peak rates of runoff from a development generated by less common storms to mitigate flooding and channel erosion produced by events of this magnitude. Designing a stormwater management practice according to the critical storm method reduces stormwater discharge rates to no more than those that occurred prior to development for a selected design storm.

The peak rates of runoff from an area after development may be no greater than the peak rates of runoff from the same area before development for all 1- to 100-year frequency, 24-hour storms.

If the volume of runoff from an area after development will be greater than the volume of runoff from the same area before development, it shall be compensated by reducing the peak rate of runoff from the critical storm and all more frequent storms occurring on the development area to the peak rate of runoff from a 1-year frequency, 24-hour storm occurring on the same area under pre-development conditions. Storms of less-frequent occurrence (longer return periods) than the critical storm up to the 100-year storm shall have peak runoff rates no greater than the peak runoff rates from equivalent size storms under pre-development conditions.

Apply the critical storm method to each individual watershed within the development area. Calculate all pre- and post-development runoff rates and volumes at each outlet using their respective drainage divides and design stormwater management practices accordingly.

Overflow Routes for Extreme Flood

Overflow routes and the extent of high-water levels for the 100-year flood shall be identified for the site and for downstream areas between the site and the nearest acceptable floodway or outlet. Provisions shall be made to ensure no adverse impacts offsite or internal to the site.

Acceptable overflow routes are defined as available flow paths that do not flood structures including buildings, parking garages and the like. Where acceptable overflow routes do not exist:

1. Buildings shall be protected from flooding by two separate enclosed drainage systems, a primary and a redundant system, each independently protecting the building from flooding during the 100-year storm. Runoff shall be directed to the inlets of the primary system for up to a 10-year storm, to minimize the accumulation of debris over the redundant inlets; and
2. Detention and retention basins shall be increased in size to store two times the flood control volume.

Note: The intent of the extreme flood criteria is to prevent flood damage from large but infrequent storm events by identifying and/or designing overland flow paths that are clear of structures and have grades below the lowest openings of structures. Overflow routes may include floodplains along open channels, overbank areas along vegetated swales, curb jumps in drives and parking lots and other flow paths flood waters will take to reach an outlet, whether overland or underground.

Pretreatment

Where Required

Pretreatment is required prior to discharging stormwater runoff to the following structural BMPs to preserve the longevity and function of the BMP:

1. Detention Basins
2. Retention Basins
3. Infiltration Practices
4. Bioretention/Rain Gardens
5. Constructed Filters
6. Capture Reuse

Treatment BMPs

Pretreatment provides for the removal of fine sediment, trash and debris. Methods of pretreatment include:

1. Forebays (including spill containment cells, water quality swales, check dams and level spreaders)
2. Vegetated Filter Strips (including buffers and green roofs)
3. Vegetated Swales (including natural flow paths)
4. Water Quality Devices

Standard

Sediment Forebay

A minimum pretreatment volume equivalent to 10% of the water quality volume is required for sediment forebays using gravity.

Changes in forebay size may be allowed if sufficient design information is provided.

Vegetated Filter Strip

Provide a 10-foot minimum sheet flow length at a maximum slope of 2% with an impervious approach length no greater than 3.5 times the filter strip length, up to a maximum approach length of 75 feet.

Provide a 15-foot minimum sheet flow length for slopes between 2% and 6% with an impervious approach length no greater than 3 times the filter strip length, up to a maximum approach length of 75 feet.

Vegetated Swale

Provide a 20-foot minimum length and a minimum 1-foot high check dam with wedge storage sized as a sediment forebay.

Water Quality Device

Configured to trap sediment, oils and floatables in an integral unit. Follow manufacturer's guidelines. Water quality devices shall provide a minimum treatment rate of 50% TSS removal at the design flow rate according to NJDEP testing or the testing protocol in the CGP.

Catch basin inserts (inlet filters) are generally not accepted as a post-construction BMP due to the high level of maintenance required and because their use impedes inspection of the storm sewer system, but they may be evaluated for use on small retrofit sites if no other alterations to the storm sewer system are necessary.

Stormwater Design Criteria

Soils Investigation

Qualifications

Soils investigation by a qualified geotechnical consultant is required for retention and detention basins, infiltration practices, bioretention/rain gardens, constructed filters, planter boxes and pervious pavement to determine the site soil infiltration characteristics and groundwater level. The geotechnical consultant shall be a professional engineer, soil scientist, or professional geologist.

Background Evaluation

An initial feasibility investigation shall be conducted to screen proposed BMP sites. The investigation involves review of the following resources:

1. County Soil Survey prepared by the NRCS and U.S. Department of Agriculture USDA Hydrologic Soil Group (HSG) classifications.
2. Existing soil borings, wells or geotechnical report on the site.
3. Onsite septic percolation testing.
4. Cyclical groundwater levels. https://waterdata.usgs.gov/oh/nwis/gw

Test Pit/Soil Boring Requirements

A test pit (excavated trench) or soil boring shall be used for geotechnical investigation. Test pits may typically be selected for shallower investigations in locations where groundwater is sufficiently low.

The number of test pits or soil borings will vary depending on site conditions and the proposed development. The minimum number of test pits or soil borings shall be determined from Table 3.

Additional tests may be requested based on local conditions and initial findings (e.g., large variability in soil type, high groundwater table).

Table 3 – Minimum Number of Soil Tests Required

Type of BMP	Test Pit/Soil Boring	Depth of Test Pit/ Soil Boring	Field Permeability Test	
			Design	Post-construction
Retention Basin	1 per 5,000 square feet of bottom area; 1 minimum	10 feet below proposed bottom[2]	1 per change in soil class; 1 minimum	1 minimum
Infiltration Bed Pervious Pavement				No
Infiltration Trench	1 per 500 to 1,000 linear feet of BMP; 1 minimum	5 feet below proposed bottom	1 per change in soil class; 1 minimum	No
Bioswale				1 minimum
Dry Well Leaching Basin	1 minimum	5 feet below proposed bottom	1 per change in soil class; 1 minimum	No
Bioretention/Rain Garden Planter Box				1 minimum
Detention Basin	1 per 10,000 square feet of bottom area; 1 minimum	5 feet below proposed bottom	No	No

[2] Bottom refers to the lowest elevation of the practice including sub-surface layers.

Excavate a test pit or soil boring in the location of the proposed BMP. The following conditions shall be noted and described, referenced from a top-of-ground elevation:

1. Depth to groundwater recorded during initial digging or drilling and again upon completion of the excavation.
2. Depth to bedrock or hardpan.
3. Depth and thickness of each soil horizon including the presence of mottling.
4. Unified Soil Classification System (USCS) for all soil horizons. USDA soil texture classification when required.

Test pit reports and soil boring logs shall include the date(s) data was collected and the location referenced to a site plan.

Highest Known Groundwater Elevation

The highest known groundwater elevation shall be determined by adjusting the measured groundwater elevation using indicators such as soil mottling and regional water level data. It should also take into consideration local conditions that may be temporarily altering water levels at the time of measurement. Such conditions could include, but not be limited to dewatering, irrigation well or large quantity withdrawals in the area or areas of groundwater infiltration (such as a nearby retention basin).

Field Permeability Testing

Field permeability testing is generally not required but is recommended to determine a design infiltration rate. The City reserves the right to request that field permeability testing be performed.

Acceptable field tests include:

1. Infiltration Rate of Soils in Field Using Double-Ring Infiltrometers (ASTM D3385).
2. Single-Ring Infiltrometer Method (*Rainwater and Land Development*, Sec 2.17).
3. Pit Method (*Rainwater and Land Development*, Sec 2.17)

Laboratory tests are not allowed.

The minimum number of field permeability tests shall be determined from Table 4**.** The City reserves the right to request additional field permeability tests be performed.

Tests shall be conducted in the location of the proposed BMP per Table 3**.** Field permeability tests should be at a depth 2 to 5 feet below the proposed bottom elevation. An alternate testing depth may be allowed if material is identical and groundwater is not an issue. Tests shall not be conducted in the rain or within 24 hours of significant rainfall events (>0.5 inch) or when the ground is frozen.

Test reports shall include the date(s) data was collected and the location referenced to a site plan.

Design Infiltration Rates

The procedure used to determine a design infiltration rate is summarized in Table 4. The resulting design infiltration rate shall be the limiting value of the underlying soil or top dressing.

Table 4 – Determination of a Design Infiltration Rate

Description	Value	Maximum Design Infiltration Rate
1. Underlying Soil		
Field Permeability Testing Conducted	Test value divided by 2	10 in/hr
No Testing	Table 5	2.8 in/hr
2. Top Dressing	Table 6	2.8 in/hr

The infiltration rate determined from field permeability testing shall be divided by 2 to calculate the design infiltration rate, up to a maximum design infiltration rate of 10 inches per hour. The least permeable soil horizon within 4 feet below the proposed BMP bottom elevation shall be used to determine the design infiltration rate.

Where field permeability testing is not performed, the design infiltration rates provided in Table 5 shall be used to calculate the storage volume and minimum infiltration area of the BMP necessary to drain in the allotted drawdown time.

Table 5 – Design Infiltration Rates by USDA Soil Texture Class

Soil Texture Class	Effective Water Capacity[1] (inches per inch)	Design Infiltration Rate[2] (inches per hour)	HSG
Gravel	0.40	3.60	A
Sand	0.35	2.80	A
Loamy Sand	0.31	2.00	A
Sandy Loam	0.25	0.80	A
(Medium) Loam	0.19	0.25	B
Silty Loam / Silt	0.17	0.10	B
Sandy Clay Loam	0.14	0.07	C
Clay Loam	0.14	0.02	D
Silty Clay Loam	0.11	0.02	D
Sandy Clay	0.09	< 0.005	D
Silty Clay	0.09	< 0.005	D
Clay	0.08	< 0.005	D

[1]Source: Maryland Department of Environment (2000). *Maryland Stormwater Design Manual*, Appendix D.13, Table D.13.1 (Rawls, Brakensiek and Saxton, 1982).
[2]Source: Ohio Environmental Protection Agency (2018). *Rainwater and Land Development,* Section 2.17.

Table 5 provides design values of the infiltration rate and effective water capacity (void ratio) for soils based on their textural classification. Soil textural classes correspond to the USDA Soil Textural Triangle shown in Figure 1.

Note: Infiltration is the process by which water on the ground surface enters the soil. Infiltration rate is a measure of the rate at which soil can absorb rainfall or irrigation in inches per hour. The rate decreases as the soil becomes saturated. The design infiltration rate assumes saturated conditions and closely approximates the hydraulic conductivity (typically given in feet per day) of the near-surface soil.

Note: The effective water capacity of a soil is the fraction of the void spaces available for water storage measured in inches per inch.

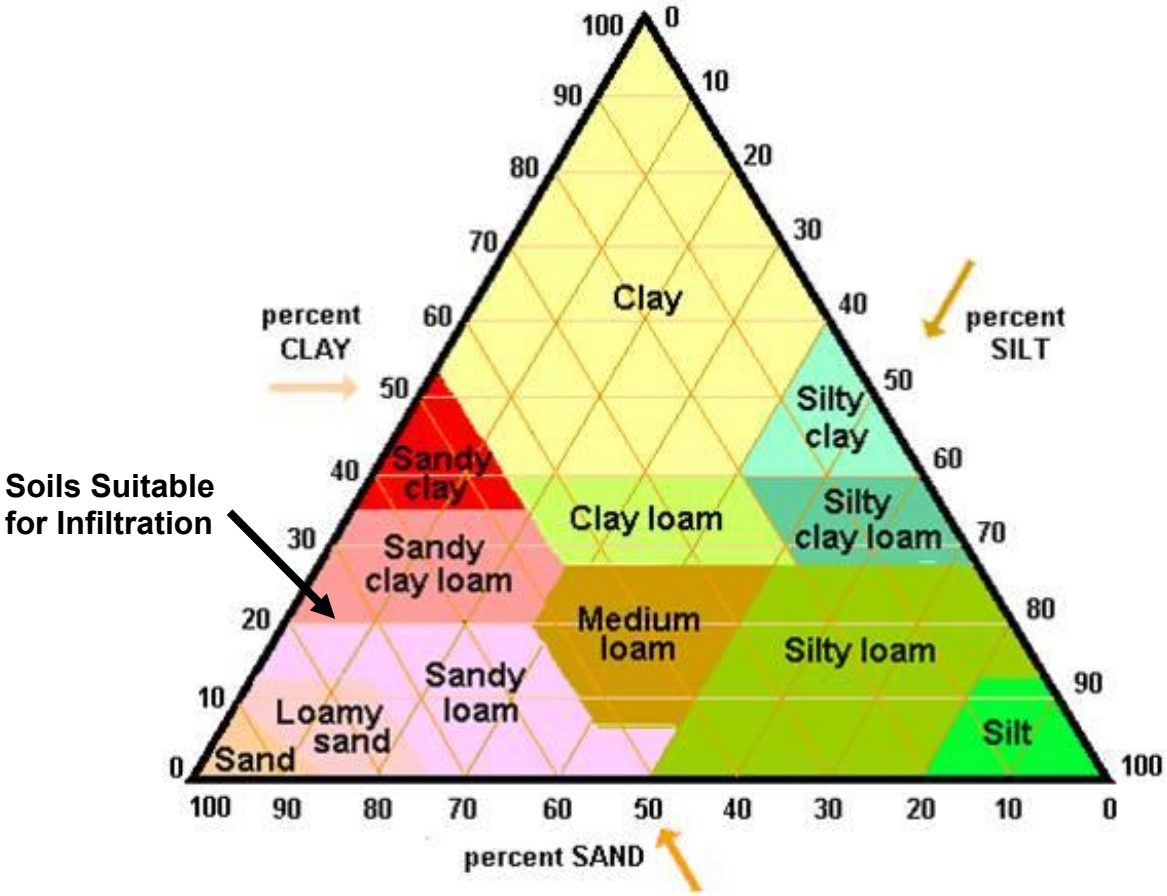
Minimum Allowable Infiltration Rate

Soil textures with design infiltration rates less than 0.25 inches per hour are deemed not suitable for infiltration BMPs. Soils with design infiltration rates less than 0.25 inches per hour may still utilize LID and Small Site BMPs to provide extended detention as long as an underdrain is provided.

Soils with design infiltration rates between 0.24 and 0.50 inches per hour may be used for LID and Small Site BMPs if suitable supplemental measures are included in the design. Supplemental measures may include subsoil amendment, underdrain placed at the top of the storage bed layer or placement of wick drains.

The design infiltration rate of the underlying soil must be no less than 3.6 inches per hour for infiltration BMPs designed for flood control.

Figure 1 – USDA Soil Textural Triangle



Calculation Methodology

Critical Storm Method

The critical storm method is used to determine the allowable peak discharge rates of runoff from a development generated by less common storms to mitigate flooding and channel erosion produced by events of this magnitude. Designing a stormwater management practice according to the critical storm method reduces stormwater discharge rates to no more than those that occurred prior to development for a selected design storm. It shall be applied to detention or infiltration practices as well as low-impact design.

The Critical Storm for each specific development drainage area shall be determined as follows and according to the methodology included in the most current edition of *Rainwater and Land Development* by the OEPA.

1. Determined using the runoff curve number method described in *NRCS TR-55*.
2. Calculations shall include the lot coverage assumptions used for full build out as proposed.
3. Calculations shall be based on the entire contributing watershed to the development area.
4. Model pervious, directly connected impervious and disconnected impervious areas as separate watersheds.
5. Drainage area maps shall include area, curve number, and time of concentrations. Time of concentration shall also show the flow path and the separation in flow type.
6. Use the Precipitation-Frequency Atlas of the *United States, NOAA Atlas 14* for rainfall depth data for stormwater design.
7. Use the SCS Type II Rainfall distribution for all design events with a recurrence interval greater than 1 year.
8. Curve numbers for the pre-development condition shall reflect the average type of land use over the past 10 years and not only the current land use.
    a. Pre-development Curve numbers:
        - For wooded or brushy areas, use listed values from *NRCS TR-55* in good condition.
        - For meadows, use listed values.
        - For all other areas (including all types of agriculture) use pasture, grassland, or range in good hydrologic condition.
    b. Post-development Curve numbers:
        - Open space areas shall use post-construction soil groups from *Rainwater and Land Development* unless the soil is amended using the soil profile restoration design criteria in *Rainwater and Land Development*
        - All undisturbed areas or open space with amended soils shall be treated as ”open space in good condition.”
9. Time of Concentration – Use-velocity based methods from *NRCS TR-55* to estimate travel time for overland sheet flow, shallow concentrated flow, and channel flow. Maximum sheet flow length is 100 ft.

Rational Method

The Rational Method may be used to calculate stormwater runoff peak discharges to size conveyance systems for contributing drainage areas of 40 acres or less. The peak runoff rate is given by the equation:

$Q = CIA$ (Equation 3)

Where:

Q = peak runoff rate in cubic feet per second

I = average rainfall intensity in inches per hour for a storm with duration equal to the time of concentration of the drainage area.

A = drainage area in acres

Runoff coefficients shall be selected from Table 6. Lawns and Open reflect average slopes (2% to 7%). Subtract 0.05 for flat pervious slopes (< 2%). Add 0.05 for steep pervious slopes (> 7%).

Table 6 – Rational Method Runoff Coefficients (10- to 100-year rainfall frequencies)

	Return Period (years)		
Character of Surface	10	25	100
Asphalt and Concrete Pavement/Roofs	0.95	0.97	0.98
Brick Pavement and Gravel Surface	0.85	0.88	0.91
Lawns and Open (HSG A)*	0.15	0.17	0.20
Lawns and Open (HSG B)	0.20	0.25	0.35
Lawns and Open (HSG C)	0.35	0.45	0.55
Lawns and Open (HSG D)	0.50	0.56	0.64
Water	1.00	1.00	1.00

Source: Runoff coefficients are calculated to match 24-hour runoff volumes from CN Method with antecedent moisture condition II and initial abstract (I_a) = 0.2S using CN's for "Open Spaces, Good Condition" for Lawns and Open, and a CN of 95 for Brick Pavement and Gravel Surface.

*The runoff coefficient for Lawns and Open (HSG A) is adjusted to match values in American Society of Civil Engineers and the Water Pollution Control Federation (1969). *Design and Construction of Sanitary and Storm Sewers*, as the calculated value is less than 0.01. Frequency adjustment factors of 1.1 and 1.25 have been applied for the 25- and 100-year frequencies respectively, with a maximum value of 1.00. Adjustment factors from Mays (2001). *Stormwater Collection Systems Design Handbook.*

A minimum 15-minute time of concentration shall be used with the Rational Method.

Runoff Curve Number Method

The Runoff Curve Number Method developed by the NRCS shall be used to calculate stormwater runoff volumes and peak discharges to size storage systems and may be used to size conveyance systems. The formulas are as follows:

$$Q_v = \frac{(P - 0.2S)^2}{(P + 0.8S)}$$ (Equation 4)

Where:
Q_v = surface runoff in inches
P = rainfall in inches
S = potential maximum retention after runoff begins in inches

And where:
$$S = \frac{1000}{CN} - 10$$ (Equation 5)

Surface runoff (Q_v) is calculated separately for each land use and soil type combination. Total runoff volume can then be calculated by the formula:

$$V_t = (\sum_i Q_{vi} A_i)\ X\ 3630$$ (Equation 6)

Where:
V_t = total runoff volume of the design storm in cubic feet
Q_v = surface runoff for the i^{th} land use in inches
A = contributing area associated with the i^{th} land use in acres
3630 = factor to convert acre-inches to cubic feet

Curve Number (CN) values are taken from *NRCS TR-55* and provided in Table 7.

The "Water" cover type shall be used up to the design high water level for detention/retention basins. The "Meadow" or "Open Spaces" cover type may be used for vegetative BMPs, including those that temporarily pond surface water, to receive credit for channel protection.

Peak Discharge

The TR-55 method, or computer software such as NRCS WinTR-55, may be used to calculate peak stormwater runoff rates.

Time of concentration for the Runoff Curve Number Method shall be calculated using *NRCS TR-55* methodology. A minimum of 0.1 hour (6 minutes) shall be used.

Table 7 – Curve Numbers from TR-55

Land Use Description		Curve Number[1]			
	Hydrologic Condition[2]	Hydrologic Soil Group			
Cover Type		A	B	C	D
Cultivated Land	Good	64	75	82	85
Pasture or Range Land	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Meadow		30	58	71	78
Orchard or Tree Farm[3]	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	30[4]	55	70	77
Open Spaces (Grass Cover)[5]	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Paved Parking Lot, Roof, Driveway		98	98	98	98
Gravel[6]		88	93	94	95
Bare Soil		77	86	91	94
Water[7]		100	100	100	100

Source: U.S. Department of Agriculture Soil Conservation Service (1986). *Urban Hydrology for Small Watersheds*, *Technical Release No. 55*.

[1]Antecedent moisture condition II and initial abstract (I_a) = 0.2S.

[2]Poor Condition: pasture or open space with less than 50% ground cover or heavily grazed with no mulch; woods - forest litter, small trees and brush are destroyed by heavy grazing or regular burning.

Fair Condition: pasture or open space with 50% to 75% grass cover and not heavily grazed; woods are grazed but not burned and some forest litter covers the soil.

Good Condition: cultivated land (row crops, straight row) with conservation treatment (crop residue cover), also small grain; pasture or open space with 75% or more ground cover and lightly or only occasionally grazed; woods are protected from grazing and litter and brush adequately cover the soil.

[3]CN's shown were computed for areas with 50% woods and 50% pasture (grass) cover. Other combinations of conditions may be computed from the CN's for woods and pasture.

[4]Actual curve number is less than 30; use CN = 30 for runoff computations.

[5]CN's shown are equivalent to those of pasture.

[6]Surface only; not including right-of-way.

[7]Water added.

Water Quality Volume

The water quality volume shall be calculated according to the methodology described in the CGP according to the following equations.

$WQ_v = Rv * P * A/12$ (Equation 7)

Where:
WQ_v = water quality volume in acre-feet
Rv = the volumetric runoff coefficient calculated using Equation 2
P = 0.90 inch precipitation depth
A = area draining into the BMP in acres

$Rv = 0.05 + 0.9i$ (Equation 8)

Where i = fraction of post-construction impervious surface

An additional 20 percent of the WQ_v shall be incorporated into the BMP for sediment storage.

Runoff Reduction Practices

The size of structural post-construction practices used to capture and treat stormwater runoff can be reduced by incorporating runoff reduction practices into the design of the site's drainage system. The approach to calculate and document runoff reduction is detailed in *Rainwater and Land Development*. BMP-specific reduction volumes are set by specifications in *Rainwater and Land Development* for the following practices:

- Impervious surface disconnection
- Rainwater harvesting
- Bioretention
- Infiltration basin
- Infiltration trench
- Permeable pavement with infiltration
- Underground storage with infiltration
- Grass swale
- Sheet flow to filter strip
- Sheet flow to conservation area

The use of runoff reduction practices is allowed to demonstrate compliance with the water quality requirement of these specifications for areas of the site not draining into a common drainage system of the site, e.g., sheet flow from perimeter areas such as the rear yards of residential lots, low density development scenarios, or where that applicant can demonstrate that the intent of pollutant removal and stream protection is being addressed through non-structural post-construction BMPs based upon review and approval by the City Engineer.

Rainfall

Use the Precipitation-Frequency Atlas of the *United States, NOAA Alas 14* for rainfall depth data for stormwater design. Divide the rainfall depth by the duration in hours to obtain the rainfall intensity. 24-hour rainfall amounts shall be used with the Runoff Curve Number Method.

An SCS Type II rainfall distribution shall be used when a unit hydrograph approach is used (e.g. WinTR-55 computer program).

BMP Design Criteria

Stormwater BMPs should be designed according to the methodology in the most current edition of *Rainwater and Land Development* by the OEPA, the CGP, the *Location and Design Manual* by the Ohio Department of Transportation (ODOT), or another design manual acceptable for use by the City and OEPA as well as the specifications contained herein.

Storm Sewers

Summary

Description:	Provides stormwater conveyance in an enclosed system.
Application:	Urban areas: where above-ground conveyance is not desirable.
Types:	Pipe (solid wall, perforated).
Pretreatment Required:	No. This BMP can provide spill containment.
Maintenance Plan:	Yes.
Calculation Credits:	
Volume Reduction:	Solid wall pipe: None. Perforated pipe (with slope): None.
Rate Reduction:	None.
Water Quality:	None.

Design Requirements

a. Sizing and Configuration
   (1) Storm sewer shall be designed to convey the peak discharge from a 10-year rainfall event.
   (2) A dual or redundant storm sewer may be required to convey the peak discharge from a 100-year rainfall event if acceptable overland flow routes do not exist (refer to Part 2 – Post-Construction Stormwater Management Requirements “Flood Control”).
   (3) Design velocities, capacities and friction losses shall be based on Manning's equation:

$$Q = \frac{1.49 A R^{\frac{2}{3}} S^{\frac{1}{2}}}{n} \qquad \text{(Equation 9)}$$

where:

Q = discharge (cubic feet per second)

A = wetted area (square feet)

R = hydraulic radius (feet)

S = slope (feet per foot)

n = Manning’s roughness coefficient

   (4) Manning's coefficients for closed conduit are included in Table 8.

(5) Acceptable slopes for circular pipe ("n" = 0.013) are included in Table 9. Minimum and maximum grade for other Manning's n values must be calculated based on allowable minimum and maximum velocities (V).
(6) As a general rule, the storm sewer system shall be designed without surcharging. Where this is not possible, surcharging may be allowed to 1 foot below the top of casting. However, minor losses must be considered in hydraulic grade line calculations.
(7) Storm sewer pipe shall have a minimum diameter of 12 inches. Smaller pipe may be approved for private systems.
(8) For rigid pipe; provide a minimum height of cover of 15 inches to the pavement surface including a minimum cover of 9 inches to the top of the subgrade. Where the pipe is not under pavement, provide a minimum height of cover of 18 inches to the finished grade.
(9) For flexible pipe; provide a minimum height of cover of 24 inches to the pavement surface including a minimum cover of 12 inches to the top of the subgrade. Where the pipe is not under pavement, provide a minimum height of cover of 24 inches to the finished grade.
(10) Public storm sewers shall be designed according to the criteria in the ODOT *Location and Design Manual*.
(11) Restricted conveyance systems designed to create backflow into stormwater storage facilities are not permitted. A storm sewer line shall not be used as both an inlet and outlet line to a stormwater storage facility.

Table 8 – Manning's Roughness Coefficients

Conduit	Coefficients
Closed Conduits	
Asbestos Cement Pipe	0.011 to 0.015
Brick	0.013 to 0.017
Cast Iron Pipe (cement lined and seal coated)	0.011 to 0.015
Concrete (Monolithic)	
Smooth Forms	0.012 to 0.014
Rough Forms	0.015 to 0.017
Concrete Pipe	0.011 to 0.015
Corrugated Metal Pipe (1/2inch corrugated)	0.022 to 0.026
Paved Invert	0.018 to 0.022
Spun Asphalt Lined	0.011 to 0.015
Plastic Pipe (smooth)	0.011 to 0.015
Vitrified Clay Pipes	0.011 to 0.015
Liner Channels	0.013 to 0.017
Open Channels	
Lined Channels	
Asphalt	0.013 to 0.017
Brick	0.012 to 0.018
Concrete	0.011 to 0.020
Rubble or riprap	0.020 to 0.035
Vegetal	0.030 to 0.040
Excavated or Dredged	
Earth, straight and uniform	0.020 to 0.030
Earth, winding, fairly uniform	0.025 to 0.040
Rock	0.030 to 0.045
Unmaintained	0.050 to 0.140
Natural Channels (streams, top width at flood state <100 feet)	
Fairly regular section	0.030 to 0.070
Irregular section with pools	0.040 to 0.100
Source: American Society of Civil Engineers and the Water Pollution Control Federation (1969). *Design and Construction of Sanitary and Storm Sewers*.	

Table 9 – Minimum and Maximum Slopes for Storm Sewers

Pipe Size (inches)	Minimum % of Grade (Velocity = 2.5 feet per second)	Maximum % of Grade (Velocity = 10 feet per second)
12	0.32	4.88
15	0.24	3.62
18	0.20	2.84
21	0.16	2.30
24	0.14	1.94
27	0.12	1.66
30	0.10	1.44
36	0.08	1.12
42	0.06	0.92
48	0.06	0.76
54	0.04	0.60
60	0.04	0.54
66	0.04	0.48
Manning's "n" = 0.013		

b. End Treatment
   (1) Outlet pipes shall require energy dissipation. Riprap protection or equivalent erosion control measures shall be used where the velocity exceeds 4 feet per second, up to maximum allowable design velocity of 8 feet per second.
   (2) Outlets into open channels or grassed swales shall enter at an angle of 90 degrees or less with the direction of flow.
   (3) Outlets through sloped embankments shall enter at the toe of slope to minimize the erosive potential.

c. Manholes and Catch Basins
   (1) Manhole spacing shall not exceed 400 feet for sewers less than 42 inches in diameter and 600 feet for larger sewers.
   (2) Manholes shall be placed at all changes in pipe direction, slope, pipe size, all inlet connection locations and at the upper end of the storm sewer.
   (3) Where possible, pipe inverts at junctions shall be designed to minimize junction losses (match 0.8 points of pipe diameters).
   (4) Minimum inside diameter of all manholes, catch basins, and inlet structures shall be 48 inches, except that a 24-inch diameter structure may be allowed with a single 12-inch outlet pipe.
   (5) Catch basins shall be placed at low points of streets and yards. Spacing and/or number of inlet structures required to accommodate the design flows in streets, private drives and parking areas shall be provided based on inlet capacity with no ponding occurring during a 10-year storm and the following additional stipulations:
      (a.) No more than 300 feet of pavement surface drainage will be allowed. No more than 200 feet of surface drainage will be allowed for grades exceeding 4%.
      (b.) Consideration shall be given to pedestrian crossings when siting catch basins in intersections. Catch basins shall be placed upstream of pedestrian crossings when practical.
      (c.) No more than 150 feet of street drainage will be allowed to flow around a corner.
      (d.) No flow will be allowed across a Tribal street intersection.

d. Sump Discharge
   (1) Sump discharge outlets for individual lots shall be a catch basin (minimum 4-foot diameter) with lead (6-inch minimum diameter); manufactured tees; or cored and booted lead.

e. Rear Lot Drainage
   (1) Lots provided with rear lot drainage shall have an underdrain.
   (2) Minimum diameter of rear lot catch basin shall be 2 feet.
   (3) Minimum pipe diameter and slope by drainage area:

Drainage Area (acre)	Minimum Pipe Diameter (inches)	Slope
≤ 0.5 acre	6	0.5%
≥ 0.5 acre; ≤ 1 acre	8	0.3%
> 1 acre	mainline storm sewer	Table 9

f. Materials
   (1) All materials must comply with the authority having jurisdiction over the storm sewer system.
   (2) Storm sewer pipe within the influence of a public road shall be reinforced concrete pipe. All other storm sewer pipe shall be reinforced concrete or smooth interior wall polyethylene in accordance with ODOT *Standard Specifications*. Other materials shall be subject to approval.
   (3) Pipe joints shall be designed to prevent excessive infiltration or exfiltration.
   (4) Manholes and catch basins shall be in accordance with ODOT *Standard Specifications*.

(5) Connections to manholes shall be made with a resilient connector for pipe diameters 24 inches or less. Concrete pipe connections shall be made by grouting the inside and outside wall of the structure.

Culvert or Bridge

Summary

Description:	Provides stormwater conveyance through a crossing structure.
Application:	Where crossing of open channels, wetlands, waterbodies and grassed swales is required. Culverts can also provide equalization and outlet control.
Types:	Pipe Culvert; Box Culvert; Bridge.
Pretreatment Required:	No.
Maintenance Plan:	Yes.
Calculation Credits:	
Volume Reduction:	None.
Rate Reduction:	None.
Water Quality:	None.

Design Requirements

a. Sizing and Configuration
   (1) Bridges shall be designed to provide a 4.5-foot minimum under clearance at normal flow for canoe traffic on navigable waterways, and a 2-foot minimum freeboard to the underside (low chord) of the bridge for a 100-year flood where conditions allow.
   (2) Footings shall extend at least 4 feet below the bottom of the channel.
   (3) Culverts serving a drainage area of less than 2 square miles shall be designed for the 25-year peak discharge in the developed watershed with a maximum outlet velocity of 8 feet per second. A maximum of 1 foot of inlet submergence may be permitted if this does not backup water out of the easement.
   (4) The effect of the 100-year storm shall be reviewed to ensure no adverse increase in water elevation off the development property or flooding of structures within the development.
   (5) Sizing of culverts and bridges shall be performed using the Bernoulli Equation and in accordance with the methodology contained in the ODOT *Location and Design Manual*.
   (6) Minimum diameter of a drive culvert shall be 12 inches.
   (7) Minimum diameter of a road crossing culvert shall be 18 inches or equivalent pipe arch.
   (8) Culverts shall span the measured bank full width.
b. End Treatment
   (1) Headwalls, wingwalls and all other end treatments shall be designed to ensure the stability of the surrounding soil. ODOT or manufacturer's designs may be used.
   (2) Riprap protection or equivalent erosion control measures shall be used where the velocity exceeds 4 feet per second, up to maximum allowable design velocity of 8 feet per second.
c. Materials
   (1) All materials must comply with the authority having jurisdiction over the roadway.

Culverts may be reinforced concrete pipe, corrugated steel pipe or pipe arch in accordance with ODOT *Standard Specifications*. Smooth interior wall polyethylene may also be allowed.

Open Channel

Summary

Description:	Stormwater conveyance in an excavated channel.
Application:	Larger drainage areas with concentrated runoff.
Types:	Channel; Ditch.
Pretreatment Required:	No.
Maintenance Plan:	Yes.
Calculation Credits:	
Volume Reduction:	None.
Rate Reduction:	None.
Water Quality:	None.

Design Requirements

a. Sizing and Configuration
   (1) The open channel shall be designed to convey the 25-year peak discharge.
   (2) Open channel design velocities, capacities and friction losses shall be based on Manning's equation:

$$Q = \frac{1.49 A R^{\frac{2}{3}} S^{\frac{1}{2}}}{n} \qquad \text{(Equation 10)}$$

where:

Q = discharge (cubic feet per second)

A = wetted area (square feet)

R = hydraulic radius (feet)

S = slope (feet per foot)

n = Manning's roughness coefficient

   (3) Manning's Coefficients shall be determined from Table 8. A minimum Manning's Coefficient of 0.035 shall be used for open channels, unless special treatment is given to the bottom and sides (riprap, paving, mown sod, etc.).
   (4) Minimum bottom width shall be 2 feet.
   (5) Minimum longitudinal slope shall be 0.10%.
   (6) Side slopes shall be no steeper than 2:1 (horizontal to vertical).
   (7) The minimum velocity for open channels during the design event shall be 1.5 feet per second.
   (8) The maximum velocity shall be 4 feet per second. Riprap protection or equivalent shall be used where the velocity exceeds 4 feet per second, up to maximum allowable design velocity of 8 feet per second.

b. Connections and Crossings
   (1) Outlets into the open channel shall enter at an angle of 90 degrees or less with the direction of flow.
   (2) A minimum clearance of 5 feet is required between open channel inverts and underground utilities unless special provisions are approved.

Sediment Forebay

Summary

Description:	Stormwater pretreatment practice.
Application:	Typically used with a detention or retention basin.
Types:	Wet basin; Dry basin; Level spreader.
Pretreatment Required:	No. This BMP can provide pretreatment.
Maintenance Plan:	Yes.
Calculation Credits:	
Volume Reduction:	None.
Rate Reduction:	None.
Water Quality:	Count volume routed through BMP.

Design Requirements

a. Size for pretreatment, 10% of the WQv.
b. The pretreatment volume is the volume of the forebay to the elevation of the level spreader or overflow spillway including any permanent pool.
c. Siting
   (1) Where more than one inlet pipe is required, the calculated forebay volume shall be pro-rated by flow contribution of each inlet.
d. Configuration
   (1) The sediment forebay shall be a separate sump, which can be formed by grading.
   (2) The minimum sump depth shall be 2 feet, and in any case no less than 1 foot.
   (3) The maximum depth-to-surface area ratio is 4:1.
   (4) The length -to -width ratio shall be a minimum of 1.5:1 and a maximum of 4:1 to allow for adequate hydraulic length yet minimize scour velocities.
   (5) The top-of-berm elevation between the forebay and the basin shall be a minimum of 1 foot below the outer berm elevation.
   (6) The overflow spillway shall be sized using the following equations and designed to prevent erosion.

   (a.) Rectangular Weir: $Q = CLH^{\frac{1}{3}}$ (Equation 11)

   (b.) Trapezoidal Weir: $Q = 0.75CmH^{2.5} + CLH^{\frac{3}{2}}$ (Equation 12)

   (c.) Triangular Weir: $Q = 0.75CmH^{2.5}$ (Equation 13)

   Where:

   Q = discharge in cubic feet per second
   C = coefficient of discharge (varies from 2.6 to 3.3)
   M = horizontal component of side slope
   L = length of spillway crest in feet
   H = total head measured above spillway crest in feet

Part 3 – Soil Erosion and Sediment Control

General Provisions for Erosion and Sediment Control

Applicants shall provide erosion and sediment controls which manage and treat runoff in accordance with the provisions of the CGP. In addition, the City recognizes the following basic principles which will be included in the planning, design, construction, and inspection phases of all projects. These principles are:

1. Design and construct terrain features to minimize the erosion potential of the exposed site based on the soil type, time of year, proximity to waterways, duration of exposure, length and steepness of the slope, and the anticipated volume and intensity of runoff.
2. Minimize the surface area of unstabilized soils left unprotected and vulnerable to runoff and wind at any one time.
3. Minimize the amount of time that unstabilized soil areas are exposed to erosive forces.
4. Provide control measures that will effectively control erosion of, and sediment from, exposed areas, and stabilize disturbed areas, except for actively cultivated agricultural fields, either temporarily or permanently as soon as possible.
5. Avoid concentrating runoff. When concentrated runoff cannot be avoided, runoff velocities shall be reduced to non-erosive velocities.
6. Eroded sediments will be trapped on-site with temporary and permanent barriers, basins, or other sediment retention devices while allowing for the controlled discharge of runoff at non-erosive velocities.
7. Implement a continuous inspection and maintenance program.

Stormwater Pollution Prevention Plans

This regulation requires that a SWP3 be developed and implemented for all soil disturbing activities disturbing one or more acres of total land, or less than one acre if part of a larger common plan of development or sale disturbing one or more acres of total land. The City Engineer may require a SWP3 for sites disturbing less than one acre.

In addition, the following activities shall submit an Abbreviated SWP3:

1. New single-family residential construction that disturbs 0.1 up to one acre of land.
2. Additions or accessory buildings for single-family residential construction that disturb 0.1 up to one acre of land.
3. All non-residential construction that disturb 0.1 up to one acre of land.
4. General clearing activities not related to construction that disturb 0.1 up to one acre of land.
5. Activities disturbing 0.1 or less of an acre are not required to submit a SWP3, unless required by the City Engineer. These activities must comply with all other provisions of Part 3 – Soil Erosion and Sediment Control of these specifications.

SWP3 Requirements

The applicant shall submit a SWP3 that meets the requirements of the CGP and the following additional requirements:

1. The SWP3 shall be certified by a professional engineer, a registered surveyor, certified professional erosion and sediment control specialist, or a registered landscape architect.
2. The SWP3 shall include control measures to ensure that discharges from the construction site and construction support activities comply with the non-numeric effluent limitations contained in the CGP.

3. In addition to all information required by the CGP, the SWP3 shall also include completed design tools found on OEPA's website such as the Sediment Basin Compliance Spreadsheet.
4. Before any off-site support areas such as borrow or spoil areas, concrete or asphalt batch plants, equipment staging yards or material storage areas are utilized, a SWP3 for the off-site support area must be submitted and approved by the City Engineer. The applicant shall ensure appropriate permits have been obtained to operate the off-site support area. Failure to do so can lead to enforcement action under Chapter 939 of the City's *Code of Ordinances*.
5. The City Engineer may require the SWP3 to include a Soils Engineering Report based upon their determination that the conditions of the soils are unknown or unclear to the extent that additional information is required to protect against erosion or other hazards. This report shall be based on adequate and necessary test borings and shall contain all the information listed below. Recommendations included in the report and approved by the City Engineer shall be incorporated in the grading plans and/or other specifications for site development.
    a. Data regarding the nature, distribution, strength, and erodibility of existing soils.
    b. If applicable, data regarding the nature, distribution, strength, and erodibility of the soil to be placed on the site.
    c. Conclusions and recommendations for grading procedures.
    d. Conclusions and recommended designs for interim soil stabilization devices and measures, and for permanent soil stabilization after construction is completed.
    e. Design criteria for corrective measures when necessary.
    f. Opinions and recommendations covering the stability of the site.
    g. Delineations of surface waters of the state located on the site. Affirmation by the U.S. Army Corps of Engineers may be required.

Performance Standards

The SWP3 must contain a description of the controls appropriate for each stage of construction operation and the applicant must implement such controls. Each stage of a phased or staged project must be self-sufficient in terms of stormwater pollution prevention. BMP selection and design must meet criteria established within the current CGP. BMPs must be designed, constructed, and installed to meet the specifications in *Rainwater and Land Development* or another design manual acceptable to the City. The approved SWP3, and the sediment and erosion controls, and non-sediment pollution controls contained therein, shall be implemented, and maintained according to the requirements in the CGP. Site operators must conduct site inspections as described in the CGP.

Inspection reports shall be available to the City and/or their designee within seven working days from the inspection and retained at the development site.

The following standards will also apply:

1. BMPs must be implemented to ensure sediment is not tracked off-site and that dust is controlled. These BMPs must include, but are not limited to, the following:
    a. Construction entrances shall be built and shall serve as the only permitted points of ingress and egress to the development area. These entrances shall be built of a stabilized pad of aggregate stone or recycled concrete or cement sized greater than 2 inch in diameter placed over a geotextile. Culverts shall be provided where construction entrances cross drainage ditches and water bars shall be provided to divert sediment-laden runoff away from connected roadways.

b. Streets and catch basins adjacent to construction entrances shall be kept free of sediment tracked off site. Streets directly adjacent to construction entrances and receiving traffic from the development area, shall be cleaned daily or as needed to remove sediment tracked off-site. If applicable, the catch basins on these streets nearest to the construction entrances shall also be cleaned weekly and protected from sediment-laden runoff, if feasible without posing a public safety hazard.
c. Based on site conditions, the City Engineer may require additional BMPs to control off site tracking and dust. These additional BMPs may include:
    - Fencing installed around the perimeter of the development area and any conservation easement areas to ensure that all vehicle traffic adheres to designated construction entrances.
    - Applicants shall take all necessary measures to comply with applicable regulations regarding fugitive dust emissions, including obtaining necessary permits for such emissions. The City Engineer may require dust controls including the use of water trucks to wet disturbed areas, tarping stockpiles, temporary stabilization of disturbed areas, and regulation of the speed of vehicles on the site.

2. Construction vehicles shall avoid water resources. If it is infeasible to provide and maintain an undisturbed natural buffer around water resources, the SWP3 shall comply with all the following additional requirements:
    a. All stream crossings shall be designed as specified in the most recent edition of *Rainwater and Land Development*.
    b. Temporary stream crossings shall be constructed if water resources or wetlands will be crossed by construction vehicles during construction.
    c. Construction of bridges, culverts, or sediment control structures shall not place soil, debris, or other particulate material into or close to the water resources or wetlands in such a manner that it may slough, slip, or erode.
    d. Protected areas or critical areas, including wetlands, riparian areas, and conservation easements shall be physically marked and maintained in the field prior to and throughout all earth disturbing activities.
3. Non-sediment pollutant controls. No solid or liquid waste, including building materials, shall be discharged in stormwater runoff. The applicant must implement site BMPs to prevent toxic materials, hazardous materials, or other debris from entering waste resources or wetlands. These practices shall include but are not limited to the following:
    a. Waste materials. A covered dumpster shall be made available for the proper disposal of garbage, plaster, drywall, grout, gypsum, and other waste materials.
    b. Concrete truck wash out. The washing of concrete material into a street, catch basin, or other public facility or natural resource is prohibited. A designated area for concrete washout shall be made available.
    c. Fuel/liquid tank storage. All fuel/liquid tanks and drums shall be stored in a marked storage area. A dike shall be constructed around this storage area with a minimum capacity equal to 110 percent of the volume of all containers in the storage area.
    d. Toxic or hazardous waste disposal. Any toxic or hazardous waste shall be disposed of properly.
    e. Contaminated soils disposal and runoff. Contaminated soils from redevelopment sites shall be disposed of properly. Runoff from contaminated soils shall not be discharged from the site. Proper permits shall be obtained for development projects on solid waste landfill sites or redevelopment sites.
4. For sites that will not be completed by October 1, a Pre-Winter Stabilization Meeting shall be held by the landowner and the applicant, engineer and contractor of the project and the City prior to October 1, in order to plan and approve winter erosion and sediment controls as defined in the most current online edition of *Rainwater and Land Development*.

Abbreviated/Small-Site SWP3

In order to control sediment pollution of water resources, the applicant shall submit an Abbreviated SWP3, also known as an individual/small lot SWP3, in accordance with the requirements of this chapter. The Abbreviated SWP3 shall be certified by a professional engineer, a registered surveyor, certified professional erosion and sediment control specialist, or a registered landscape architect. The Abbreviated SWP3 shall include a minimum of the following BMPs. The City may require other BMPs as site conditions warrant.

1. Construction Entrances: Construction entrances shall be built and shall serve as the only permitted points of ingress and egress to the development area. These entrances shall be built of a stabilized pad of aggregate stone or recycled concrete per City standards.
2. Concrete Truck Wash Out: The washing of concrete material into a street, catch basin, or other public facility or natural resource is prohibited. A designated area for concrete washout shall be indicated on the plan. Use for other waste and wastewater is prohibited. This area must not drain to or have runoff to any open streams or swales.
3. Street Sweeping: Streets directly adjacent to construction entrances and receiving traffic from the development area shall be cleaned daily or as needed to remove sediment tracked off-site. If applicable, the catch basins on these streets nearest to the construction entrances shall be cleaned weekly.
4. Stabilization. The development area shall be stabilized as detailed in Table 10.

Table 10 – Stabilization

Area requiring stabilization	Time frame to apply erosion controls
Any disturbed area within 50 feet of a surface water of the state and not at final grade.	Within 2 days of the most recent disturbance if that area will remain idle for more than 14 days.
For all construction activities, any disturbed area, including soil stockpiles, that will be dormant for more than 14 days but less than one year, and not within 50 feet of a stream.	Within 7 days of the most recent disturbance within the area.
Disturbed areas that will be idle over winter.	Prior to November 1.
Areas at final grade.	Within 7 days of reaching final grade or within 2 days of reaching final grade for areas within 50 feet of a surface water of the state.
Note: Where vegetative stabilization techniques may cause structural instability or are otherwise unobtainable, alternative stabilization techniques must be employed. These techniques may include mulching or erosion matting.	

5. Inlet Protection. Erosion and sediment control practices, such as boxed inlet protection, shall be installed on stormwater catch basins located on the subject property and, if there is no threat to public safety, on curb inlets closest to the construction entrance, to minimize sediment-laden water entering active storm drain systems, including rear yard inlets.
6. Silt Fence and Other Perimeter Controls. Silt fence and other perimeter controls approved by the City shall be used to protect adjacent properties and water resources from sediment discharged via sheet (diffused) flow. Silt fence shall be placed along level contours and the permissible drainage area is limited to those indicated in in the CGP.
7. Non-sediment pollutant controls. No solid or liquid waste, including building materials, shall be discharged in stormwater runoff. The applicant must implement site BMPs to prevent toxic materials, hazardous materials,

or other debris from entering waste resources or wetlands. These practices shall include but are not limited to the following:

a. Waste materials. A covered dumpster shall be made available for the proper disposal of garbage, plaster, drywall, grout, gypsum, and other waste materials.
b. Concrete truck wash out. The washing of concrete material into a street, catch basin, or other public facility or natural resource is prohibited. A designated area for concrete washout shall be made available.
c. Fuel/liquid tank storage. All fuel/liquid tanks and drums shall be stored in a marked storage area. A dike shall be constructed around this storage area with a minimum capacity equal to 110 percent of the volume of all containers in the storage area.
d. Toxic or hazardous waste disposal. Any toxic or hazardous waste shall be disposed of properly.
e. Contaminated soils disposal and runoff. Contaminated soils from redevelopment sites shall be disposed of properly. Runoff from contaminated soils shall not be discharged from the site. Proper permits shall be obtained for development projects on solid waste landfill sites or redevelopment sites.

8. Internal Inspection and Maintenance. All controls on the development area shall be inspected by qualified inspection personnel at least once every seven calendar days and within 24 hours after any storm event greater than one-half inch of rain per 24- hour period. Maintenance shall occur as detailed below:
   a. When BMPs require repair or maintenance. If the internal inspection reveals that a BMP needs repair or maintenance, with the exception of a sediment-settling pond, it must be repaired or maintained within three days of the inspection. Sediment settling ponds must be repaired or maintained within ten days of the inspection.
   b. When BMPs fail to provide their intended function. If the internal inspection reveals that a BMP fails to perform its intended function and that another, more appropriate control practice is required, the Abbreviated SWP3 must be amended and the new control practice must be installed within ten days of the inspection.
   c. When BMPs depicted on the Abbreviated SWP3 are not installed. If the internal inspection reveals that a BMP has not been implemented in accordance with the schedule, the BMP must be implemented within ten days from the date of the inspection. If the inspection reveals that the planned control practice is not needed, the record must contain a statement of explanation as to why the control practice is not needed.
9. Final Stabilization: Final stabilization is achieved when the site has reached 70% cover and when the City Engineer approves the site condition.

Appendix 1

Application Packet

CITY OF WILMINGTON
Earthwork/ Land Disturbance Permit

EARTHWORK/LAND DISTURBANCE PERMIT INFORMATION

An Earthwork/Land Disturbance Permit is required for the following activities (WCO 939.01):

1. All site subdivision or site plan applications.
2. Land development activities smaller than the minimum applicability criteria (one acre) IF such activities are part of a larger common plan of development that meets the applicability criteria.

An Earthwork/Land Disturbance Permit is NOT required for the following (WCO 939.01(b)):

1. Additions or modifications to single-family structures.
2. Developments that do not disturb one acre or more, provided they are not part of a larger common development plan.
3. Repairs to any stormwater treatment practice deemed necessary by the City of Wilmington.
4. Agricultural activity.

The following documents must accompany the Earthwork/Land Disturbance Permit application (WCO 939.03):

1. A stormwater management plan (electronic submission or two paper copies). (See WCO 939.05 Requirements for stormwater management plan approval)
2. A maintenance agreement on city-approved form (electronic submission or two paper copies) (See WCO 939.07 Maintenance and repair of stormwater facilities.)
3. A non-refundable permit review fee.

Other considerations

1. Permit approval/disapproval will be communicated to applicant within 30 days (WCO 939.03(c)(4)).
2. If the application, or any portion thereof, is disapproved, the applicant may revise the stormwater management plan or agreement. If additional information is submitted, the city will communicate approval/disapproval to the applicant within 15 days (WCO 939.03(c)(5)).
3. The permit shall be valid from the date of issuance through the date the City notifies the permit holder that all stormwater management practices have passed the final inspection under permit condition (WCO 939.03(c)(6)).

FOR MORE INFORMATION ON PERMIT REQUIREMENTS, PLEASE REVIEW WILMINGTON CODIFIED ORDINANCES CHAPTER 939 CONTROL OF POST-CONSTRUCTION STORMWATER RUNOFF.

FEE SCHEDULE

Application Fee

Residential Development - $75.00/acre

Review Deposit - $ 2,000

Commercial Development - $100.00/acre

After review of the Earthwork/Land Disturbance Permit Application for completeness, the City of Wilmington will send you an invoice for your permit fees.

EARTHWORK/LAND DISTURBANCE PERMIT APPLICATION

Date: _____/_____/_____ **PERMIT NO.** _____

NOTE: This is not an NPDES permit.

1. CLASS OF PERMIT:	☐ RESIDENTIAL	☐ COMMERCIAL

3. APPLICANT INFORMATION				
☐ Owner	☐ Site Contact	☐ Engineer	☐ Contractor	☐ Other

4. PARCEL/PROPERTY INFORMATION																
Parcel ID		Property Address														
Zoning	LI	GI	SC	DC	DT	MF	MH	RR	SN	TN	Overlay Districts	AZD	H1	PUD	SR	
Site Name																
Lot No.		Subdivision/Legal Description														
Is this property in a Flood Plain?	☐ Yes	☐ No														
If yes, please provide flood plain information																

5. OWNER INFORMATION					
Owner Name					
Address					
Phone		Cell		Email	

6. SITE CONTACT INFORMATION					
Site Contact Name					
Address					
Phone		Cell		Email	
Contact Person					

7. ENGINEER INFORMATION					
Plans Prepared By					
Contact Name/Title					
Address					
Phone		Cell		Email	

6. CONTRACTOR INFORMATION					
Contractor Name					
Address					
Phone		Cell		Email	
Contact Person					

13. DESCRIPTION OF EARTHWORK/LAND DISTURBANCE ACTIVITY

Please be specific in description of boundaries and scope of activity. If a phased approval is requested, please provide detail in this section.

8. SOIL DISTURBING ACTIVITY.		Is disturbed area greater than one (1) acre? ☐ Yes ☐ No	
Total Site/Parcel Area (In acres)		Total Disturbed Soil Area (in acres)	
Proposed Start Date		Proposed Completion Date	

OTHER JURISDICTIONAL PERMIT INFORMATION Please mark n/a if not applicable	
Ohio EPA NPDES Permit # ☐ OR Date NOI Sent ☐	
Will any jurisdictional streams or wetlands be disturbed or impacted? ☐ Yes ☐ No If yes, provide permit number or proof that no permit is needed.	
US Army Corps of Engineers 404 Permit # **	
Nationwide Permit# **	
Ohio EPA 401 Water Quality Permit # **	
Ohio Dam Safety Law (ODNR Tracking # or other proof of compliance)	
*** If permit required but not yet received, please provide date applied.*	
14. SIGNATURE OF APPLICANT:	**X**
PRINTED NAME OF APPLICANT	

FEE SCHEDULE

Residential Development - $75.00/acre
Commercial Development - $100.00/acre
After review of the Earthwork/Land Disturbance Permit Application for completeness, the City of Wilmington will send you an invoice for your permit fees.

YOU WILL BE INVOICED FOR YOUR PERMIT FEES
Payment accepted by credit/debit card (3% fee applies), check, money order, or exact cash only.
Checks may be made payable to: City of Wilmington

Remittance Address:
Department of Public Service
City of Wilmington
69 N. South St.
Wilmington, OH 45177

Zoning Designation Key							
Base Districts				Overlay Districts			
DC	Downtown Core	MH	Mobile Home Park	AZD1	Airport Overlay 1	H1	Commercial Historic Overlay
DT	Downtown Transition	RR	Rural Residential	AZD2	Airport Overlay 2	SR	Stream and Riparian Overlay
GI	General Industrial	SC	Suburban Commercial	AZD3	Airport Overlay 3	PUD	Planned Unit Development Overlay
LI	Light Industrial	SN	Suburban Neighborhood	AZD4	Airport Overlay 4		
MF	Multi-Family	TN	Traditional Neighborhood				

COMPREHENSIVE STORMWATER MANAGEMENT PLAN CHECKLIST

This checklist includes information that must be included at a minimum as part of the Comprehensive Stormwater Management Plan.

Minimum Required Elements

- □ Stormwater Review Application
- □ Narrative Stormwater Report
- □ Site Description
- □ Construction Site Plan Sheets
- □ Signed Long-term inspection and maintenance covenant
- □ Signed Acknowledgement of Comprehensive Stormwater Management Plan

Required Information

A. General Information:
   1. Development name/subdivision number, phase (if applicable).
   2. Name, address, and telephone number of Developer.
   3. Name, address, telephone, signature, and seal of the Design Professional.
   4. Description of location (site address, Lat/Lon of site entrance).
   5. Location map.
   6. OEPA NPDES permit number and other applicable state and federal permit numbers, if available, or status of various permitting requirements if final approvals have not been received.

B. Site Description:
   1. A description of the nature and type of the construction activity (e.g. residential, shopping mall, highway, etc.), include any phasing.
   2. Total area of the site and the area of the site that is expected to be disturbed (i.e. grubbing, clearing, excavation, filling or grading, including off-site borrow areas).
   3. A description of prior land uses at the site.
   4. An estimate of the impervious area at the beginning and at the conclusion of the project.
   5. Existing data describing the soils throughout the site, including the soil series and association, hydrologic soil group, porosity, infiltration characteristics, depth to groundwater, depth to bedrock, and any impermeable layers.
   6. If available, the quality of any known pollutant discharge from the site such as that which may result from previous contamination caused by prior land uses.
   7. The location and name of the immediate water resource(s) and the first downstream water resource(s).
   8. The aerial (plan view) extent and description of water resources at or near the site that will be disturbed or will receive discharges from the project.
   9. Describe the current condition of water resources including the vertical stability of stream channels and indications of channel incision that may be responsible for current or future sources of high sediment loading or loss of channel stability.

C. Site Map:
   1. Limits of soil-disturbing activity on the site.
   2. Soils types for the entire site, including locations of unstable or highly erodible soils.
   3. Existing and proposed two-foot contours. This must include a delineation of drainage watersheds expected before, during, and after major grading activities as well as the size of each drainage watershed in acres.

4. Existing and planned locations of buildings, roads, parking facilities, and utilities.
5. List of sub-lot numbers if project is a subdivision.
6. Location of any easements or other restrictions placed on the use of the property.
7. Water resource locations including springs, wetlands, streams, lakes, water wells, and associated setbacks on or within 200 feet of the site, including the boundaries of wetlands or streams and first subsequent named receiving water(s) the applicant intends to fill or relocate for which the applicant is seeking approval from the Army Corps of Engineers and/or OEPA.
8. The location of any in-stream activities including stream crossings.

D. Preliminary Comprehensive Stormwater Management Plan Sheets
   1. Sheets no larger than 24" x 36".
   2. Scale no smaller than 1" = 50'.
   3. Sealed by a professional engineer licensed in the State of Ohio.
   4. Existing and Proposed Site Features
      a. Existing and proposed contours (no greater than 2' interval inside the project; no greater than 10' interval outside the plat).
      b. Existing and proposed buildings (label those under construction with address).
      c. Existing and proposed roads with name, right of way width, and ownership (public or private).
      d. Location and description of any other onsite and adjacent offsite utilities or features that may be relevant to the site plan (e.g., railroads, high tension power lines, underground transmission lines, sanitary sewers, water mains, septic drain fields, wells, cemeteries, and parks).
      e. Location of all proposed septic drain fields. (Comply with isolation distance requirements).
   5. Drainage
      a. Existing water resources on or adjacent to the development.
      b. Limits and elevation of 100-year floodplain.
      c. Wetland boundaries and buffers with determination date and company.
      d. Riparian buffers, natural flow pathways, and other sensitive areas.
      e. Existing ditches, culverts, storm sewer, drainage structures and stormwater BMPs (with labeling as to type, size, rim, and invert elevations).
      f. Proposed drainage system (clearly identify all open and enclose portions).
      g. Preliminary layout of proposed stormwater BMPs.
      h. Existing and Proposed Drainage Areas with time of concentration and surface area description.
      i. Stormwater runoff discharge location(s) from the site, including roof water.
      j. Ownership of proposed drainage system.

E. Final Comprehensive Stormwater Management Plan Sheets
   1. Sheets no larger than 24" x 36".
   2. Scale no smaller than 1" = 50'.
   3. Minimum Required Information
      a. Benchmark locations, elevations, and vertical datum.
      b. Plans, profiles, and cross sections (roads, storm sewers, laterals, open channels, other stormwater control measures).
      c. Details of storm sewer, culverts, and outlet control structures (manhole/catch basin numbers; rim and invert elevations; pipe length, diameter, material, slope, class, type of joints; special backfill and bedding; dimensions; inlet/outlet protection).
      d. Details of other stormwater BMPs with sufficient information to show compliance.
      e. Lot grading plan (detail, statement, or drainage arrows).
      f. Minimum opening and basement elevation for each lot.
      g. A soil erosion and sedimentation control plan with minimum measures and proposed staging.

   h. Protected sensitive areas, minimal disturbance areas and other “non structural” BMPs.
   i. Contaminated soil and groundwater procedures (if required).
4. Maintenance Assurance
   a. Identified access routes for trucks and maintenance equipment, including fences and gates.
   b. Proper siting, sizing, and design of stormwater control measures for accessibility (e.g., outlet control structure access during flood event, steps, turning room, cleanouts, etc.).
   c. Design of stormwater control measure elements to minimize amount of maintenance required (e.g., filters on small orifices, design of trash racks to facilitate debris removal, etc.).
   d. Design details to illustrate maintenance features (e.g., removable grates or rails, locks, access platforms, etc.).
   e. Identified areas for staging and temporary spoil disposal.

F. Design Calculations
1. Completed, signed, and sealed by a professional engineer licensed in the State of Ohio.
2. Submit with Final Comprehensive Stormwater Management Plan.
3. A final set of approved calculations, updated with date, must be received before written approval will be granted.
4. Minimum Required Information.
   a. Drainage subcatchment map (include impervious and pervious acreages for existing and proposed land use, any tributary areas originating outside of the development).
   b. Site runoff volumes and peak discharge rates (determination of runoff coefficients or curve numbers, time of concentration, allowable release rate).
   c. Required channel protection and water quality treatment volumes and treatment provided.
   d. TSS removal efficiency and third party documentation (as needed).
   e. Critical storm determination and required flood control storage volumes and storage volumes provided.
   f. Water elevations (normal, design high water, hydraulic grade line).
   g. Identification of overland flow routes on the drainage map.
   h. Capacity of downstream infrastructure necessary to demonstrate an adequate outlet.
   i. Stormwater control measure design calculations (storm sewer, culvert, and open channel sizing; orifice and weir sizing; critical velocities; stage storage table; subsurface storage; BMP drain time).
   j. Design infiltration rate.
   k. Geotechnical report (soil borings, any infiltration test results).

Construction General Permit OHC000005
Storm Water Pollution Prevention Plan Checklist

State of Ohio Environmental Protection Agency
Division of Surface Water

Facility Name:	**Date Received:**
SWP3 Reviewer:	**Date Reviewed:**

Part III.G.1 - Site Description				
Does the SWP3 describe, show or include:	**Y**	**N**	**N/A**	**Comments**
(a) the nature and type of construction activity (e.g., low density residential, shopping mall, highway, etc.)?				
(b) the area of the site to be disturbed				
(c) the impervious area and percent imperviousness created by the construction activity?				
(d) storm water calculations, (pre and post-construction volumetric runoff coefficients and resulting water quality volume; design details for post-construction storm water facilities and pretreatment practices (e.g. drainage areas, capacities, elevations, outlet details and drain times) and if applicable, explanation of the use of existing post-construction facilities?				
(e) any existing data describing the soil?				
any information on the quality of the storm water discharge from the construction site?				
(f) any information about prior land uses at the site (e.g., was the property used to manage solid or hazardous waste)?				
(g) a description of the condition of on-site streams (e.g. prior channelization, bed instability or headcuts, channels on public maintenance, or natural channels)?				
(h) an implementation schedule which describes the sequence of major construction operations (i.e., grubbing, excavating, grading, utilities infrastructure installation and others) and the implementation of erosion, sediment and storm water management practices or facilities to be employed during each operation of the sequence?				
(i) the name(s) or location(s) of the initial and subsequent surface water bodies receiving the storm water discharge?				
the areal extent and description of the wetland or other special aquatic sites which will be disturbed and/or will receive the storm water discharges?				
(j) a detail drawing of a typical individual lot showing sediment and erosion controls or storm water control practices? (This does not remove responsibility to designate control practices in a SWP3 for critical areas such as steep slopes, stream banks, drainage ways & riparian zones.)				
(k) the location and description of storm water discharges associated with dedicated asphalt and/or concrete batch plants covered by the NPDES construction storm water general permit?				
(l) a cover page identifying the name and location of the site, the name and contact information for site operators and SWP3 authorization agents as well as preparation date, start date, and completion date?				
(m) a log documenting grading & stabilization activity as well as SWP3 amendments that occur after construction commencement?				

Part III.G.1.n - Site Map Requirements				
Does the SWP3 site map show:	**Y**	**N**	**N/A**	**Comments**
(i) limits of earth-disturbing activity of the site including associated off-site borrow or spoil areas that are not addressed by a separate NOI and associated SWP3?				
(ii) soils types depicted for all areas of the site, including locations of unstable, highly erodible and/or known contaminated soils?				
(iii) existing and proposed contours to delineate drainage watersheds expected during and after major grading activities as well as the size of each drainage watershed, in acres?				
(iv) location of any delineated boundary for required riparian setbacks?				
(v) conservation easements for areas designated as open space, preserved vegetation or otherwise protected from earth disturbing activities with a description of any associated temporary or permanent fencing or signage?				
(vi) surface water locations including springs, wetlands, streams, lakes, water wells, etc., on or within 200 feet of the site, including the boundaries of wetlands or stream channels and first subsequent named receiving water(s) the permittee intends to fill or relocate for which the permittee is seeking approval from the Army Corps of Engineers and/or Ohio EPA?				
(vii) the location of existing and planned buildings, roads, parking facilities, and utilities?				
(viii) include the location of all erosion and sediment control practices, including the location of areas likely to require temporary stabilization during site development?				
(ix) location of sediment traps and basins noting their sediment storage volume and dewatering (detention) volume and contributing drainage area?				
(x) location of permanent storm water management practices (new & existing) as well as pretreatment practices to be used to control pollutants in storm water after construction operations have been completed along with the location of existing and planned drainage features (e.g. catch basins, culverts, ditches, swales, surface inlets and outlet structures)?				
(xi) areas designated for the storage or disposal of solid, sanitary, and toxic wastes (including dumpster areas), areas designated for cement truck washout, and areas for vehicle fueling?				
(xii) location of designated construction entrances where the vehicles will access the construction site?				
(xiii) location of any areas of proposed floodplain fill, floodplain excavation, stream restoration or known temporary or permanent stream crossings?				

Part III.G.2 - Sediment & Erosion Controls				
(a) Preservation Methods	**Y**	**N**	**N/A**	**Comments**
(1) Has every effort been made to preserve the natural riparian setback adjacent to streams or other surface water bodies? (E.g. preserving existing vegetation, vegetative buffer strips, and existing soil profile and topsoil; and designating tree preservation areas or other protective clearing or grubbing practices.				

(2) Have efforts been made to phase in construction activities to minimize the amount of land disturbance at one time?				
(3) Will any portions of the site be left undisturbed (e.g., tree preservation areas)?				
(b) Erosion Control Practices	**Y**	**N**	**N/A**	**Comments**
(1) Does the SWP3 include erosion controls to provide cover over disturbed soils?				
(2) Does the SWP3 describe the control practices used to re-establish suitable cover (e.g. vegetation) on disturbed areas after grading?				
(3) Does the SWP3 specify the types of stabilization measures to be employed for any time of the year?				
(b)(i) & Part II.B (Table 2): Temporary Stabilization	**Y**	**N**	**N/A**	**Comments**
For disturbed areas within 50 feet of a stream remaining dormant for over 14 days, will temporary erosion controls be applied within 2 days?				
For disturbed areas over 50 feet away from a stream remaining dormant for over 14 days, will temporary erosion controls be applied within 7 days?				
For disturbed areas that will be left idle over winter, will temporary erosion controls be applied prior to onset of winter weather?				
(b)(i) & Part II.B (Table 1): Permanent Stabilization	**Y**	**N**	**N/A**	**Comments**
For disturbed areas within 50 feet of a stream at final grade, will permanent erosion controls be applied within 2 days of reaching final grade?				
For disturbed areas remaining dormant for over 1 year or at final grade, will permanent erosion controls be applied within 7 days of the most recent disturbance?				
(b)(ii) Permanent Stabilization of Conveyance Channels				
Will operators undertake special measures to stabilize channels and outfalls and prevent erosive flows?				
(c) Runoff Control Practices - Does the SWP3 incorporate	**Y**	**N**	**N/A**	**Comments**
(1) measures to reduce flow rates on disturbed areas (e.g., riprap, rock check dams, & pipe slope drains)?				
(2) measures to divert runoff from disturbed areas and steep slopes?				
(d) Sediment Control Practices	**Y**	**N**	**N/A**	**Comments**
(1) Will sediment control devices be implemented for all areas remaining disturbed for over 14 days?				
(2) Are detail drawings of the sediment controls to be used included in the SWP3?				
(d)(i) Timing of Installing Sediment Controls.	**Y**	**N**	**N/A**	**Comments**
Does the SWP3 specify that sediment controls will be implemented prior to grading and within 7 days of grubbing?				
Does the SWP3 require additional sediment controls or modifications for changing slopes and topography?				
(d)(ii) Sediment Settling Ponds	**Y**	**N**	**N/A**	**Comments**
Does the SWP3 include the use of a sediment settling pond? *NOTE: This is required for areas with concentrated runoff or when the capacity of sediment barriers or inlet protection has been exceeded.*				
Are alternatives proposed in lieu of a required settling pond? These must be equivalent to a sediment settling pond effectiveness.				
Is the dewatering volume appropriately sized (67 yd^3 or 1800 ft^3 per acre of drainage area)?				

Is the depth of the dewatering volume for each sediment settling pond ≤5 feet?				
Will the dewatering volume drain in 48 hours to 72 hours?				
Is a skimmer specified in the SWP3?				
Has a sediment storage zone volume been provided (≥ 1000 ft^3 per disturbed acre or based on RUSLE calculations?				
Is the length to width ratio of the settling pond ≥ 2:1? *NOTE: Greater distances from storm water inlet of the pond to the outlet increase effectiveness of sediment settlement.*				
Is clean-out of the sediment storage zone specified in the SWP3? (E.g. when sediment occupies 50 percent of the sediment storage zone and prior to conversion to a post-construction BMP.)				
Have public safety concerns been considered in pond design and alternative sediment controls?				
(d)(iii) Sediment Barriers & Diversions	**Y**	**N**	**N/A**	**Comments**
Are sediment barriers or diversions used to intercept sheet flow? *NOTE: Sediment barriers are suitable for sheet flow and not for concentrated storm water flow.*				
Are alternative sediment barriers, used in lieu of silt fence, at least 12-inches in diameter?				
Are diversions used to keep runoff away from steep slopes or concentrated flow?				
Do sediment barriers meet the maximum drainage area limits of table 3 or the Rainwater and Land Development manual?				

(d)(iv) Inlet Protection	**Y**	**N**	**N/A**	**Comments**
Do drain inlets and curb inlets drain into a sediment settling pond?				
Inlets not connected to a sediment settling pond are limited to runoff from ≤ one acres?				
Does inlet protection meet acceptable standards?				
(d)(v) Stream Protection	**Y**	**N**	**N/A**	**Comments**
No structural sediment controls are proposed for use in streams.				
Have efforts been made to limit construction disturbance or activities on stream banks, and the width or number of stream crossings? *NOTE: If work along a stream bank is necessary, a non-erodible pad or non-erodible stream diversion dams (sand bags) must be installed. If stream crossings are necessary, a non-erodible stream crossing must be installed.*				

Part III.G.2.e – Post-Construction Storm Water Management				
	Y	**N**	**N/A**	**Comments**
Does the SWP3 include the installation of a structural post-construction BMP. *NOTE: Projects that do not significantly grade or impact pervious areas or install impervious surface such as park lands do not require the installation of post-construction BMPs.*				
Is the construction activity a linear project (e.g., pipeline or utility line installation) that does not result in the installation of additional impervious surface? *NOTE: If yes, then the installation of structural post-construction BMPs is not required.*				
Maintenance Plans	**Y**	**N**	**N/A**	**Comments**
Has a long-term maintenance plan been developed or included in the SWP3 for maintenance of the structural post-construction BMP?				

NOTE: The long-term maintenance plan must be developed and provided to the post-construction site operator.				
Does the long-term maintenance plan include the following?				
(1) an entity designated for storm water inspection and maintenance responsibilities?				
(2) the routine and non-routine maintenance tasks to be undertaken?				
(3) a schedule for inspection and maintenance?				
(4) any necessary legally binding maintenance easements and agreements?				
(5) construction drawings or excerpts showing the facility plan view and profile, as well as details of the outlet(s)?				
(6) a map showing all access and maintenance easements?				
(7) a description of how pollutants will be removed and disposed of?				
Does the SWP3 include a structural post-construction BMP designed to release the water quality volume over a 24-hour to 48-hour time period?				
Calculation of Water Quality Volume (WQv)	**Y**	**N**	**N/A**	**Comments**
Is the calculation of the WQv,shown? With correct values used for the following:				
(a) runoff coefficient (Rv), where Rv = 0.05 + 0.9i i = ratio of impervious surface				
(b) precipitation depth (P = 0.9 inches)?				
(c) and the drainage area (A) to the BMP?				
If the structural post-construction BMP will be used for sediment storage, does it include a sediment accumulation volume of at least 20% of the WQv?				
If a regional storm water BMP will be used to meet the post-construction requirements, does it:				
(1) meet the design requirement for treating the WQv?				
(2) have a legal agreement established with the BMP owner for long-term maintenance?				
Table 4a Do extended detention practices **s**how an appropriate minimum drain time that shall not discharge more than the first half of the WQv in less than one-third of the drain time? *NOTE: Dry = 48 hr; Wet, wetland, permeable pavement, underground storage, and sand/media filtration min. 24, <72 hr.*				
Table 4a Do extended detention practices show appropriate design features? • Wetland and wet basins: permanent pool = 1WQv • Dry, wet and wetland: sediment storage = 0.2WQv • Dry: forebay and micro-pool or acceptable pretreatment and a protected outlet. Underground storage: acceptable pretreatment capable of ≥ 50%TSS.				
Table 4b Do planned infiltrating practices show an appropriate maximum drain time? Note: Bioretention and infiltration basin ≤ 24; infiltration trench, permeable pavement and underground storage ≤ 48 hours.				
Table 4b Do planned infiltrating underground storage practices (for credit) show acceptable of pretreatment of ≥ 80% TSS.				
Small Construction Activities ≤ 2 Acres If the SWP3 proposes to use an alternative BMP instead of a Table 4a or 4b practice,	**Y**	**N**	**N/A**	**Comments**

(1) does the SWP3 provide justification on why a standard BMP is infeasible and their use would prevent the project?				
(2) Is the alternative BMP acceptable to the local MS4 or jurisdiction?				
Transportation Projects	**Y**	**N**	**N/A**	**Comments**
For (public road construction activities), are the post-construction BMPs designed consistent with the Ohio Department of Transportation's "Location and Design Manual, Volume Two?"				
Offsite Mitigation of Post-Construction If the SWP3 is proposing to use an offsite post-construction BMP, then does the SWP3 include:	**Y**	**N**	**N/A**	**Comments**
(1) a maintenance agreement or policy is established to ensure operations and treatment long-term?				
(2) the offsite location discharges to the same HUC-12 watershed unit?				
(3) the mitigation ratio of the WQv is 1.5 to 1 or the WQv at the point of retrofit, whichever is greater?				
Previously Developed Areas (Redevelopment)	**Y**	**N**	**N/A**	**Comments**
For construction of a previously developed area, was one of the following options used to as a post-construction practice:				
(a) 20% net reduction in the site's volumetric runoff coefficient?				
(b) a BMP sized to treat 20% of the WQv for the previously developed area using a standard BMP from Tables 4a or 4b?				
For construction involving both previously developed and undeveloped land, was equation 3 shown to calculate the WQv? $WQv = 0.9inches * A * [(Rv_1 * 0.2) + (Rv_2 – Rv_1)]/12$				
Runoff Reduction Practices:	**Y**	**N**	**N/A**	**Comments**
If the SWP3 proposes to use runoff reduction methods to reduce the WQv or size of post-construction practices, are one of the following acceptable practices being used with appropriate credit? • Green Roof • Impervious Surface Disconnection • Rainwater Harvesting • Bioretention Area/Cell • Infiltration Basin • Infiltration Trench • Permeable Pavement (Infiltration) • Underground Storage (Infiltration) • Grass Swale • Sheet Flow to Filter Strip Sheet Flow to Conservation Area				
Do practices meet Ohio EPA's Rainwater and Land Development Manual specifications?				
Is any runoff reduction practice(s) used to meet the groundwater recharge requirements for the Big Darby Creek Watershed shown in recharge calculations?				
Is any runoff reduction practice used meet post-construction requirement for areas that cannot drain to a structural practice (e.g., backyards of residential lots) shown in calculations?				
Alternative Post-Construction BMPs	**Y**	**N**	**N/A**	**Comments**

If the SWP3 proposes to use alternative post-construction BMPs to those of Tables 4a and 4b practices, has approval been obtained from Ohio EPA? (Attach correspondence & Alt. Practice Form)				

Part III.G.2.f - Surface Water Protection	**Y**	**N**	**N/A**	**Comments**
Does the site contain any streams, rivers, lakes, or wetlands?				
If so, has the U.S. Army Corps of Engineers been contacted for a determination of impacts requiring Clean Water Act 401 or 404 permitting? (Attach any reference numbers)				
For storm water discharges from BMPs into wetlands, have appropriate BMPs been proposed to treat and diffuse flows?				

Part III.G.2.g - Other Controls				
(Non-sediment pollutant controls, tracking, dust, wastes, dewatering, and contaminated sediments)				
Handling of Toxic or Hazardous Materials	**Y**	**N**	**N/A**	**Comments**
(1) The SWP3 considers and addresses potential toxic or hazardous wastes and their proper disposal?				
(2) The SWP3 addresses the need and methods to exclude waste materials or wastewater (e.g. from washout) from storm water or waters of the state? and of responding to chemical spills and leaks (e.g. directs to onsite Spill Prevention Control and Countermeasure (SPCC) plan).				
(3) The SWPPP addresses potential materials and responses to chemical spills and leaks (e.g. directs to onsite Spill Prevention Control and Countermeasure (SPCC) plan).				
Waste Disposal	**Y**	**N**	**N/A**	**Comments**
Covered and leak-proof containers are planned for disposal of debris, trash, hazardous or petroleum wastes?				
As applicable, the SWP3 states that all waste will comply with applicable state or local waste disposal requirements and provisions address issues such as open burning, sanitary wastes and construction and demolition debris?				
Clean Hard Fill	**Y**	**N**	**N/A**	**Comments**
(1) If disposal of bricks, hardened concrete, and/or soil is planned, are these materials required to be free from contamination that may leach to waters of the state?				
(2) If clean construction wastes will be disposed into the property, have are there any local prohibitions from this type of disposal?				
Construction Chemical Compounds	**Y**	**N**	**N/A**	**Comments**
(1) Does the SWP3 designate areas used for mixing or storage of compounds such as fertilizers, lime, asphalt, or concrete?				
(2) If so, are these areas located away from watercourses, drainage ditches, field drains, or other storm water drainage areas?				
Equipment Fueling & Maintenance	**Y**	**N**	**N/A**	**Comments**
(1) Does the SWP3 designate areas used for fueling or performing vehicle maintenance that provide separation from watercourses, drainage ditches, field drains, or other storm water drainage areas?				
(2) If applicable, has a spill prevention control and countermeasures (SPCC) plan been developed?				

NOTE: An SPCC plan is required for sites which have the following: • Aboveground oil/fuel storage capacity of more than 1,320 gallons in all containers 55 gallons or greater in volume, or • Underground oil/fuel storage capacity of more than 42,000 gallons.				
Concrete Wash Waters	**Y**	**N**	**N/A**	**Comments**
(1) Does the SWP3 designate areas used for concrete chute cleaning or other concrete wash waters that are these areas located away from watercourses, drainage ditches, field drains, or other drainage areas?				
Trench & Ground Water Control	**Y**	**N**	**N/A**	**Comments**
Does the construction site have an onsite trench or pond that must be dewatered?				
If so, does the SWP3 call for the discharge of potentially turbid water through a filter bag, sump pit, or other sediment removal device?				
Contaminated Soils	**Y**	**N**	**N/A**	**Comments**
If applicable, does the SWP3 address proper handling and disposal of soils contaminated by petroleum or other chemical spills? *NOTE: Contaminated soils must be treated and/or disposed in Ohio EPA approved solid waste management facilities or hazardous waste treatment, storage or disposal facilities.*				
If the facility contains contaminated soil, which of the following practices will be used to prevent contamination from being released?				
(1) Berms, trenches, and pits used to collect contaminated runoff and prevent discharges;				
(2) Runoff is planned to be pumped into a sanitary sewer (requires prior approval of the sanitary sewer operator) or into a container for transport to an appropriate treatment/disposal facility;				
(3) Areas of contamination are planned for covering with tarps or other methods that prevent storm water from coming into contact with the material.				
Spill Reporting Requirements	**Y**	**N**	**N/A**	**Comments**
(1) The SWP3 describes procedures in the event of a small release (less than 25 gallons) of petroleum waste? *NOTE: Petroleum-based and concrete curing compounds must have special handling procedures.*				
(2) The SWP3 describe what to do in the event of a larger release (25 or more gallons) of petroleum waste? *NOTE: Ohio EPA (1-800-282-9378), the local fire department, and the local emergency planning committee (LEPC) must be contacted within 30 minutes of a spill of 25 or more gallons.*				
Open Burning	**Y**	**N**	**N/A**	**Comments**
(1) If applicable, does the SWPPP restrict open burning to legal limits (as defined in OAC 3745-19)?				
Dust Controls/Suppressants	**Y**	**N**	**N/A**	**Comments**
(1) If dust suppressants are proposed in the SWP3, are application areas away from catch basins for storm sewers or other drainage ways? *NOTE: Used oil may not be used as a dust suppressant*				
Air Permitting Requirements	**Y**	**N**	**N/A**	**Comments**
(1) If applicable (e.g. *mobile concrete batch plants, mobile asphalt plants, concrete crushers, and large generators) have* appropriate				

measures been taken to ensure that all air pollution permits have been obtained?				
(2) In the case of applicable restoration or demolition projects, a notification will be submitted to Ohio EPA, Division of Air Pollution Control to determine if asbestos corrective actions are required?				
Process Wastewater/Leachate Management	**Y**	**N**	**N/A**	**Comments**
All process wastewaters (e.g., equipment washing, leachate associated with on-site waste disposal, and concrete wash-outs) be collected and disposed of properly (e.g., to a publicly-owned treatment works)? *NOTE: The NPDES construction storm water general permit only authorizes the discharge of storm water and certain uncontaminated non-storm waters. The discharge of non-storm waters to waters of the state may be in violation of local, state, and federal laws or regulations.*				
Additional Concerns	**Y**	**N**	**N/A**	**Comments**
For construction activities involving the installation and/or replacement of a centralized sanitary system, (including sewer extensions) or a sewerage system (except those serving one, two, and three family dwellings) and potable water lines, a PTI application was submitted to Ohio EPA? *NOTE: Coverage under the NPDES construction storm water general permit does not alone authorize the installation of such sanitary sewerage systems or potable water lines.*				
Does the SWP3 include measures for implementing good housekeeping practices?				
Does the SWP3 promote the use of protected storage areas for industrial or construction materials to minimize exposure of such materials to storm water?				

Part III.G.2.h - Maintenance				
	Y	**N**	**N/A**	**Comments**
The SWPPP describes adequate repair and maintenance procedures for each temporary and permanent control practice planned in order to ensure continued function.				
Part III.G.2.i - Inspections				
	Y	**N**	**N/A**	**Comments**
The SWP3 states that only "qualified inspection personnel" will perform the inspections?				
The SWP3 requires construction site inspections to be performed once every 7 calendar days; and after every rain event $\geq$ 0.5-inch in a 24-hour period by the end of next calendar day (excluding non-working weekends & holidays)?				
The SWP3 states that the inspection frequency may be reduced to monthly for dormant sites if:				
• the entire site is temporarily stabilized or				
• runoff is unlikely due to weather conditions for extended periods of time (e.g., frozen ground)?				
Does the SWP3 include an inspection checklist (to be completed and signed after every inspection) that includes: • the inspection date; • names, titles, and qualifications of inspectors;				

• weather for the period since the last inspection (e.g., beginning, duration, & rainfall amount of each storm event and whether a discharge occurred); • weather and a description of any discharges occurring at the time of the inspection; • location(s) of discharges of sediment or other pollutants from the site; • location(s) of BMPs that need to be maintained; • location(s) of BMPs that failed to operate as designed or proved inadequate for a particular location; • location(s) where additional BMPs are needed that did not exist at the time of inspection; • and corrective action required including any changes to the SWP3 necessary and implementation dates				
The SWP3 details the areas to inspect (disturbed areas; material storage areas; erosion and sediment controls; discharge locations; and vehicle entrance/exit locations)?				
Does the SWP3 state that inspection records will be kept for 3 years after termination of construction activities?				
Does the SWP3 specify the time within which BMPS must be repaired, maintained or a new functional BMP installed? (Within 3 days of inspection for non-sediment pond BMPs, and within 10 days of inspection for sediment ponds to be repaired or cleaned out and replacing a BMP not meeting the intended function or missing from the site.)				

ACKNOWLEDGEMENT OF COMPREHENSIVE STORMWATER MANAGEMENT PLAN & STORMWATER POLLUTION PREVENTION PLAN

Project Name: _____ Location: _____

Developer/Lessee: _____ Design Firm: _____

Address: _____ Address: _____

City/State/Zip: _____ City/State/Zip: _____

Telephone: _____ Telephone: _____

"I certify under penalty of law that I have read and am familiar with the contents of the Comprehensive Stormwater Management Plan and Stormwater Pollution Prevention Plan prepared for the project referenced above including the inspection and maintenance agreement. Any changes or alterations to the contents of the above shall be made in writing and resubmitted to the City of Wilmington for review and approval. Failure to do so may result in enforcement actions as outlined in the City of Wilmington codified ordinances. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

	NAME	SIGNATURE	DATE
DEVELOPER/APPLICANT			
CONTRACTOR			
SUB-CONTRACTOR			
SUB-CONTRACTOR			
SUB-CONTRACTOR			

INSPECTION & MAINTENANCE PLAN CHECKLIST

This checklist includes information that must be included at a minimum as part of the Inspection & Maintenance Plan and signed Inspection & Maintenance Agreement.

Minimum Required Elements

- □ Signed and Recorded Inspection & Maintenance Covenant
  - Exhibit A – Legal Description or Map of the Property
  - Exhibit B – Map of the Proposed Stormwater Management System
- □ Long-term Inspection & Maintenance Plan
- □ Final Inspection Reports and As-Built Certification

Long-term Inspection & Maintenance Plan Required Information

A. General Information:
   1. Development name/subdivision number, phase (if applicable)
   2. Name, address, and telephone number of Developer
   3. Description of location (site address, Lat/Lon of site entrance)

B. Responsible Parties:
   1. A description of the parties responsible for maintenance during and following construction including:
      a. Name, Role
      b. Address
      c. Phone Number
      d. E-mail Address

C. Recordkeeping
   1. A short description of where written documentation of maintenance activities, inspection reports, etc. will be maintained.

D. Budget and Financing
   1. A description of the funding source for future inspections and maintenance.
   2. Estimated annual inspection and maintenance costs.

E. Time Frame for Corrective Action
   1. A description of the routine inspection and maintenance schedule. A detailed schedule should be included as an attachment.
   2. Time frame for corrective maintenance activities.
   3. Time frame for emergency maintenance activities.
   4. The consequences/enforcement actions if the responsible party fails to act within the time frame specified. E.g. the provisions of the inspection & maintenance agreement shall govern.

F. Signatures
   1. Signatures of the responsible party during and following construction.

G. Description of the Stormwater System
   1. A location map showing the overall site location.
   2. A system map showing the location of the stormwater control measures (SCM) on-site.
   3. A narrative description (1 paragraph) of the stormwater management system installed on-site.
   4. List of major SCM on-site including their routine inspection frequency and routine maintenance activities.

H. Inspection & Maintenance Schedule
   1. A quarterly schedule of routine inspection and maintenance activities for SCM on-site as described above.
   2. A long-term maintenance schedule for major maintenance (e.g. dredging) and replacement of SCM on-site.

SUBMITTAL CHECKLIST

Project Name: _____	Date: _____
Location: _____	Reviewed By: _____

	Date Received	Date Accepted
Required for Comprehensive Stormwater Management Plan Approval		
☐ Completed Stormwater Review Application form.		
☐ Preliminary Comprehensive Stormwater Management Plan; or Final Comprehensive Stormwater Management Plan and design calculations – one (1) electronic PDF file, and one (1) electronic XLSX file of calculations (if requested).		
☐ Recorded drainage easements.		
☐ Inspection and Maintenance Plan and Recorded inspection and maintenance covenant and exhibits.		
☐ Contractors Acknowledgement of Comprehensive Stormwater Management Plan.		
☐ Review fees and deposit.		
☐ Performance Guarantee.		
Required for Stormwater Pollution Prevention Plan (SWP3) Approval		
☐ Completed Stormwater Review Application form.		
☐ Stormwater Pollution Prevention Plan or Abbreviated Stormwater Pollution Prevention Plan and design calculations.		
☐ OEPA Notice of Coverage (or date applied for).		
☐ Review fees and deposit.		
☐ Performance Guarantee.		
Upon Completion of Construction		
☐ Site has achieved final stabilization.		
☐ As-Built Certification approved by City Engineer.		
☐ Final Inspection and Maintenance Agreement has been signed and recorded.		
☐ Final Inspection completed and approved by the City of Wilmington.		
☐ OEPA Notice of Termination approved by the City of Wilmington.		

Appendix 2

Stormwater Forms

STORMWATER EASEMENT

_____

(NAME OF WATERCOURSE)

For and in consideration of _____ Dollars and (00/100) and the prospective benefits to be derived because of the establishment, construction, operation, maintenance and improvement of _____, a watercourse under the supervision of the City of Wilmington, Ohio (City), whose address is 69 North South Street, Wilmington, Ohio 45177;

_____, whose address is _____, who are the owners of lands described in Exhibit A (hereafter "Owners"), now convey and release to the City, whose address is 69 North South Street, Wilmington, Ohio 45177, an easement for purposes of establishment, construction, operation, maintenance and improvement of said watercourse over and across land owned by them. The easement is described and depicted in the attached Exhibit A ("Easement Area").

This conveyance shall be deemed a sufficient conveyance to vest in the City, an easement over the Easement Area for the uses and purposes of drainage with such rights of entry upon, passage over, storing of equipment and materials including excavated earth as may be necessary or useful for the establishment, construction, operation, maintenance and improvement of said watercourse.

Non-movable or permanent structures shall not be constructed by Owners, their agents, employees, or contractors within the specific limits of the Easement Area. This conveyance shall also be deemed sufficient to vest in the City an easement over the Easement Area for the clearing of the Easement Area and the spreading and/or removal of spoil and excavated materials.

This conveyance includes a release of any and all damages or claims arising out of the easement herein granted, or because of the establishment, construction, operation, maintenance and improvement of the watercourse.

This Easement shall be binding upon Owners, and the City, their heirs, assigns, successors in interest and successors in office and be deemed to run with the land in perpetuity.

Dated:_____ _____

(Printed Name)

Dated:_____ _____

(Printed Name)

STATE OF OHIO)
)ss.
COUNTY OF)

On this _____ day of _____, 20__, before me, a Notary Public in and for said County, personally appeared _____, to me known to be the person described in and who executed the foregoing instrument and acknowledged the same to be his/her free act and deed.

_____
_____Notary Public
State of Ohio, County of _____
My Commission Expires: _____
Acting in the County of _____

STATE OF OHIO)
)ss.
COUNTY OF)

On this _____ day of _____, 20__, before me, a Notary Public in and for said County, personally appeared _____, to me known to be the person described in and who executed the foregoing instrument and acknowledged the same to be his/her free act and deed.

_____
_____Notary Public
State of Ohio, County of _____
My Commission Expires: _____
Acting in the County of _____

When Recorded Return To:
City of Wilmington Building and Zoning
69 North South Street
Wilmington, OH 45177
(937) 382 5134

MAINTENANCE COVENANT

(for Private Developments)

THIS COVENANT is made and entered into effective the _____ day of _____, _____, by _____, of _____, its assigns and successors in interest, hereinafter referred to as "the Owner," and the City of Wilmington, Ohio, hereinafter referred to as "the Community."

[Owner's Name], as "Owner(s)" of the property described below, in accordance with the City of Wilmington Code of Ordinance Chapter 939 agrees to install and maintain stormwater management practices hereinafter referred to as the "Stormwater Management System" on the subject property in accordance with approved plans and conditions. The Owner further agrees to the terms stated in this document to ensure that the Stormwater Management System continues serving the intended function in perpetuity. This Covenant includes the following exhibits:

> **Exhibit A**: Legal description of the real estate for which this Agreement applies ("Property").
>
> **Exhibit B**: Location map(s) showing a location of the Property and an accurate location of each stormwater management practice affected by this Covenant.
>
> **Exhibit C**: Long-term Maintenance Plan ("Maintenance Plan") that prescribes those activities that must be carried out to maintain compliance with this Covenant.
>
> Note: After construction has been verified and accepted by the Community for the Stormwater Management System, this covenant and all exhibits shall be recorded by the Owner and a copy of the recorded document provided to the Community.

Through this Covenant, the Owner(s) hereby subjects the Property to the following covenants, conditions, and restrictions:

1. The Owner(s) shall be solely responsible for the installation, maintenance and repair of the Stormwater Management System, drainage easements and associated landscaping identified in Exhibit B in accordance with the Maintenance Plan (Exhibit C).

2. No alterations or changes to the storm water system identified in Exhibit B shall be permitted unless they are deemed to comply with this Covenant and are approved in writing by the Community.

3. The Owner(s), at its expense, shall secure from any affected lessees of land all easements and releases of rights-of-way necessary for utilization of the Stormwater Management System identified in Exhibit B and shall record them with the Register of Deeds. These easements and releases of rights-of-way shall not be altered, amended, vacated, released or abandoned without prior written approval of the Community.

4. The Owner(s) hereby conveys to the Community, its authorized agents and employees an easement over, on and in the property described in Exhibit A to enter upon the property for the purpose of access to the Stormwater Management System for the inspection, maintenance and repair thereof, should the Owner(s) fail to properly inspect, maintain and repair the practices.

5. The Owner(s) shall retain the services of a qualified inspector (as described in Exhibit C – Maintenance Requirement 1) to operate and ensure the maintenance of the storm water system identified in Exhibit B in accordance with the Maintenance Plan (Exhibit C).

6. Inspections are required at least after every major rain event.

7. Upon request by the Community, the Owner(s) shall annually, by December 30th, provide to the Community records (logs, invoices, reports, data, etc.) of inspections, maintenance, and repair of the Stormwater Management System identified in Exhibit B in accordance with the Maintenance Plan.

8. Upon written notification by the Community or their designee of required maintenance or repairs, the Owner(s) shall complete the specified maintenance or repairs within a reasonable time frame determined by the Community. The Owner(s) shall be liable for the failure to undertake any maintenance or repairs so that the public health, safety and welfare shall not be endangered nor road improvements damaged.

9. If the Owner(s) does not keep the storm water management practices in reasonable order and condition, or complete maintenance activities in accordance with the Maintenance Plan contained in Exhibit C, or the reporting required above, or the required maintenance or repairs within the specified time frames, the Community is authorized, but not required, to perform the specified inspections, maintenance or repairs in order to preserve the intended functions of the Stormwater Management System and prevent the Stormwater Management System from becoming a threat to public health, safety, general welfare or the environment. In the case of an emergency, as determined by the Community, no notice shall be required prior to the Community performing emergency maintenance or repairs. The Community may levy the costs and expenses of such inspections, maintenance or repairs plus a ten percent (10%) administrative fee against the Owner(s). If said costs and expenses are not paid by the Owner(s), the Community may pursue the collection of same through appropriate court actions and in such a case, the Owner(s) shall pay in addition to said costs and expenses all costs of litigation, including attorney fees.

10. The Owner(s) agrees that this Covenant shall be recorded and that the land described in Exhibit A shall be subject to the covenants and obligations contained herein, and this covenant shall bind all current and future lessees of the property.

11. The Owner(s) agrees in the event that the Property is sold, transferred, or leased to provide information to the new operator or lessee regarding proper inspection, maintenance and repair of the storm water management practices. The information shall accompany the first deed transfer and include Exhibits B and C and this Covenant. The transfer of this information shall also be required with any subsequent sale, transfer or lease of the Property.

12. The Owner(s) agree that the rights, obligations and responsibilities hereunder shall commence upon execution of the Covenant.

13. The parties whose signatures appear below hereby represent and warrant that they have the authority and capacity to sign this covenant and bind the respective parties hereto.

14. The Proprietor, its agents, representatives, successors and assigns shall defend, indemnify and hold the Community harmless from and against any claims, demands, actions, damages, injuries, costs or expenses of any nature whatsoever, hereinafter "Claims", fixed or contingent, known or unknown, arising out of or in any way connected with the design, construction, use, maintenance, repair or operation (or omissions in such regard) of the storm drainage system referred to in the permit as Exhibit C hereto, appurtenances, connections and attachments thereto which are the subject of this Covenant. This indemnity and hold harmless shall include any costs, expenses and attorney fees incurred by the Community in connection with such Claims or the enforcement of this Covenant.

IN WITNESS WHEREOF, the parties hereto have executed this Covenant the day and year first above written:

_____
Signature

_____
Print Name

_____
Title

STATE OF:_____
COUNTY OF:_____

On this _____day of _____, 20_____
before me personally appeared
_____,
and _____ title of
_____.

_____
Signature Date

_____
Print Name

I hereby state I am a Notary in the County
of _____, and my commission expires
on _____.

_____
Signature

_____
Print Name

_____
Title

STATE OF:_____
COUNTY OF:_____

On this _____ day of _____, 20_____
before me personally appeared
_____,
and _____ title of
_____.

_____
Signature Date

_____
Print Name

I hereby state I am a Notary in the County
of _____, and my commission expires
expires on _____.

DRAFTED BY:
NAME: _____
ADDRESS: _____
_____

Storm Water Management System
MAINTENANCE PLAN

for

[Name of Development]
City of Wilmington
Clinton County, Ohio

Prepared by
[Name of Preparer]
[Firm]
[Address]

[Date]

Responsibility for Maintenance

1. During construction, it is the Developer's responsibility to perform the maintenance. Contact information for the responsible party is:

   [e.g. Construction Supervisor]
   [Name]
   [Address]
   [Phone]
   [email]

2. Following construction, it will be the responsibility of [Responsible Entity Name] to perform the maintenance. Contact information for the responsible party is:

   [e.g. Property Manager]
   [Name]
   [Address]
   [Phone]
   [email]

   [e.g. Maintenance Supervisor]
   [Name]
   [Address]
   [Phone]
   [email]

Maintenance Tasks and Schedule

1. See attached drawings of storm water management system for locations, number, size and type of individual Best Management Practices (Exhibit B).
2. See attached Table No. 1 for tasks and inspection schedule.

Time Frame for Corrective Action

1. Routine Maintenance: Maintenance shall be completed in accordance with the routine maintenance schedule included in Table 1.
2. Corrective Maintenance: Minor corrective action shall be completed within 30 days of regularly scheduled inspection or notification that action is required.
3. Emergency Maintenance: Corrective action shall be completed within 7 days of notification unless threat to public health, safety, and welfare requires even more immediate action.
4. Solid waste handling procedures shall be in accordance with applicable laws and regulations.
5. If [Responsible Entity Name] fails to act within the time frame specified, the provisions of the Maintenance Agreement shall govern.

Recordkeeping

1. Written documentation of maintenance inspections, maintenance activities, and expenditures will be completed in a timely manner and kept on file at [location].

Budget and Financing

1. [Responsible Entity Name] will pay for all maintenance activities on a continuing basis. The funding source will be [describe].
2. The annual maintenance budget for [Name of Development] development is [$_____] itemized as follows:
    a. xxx
    b. xxx
    c. xxx
    d. xxx

Construction Site Inspection Checklist for OHC000005

By making use of some simple Best Management Practices (BMPs) a construction site operator can do his or her share to protect Ohio's water resources from the harmful effects of sediment. The topography of the site and the extent of the construction activities will determine which of these practices are applicable to any given site, but the BMPs listed here are applicable to most construction sites. For details on the installation and maintenance of these BMPs, please refer to the current ***Rainwater and Land Development****, Ohio EPA's Standards for Storm Water Management Land Development and Urban Stream Protection*. The manual is available at http://epa.ohio.gov/dsw/storm/technical_guidance.

Temporary Stabilization

This is the most effective BMP. All disturbed areas that will lie dormant for over 14 days must be stabilized within 7 days of the date the area becomes inactive. The goal of temporary stabilization is to provide cover, quickly. Areas within 50 feet of a stream must be stabilized within 2 days of inactivity. This is accomplished by seeding with fast-growing grasses then covering with straw mulch. Apply only mulch between November 1 and March 31. To minimize your costs of temporary stabilization, leave natural cover in place for as long as possible. Only disturb areas you intend to work within the next 14 days.

Construction Entrances

Construction entrances are installed to minimize off-site tracking of sediments. A stone access drive should be installed at every point where vehicles enter or exit the site. Every individual lot should also have its own drive once construction on the lot begins.

Sediment Ponds

Sediment ponds are required for construction areas with concentrated runoff or when the design capacity of silt fence or inlet protection is exceeded. There are two types of sediment ponds: sediment basins and sediment traps. A sediment trap is appropriate where the contributing drainage area is 5 acres or less. The outlet is an earthen embankment with a simple stone spillway. A sediment basin is appropriate for drainage areas larger than 10 acres. The outlet is an engineered riser pipe with a skimmer or similar device used to dewater the pond at the surface. Often a permanent storm water management pond, such as a retention or detention basin, can be modified to act as a sediment basin during construction. All sediment ponds must be installed within 7 days of first grubbing the area they control, provide a minimum dewatering zone of 67 cubic yards per acre of total contributing drainage area and a sediment settling zone of 34 cubic yards per disturbed acre below the level of the outlet. Sediment basins must be designed to drain the dewatering zone over a 48-hour period.

Sediment Barriers

This is typically used at the perimeter of a disturbed area. It's only for small drainage areas on relatively flat slopes or around small soil storage piles. Not suitable where runoff is concentrated in a ditch, pipe or through streams. For large drainage areas where flow is concentrated, collect runoff in diversion berms or channels and pass it through a sediment pond prior to discharging it from the site. Combination barriers constructed of silt fence supported by straw bales or silt fence embedded within rock check dams may be effective within small channels. As with all sediment controls, sediment barriers must be capable of pooling runoff so that sediment can settle out of suspension. Sediment barriers must be installed within 7 days of first grubbing the area it controls.

Inlet Protection

This must be installed on all yard drains and curb drains when these inlets do not drain to a sediment trap or basin. Even if there is a sediment trap or basin, inlet protection is still recommended, as it will increase the overall sediment removal efficiency. These are best used on roads with little or no traffic. If working properly, inlet protection will cause water to pond. If used on curb inlets, streets will flood temporarily during heavy storms. Check with your municipality before installing curb inlet protection. They may prefer an alternate means of sediment control such as silt fence or ponds.

Permanent Stabilization

All areas at final grade must be permanently stabilized within 7 days of reaching final grade. This is usually accomplished by using seed and mulch, but special measures are sometimes required. This is particularly true in drainage ditches or on steep slopes. These measures include the addition of topsoil, erosion control matting, rock rip-rap or retaining walls. Permanent seeding should be done March 1 to May 31 and August 1 to September 30. Dormant seeding can be done from November 20 to March 15. At all other times of the year, the area should be temporarily stabilized until a permanent seeding can be applied.

Non-Sediment Pollution Control

Although sediment is the pollutant of greatest concern on most construction sites, there are other sources of pollution. Most of these BMPs are easy to implement with a little bit of planning and go a long way toward keeping your site clean and organized. Please be sure to inform all contractors how these BMPs affect their operations on the site, particularly those that will be working near a stream.

Inspection Sheet

INSPECTIONS MUST BE CONDUCTED ONCE EVERY 7 DAYS AND WITHIN 24 HOURS OF A 0.5" OR GREATER RAINFALL. ALL SEDIMENT CONTROLS MUST BE INSTALLED PRIOR TO GRADING AND WITHIN 7 DAYS OF FIRST GRUBBING

GENERAL INSPECTION INFORMATION

Construction Site Inspection Date: _____ Inspector Name: _____

Inspector Title: _____ Qualifications/Certifications: _____

Storm Events of the Last 7 Days

Storm Event Date	Storm Event Time	Storm Event Duration	Total Rainfall Amount	Discharge Occur? (Y/N)
_____	_____	_____	_____(inches)	_____
_____	_____	_____	_____(inches)	_____
_____	_____	_____	_____(inches)	_____
_____	_____	_____	_____(inches)	_____

Weather Information at the Time of Inspection

Temperature _____ Climate (Sunny, Cloudy, Rain)? _____ Is Storm Water Being Discharged? _____

Sketch or Small Site Map

Along with a narrative inspection log, Ohio EPA recommends the inspector use a sketch or a reduced photocopy of the site plan showing the location of storm water outfalls and storm drain inlets as well as the location and types of control measures. Problems observed at these locations, or at other locations on the construction site, should be highlighted and any corrective measures undertaken should be drawn in and noted in detail on the front side of the sketch. This method will also be helpful as the permittee is required to update the SWP3 to reflect current site conditions.

CONSTRUCTION ENTRANCES

Key things to look for ...

	Yes	No
1. Has the drive been constructed by placing geotextile fabric under the stone?	☐	☐
2. Is the stone 2-inch diameter?	☐	☐
3. Has the stone been placed to a depth of 6 inches, with a width of 10 feet and a length of at least 50 feet (30 feet for entrances onto individual sublots)?	☐	☐
4. If the drive is placed on a slope, has a diversion berm been constructed across the drive to divert runoff away from the street or water resource?	☐	☐
5. If drive is placed across a ditch, was a culvert pipe used to allow runoff to flow across the drive?	☐	☐

Note areas where repairs or maintenance is needed or where this practice needs to be applied:

SEDIMENT PONDS

Key things to look for ...

		Yes	No
1.	Are concentrated flows of runoff directed to a sediment pond?	☐	☐
2.	Is sheet-flow runoff from drainage areas that exceed the design capacity of silt fence (generally 0.25 acre or larger) directed to a sediment pond?	☐	☐
3.	Is runoff being collected and directed to the sediment pond via the storm sewer system or via a network of diversion berms and channels?	☐	☐
4.	Is the sediment pond dewatering zone appropriately sized (67 cubic yards per acre of total drainage area)?	☐	☐
5.	Is the sediment pond sediment settling zone appropriately sized (34 cubic yards per acre of disturbed area)?	☐	☐
6.	Is the sediment basin designed to be dewatered at the surface through the use of a skimmer or another similar surface water dewatering device?	☐	☐
7.	Is the sediment basin designed so that the dewatering zone will drain in no less time than 48 hours?	☐	☐
8.	Have the embankments of the sediment pond and the areas that lie downstream of the pond been stabilized?	☐	☐
9.	For sediment traps, is there geotextile under the stone spillway and is the spillway saddle-shaped?	☐	☐
10.	For sediment traps, which dewater 100% between storms, is the dewatering pipe end-capped, no larger than 6 inches in diameter, perforated and double-wrapped in geotextile?	☐	☐
11.	Is the length-to-width ratio between inlet(s) and outlet at least 2:1? **NOTE**: If not, a baffle should be added to lengthen the distance.	☐	☐
12.	Is the depth from the bottom of the basin to the top of the primary spillway no more than 3 to 5 feet?	☐	☐
13.	For a modified storm water pond being used as a sediment pond, is the connection between the riser pipe and the permanent outlet water-tight?	☐	☐
14.	Was the basin installed prior to grading the site?	☐	☐
15.	Is it time to clean-out the sediment pond to restore its original capacity? Generally, sediment should be removed from the sediment settling zone once it's half-full. Stabilize the dredged sediments with seed and mulch.	☐	☐

Note areas where repairs or maintenance is needed or where this practice needs to be applied:

SEDIMENT BARRIERS

Key things to look for ...

	Yes	No
1. Is the silt fence at least 4" to 6" into the ground?	☐	☐
2. Is the silt fence trench backfilled to prevent runoff from cutting underneath the fence?	☐	☐
3. Is the silt fence pulled tight so it won't sag when water builds up behind it?	☐	☐
4. Are the ends brought upslope of the rest of the silt fence so as to prevent runoff from going around the ends?	☐	☐
5. Is the silt fence placed on a level contour? If not, the fence will only act as a diversion.	☐	☐
6. Have all the gaps and tears in the silt fence been eliminated.	☐	☐
7. Is the sediment barrier controlling an appropriate drainage area? Refer to Chapter 6 of ***Rainwater*** manual. **RULE OF THUMB**: Design capacity for 100 linear feet of sediment barrier is 0.5 acres for slopes < 2%, 0.25 acres for slopes 2% to 20%, & 0.125 acres for slopes 20% or more. Generally, no more than 0.25 acres should lie behind 100 feet of sediment barrier at 2% to 20% slope, i.e., the distance between the barrier and the top of the slope behind it should be no more than 125 feet. The allowable distance increases on flatter slopes and decreases for steeper slopes. **All non-silt fence sediment barriers must be at least 12-inches in diameter.**	☐	☐

Note areas where repairs or maintenance is needed or where this practice needs to be applied:

INLET PROTECTION

Key things to look for ...

	Yes	No
1. Does water pond around the inlet when it rains?	☐	☐
2. Has the fabric been replaced when it develops tears or sags?	☐	☐
3. For curb inlet protection, does the fabric cover the entire grate, including the curb window?	☐	☐
4. For yard inlet protection, does the structure encircle the entire grate?	☐	☐
5. Is the fabric properly entrenched or anchored so that water passes through it and not under it?	☐	☐
6. For yard inlet protection, is the fabric properly supported to withstand the weight of water and prevent sagging? The fabric should be supported by a wood frame with cross braces, or straw bales.	☐	☐
7. Is sediment that has accumulated around the inlet removed on a regular basis?	☐	☐

Note areas where repairs or maintenance is needed or where this practice needs to be applied:

TEMPORARY STABILIZATION

Key things to look for ...

	Yes	No
1. Are there any areas of the site that are disturbed, but will likely lie dormant for over 14 days?	☐	☐
2. Have all dormant, disturbed areas been temporarily stabilized in their entireties?	☐	☐
3. Have disturbed areas outside the silt fence been seeded or mulched?	☐	☐
4. Have soil stockpiles that will sit for over 14 days been stabilized?	☐	☐
5. Has seed and mulch been applied at the proper rate? In general, seed is applied at 3 to 5 lbs per 1000 sq ft and straw mulch is applied at 2-3 bales per 1000 sq ft.	☐	☐
6. Has seed or mulch blown away? If so, repair.	☐	☐

Note areas where repairs or maintenance is needed or where this practice needs to be applied:

PERMANENT STABILIZATION

Key things to look for ...

	Yes	No
1. Are any areas at final grade?	☐	☐
2. Has the soil been properly prepared to accept permanent seeding?	☐	☐
3. Has seed and mulch been applied at the appropriate rate (see Chapter 7 of the ***Rainwater*** manual)?	☐	☐
4. If rainfall has been inadequate, are seeded areas being watered?	☐	☐
5. For drainage ditches where flow velocity exceeds 3.5 ft/s from a 10-year, 24-hour storm has matting been applied to the ditch bottom?	☐	☐
6. If the flow velocity exceeds 5.0 ft/s, has the ditch bottom been stabilized with rock rip-rap? **NOTE**: Rock check dams may be needed to slow the flow of runoff.	☐	☐
7. Has rock rip-rap been placed under all storm water outfall pipes to prevent scouring in the receiving stream or erosion of the receiving channel?	☐	☐
8. For sites with steep slopes or fill areas, is runoff from the top of the site conveyed to the bottom of the slope or fill area in a controlled manner so as not to cause erosion?	☐	☐

Note areas where repairs or maintenance is needed or where this practice needs to be applied:

NON-SEDIMENT POLLUTION CONTROL

Key things to look for ...

	Yes	No
1. Has an area been designated for washing out concrete trucks? Washings must be contained on site within a bermed area until they harden. The washings should never be directed toward a watercourse, ditch or storm drain.	☐	☐
2. Is waste and packaging disposed of in a dumpster? Do not burn them on site.	☐	☐
3. Are fuel tanks and drums of toxic and hazardous materials stored within a diked area or trailer and away from any watercourse, ditch or storm drain?	☐	☐
4. Are streets swept as often as necessary to keep them clean and free from sediment? NOTE: Sediment should be swept back onto the lot - not down the storm sewers.	☐	☐
5. Are stockpiles of soil or other materials stored away from any watercourse, ditch or storm drain?	☐	☐
6. Have stream crossings been constructed entirely of non-erodible material?	☐	☐
7. If an area of the site is being dewatered, is it being pumped from a sump pit or is the discharge directed to a sediment pond? **NOTE**: if you must lower ground water, the water may be discharged to the receiving stream as long as the water remains clean. Be sure not to co-mingle the clean ground water with sediment-laden water or to discharge it off-site by passing it over disturbed ground.	☐	☐

Note areas where repairs or maintenance is needed or where this practice needs to be applied:

Appendix 3

Watershed Policy Statements

Appendix 4

Design Aids

Links to OEPA Design Resources

- OEPA Surface Water Permitting Stormwater Program Homepage

Design Manuals

- Ohio Rainwater and Land Development Manual
- ODOT Location & Design Manual Volume 2

Tools and Spreadsheets

- WQv Calculator
- BMP Compliance Worksheets
- Runoff Reduction Spreadsheet
- Sediment Basin Compliance Spreadsheet

Project: ______________ Date: ______________
Location: ______________

Design Storm = ______________ Pipe Manning Coefficient n = ______________

Discharge											Storm Sewer Data												Year Frequency Hydraulic Grade Line								
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22		23	24	25	26	27	28	29		
Structure #	**Drainage Area (ac)**	**Surface C C**	**CA (ac)**	**ΣCA (ac)**	**Inlet or Conduit Travel Time Tt (min)**	**Time of Concentration Tc (min)**	**Rainfall Intensity i (in/hr)**	**Run off (Q=CiA) Qr (cfs)**	**Other Controlled Runoff Qc (cfs)**	**Total Run-off, Q Qt (cfs)**	**Pipe Designation**	**Diameter (in)**	**Length (ft)**	**Slope (%) (ft/ft)**	**Gutter at Inlet or Cover Elev. (ft)**	**Inlet or Manhole Bottom inv. Out (ft)**	**Pipe Cover (ft)**	**Meets Cover Design Criteria**	**Just Full Capacity Qfull (cfs)**	**Velocity Vf (ft/s)**	**Meets Velocity Design**	**% Full**	**Rainfall Intensity (in/hr)**	**Total Run-off Q (cfs)**	**Slope (ft/ft)**	**Head Loss (ft)**	**Elevation of Hydraulic Grade Line**	**Crown Pipe**	**Pressure Flow**	**Depth at inlet (feet)**	**Spread at inlet (feet)**