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## Acronyms

AST: Aboveground Storage Tank

BMP: Best Management Practice

CIP: Capital Improvement Plan

CSAC: Community Services Advisory Commission

CWA: Clean Water Act

EPA: Environmental Protection Agency

FCPH: Franklin County Public Health

FOG: Fats, Oils, and Grease

Franklin SWCD: Franklin Soil and Water Conservation District

FY: Fiscal Year

GIS: Geographic Information System

GPS: Global Positioning System

HOA: Homeowners Association

HSTS: Household Sewage Treatment System

IDDE: Illicit Discharge Detection and Elimination

MCM: Minimum Control Measure

MEP: Maximum Extent Practicable

MS4: Municipal Separate Storm Sewer System

NPDES: National Pollutant Discharge Elimination System

S&EC: Sediment and Erosion Control

SWMP: Storm Water Management Program

SWP3: Storm Water Pollution Prevention Plan

TDS: Total Dissolved Solids

TMDL: Total Maximum Daily Load

## Glossary

**BMP / Best Management Practice**: Activities or structural improvements that help reduce the quantity and improve the quality of stormwater runoff. BMPs include public education and outreach, treatment requirements, operating procedures, and practices to control runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

**CWA / Clean Water Act**: Amendments made to the Federal Water Pollution Control Act in 1972 to establish water quality standards and to create the National Pollutant Discharge Elimination System to protect the waters of the U. S. by regulating the discharge of pollutants from point source discharges and municipal separate storm sewer systems.

**Detention Pond**: Pond that stores a volume of water for a given period of time and then discharges the water downstream.

**Discharge**: An outflow of water from a stream, pipe, ground water system or watershed.

**Erosion**: the overall process of the transport of material on the earth's surface including the movement of soil and rock by agents such as water, wind, or gravity.

**Illicit Discharge**: The term refers to any discharge to an MS4 that is not composed entirely of stormwater unless authorized via an NPDES permit or otherwise excluded from regulation. Thus, not all illicit discharges are illegal or prohibited.

**MEP / Maximum Extent Practicable**: a water quality standard that applies to all MS4 operators under NPDES permits. The standard has no exact definition, as it was intended to be flexible to allow operators to tailor their stormwater programs to their particular site.

**MS4 / Municipal Separate Storm Sewer Systems**: Areas with a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, and storm drains) that are not a combined sewer or part of a publicly owned treatment system and are owned or operated and regulated by a municipality or authorized agency. MS4s may be small, medium or large with the medium or large MS4s being principally determined by population size.

**NOI / Notice of Intent**: An application to notify the permitting authority of a facility's intention to be covered by a general permit. This exempts a facility from having to submit an individual or group application.

**NPDES / National Pollutant Discharge Elimination System**: the EPA's regulatory program to control the discharge of pollutants to waters of the United States.

**NPS / Non-Point Source Pollutants**: pollution coming from many diffuse sources whose origin is often difficult to identify. This pollution occurs as rain or snowmelt travels over the land surface and picks up pollutants such as fertilizer, pesticides, and chemicals from cars. This pollution is difficult to regulate due to its origin from many different sources. These pollutants enter waterways untreated and are a major threat to aquatic organisms and people who fish or use waterways for recreational purposes.

**Nutrients**: The term typically refers to nitrogen and phosphorus or compounds containing free amounts of the two elements. These elements are essential for the growth of plant life, but can create problems in the form of algal blooms, depletion of dissolved oxygen and pH changes in streams and other water bodies when higher concentrations are allowed to enter drainage systems and lakes.

**Outfall**: the point where a sewer or drainage discharges into a receiving waterway.

**Point Source Pollution**: pollution coming from a single, definable source, such as a factory.

**Retention Pond**: Pond that stores a volume of water without allowing it to discharge downstream.

**Runoff**: any drainage that leaves an area as surface flow.

**Sanitary Sewer**: an underground pipe system that carries sanitary waste and other wastewater to a treatment plant.

**Sediment**: material derived from the weathering of rock such as sand and soil. This material can be detrimental to aquatic life and habitats if too much is allowed to wash into rivers and ponds.

**Storm Drain**: any drain which drains directly into the storm sewer system, usually found along roadways or in parking lots.

**Storm Sewer**: an underground pipe system that carries runoff from streets and other surfaces.

**Stormwater**: stormwater or snow melt runoff, and surface runoff and drainage.

**Stormwater Associated with Industrial Activity:** the discharge from any conveyance which is used for collecting and conveying stormwater, which is directly related to manufacturing, processing, or raw material storage areas at an industrial plant, or associated with clearing, grading, and/or excavation, and is required to have an NPDES permit in accordance with 40 CFR 122.26.

**Stormwater Management**: any measure associated with the planning, maintenance, and regulation of facilities which collect, store, or convey stormwater.

**Surface Runoff**: the flow of water across the land surface that occurs when the rainfall rate exceeds the ability of the soil to absorb the water. Also occurs on impervious surfaces, such as parking lots, where water cannot infiltrate at all.

**Surface Water**: any water that remains on the earth's surface, such as ponds, rivers, streams, impoundments, wetlands, oceans, etc.

**SWPPP / Stormwater Pollution Prevention Plan**: A plan developed by a facility or entity that thoroughly evaluates potential pollutant sources at a construction site and selects and implements appropriate best management practice measures designed to prevent or control the discharge of pollutants in stormwater runoff.

**TMDL / Total Maximum Daily Load**: a regulatory limit of the maximum amount of a pollutant type that can be released into a body of water in a twenty-four hour period without adversely affecting water quality.

**Tributary**: a stream which drains into another larger stream or body of water.

**Waters of the US**: These are surface waters defined as wetlands, lakes (including dry lakes), rivers, streams (including intermittent streams, ephemeral washes and arroyos), mudflats, sandflats, sloughs, wet meadows, playa lakes, natural ponds, and man-made impoundments.

**Watershed**: a geographic area in which water flowing across the surface will drain into a certain stream or river and flow out of the area via that stream or river. All of the land that drains to a particular body of water. Also known as a catchment or drainage basin.

# 1.0 Introduction

## 1.1 Overview

This document presents the 5-year plan for the City of Dublin's Stormwater Management Program (SWMP). Preparation, execution, and maintenance of this plan is required to meet the current requirements of Ohio EPA's third generation Small Municipal Separate Storm Sewer Systems (MS4) permit, which is a part of the larger National Pollutant Discharge Elimination System (NPDES). The permit regulates discharges from the City of Dublin in an effort to reduce the discharge of pollutants, protect water quality, and meet the requirements of the federal Clean Water Act (CWA) to the "Maximum Extent Practicable" (MEP).

The Storm Water Management Plan traverses all areas within the City limits. Dublin has 561 miles of roadways (2013 Comprehensive Annual Financial Report) and over 1639 storm water outfalls to the Waters of the State. The MS4 drainage area is approximately 25 square miles which encompasses 24 waterways.

To achieve the maximum extent practicable of reduction in pollutants, best management practices (BMPs) are developed to satisfy the six minimum control measures. The six minimum control measures are:

- Public Education and Outreach on Stormwater Impacts
- Public Involvement/Participation
- Illicit Discharge Detection and Elimination
- Construction Site Storm Water Runoff Control
- Post Construction Storm Water Management in New Development and Redevelopment
- Pollution Prevention/Good Housekeeping for Municipal Operations

## 1.2 Regulatory Background

The City of Dublin Ordinance No. 48-05 provides the City with authority to control the quality and quantity of separate stormwater discharge to its storm sewer system. A copy of the ordinance is found in Appendix A. Its authority addresses both industrial and municipal discharges; and development discharges if flows goes to the MS4. The City of Dublin has the legal authority to fully implement its stormwater management plan.

Per the Franklin County Soil and Water Conservation District's *TMDL Community Identifier Table* and Ohio EPA's website GIS page that shows the "Water Quality Summary – 2014 Integrated Report", the City of Dublin is in the Rush Run (Olentangy), Hayden Run (Scioto), and the Indian Run (Scioto) watersheds. The Total Maximum Daily Loads (TMDL) for the Hayden Run and Indian Run watersheds are currently in development. There is a TMDL for the Rush Run watershed.

The Ohio EPA's GIS page shows that only the properties that front the west side of Sawmill Road are in the Rush Run watershed; however, upon review of the City's storm sewer infrastructure, all stormwater from these properties is directed to the Scioto River. In addition, water quality sampling of the Olentangy River both upstream and downstream of the Rush Run confluence shows the Olentangy River as being in attainment. Given this information, there should not be a TMDL for the properties on Sawmill Road that are located within the City of Dublin's MS4 boundaries; if there was, this segment of the Olentangy watershed is in attainment of its water quality parameters.

## 1.3 SWMP Implementation Responsibilities

The requirements of the City's MS4 permit affect many departments across the City's organizational structure. Coordination between departments is critical to facilitate information sharing, promote understanding of the NPDES permit, and facilitate permit compliance. The primary entity responsible for administering the SWMP is the Engineering Department. Other departments, including Parks and Recreation, Streets and Utilities and Facilities, GIS and Development departments, are responsible for executing some tasks and do so in cooperation with the Engineering Department. A copy of the organizational chart is provided in Appendix B.

With the assistance of the heads of each department identified in the organization chart, the Stormwater Engineer is responsible for compiling a list of department contacts and coordinating with them to identify SWMP areas needing participation, recordkeeping, and staff training. Specific tasks of the Stormwater Engineer include:

- Identifying which permit requirements apply to each department;
- Assist in determining how to integrate compliance activities into each department's programs and operations; and,

- Compiles information submitted by each department as required for the annual report to Ohio EPA.

The City of Dublin currently receives assistance from the Franklin County Soil and Water Conservation District (Franklin SWCD) and Public Health Department (FCPH) for services associated with the Illicit Discharge Detection and Elimination (IDDE) minimal control measure. This includes dry weather screening, testing of possible illicit discharges, household septic treatment systems (HSTS) mapping, HSTS permitting and maintenance enforcement and waterway inspections. In addition, Franklin SWCD and FCPH assists the City with Public Education and Outreach and Public Involvement and Participation. The City intends to continue these services with the County.

## 1.4 Documentation Organization

The remainder of this document is organized as follows:

- Section 2.0 discusses the City's overall Stormwater Management Program administration.
- Section 3.0 discusses the current and planned activities to meet the requirements of Minimum Control Measure #1: Education and Outreach.
- Section 4.0 discusses the current and planned activities to meet the requirements of Minimum Control Measure #2: Public Involvement and Participation.
- Section 5.0 discusses the current and planned activities to meet the requirements of Minimum Control Measure #3: Illicit Discharge Detection and Elimination.
- Section 6.0 discusses the current and planned activities to meet the requirements of Minimum Control Measure #4: Construction Site Stormwater Runoff Control
- Section 7.0 discusses the current and planned activities to meet the requirements of Minimum Control Measure #5: Post Construction Stormwater Management in New Development and Redevelopment
- Section 8.0 discusses the current and planned activities to meet the requirements of Minimum Control Measure #6: Pollution Prevention/Good Housekeeping for Municipal Operators.
- Section 9.0 discusses the reporting, documentation, and revision procedures required to maintain the Storm Water Management Program.

Each section includes a summary of the MS4 permit requirements and a description of current and planned best management practices that will be used to maintain permit compliance. This document also contains the following attachments for easy reference:

| | |
|---|---|
| Appendix A | Chapter 53, Stormwater Management & Stream Protection Ordinance |
| Appendix B | City's Stormwater Organization Chart |
| Appendix C | Stormwater Management Design Manual |
| Appendix D | Franklin County Storm Water Management Program – Illicit Discharge Detection and Elimination Plan |
| Appendix E | Chapter 51, Sewer Regulations |
| Appendix F | BMP Minimum Control Measures Tables |
| Appendix G | BMP Implementation Schedules |

# 2.0 Stormwater Management Program Administration

This section describes how the City is fulfilling its Permit requirements related to overall stormwater management administration through current and planned compliance activities.

## 2.1 Permit Requirements

The Permit requires the City to:

- Develop, implement, and enforce a SWMP designed to reduce the discharge of pollutants from the City's MS4 to the maximum extent practicable (MEP), to protect water quality, and to satisfy the appropriate water quality requirements of the Ohio Revised Code (ORC) 6111 and the Federal Clean Water Act.
- Submit annual compliance reports to Ohio EPA by April 1st that summarizes SWMP implementation status and presents information from assessment and evaluation activities conducted during that reporting period.
- Complete an annual review of the SWMP in conjunction with preparation of the annual report.

## 2.2 Past Activities

The City has completed its annual compliance reports through the two past permit cycles based on its 2003 Stormwater Management Program. An annual review of the SWMP was performed with each annual report. BMPs were changed or modified based on whether or not they were effective and/or necessary.

## 2.3 Planned Activities

The City is planning on starting a Stormwater Committee that will be comprised of the City staff identified in the Organizational Chart (Appendix B). The group will meet quarterly to prioritize, plan, and carryout permit requirements. Meeting regularly will aid in making sure that tasks are being carried out and that the responsible party has the tools required to complete their task. Meeting minutes will be recorded.

For the annual report, the City currently relies on email records, spreadsheets, and databases to track components of the report. To facilitate easier tracking of its storm water activities, the City proposes to use Cityworks Public Asset Management software. By using Cityworks, the information for the annual reports will be in one location for easier access. Cityworks is a program that works with GIS to provide an asset management repository. The City is already using the software for tracking work orders and customer calls, and has decided it can readily use the software to track IDDE sampling, track storm sewer infrastructure maintenance, annual inspections of post-construction stormwater BMPs, and storm water from industrial sites.

# 3.0 Public Education and Outreach on Storm Water Impacts

This Section describes past, current, and future activities related to the education and outreach of storm water impacts. With a large portion of stormwater pollution identified as coming from commercial, residential, and municipal sources, community awareness and involvement becomes the foundation of an effective storm water pollution prevention program. By giving the public a better understanding of storm water, we can change or impact those behaviors that contribute to pollution at its source.

The public education and outreach programs work to distribute educational materials and conduct outreach activities to encourage the public to take action to reduce pollutants.

## 3.1 Permit Requirements

The permit requires the City to:

- Implement a public education program to distribute educational materials to the community or to conduct equivalent outreach activities about the impacts of stormwater discharges on water bodies and the steps that the public can take to reduce pollutants in stormwater runoff.
- Education and Outreach Program aimed at target audiences to reduce or eliminate behaviors and practices that cause or contribute to adverse stormwater impacts.
- Include more than one mechanism and target at least five different storm water themes or messages over the permit term.
- Include at least one theme or message shall be targeted to the development community.
- Reach 50 percent of the City's population over the permit term.

## 3.2 Past Activities

The following activities were identified for use in the City's 2003 Stormwater Management Program for Public Education and Outreach:

| Activity | Planned |
|---|---|
| Catch basin Stenciling | Purchase/Install 500 "No Dumping" Markers per year |
| Household Hazardous Waste (HHW) Collections | Collect 100 gallons of HHW per year |

Catch basin stenciling was discontinued because most, if not all, of the older inlets were stenciled and new inlets have the "No Dumping" message already cast into the metal. Household hazardous waste collections were moved from the Public Education/Outreach MCM to the Public Involvement MCM.

The 2014 Annual Report listed the following activities being completed:

| BMP | Measurable Goal | Theme or Message | Effective (Yes or No) |
|---|---|---|---|
| Walking of the Waterways | Evaluate current condition of Dublin waterways | Walking of the Waterways | Yes |
| Rain Barrel Program | Class attendance | Water Conservation | Yes |
| Curbside Leaf Program | Proper leaf management prior to collection | Rake them Right | Yes |
| Stormwater Management and Stream Protection Webpage | Bring water quality awareness to residents via city website | Only Rain Down the Drain | Yes |
| 2014 Construction Industry Forum | Awareness to the construction industry to preserve natural resources | Only Rain Down the Drain | Yes |

## 3.3 Planned Activities

In the 2014 Annual Report, the following activities were planned for 2015:

- Rain Barrel Program: Provide at least two classes so that residents may obtain a rain barrel and learn how to properly install them.
- Curbside Leaf Program: Distribute door hangers and provide updates on the website and on-going messaging.

- Stormwater Management and Stream Protection Webpage: Review and update the information on the City's website and develop content directed at Contractors.

The City has planned a variety of education and outreach programs and activities over the next permit term. Table 3.1 describes the activities planned, and the implementation schedule with delivery mechanism for each activity. Delivery mechanisms include the use of the City's website, direct mailings to targeted audiences, articles in the City's quarterly magazine, and email blasts to businesses. Social media will be used to call attention to the other media blasts, particularly for updates to the website.

The City's public education and outreach materials will reach out to a variety of target audiences including the general public, school children, commercial businesses, property managers and developers, and landscapers. Public outreach to citizens will include a variety of topics including lawn watering and fertilizing, household waste, and stream maintenance for streamside property owners. Outreach for businesses and the development community will focus on the care and maintenance of water quality and quantity control structures and the proper disposal of fats, oils, and grease. See Appendix G for a graphical representation of the BMP schedule.

## 3.4 Program Evaluation

In addition to the "Measurable Goals" list in Table 3.1, the City will conduct surveys and quizzes on storm water on its website as part of MCM #2 – Public Involvement and Participation. These tools were used in the previous permit term, and will be reused to assess the success of the public education and outreach efforts.

**MCM #1 – PUBLIC EDUCATION AND OUTREACH**

| BEST MANAGEMENT PRACTICE | BMP IDENTIFIER | LEGAL AUTHORITY | SCHEDULE | TASK | TARGETED AUDIENCE | MEASUREABLE GOAL | RATIONALE | RESPONSIBLE PARTY |
|---|---|---|---|---|---|---|---|---|
| Public education targeted to homeowners | 1-01 | N/A | • Website – always accessible.<br>• Social media messages calling attention to website – March, May, August annually | Update website with information on how storm sewers function and their effects on water bodies. | All | Number of topics covered.<br>Number of hits on website.<br>Number of social media messages | General information provided on City website for all to view. | Stormwater Engineer/ Community Relations |
| | 1-02 | | August second year | Streamside care guide for Homeowners (brochure) | Stream-side property owners | Number of brochures distributed/ mailed out. | Input received from CSAC. Creates awareness of stream function to those who live closest to it. | Stormwater Engineer/ Community Relations |
| | 1-03 | N/A | October annually starting in Year 1 | Stormwater informational booth at City's Spooktacular | Residents | Number of materials distributed and topics covered. Attendance at event. | Very successful program in 2015. Targets residents which are the largest land use and percent population. | Franklin County SWCD |
| | 1-04 | N/A | Annually | Rain barrel program – smart watering campaign launched in spring to educate about the proper amount of water needed to keep lawns green. | Residents | Class attendance | Very successful program. Targets residents which are the largest land use and percent population. | Franklin County SWCD |
| Public education concerning application and disposal of pesticides, herbicides, and fertilizers, including the use of phosphorus-free alternatives | 1-05 | N/A | • Website – always accessible.<br>• Social media messages calling attention to website – March, September annually. | Provide information on earth-friendly fertilizing to residents, landscape companies, and golf courses. | Residents, landscape companies, and golf courses | Number of social media messages.<br>Number of hits on the website. | Ohio EPA's Middle Scioto TSD lists nitrification/ eutrophication and pesticides as a target contaminant in the Indian Fork watersheds | Stormwater Engineer/ Community Relations |
| | 1-06 | N/A | May fourth year | Explore co-hosting with a local gardening company a rain garden workshop | Residents | Number of attendees. Topics covered. Advertising used also as education. | Ohio EPA's Middle Scioto TDS lists nitrification/ eutrophication and pesticides as a target contaminant in the Indian Fork watersheds | Stormwater Engineer/ Community Relations |
| | 1-07 | N/A | • Website – always accessible.<br>• Social media messages calling attention to website – March, September annually.<br>• Article in Dublin Life (Spring edition – Second Year) | Provide lawn care fact sheets to home owners focusing on proper watering and fertilizing | Residents | Number of fact sheets distributed | Ohio EPA's Middle Scioto TDS lists nitrification/ eutrophication and pesticides as a target contaminant in the Indian Fork watersheds | Stormwater Engineer/ Community Relations |
| Public education concerning proper septic system maintenance | 1-08 | N/A | As needed by FCPH | Provide maintenance instructions to those properties with HSTS | Residents | Number of mailers sent/passed out | Ohio EPA's Middle Scioto TDS lists sewage as a target contaminant in the Indian Fork watersheds | Stormwater Engineer/ Franklin County Public Health |

MCM – Minimum Control Measure; BMP – Best Management Practice; N/A – Not Applicable; CSAC – Community Services Advisory Commission; SWCD – Soil and Water Conservation District; EPA – Environmental Protection Agency; TSD - Technical Support Document; FCPH – Franklin County Public Health; HSTS – Home Sewage Treatment Systems

**TABLE 3.1: MCM #1 – PUBLIC EDUCATION AND OUTREACH (CONT'D)**

| BEST MANAGEMENT PRACTICE | BMP IDENTIFIER | LEGAL AUTHORITY | SCHEDULE | TASK | TARGETED AUDIENCE | MEASUREABLE GOAL | RATIONALE | RESPONSIBLE PARTY |
|---|---|---|---|---|---|---|---|---|
| Public education to commercial, industrial, and institutional businesses likely to have a significant impact to stormwater | 1-09 | N/A | Email blast to commercial businesses – January third year | Provide FOG educational material to commercial businesses | Commercial businesses | Number of email recipients from sending email via the economic development department's email list | The City has experienced issues with FOG in the storm sewer. | Stormwater Engineer/ Community Relations |
| Public education to inform residents, businesses of the hazards associated with illicit discharges and improper disposal of wastes (in conjunction with MCM #3) | 1-10 | N/A | • Website – always accessible.<br>• Social media messages calling attention to website – November annually starting in second year | Add information to the website on what an illicit discharge and illicit connection elimination are and how they impact water quality. Use social media for brief information and redirect reader to the IDDE website info. | All | Number of website hits. Number of social media messages. | Satisfies requirements of the NPDES MS4 permit. | Stormwater Engineer/ Community Relations |
| | 1-11 | N/A | • Website – always accessible.<br>• Social media messages calling attention to website – November annually starting in second year | Continue Providing the public with information on household hazardous wastes including vehicle maintenance wastes | All | Number of social media messages. Number of website hits. | Satisfies requirements of the NPDES MS4 permit. | Stormwater Engineer/ Community Relations |
| Pond Maintenance Brochure | 1-12 | N/A | April second year | Brochures distributed to those property owners and HOAs with a privately maintained stormwater pond. | Property owners and HOAs with a privately maintained stormwater pond. | Number of brochures distributed/ mailed out. | Input received from CSAC. Brings attention to the maintenance requirement of this frequently used BMP. | Stormwater Engineer/ Community Relations |
| Curbside leaf program | 1-13 | N/A | September first year | Distribute door hangers and provide updates to the City website. | Residents | Distribute 2,000 door hangers | Educates the public on the proper disposal of leaves and the City's curbside leaf pickup service. | Stormwater Engineer/ Volunteer Services/ Community Relations |

MCM – Minimum Control Measure; BMP – Best Management Practice; N/A – Not Applicable; FOG – Fats, Oils, Grease; NPDES – National Pollutant Discharge Elimination System; MS4 - Municipal Separate Storm Sewer System; HOA – Homeowners' Association; CSAC – Community Services Advisory Commission

# 4.0 Public Involvement and Participation

This Section describes the City's activities associated with MCM #2: Public Involvement and Participation. The Program will promote activities that will encourage the public to become involved in the reduction of stormwater pollution.

## 4.1 Permit Requirements

The permit requires the City to:

- Implement a public involvement/participation program.
- At a minimum, implement five public involvement activities over the permit term.
- In the annual report, identify each public involvement activities conducted including a brief description of the activity and an estimate on the number of people who participated.
- Solicit public review of the updated SWMP.

## 4.2 Past Activities

The following activities were identified for use in the City's 2003 Stormwater Management Program for Public Involvement and Participation:

| ACTIVITY | PLANNED |
|---|---|
| Coordinate Annual Contractors Workshop to discuss erosion and sediment control BMPs | Conduct workshop for 100 attendees and distribute literature |
| Coordinate annual staff training to discuss erosion and sediment control BMPs | Conduct workshop for 100 attendees and distribute literature |
| Adopt-A-Waterway | Conduct once-a-year stream litter clean-up |

The annual staff training event was moved from this MCM to the Pollution Prevention/Good Housekeeping MCM. "Adopt-A-Waterway" was renamed "River Clean-Up Days".

The 2014 Annual Report listed the following activities being completed:

| BMP | Measurable Goal | Theme or Message | Effective (Yes or No) |
|---|---|---|---|
| River Boxes Program | Visitors to Dublin waterways seeing and interactive with water-related programming | Only Rain Down the Drain | Yes |
| Student Programming | Promote responsible land use decisions to conserve, protect, and improve soil and water resources | Water Quality | Yes |

| BMP | Measurable Goal | Theme or Message | Effective (Yes or No) |
|---|---|---|---|
| Hazardous Waste and E-Waste Disposal | Amount of materials diverted from waste stream | Only Rain Down the Drain | Yes |
| Online Survey | Survey participants | Water quality and preservation | Yes |
| City Events and Classes | Activity attendance | Water quality and preservation | Yes |

## 4.3 Planned Activities

In the 2014 Annual Report, the following activities were planned for 2015:

- River Boxes Program: visitors to Dublin's waterways seeing and interacting with water-related programming.
- Student Programming: In classroom instruction. Partnering with the Franklin Soil and Water Conservation District.
- Developer/Contractor Event: Host a training session on erosion control and water quality.

Table 4.1 describes the public involvement activities planned for the next permit term. See Appendix G for a graphical representation of the BMP schedule.

To satisfy a requirement for the SWMP update by Ohio EPA, the City solicited public comment by involving the Community Services Advisory Commission (CSAC) in the review of the new document. The committee makes recommendations to City Council regarding policies and programs related to community services, natural resources and related issues. Members of CSAC are City Council appointed residents.

## 4.4 Program Evaluation

The BMPs for MCM #2 were selected to increase awareness of the storm sewer system and to encourage active participation in maintaining the municipality's separate storm sewer system. Table 4.1 lists the measurable goals for each BMP. In addition, feedback from each of the CSAC meetings where this SWMP was presented have been incorporated into this Storm Water Management Program plan.

**TABLE 4.1: MCM #2 – PUBLIC INVOLVEMENT AND PARTICIPATION PLAN**

| BEST MANAGEMENT PRACTICE | BMP IDENTIFIER | LEGAL AUTHORITY | IMPLEMENTATION SCHEDULE | TASK | TARGETED AUDIENCE | MEASUREABLE GOAL | RATIONALE | RESPONSIBLE PARTY |
|---|---|---|---|---|---|---|---|---|
| Involve the public in the development of the SWMP | 2-01 | N/A | Fall 2015 | Provide copies of the draft and final SWMP to CSAC. Solicit comment on the draft | All stakeholder groups | Meeting minutes and attendance records | Satisfies requirements of the NPDES MS4 permit. | Stormwater Engineer |
| River Clean-Up Days | 2-02 | N/A | Annually in August | Volunteers cleaning streams and streambanks in Dublin | Residents | Number of participants. Volume and type of debris | Successfully completed each year. Physically removes garbage from the River. | Stormwater Engineer/ Parks – Volunteer Resources |
| Volunteer Water Quality sampling | 2-03 | N/A | Annually in fall and spring. | Begin water quality monitoring with local schools. Monitoring locations at upstream corporate limit and at downstream locations prior to the Scioto River | Residents | Number of students. Number of samples collected. | Reaching out to Dublin's younger population. Will provide water quality data for the City's MS4. | Nature Educator |
| Stormwater survey on website | 2-04 | N/A | Spring of second year. | Develop an online survey form for the citizens of Dublin to determine their awareness and opinion of stormwater and water quality issues. Advertise survey via social media and newspaper ad/story | Residents | Number of surveys completed. | Successful in the past. Builds awareness of stormwater and water quality issues to the general public. | Stormwater Engineer/ Community Relations |
| Stormwater quiz on website | 2-05 | N/A | Fall of third year. | Develop an online quiz form for the citizens of Dublin to determine their awareness and opinion of stormwater and water quality issues. Advertise survey via social media and newspaper ad/story. Encourage students to take online via science classes | Residents | Number of quizzes taken. | Successful in the past. Builds awareness of stormwater and water quality issues to the general public. | Stormwater Engineer/ Community Relations |
| Student programming | 2-06 | N/A | Annually | • Annual Envirothon Event<br>• Annual Poster Contest<br>• Teachers borrow kits and materials for classroom use | 1070 students | Number of students participating. | Reaching out to Dublin's younger population. All programs were successful in the past. | Franklin County SWCD |
| Waterway workshop | 2-07 | N/A | Fall second year | Streamside tour by waterways personnel on erosion and what can be done to maintain and/or restore it. | Residents | Number of tour attendees. | Input received from CSAC. Creates awareness of erosion and what can be done to prevent it. Educates those who attend on what can be done to remedy/ restore banks already impacted by erosion. | Franklin County SWCD |

MCM – Minimum Control Measure; SWMP – Stormwater Management Program; BMP – Best Management Practice; N/A – Not Applicable; CSAC – Community Services Advisory Commission; NPDES – National Pollutant Discharge Elimination System; MS4 - Municipal Separate Storm Sewer System; SWCD – Soil and Water Conservation District

# 5.0 Illicit Discharge Detection and Elimination (IDDE)

An illicit discharge is defined as "any discharge to a Municipal Separate Storm Sewer System that is not entirely composed of stormwater". The goal of a successful IDDE program is to eliminate illicit discharges from entering the storm sewer system. This Section describes how the City will meet its requirements related to IDDE compliance activities.

The Illicit Discharge Detection and Elimination (IDDE) Program will involve multiple parties including various departments from within the City, the Franklin Soil and Water Conservation District, the Franklin County Public Health department, and the Washington Township Fire Department. Permit Requirements

## 5.1 Permit Requirements

The permit requires the City to:

- Develop, implement and enforce a program to detect and eliminate illicit discharges into the City's MS4;
- Develop and maintain a comprehensive storm sewer system map showing outfalls, storm sewer infrastructure, flood control facilities, post construction water quality BMPs, and private post-construction water quality BMPs which have been installed to satisfy Ohio EPA's NPDES Construction General Permit and/or the City's local post-construction water quality BMP requirements.
- Maintain a map showing the location of all home sewage treatment systems (HSTSs) discharging to the City's MS4.
- Prohibit by ordinance illicit discharges into the MS4 and have appropriate enforcement procedures and actions.
- Work with the Franklin County Public Health department to proactively identify residents with existing HSTSs that can be legally, feasibly and economically connected to central sewers. At a minimum, the plan shall evaluate applying the provisions identified by ORC 6117.51. At a minimum, this activity should require connection to central sewers for any discharging HSTS that is not operating as designed and

intended if feasible, but it does not preclude connection to central sewers of any HSTS if local planning and coordination recommends such.

- Work with the Franklin County Public Health department to develop a proactive operation and maintenance program or implement/enhance an existing operation and maintenance program which determines if existing discharging HSTSs are operating as designed and intended and, for those not meeting the criteria, requires elimination, upgrade, or replacement of the systems if appropriate. For HSTS discharges that cannot be eliminated through the connection to central sewers or installation of soil absorption systems, the property owner must be notified of the requirement to pursue coverage under an appropriate Ohio EPA General NPDES permit.
- Actively investigate the sources of contamination in outfalls identified during the dry weather screening event. When the source of contamination is identified as a discharging HSTS that is not operating as designed and intended, work with the Franklin County Public Health department to determine the appropriate course of action in resolving the improperly functioning HSTS.
- Evaluate the planned or possible future installation of sanitary sewers for areas which contain high densities of discharging HSTSs.
- Inform public employees, businesses, and the general public of hazards associated with illegal discharges and improper disposal of wastes.
- Address non-stormwater discharges of flow if the City or Ohio EPA has identified them as significant contributors of pollutants to the MS4.
- Develop a list of occasional incidental non-stormwater discharges that will not be addressed as illicit discharges. The non-stormwater discharges must not be reasonably expected to be significant sources of pollutants into the MS4, because of either the nature of the discharges or conditions established for allowing these discharge to the City's MS4. The City must document in the SWMP any local controls or conditions placed on the discharges. The MS4 must include a provision prohibiting any individual non-stormwater discharge that is determined to be contributing significant amounts of pollutants to the MS4.

## 5.2 Past Activities

The following activities were identified for use in the City's 2003 Stormwater Management Program for Public Education and Outreach:

| Activity | Planned |
|---|---|
| Update Digital Stormwater System Map | Ongoing |
| Conduct Inspections of Stormwater Management System Structures | Conduct field inspection of 500 structures |
| Conduct Trash/Debris/Sediment Removal at Inlets/Catch Basins | Remove debris at 250 structures |

The 2014 Annual Report listed the following activities being completed:

| BMP | Measureable Goal |
|---|---|
| Ordinance or other regulatory mechanism | Ordinance in place |
| Storm Sewer System Map | Map facilities |
| HSTS Mapping and List | Add new HSTS to mapping |
| IDDE Plan | Sewer extension policy approved by council |
| Dry Weather Screening of Outfalls | Dry weather screen outfalls in open drainage of the southern tributaries in Dublin |

Results of the City's IDDE program include:

- Implementing and enforcing an IDDE program through Chapter 53: Stormwater Management and Stream Protection and Chapter 51: Sewer Regulations.
- Mapping all MS4 outfalls and incorporating the data into GIS.
- Adding the locations of all of the City's HSTS that discharge to the MS4 to the GIS.
- One round of dry weather screening of 1639 identified outfalls to the MS4. Of the 1639 outfalls, 220 dry weather flows were identified with 29 potential illicit connections. To date, 3 of the 29 potential illicit connections have been eliminated.

## 5.3 Planned Activities

Table 5.1 describes the activities planned for the next permit term. See Appendix G for a graphical representation of the BMP schedule.

Detailed task descriptions include:

- Continue mapping of any new or newly identified outfalls into the MS4.
- Creation of an IDDE plan that includes protocols for the evaluation, prioritization, and elimination of illicit discharges identified during the annual dry weather screening. The plan will include written protocols for all personnel investigating illicit discharges and responding to spills. The plan will basically require dry weather monitoring/sampling 1/5$^{th}$ or 20% of the Dublin MS4 area per year and sampling entire MS4 every permit cycle. Designated "hot spots" will be screened/sampled annually. Hot spots will be defined as those areas where illicit discharges were previously observed, areas near HSTS facilities, and areas near commercial/industrial properties. This also includes those properties with an Industrial Stormwater Permit through Ohio EPA. The City of Dublin/Franklin Soil and Water Conservation District's "Dry Weather Screening for the National Pollutant Discharge Elimination System Illicit Discharge Detection and Elimination Minimum Control Measure" guide detailing dry weather screening and sampling protocol is provided in Appendix D.
- Continued coordination with Franklin County Soil and Water Conservation District and the Franklin County Public Health department on IDDE and HSTS identification and enforcement.

- 2015: The City has a draft policy to get the 378 HSTS properties connected to public sewer. The policy is currently in legislative review. In the policy, the City has prioritized sewer extension areas and developed a 25-year conceptual implementation plan. Property owners within an area can petition to be moved up in the prioritization list. The City will fund 100% of the cost of the design and construction of the sewer mainline. Property owners will pay for their private connection costs. Connections to the sewer must be made within two years of mainline service becoming available.
- Integrating the outfall sampling data into Cityworks software for tracking. Use the collected data to prioritize tributaries for dry weather screening.
- Identify and contact those businesses that have an industrial storm water permit through Ohio EPA. The City will notify industries and businesses of BMP requirements during standard business inspections of targeted industrial users and activities, when responding to spill complaints, and at sites discovered during the City's illicit discharge screening process. Request copies of their reports to Ohio EPA be sent to the City's Stormwater Manager for record-keeping purposes.
- In conjunction with MCM #1, implement a Fats, Oil, and Grease (FOG) educational outreach to businesses that work with the product.
- Use Cityworks to track and plan the annual storm sewer cleaning program.
- Formalize the City's Spill Response program with the Washington Township Fire Department.
- In conjunction with MCM #6 Good Housekeeping/Pollution Prevention, provide training to staff on how to identify and prevent illicit discharges. Staff to receive training will include Engineering Inspectors, Street and Utilities Facilities, Park Operations, and Police and Fire personnel (anyone with duties outside of the office and in the field). Program will include topics of detecting illicit discharges, methods to detect, and why we are eliminating illicit discharges.

The overall management and implementation of the IDDE program will be under the direction of the Stormwater Engineer from the Engineering Department. A breakdown of responsibilities is shown in the overall Organizational Chart in Appendix B and is summarized as follows:

| Department or Agency | Responsibility |
|---|---|
| Street and Utilities | ▪ IDDE Identification<br>▪ Containment (as required to assist Fire Department and Engineering)<br>▪ Tracing (as required to assist Franklin SWCD and Engineering) |
| Engineering Inspection Department | ▪ IDDE Identification<br>▪ Tracing (as required to assist Franklin SWCD) |
| Franklin SWCD | ▪ IDDE Identification Outfall Screening/Sampling<br>▪ Stream Inspections |

| Department or Agency | Responsibility |
|---|---|
| GIS/Engineering | ▪ Comprehensive Storm Sewer Mapping<br>▪ HSTS Mapping |
| Franklin County Public Health | ▪ HSTS Enforcement<br>▪ HSTS Elimination |
| Washington Township Fire Department | ▪ Spill Response and Hazard Assessment<br>▪ Containment |

## 5.4 Program Evaluation

The City will evaluate the program on an annual basis based on the following information:

- Number of outfalls dry weather screened
- Number of dry weather flows identified
- Number of illicit discharges identified
- Number of illicit discharges eliminated
- A list of illicit connections that have been identified but have yet to be eliminated, including estimated schedules for elimination
- Summary of any storm sewer system mapping updates

In addition, the following HSTS information will be assessed on a biannual basis:

- The health risk information from Franklin County
- The number/quantity of known water wells and HSTS
- An updated list of properties within 100 feet of a sanitary sewer
- An updated map of proposed extension areas
- Updated preliminary cost estimates for extensions
- Any recommendations related to applications/petitions received by March 1
- A list of recommended extension areas for the next five year CIP update
- Copies of any notifications to property owners of utility extensions planned within the upcoming Capital Improvement Projects (CIP) period.

**TABLE 5.1: MCM #3 - ILLICIT DISCHARGE DETECTION AND ELIMINATION**

| BEST MANAGEMENT PRACTICES | BMP IDENTIFIER | LEGAL AUTHORITY | IMPLEMENTATION SCHEDULE | TASK | TARGETED AUDIENCE | MEASURABLE GOAL | RATIONALE | RESPONSIBLE PARTY |
|---|---|---|---|---|---|---|---|---|
| Ordinance or Other Regulatory Mechanism | 3-01 | Ordinance #48-05 | Winter 2016 | Initiate contact with businesses that have an Ohio EPA Industrial Stormwater Permit | Industrial companies with Ohio EPA industrial stormwater permits | Number of permittees contacted | Satisfies requirements of the NPDES MS4 permit. | Stormwater Engineer |
| | 3-02 | Ordinance #59-74 | Ongoing | • HSTS Enforcement<br>• HSTS Elimination | Property owners with septic systems | • Number of HSTS enforcement actions<br>• Number of HSTS eliminated | Satisfies requirements of the NPDES MS4 permit. | Franklin County Public Health |
| Storm Sewer System Map | 3-03 | N/A | Ongoing | Revise the GIS data files to reflect changes in the MS4 | N/A | Summary of storm sewer system mapping updates | Satisfies requirements of the NPDES MS4 permit. | GIS Department |
| | 3-04 | N/A | Ongoing | Track annual storm sewer cleaning program with electronic tracking program | N/A | Implementation of tracking of storm sewer cleaning program with electronic tracking program | Satisfies requirements of the NPDES MS4 permit. | GIS Department; Streets and Utilities; Stormwater Engineer |
| Dry Weather Screening of Outfalls | 3-05 | N/A | Screen 1/5$^{th}$ of watershed annually with annually with "hot spots" screened annually | • Outfall Screening/Sampling<br>• Stream Inspections<br>• IDDE Identification | N/A | • Number of outfalls dry weather screened<br>• Number of dry weather flows identified<br>• Number of illicit discharges identified<br>• Number of illicit discharges eliminated | Satisfies requirements of the NPDES MS4 permit. | Streets and Utilities; Franklin County SWCD |
| HSTS Mapping and List | 3-06 | N/A | Ongoing | Update GIS data files to reflect changes in properties with HSTS | N/A | • The number/ quantity of known water wells and HSTS<br>• An updated list of properties within 100 feet of a sanitary sewer<br>• An updated map of proposed sanitary extension areas | Satisfies requirements of the NPDES MS4 permit. | Franklin County Public Health; GIS Department |

MCM – Minimum Control Measure; BMP – Best Management Practice; EPA – Environmental Protection Agency; N/A – Not Applicable; NPDES – National Pollutant Discharge Elimination System; MS4 - Municipal Separate Storm Sewer System; HSTS – Home Sewage Treatment Systems; GIS – Geographical Information System

**TABLE 5.1 MCM #3 - ILLICIT DISCHARGE DETECTION AND ELIMINATION (CONT'D)**

| BEST MANAGEMENT PRACTICES | BMP IDENTIFIER | LEGAL AUTHORITY | IMPLEMENTATION SCHEDULE | TASK | TARGETED AUDIENCE | MEASURABLE GOAL | RATIONALE | RESPONSIBLE PARTY |
|---|---|---|---|---|---|---|---|---|
| IDDE Plan | 3-07 | N/A | December 2016 | • With the assistance of Franklin County SWCD, develop an IDDE Plan that will include sampling prioritization procedures, field assessment procedures, water quality sampling and testing procedures, source tracing and isolating, and response procedures.<br>• A public education plan on IDDE will be created.<br>• Recordkeeping and reporting requirements will be developed. | City Staff | Creation of IDDE Plan | Satisfies requirements of the NPDES MS4 permit. | Engineering Department/ Franklin County SWCD |
| | 3-08 | N/A | July 2016 | IDDE Training of City Staff | City Staff | Number of IDDE training sessions held<br>Number of employees trained with IDDE | Satisfies requirements of the NPDES MS4 permit. | Stormwater Engineer; Franklin County SWCD |
| | 3-09 | N/A | Email blast to commercial businesses – January third year | In conjunction with MCM #1, provide FOG educational material to commercial businesses | Commercial businesses | Number of email recipients from sending email via econ. dev. email list | The City has experienced issues with FOG in the storm sewer. | Engineering Department |
| | 3-10 | N/A | July 2017 | Spill Response and Hazard Assessment | N/A | Formalize the City's Spill Response program with Washington Township Fire Department | Satisfies requirements of the NPDES MS4 permit. | Stormwater Engineer; Washington Township Fire Department; Streets and Utilities |

MCM – Minimum Control Measure; BMP – Best Management Practice; IDDE – Illicit Discharge Detection and Elimination; N/A – Not Applicable; SWCD – Soil and Water Conservation District; NPDES – National Pollutant Discharge Elimination System; MS4 - Municipal Separate Storm Sewer System

# 6.0 Construction Site Stormwater Runoff Control

The City has an established permitting program for construction sites through their building department, planning department, and engineering department approval process. Proposed development projects and capital improvement projects are reviewed and conditioned as appropriate to achieve compliance with stormwater requirements. Projects are inspected for sediment and erosion control during construction and the installation of permanent stormwater management facilities. This MCM includes the implementation of plan review and inspection activity requirements for public improvement projects carried out by the City and development projects that disturb an acre or more of land. This section discusses how the City will enhance their stormwater management program to address MS4 permit requirements related to reducing pollutants in stormwater runoff from construction activities.

## 6.1 Permit Requirements

The permit requires the City to:

- Develop, implement, and enforce a program to reduce pollutants in any stormwater runoff into the City's MS4 from construction activities that result in a land disturbance of greater than or equal to one acre. A property that is less than one acre, but is part of a larger plan of development shall also be included in the program
- Implement an ordinance to require erosion and sediment controls and to provide enforcement procedures for requiring said controls.
- Provide for requirements for construction site operators to implement appropriate sediment and erosion control BMPs.
- Provide for requirements for construction site operators to control waste such as, but not limited to, discarded building materials, concrete truck wash out, chemicals, litter, and sanitary waste at the construction site that may cause adverse impacts to water quality.
- Provide for procedures to complete stormwater pollution prevention plan review which incorporates consideration of potential water quality impacts;
- Provide for procedures for receipt and consideration of information submitted by the public.
- Provide for site inspection and enforcement of BMPs.

## 6.2 Past Activities

The City's 2003 Stormwater Management Plan consisted of three components:

| Activity | Planned |
|---|---|
| Site Plan Review | Ongoing |
| Site Inspections | Ongoing |
| Public Comment | Ongoing |

Development projects get public comments through Planning and Zoning Commission meetings. Capital improvement projects get public comments via public meetings when determined by the City Engineer. More recently, the Construction Site Stormwater MCM included:

- The implementation of the City's Stormwater Ordinance and its Stormwater Design Manual which includes Sediment and Erosion Control (S&EC) requirements;
- A formal complaint process for S&EC concerns;
- Site plan review procedures;
- Site inspection procedures; and,
- Enforcement procedures for non-compliance of S&EC requirements.


During Ohio EPA's 2014 audit, the agency cited the City for failure to incorporate effective inspection and enforcement protocols to adequately address the intent of the MS4 permit requirements. While the inspectors may be present on-site on a daily basis, the agency is requiring a standalone sediment and erosion control inspection report. To meet this requirement, the City will begin tracking sediment and erosion control inspections through an inspection form. Copies of the inspection form will be provided to the construction foreman and property owner, along with a violation letter (if applicable) documenting the sediment and erosion controls needing to be brought up to compliance.

In addition, Ohio EPA recommended the following "opportunities" to ensure compliance with their MS4 permit:

- Documentation in writing of enforcement procedures to ensure consistency; and,
- The development of a tracking system of all construction stormwater inspections to properly evaluate and address repeat offenders;

## 6.3 Planned Activities

Table 6.1 describes the public involvement activities planned for the next permit term. See Appendix G for a graphical representation of the BMP schedule.

## 6.4 Program Evaluation

Ohio EPA will evaluate the City's Construction Site Stormwater Runoff Control MCM based on the following documentation:

- The number of applicable sites within the City's MS4;
- The number of pre-construction SWP3 reviews performed;
- The number and frequency of site inspections;
- The number of violation letters issued;
- The number of enforcement actions taken; and,
- The number of complaints received and the number followed up on.

**TABLE 6.1: MCM #4 - CONSTRUCTION SITE STORMWATER RUNOFF CONTROL**

| BEST MANAGEMENT PRACTICES | BMP IDENTIFIER | LEGAL AUTHORITY | IMPLEMENTATION SCHEDULE | TASK | TARGETED AUDIENCE | MEASURABLE GOAL | RATIONALE | RESPONSIBLE PARTY |
|---|---|---|---|---|---|---|---|---|
| Ordinance and other Regulatory Mechanisms | 4-01 | Ordinance #48-05, #86-14 | Ongoing | Regular review of City ordinances, directives, and design manuals to ensure compliance with the requirements of the MS4 permit | N/A | Compliance with MS4 permit | Satisfies requirements of the NPDES MS4 permit. | Stormwater Engineer |
| Sediment and Erosion Control Requirements | 4-02 | N/A | Annually in March | In conjunction with MCM #1 – Public Education and Outreach, provide fact sheets and/or brochures on sediment and erosion control practices to developers, builders, and contractors who reside their business or is actively working on construction site in Dublin. | Developers, Builders, and Contractors | Public Education and Outreach to Developers, Builders, and Contractors | Satisfies requirements of the NPDES MS4 permit. | Engineering Department<br><br>Community Relations |
| | 4-03 | Ordinance #48-05, #86-14 | Ongoing | Compliance with City Code for all projects that cause a change of impervious surface | Developers, Builders, and Contractors | Continue process of requiring inspections on all applicable construction sites | Satisfies requirements of the NPDES MS4 permit. | Engineering Department |
| Complaint Process | 4-04 | N/A | December 2017 | In conjunction with MCMs #3 and #5, formalize the complaint tracking system for construction and sediment and erosion control related complaints and questions. | Engineering Department | • Formalizing the Complaint Tracking Procedures for construction/sediment and erosion control complaints and questions<br>• Number of complaints received<br>• Number of complaints followed up on | Satisfies requirements of the NPDES MS4 permit. | Engineering Department |
| Site Plan Review Procedures | 4-05 | N/A | June 2016 | 1. Provide annual training for stormwater review staff that is focused on sediment and erosion control practices.<br>2. Formalize a tracking system for plan reviews. | Engineering Department/ Planning Department | • System to review all plan submittals<br>• Number of sites requiring plan reviews<br>• Number of plans reviewed | Satisfies requirements of the NPDES MS4 permit. | Stormwater Manager/ Engineering Department |

MCM – Minimum Control Measure; BMP – Best Management Practice; MS4 – Municipal Separate Storm Sewer System; NPDES – National Pollutant Discharge Elimination System

**TABLE 6.1: MCM #4 - CONSTRUCTION SITE STORMWATER RUNOFF CONTROL (CONT'D)**

| BEST MANAGEMENT PRACTICES | BMP IDENTIFIER | LEGAL AUTHORITY | IMPLEMENTATION SCHEDULE | TASK | TARGETED AUDIENCE | MEASURABLE GOAL | RATIONALE | RESPONSIBLE PARTY |
|---|---|---|---|---|---|---|---|---|
| Site Inspection Procedures | 4-06 | N/A | December 2016 | 1. Review and formally scope out a process for stormwater inspections for both public and private development projects that includes a prioritization strategy for inspections.<br>2. Create checklists, as-built forms, and other forms needed to aid and document inspections.<br>3. Create a formal process for the review of SWP3 documentation in the field. Process should include checklists or other documentation that can be used for tracking purposes.<br>4. Provide sediment and erosion control training to engineering inspectors on an annual basis.<br>5. Formalize a tracking system for inspection documentation. | City Engineering Inspectors | • Inspection and enforcement program for sediment and erosion control BMPs<br>• Number of Applicable Sites<br>• Number of Inspections Performed<br>• Average Frequency of Inspections | Satisfies requirements of the NPDES MS4 permit. | Stormwater Manager/ Engineering Department |
| Enforcement Procedures | 4-07 | Ordinance #48-05 | April 2016 | Implement enforcement procedures for sediment and erosion control on construction projects | Developers, Builders, and Contractors | • Number of violation letters<br>• Number of enforcement actions | Satisfies requirements of the NPDES MS4 permit. | Engineering Department |

MCM – Minimum Control Measure; BMP – Best Management Practice; N/A – Not Applicable; NPDES – National Pollutant Discharge Elimination System; MS4 - Municipal Separate Storm Sewer System

# 7.0 Post-Construction Stormwater Management in New Development and Redevelopment

## 7.1 Permit Requirements

The permit requires the City to:

- Develop, implement, and enforce a program to address stormwater runoff from new development and redevelopment projects that disturb greater than or equal to one acre, including project less than one acre but are part of a larger plan of development.
- Develop and implement strategies which include a combination of structural and/or non-structural BMPs appropriate for the City's MS4.
- Use an ordinance to address post-construction runoff from new development and redevelopment projects to the extent allowable by law. Ordinance should be, at a minimum, be equivalent with the technical requirements set for the Ohio EPA NPDES General Storm Water Permit for Construction Activities.
- Ensure long-term operation and maintenance of post-construction BMPs.

## 7.2 Past Activities

The City's 2003 Stormwater Management Plan consisted of two components:

| Activity | Planned |
|---|---|
| Site Plan Review | Ongoing |
| Site Inspections | Conduct field inspection of 200 structures. |

The Engineering staff was responsible for all tasks in this MCM which included ensuring post-construction BMPs were implement for public and private development projects. It also required annual inspections of all detention/retention structures on an annual basis. In the most recent annual report, the measurable goals for post-construction BMPs included implementing and enforcing ordinance requirements, implementing and enforcing post-construction BMP maintenance requirements, and plan review and construction inspection of post-construction BMPs.

## 7.3 Planned Activities

Table 7.1 summarizes the activities planned for the next permit term. See Appendix G for a graphical representation of the BMP schedule.

## 7.4 Program Evaluation

Through Ohio EPA's annual report, the following documentation will be required to be reported:

- The number of sites within the City requiring post-construction BMPs;
- The number of pre-construction SWP3 plans reviewed;
- The number of inspections performed to ensure as-built requirements; and,
- The number of long-term operation and maintenance plans developed and agreements in place.

**TABLE 7.1: MCM #5 – POST CONSTRUCTION STORMWATER MANAGEMENT IN NEW DEVELOPMENT AND REDEVELOPMENT**

| BEST MANAGEMENT PRACTICES | BMP IDENTIFIER | LEGAL AUTHORITY | IMPLEMENTATION SCHEDULE | TASK | TARGETED AUDIENCE | MEASURABLE GOAL | RATIONALE | RESPONSIBLE PARTY |
|---|---|---|---|---|---|---|---|---|
| Ordinance and other Regulatory Mechanisms | 5-01 | Ordinance #48-05 | Ongoing | Ensure compliance with City Code and Ohio EPA's MS4 permit | Engineering Department | Review plans and perform inspections | Satisfies requirements of the NPDES MS4 permit. | Stormwater Engineer |
| Post-Construction Requirements | 5-02 | Ordinance #48-05 | Ongoing | Ensure compliance with City Code and Ohio EPA's MS4 permit | Engineering Department | Review plans and perform inspections | Satisfies requirements of the NPDES MS4 permit. | Engineering Department |
| Site Plan Review Procedures | 5-03 | N/A | June 2016 | 1. Review the plan review process for both public and private development projects.<br>2. Review the City's overall development process to ensure that stormwater post-construction BMPs are planned for and developed early in the planning stage.<br>3. Create forms, instruction materials, and checklists to provide a documentation trail for the stormwater review process.<br>4. Provide annual training for planning and stormwater review staff that is focused on post-construction BMP practices.<br>5. Formalize a tracking system for plan reviews. | Developers, Builders, and Contractors | System to review all plan submittals<br>Number of applicable sites requiring post-construction BMPs<br>Number of plans reviewed | Satisfies requirements of the NPDES MS4 permit. | Engineering Department<br>Planning Department |
| Site Inspection Procedures | 5-04 | N/A | December 2016 | 1. Review process for annual inspection of stormwater post-construction BMPs for both public and private development projects. Responsibility for private facility maintenance falls to the property owner. If the post-construction stormwater BMP discharges into the MS4, the City will only inspect for verification purposes that the private property owner is maintaining their system. If the system is not being maintained, the City will notify the private property owner.<br>2. Create checklists, as-built forms, and other forms needed to aid and document inspections.<br>3. Provide post construction BMP training to engineering staff on an annual basis.<br>4. Formalize a tracking system for inspection documentation. | Developers, Builders, and Contractors | Inspection and enforcement program for post construction stormwater BMPs<br>Number of site inspections performed<br>Average frequency of site inspections performed | Satisfies requirements of the NPDES MS4 permit. | Engineering Department<br>Engineering Inspectors |
| Long-Term O&M Plans/ Agreements | 5-05 | Ordinance #48-05, #86-14 | June 2017 | 1. Develop options to help ensure that future operations and maintenance are clearly identified.<br>2. Require agreements between the City and those responsible for the operation and maintenance of post-construction stormwater management BMPs. | Developers, Builders, and Contractors | • Number of sites requiring plans/agreements<br>• Number of plans developed/agreements in place | Satisfies requirements of the NPDES MS4 permit. | Engineering Department |
| Enforcement Procedures | 5-06 | Ordinance #48-05 | April 2016 | Implement enforcement procedures for sediment and erosion control on post-construction projects | Developers, Builders, and Contractors | • Number of violation letters<br>• Number of enforcement actions | Satisfies requirements of the NPDES MS4 permit. | Engineering Department |
| | 5-07 | N/A | December third year | In conjunction with MCM #3 and #4, formalize the complaint tracking system for post-construction BMP related complaints and questions. | Residents | • Formalizing the Complaint Tracking Procedures for post-construction BMP complaints and questions | Satisfies requirements of the NPDES MS4 permit. | Engineering Department |

MCM – Minimum Control Measure; BMP – Best Management Practice; EPA – Environmental Protection Agency; MS4 – Municipal Separate Storm Sewer System; NPDES – National Pollutant Discharge Elimination System; N/A – Not Applicable

# 8.0 Pollution Prevention/Good Housekeeping for Municipal Operations

This Section outlines how the City will continue to fulfill its Permit requirements related to the daily operation and maintenance of city facilities. The measure requires the City to reduce the amount of pollutants entering the storm sewer system from City operations.

## 8.1 Permit Requirements

The MS4 permit requires the following items to be addressed:

- Develop and implement an operation and maintenance program to prevent and/or reduce pollutant runoff from municipal operations;
- Implement a training program on pollution prevention/good housekeeping procedures for municipal operations such as park and open space maintenance, fleet and building maintenance, new construction and land disturbances, and storm water system maintenance;
- Maintain a list of individual NPDES permits for discharges of storm water associated with industrial activity that discharge to the City's MS4; and,
- Develop, implement, and maintain a Storm Water Pollution Prevention Plan (SWP3) for all municipal facilities that conduct activities described in 40 CFR 122.26(b)(14) that are not required to obtain an Industrial Stormwater General Permit.

The City facilities that are required to implement and maintain a SWP3 include:

| Facility Name | Reason |
|---|---|
| 5800 Building | Construction Material Storage |
| Service Center | Chemical Storage |
| Fleet Maintenance and Impound Lot | Aboveground Storage Tanks (ASTs), brine, chemicals, etc. |
| Darree Water Tank | fertilizers |
| Avery Water Tank | Fertilizers |
| WTFD Station 93 | Bioxide tanks |
| 6825 Avery-Muirfield Drive | Bioxide tanks |
| Dublin Road Bioxide Tanks | Bioxide tanks |

The Dublin Community Recreation Center (DCRC) was recently issued an individual NPDES permit for cooling water discharge. A SWP3 for the facility is required and will be developed by summer 2016.

## 8.2 Past Activities

The following activities were identified for use in the City's 2003 Stormwater Management Program for Pollution Prevention/Good Housekeeping minimum control measure:

| ACTIVITY | PLANNED |
|---|---|
| Street Sweeping/Litter Control | Clean 750 miles (centerline dimension) of streets per year |
| Inspection of covered material storage piles | Investigate means to cover material storage piles |
| Review spill prevention control and countermeasure plans | Ongoing |
| Install/maintain catch basin inserts at fleet maintenance yards | Ongoing |
| Conduct Staff Training and develop SOP's for reducing pollutant runoff from municipal operations | Ongoing |

Currently, the City's snow crews pretreat roads with brine to reduce the amount of salt required later during a storm. The City also uses SnowGo to track snow plows. By tracking where the snow plows have applied salt, it reduces and/or eliminates the chance that a road gets salted more than once.

Fertilizers are minimally used in parks. When used, it is mostly on athletic fields. Soil testing is conducted prior to apply fertilizers on athletic fields. The City has two levels of Right-of-Ways – Level 1 and Level 2. Only Level 1 right-of-ways get fertilizer treatment, and they only get treated in the fall and spring. Level 2 right-of-ways received no treatment.

## 8.3 Planned Activities

In the 2014 Annual Report, the following activities were planned for 2015:

- Employee Training Program: train employees on good housekeeping measures.
- List of Facilities subject to the program: all SWP3s completed in 2011.
- MS4 maintenance: continue to fix stormwater infrastructure problems as we become aware of them.
- Disposal of Wastes: Continue with existing programs.
- Road salt: Continue with existing programs.
- Pesticide & Herbicide usage: Utilize no-mow area where appropriate – create pond edge buffers around ponds and monitor ponds for pests.
- Fertilizer usage: Stop mowing and applying herbicide on pond buffers.
- Street sweeping: Continue with existing programs.
- Flood management projects: Continue with existing programs.

Table 8.1 summarizes the pollution prevention/good housekeeping best management practices that are planned for the next permit cycle. See Appendix G for a graphical representation of the BMP schedule.

The Ohio EPA has requested the following information on salt minimization efforts: "A description of the materials used for roadway and municipal parking lot winterization (use of

salt, sand, bottom ash, etc. or combination thereof), associated application rates, and the rationale for the selected application rates shall be included. Also identify controls or practices to be used for reducing or eliminating discharges of pollutants resulting from roadway and municipal parking lot winterization activities." Section 8.2 describes two methods that the City currently uses to reduce salt usage. Additional methods should be investigated and reported back to Ohio EPA.

In 2011, the City created SWP3 plans for those facilities requiring one. These plans need to be reviewed and updated. Each plan needs to be stored onsite. Inspections must be completed per the plan's requirements and documented within the plan. Training on implementation of the SWP3 plan should occur annually for Public Works and Parks Operations staff.

## 8.4 Program Evaluation

Annual reporting to Ohio EPA for MCM #6 is required to document the following:

- A summary of employee training programs with the number of employees who attended.
- A summary of activities and procedures that were implemented for the City's operation and maintenance program.

**TABLE 8.1: MCM #6 – POLLUTION PREVENTION/GOOD HOUSEKEEPING FOR MUNICIPAL OPERATIONS**

| BEST MANAGEMENT PRACTICE | BMP IDENTIFIER | LEGAL AUTHORITY | IMPLEMENTATION SCHEDULE | TASK | TARGETED AUDIENCE | MEASUREABLE GOALS | RATIONALE | RESPONSIBLE PARTY |
|---|---|---|---|---|---|---|---|---|
| SWP3 Training program for Public Works and Parks Operations Staff | 6-01 | N/A | Annually in November | Develop a pollution prevention/good housekeeping employee-training program. | Streets and Utilities<br>Parks Operations<br>Engineering Department | Number of employees attended | Satisfies requirements of the NPDES MS4 permit. | Stormwater Engineer |
| SWP3 review and implementation | 6-02 | N/A | Ongoing | Review and update the 2011 SWP3 documents.<br>Create a SWP3 for the Dublin Community Recreation Center for its cooling water discharge. | Streets and Utilities Department<br>Parks Operations | • Implement the SWP3 plans at the required facilities.<br>• Number of inspections performed<br>• Number of facilities requiring inspections | Satisfies requirements of the NPDES MS4 permit. | Engineering Department<br>Engineering Inspectors |
| MS4 Maintenance - Storm sewer inspection and cleaning | 6-03 | N/A | Annually clean and inspect 20% of storm sewer infrastructure per year. Inspect Hot Spots annually. | 1. Develop a system to monitor and track storm sewer cleaning activities in an electronic tracking program<br>2. Develop a schedule for conducting a visual inspection of the City's storm sewer inlets. Track in an electronic tracking program. | N/A | Summary of storm sewer maintenance activities and schedules | Satisfies requirements of the NPDES MS4 permit. | Streets and Utilities Department |
| Disposal of Wastes | 6-04 | N/A | Annually | Continue program with SWACO to collect and properly dispose of household hazardous waste from residents. | Residents | Amount of household hazardous waste collected and properly disposed | Satisfies requirements of the NPDES MS4 permit. | Streets and Utilities Department / SWACO |
| Salt Application and Storage | 6-05 | N/A | Ongoing | 1. Maintain salt storage as to not allow runoff from the storage to enter the storm sewer system.<br>2. Continue to track snow plow salt application to prevent over-applying salt to roads | N/A | • Tons of road salt used<br>• Measures taken to minimize usage | Satisfies requirements of the NPDES MS4 permit. | Streets and Utilities Department |
| Pesticide and Herbicide Usage | 6-06 | N/A | Ongoing | Continue existing policies to limit the use of pesticides and herbicides on City property. | N/A | • Gallons used<br>• Measures taken to minimize usage | Satisfies requirements of the NPDES MS4 permit. | Parks Operations |
| Fertilizer Usage | 6-07 | N/A | Ongoing | Continue existing policies to limit the use of fertilizer on City property. | N/A | • Pounds used<br>• Measures taken to minimize usage | Satisfies requirements of the NPDES MS4 permit. | Parks Operations |

MCM – Minimum Control Measure; BMP – Best Management Practice; SWP3 – Stormwater Pollution Prevention Plan; N/A – Not Applicable; MS4 – Municipal Separate Storm Sewer System; NPDES- National Pollutant Discharge Elimination System; SWACO – Solid Waste Authority of Central Ohio

**TABLE 8.1: MCM #6 – POLLUTION PREVENTION/GOOD HOUSEKEEPING FOR MUNICIPAL OPERATIONS (CONT'D)**

| BEST MANAGEMENT PRACTICE | BMP IDENTIFIER | LEGAL AUTHORITY | IMPLEMENTATION SCHEDULE | TASK | TARGETED AUDIENCE | MEASUREABLE GOALS | RATIONALE | RESPONSIBLE PARTY |
|---|---|---|---|---|---|---|---|---|
| Street Sweeping | 6-08 | N/A | Annually | Perform sweeping on curbed streets. | N/A | Amount of material collected and properly disposed | Satisfies requirements of the NPDES MS4 permit. | Streets and Utilities Department |
| Flood Management Projects | 6-09 | N/A | Ongoing | Tracking of new or existing flood management projects that were assessed for impacts on water quality | N/A | Number of projects assessed | Satisfies requirements of the NPDES MS4 permit. | Engineering Department |

MCM – Minimum Control Measure; BMP – Best Management Practice; N/A – Not Applicable; NPDES- National Pollutant Discharge Elimination System; MS4 – Municipal Separate Storm Sewer Syste

# 9.0 Documentation, Review, and Reporting

## 9.1 Documentation

A copy of the NPDES permit, the Storm Water Management Program plan, and the NOI will be kept on file at the City's Engineering Department.

Each permit cycle will be summarized in an annual report. The annual report is required to include activities completed to meet the requirements of the MS4 permit, an assessment of the appropriateness of each BMP, progress toward reducing the amount of pollutants being discharged to the MS4 to the maximum extent practicable, and the measurable goals for each minimum control measure.

Departments have been identified to implement each BMP. Documentation will be maintained as required by each BMP and submitted to the Stormwater Engineer for incorporation into the annual report.

## 9.2 Storm Water Plan Review and Modification

The Storm Water Management Plan is to comply with Ohio EPA's Phase II MS4 requirements. The plan and its BMPs will be reviewed, updated, and revised each year, as necessary to maintain the goals of reducing the discharge of pollutant to the "maximum extent practicable", protecting water quality, and satisfying the appropriate water quality requirements of the Clean Water Act. If a measurable goal is not being met, changes to the BMP will be made to increase its effectiveness. All improvements to the SWMP or to any BMP will be included in the annual report to Ohio EPA.

## 9.3 Reports to Ohio EPA

The City of Dublin will submit its required annual report during the permit cycle. The report will include the status of compliance with the permit requirements, assessment of the appropriateness of the BMPs implemented, and the progress towards achieving the measurable goals for each of the six Minimum Control Measures. The report will also provide a summary of all upcoming activities to be performed during the reporting cycle and any changes to BMPs or measurable goals.

# Appendices

| | |
|---|---|
| *Appendix A* | *Chapter 53, Stormwater Management & Stream Protection Ordinance* |
| *Appendix B* | *City's Stormwater Organization Chart* |
| *Appendix C* | *Stormwater Management Design Manual* |
| *Appendix D* | *Franklin County Storm Water Management Program – Illicit Discharge Detection and Elimination Plan* |
| *Appendix E* | *Chapter 51, Sewer Regulations* |
| *Appendix F* | *BMP Minimum Control Measures Tables* |
| *Appendix G* | *BMP Implementation Tables* |

# APPENDIX A

# CHAPTER 53, STORMWATER MANAGEMENT AND STREAM PROTECTION ORDINANCE

# APPENDIX B

# CITY'S STORMWATER ORGANIZATION CHART

# APPENDIX C

# STORMWATER DESIGN MANUAL

# APPENDIX D

# FRANKLIN COUNTY STORMWATER MANAGEMENT PROGRAM –

# ILLICIT DISCHARGE DETECTION AND ELIMINATION PLAN

# APPENDIX E

# CHAPTER 51, SEWER REGULATIONS

# APPENDIX F

# BMP MINIMUM CONTROL MEASURES TABLES

# APPENDIX G

# BMP IMPLEMENTATION TABLES

*Exhibit "A"*

# CHAPTER 53: STORMWATER MANAGEMENT AND STREAM PROTECTION

Section



## § 53.010 PURPOSE.

(A) A chapter regulating stormwater from areas of new development and redevelopment for the purpose of protecting the public health, safety, and welfare; defining appropriate stormwater management objectives for the quantity and quality of stormwater runoff in the city; providing for waivers; providing requirements for the protection of water resources; imposing application fees and procedures; requiring adherence to the plans approved by the City Engineer; providing for maintenance; and providing for enforcement and penalties for violation.

(B) In order to protect, maintain, and enhance both the immediate and the long-term health, safety, and general welfare of the citizens of Dublin, it is the intent of the city to enact this chapter so as to accomplish the following objectives:

(1) To prevent loss of life and loss of property due to flooding;

(2) To protect, restore, and maintain the chemical, physical, and biological quality of ground and surface waters;

(3) To encourage productive and enjoyable harmony between humanity and nature thus enhancing the scenic beauty and environment of the City;

(4) To prevent individuals, business entities, and governmental entities from causing harm to the community by activities which adversely affect water resources;

5) To encourage the protection of natural systems, including groundwater and the use of those natural systems in ways which do not impair their beneficial functioning;

(6) To assist in stabilizing the banks of streams to reduce bank erosion and the downstream transport of sediments eroded from watercourse banks;

(7) To provide areas for natural meandering and lateral movement of stream channels;

(8) To minimize the transport of sediments and pollutants to surface water and groundwater;

(9) To provide high quality stream habitats with shade and food to a wide array of wildlife by maintaining diverse and connected riparian vegetation;

(10) To provide economical benefits to the city by minimizing encroachment on stream channels and reducing the need for costly engineering solutions such as dams and riprap;

(11) To protect structures and reduce property damage and threats to the safety of watershed residents;

(12)To add to the quality of life of the residents of the City of Dublin and corresponding property values;

(13)To ensure the attainment of these objectives by requiring the approval and implementation of stormwater management plans for all activities which may have an adverse impact upon groundwater and surface water.

**§ 53.020 SHORT TITLE.**

This chapter shall be known and cited as the Stormwater Management and Stream Protection chapter, hereinafter referred to as the stormwater regulations.

**§ 53.030 JURISDICTION.**

The stormwater regulations shall apply in all areas within the development jurisdiction of the city.

**§ 53.040 DEFINITIONS.**

For the purpose of the stormwater regulations, the following terms, phrases, and definitions shall apply. Words used in the singular shall include the plural, and the plural, the singular. Words used in the present tense shall include the future tense. The word ***SHALL*** is mandatory and not discretionary. The word ***MAY*** is permissive. Words not defined herein shall be construed to have the meaning given by common and ordinary use as defined by the latest edition of Webster's Dictionary.

***AGRICULTURE.*** The art or science of cultivating the ground, including the harvesting of crops, and the rearing and management of live stock; farming.

***APPLICANT.*** Any person or duly designated representative applying for a permit or other type of city, federal, or state regulatory approval to proceed with a project.

***AS-BUILT PLANS.*** The final plans amended to include all locations, dimensions, elevations, capacities, capabilities, as actually constructed and installed.

***BEST MANAGEMENT PRACTICES (BMPs).*** Schedules of activities, prohibition of practices, maintenance procedures, and other management practices (both structural and non-structural) to prevent or reduce the pollution of waters. BMP's also include treatment requirements, operating procedures, and practices to control runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

***BLUE-LINE STREAM.*** Those streams shown on USGS 7.5' Quad maps with solid or dashed blue lines.

***CLEARING.*** The removal of trees, brush, and other ground cover from a part of the land, but shall not include mowing.

***COMPENSATING STORAGE.*** Equivalent floodplain storage provided to counterbalance floodplain filling.

***CONSERVATION.*** The wise use and management of natural resources.

***CONSTRUCTION.*** The erection, alteration, repair, renovation, demolition or removal of any building or structure; and the clearing, stripping, excavating, filling, grading, and regulation of sites with connection therewith.

***CONSTRUCTION ENTRANCE.*** The permitted points of ingress and egress to construction sites regulated under this regulation which reduce the mud, dust and dirt tracked out of the site.

***DAMAGED OR DISEASED TREES:*** Trees that have split trunk, broken tops, heart rot, insect or fungus problems that will lead to imminent death, undercut root systems that put the tree in imminent danger of falling, lean as a result of root failure that puts the tree in imminent danger of falling, or any other condition that puts the tree in imminent danger of being uprooted or falling into or along a stream or onto a structure.

***DENUDE***. The act of stripping, scraping, and/or scalping a site of vegetation, thus exposing bare soil.

***DETENTION*** or ***TO DETAIN.*** The retardance of, or to retard or slow, the discharge, directly or indirectly, of a given volume of stormwater runoff into surface waters in a facility that does not contain a permanent or normal pool of water.

***DEVELOPER***. Any individual, subdivider, firm, association, syndicate, partnership, corporation, trust, or any other legal entity commencing proceedings under these regulations to effect the development of land for himself or for another.

***DEVELOPMENT AREA***. Any contiguous (abutting) area owned by one or more person(s) or developed as a single phase or multiple phases (units) and used or being developed or redeveloped, for non-farm commercial, industrial, residential, or other non-farm purposes upon which earth-disturbing activities are planned or underway.

***DEVELOPMENT*** or ***DEVELOPMENT ACTIVITY.*** The alteration, construction, installation, demolition or removal of a structure, impervious surface or drainage facility; or clearing, scraping, grubbing, killing or otherwise removing the vegetation from a site; or adding, removing, exposing, excavating, leveling, grading, digging, burrowing, dumping, piling, dredging or otherwise significantly disturbing the soil, mud, sand or rock of a site. For the purposes of this ordinance, this pertains to any development greater than one (1) acre or any size of development if it is part of a larger contiguous development.

***DISCHARGE.*** The outflow of water from a project, site, aquifer, drainage basin or facility.

***DISTURBED AREA***. An area of land subject to erosion due to the removal of vegetative cover and/or other earth disturbing activities.

***DITCH.*** A constructed channel for irrigation or stormwater conveyance.

***DRAINAGE***. The removal of excess surface water or groundwater from land by surface or subsurface drains.

***DRAINAGE AREA***. The area of land contributing surface water to a specific point.

***DUMPING***. Grading, pushing, pilling, throwing, unloading, or placing of fill material, composed of earth, soil, rock, sand, gravel, or demolition material.

***EARTH-DISTURBING ACTIVITY***. Any grading, excavating, filling, or other alteration of the earth's surface where natural or man-made ground cover is destroyed and which may result in or contribute to erosion and sediment pollution.

***EASEMENT.*** A grant by a property owner for the use of a specified portion of land for a specified purpose.

***EROSION:***

(A) The wearing away of the land surface by running water, wind, ice or other geological agents, including such processes as gravitational creep.

(B) Detachment and movement of soil or rock fragments by wind, water, ice or gravity.

(C) Erosion includes:

(1) Accelerated Erosion: erosion much more rapid than normal, natural or geologic erosion, primarily as a result of the influence of the activities of man.

(2) Floodplain Erosion: abrading and wearing away of the nearly level land situated on either side of a channel due to overflow flooding.

(3) Gully Erosion: a type of erosion caused by concentrated runoff that removes soil such that channels are formed and/or become considerably deeper than what would otherwise result by normal smoothing or tilling operations.

(4) Natural (Geological) Erosion: the wearing away of the earth's surface by water, ice or other natural agents under natural environmental conditions of clime, vegetation, etc., undisturbed by man.

(5) Normal Erosion: the gradual erosion of land used by humans which does not greatly exceed natural erosion.

(6) Rill Erosion: an erosion process in which numerous small channels only several inches deep are formed; occurs mainly on recently disturbed soils.

(D) Sheet Erosion: the removal of a fairly uniform layer of soil from the land surface by wind or runoff water.

(E) Stream Erosion: erosion of the bank or bottom due to the high velocity of flow within the stream.

***EROSION AND SEDIMENT CONTROL.*** Physical, mineral, procedural, and organic measures to minimize the removal of soil from the land surface and to prevent its transport from a disturbed area by means of wind, water, ice, gravity, or any combination of those forces.

***EXEMPTION.*** Those activities that are not subject to the requirements contained in this regulation.

***EXTENDED DRY DETENTION.*** A drainage facility designed to capture the water quality volume, release 50 percent of it in no less than 16 hours, and the remainder in no less than 32 hours (for a total of 48 hours).

***FINAL STABILIZATION.*** Establishment of a uniform perennial vegetative cover with a density of at least 70% of the cover for the disturbed area, or equivalent stabilization measures (such as the use of mulches or geotextiles) employed after all earth disturbing activities have been completed.

***FINSISHED GRADE.*** The final grade or elevation of the ground surface conforming to the approved site grading plan.

***FOREBAYS.*** Areas located at detention basin inlets that are designed to trap coarse sediment particles by separating approximately ten percent of the basin volume from the remainder of the basin with a lateral sill, rock-filled gabions, a retaining wall, or horizontal rock filters.

***GRADING.*** The stripping, cutting, filling, stockpiling, or any combination thereof of earth disturbing activities, including land in its cut or filled conditions.

***GRUBBING.*** Any activity which removes or significantly disturbs the root matter within the ground.

***GROUNDWATER.*** Water below the surface of the ground whether or not flowing through known or defined channels.

***HYDROGRAPH.*** A graph of discharge versus time for a selected point in the drainage system.

***MAINTENANCE.*** The action taken to restore or preserve the as-built functional design of any facility or system.

***NATURAL SUCCESSION:*** A gradual and continuous replacement of one kind of plant and animal group by a more complex group. The plants and animals present in the initial group modify the environment through their life activities thereby making it unfavorable for themselves. They are gradually replaced by a different group of plants and animals better adapted to the new environment.

***NOXIOUS WEED:*** Any plant species defined by the Ohio Department of Agriculture as a "noxious weed" and listed as such by the Department. For the purposes of this regulation, the most recent version of this list at the time of application of this regulation shall prevail.

***100-YEAR FLOODPLAIN:*** Any land susceptible to being inundated by water from a base flood, which is the flood that has a one percent or greater chance of being equaled or exceeded in any given year. For the purposes of these regulations, the 100-year floodplain shall be defined and approved by the City Engineer of Dublin or designee.

***OPEN CHANNEL.*** A ditch, channel, swale, or other open conveyance that is not a stream and is used to safely convey stormwater runoff.

***ORDINARY HIGH WATER MARK***: The point on the bank or shore to which the presence and action of surface water is so continuous as to leave a distinctive mark by erosion, destruction or prevention of terrestrial vegetation, predominance of aquatic vegetation or other easily recognized characteristic. The ordinary high water mark defines the channel of a stream.

***OUTDOOR ACTIVITY AREAS.*** Areas where pollutants are or may become more concentrated than typical urban runoff as characterized by the USEPA National Urban Runoff Program (NURP), as listed below or otherwise defined by the City Engineer:

(1) Industrial material, waste handling, and storage areas, including but not limited to loading docks, fuel and other liquid storage/dispensing facilities, material bins, containers,

stockpiles, and other storage containers, waste dumpsters, bins, cans, tanks, stockpiles, and other waste containers.

(2) Processing, manufacturing, fabrication, cleaning, or other permanent outdoor equipment or work areas.

(3) Areas where vehicles and equipment are repaired, maintained, stored, disassembled, rinsed, cleaned or disposed.

***OWNER.*** The person in whom is vested the fee, ownership, dominion, or title of property (i.e., the proprietor). This term may also include a tenant, if chargeable under his lease for the maintenance of the property, and any agent of the owner or tenant including a developer.

***PARCEL*** or ***PARCEL OF LAND.*** A contiguous quantity of land in possession or owned by, or recorded as property of the same claimant person as of the effective date of the stormwater regulations.

***PERMITTEE.*** Any person who has been granted a permit to proceed with a project.

***PERSON.*** Any individual, firm, corporation, governmental agency, business trust, estate, trust, partnership, association, two or more persons having a joint or common business interest, or any other legal entity.

***POLLUTION.*** Any contamination or alteration of the physical, chemical, or biological properties of any waters that will render the waters harmful or detrimental to: public health, safety or welfare; domestic, commercial, industrial, agricultural, recreational, or other legitimate beneficial uses; livestock, wildlife, including birds, fish or other aquatic life.

***POST-DEVELOPMENT.*** The average conditions as of the completion of the development for which a permit has been applied.

***PRE-DEVELOPMENT.*** The hydrologic and hydraulic condition of the project site immediately before development or construction begins.

***PROFESSIONAL ENGINEER.*** A professional engineer licensed by the State of Ohio, skilled in the practice of civil engineering and the engineer of record for the project under consideration.

***PROHIBITED DISCHARGES.*** Any discharges which are not composed entirely of stormwater unless authorized under a discharge permit issued by the OEPA.

***RECHARGE.*** The inflow of water into an aquifer.

***RETENTION*** or ***TO RETAIN.*** The prevention of, or to prevent, the discharge, directly or indirectly, of a given volume of stormwater runoff into surface waters in a facility that has a permanent or normal pool of water.

***RIPARIAN AREA.*** A transitional area between flowing water and land covered by terrestrial vegetation that provides a continuous exchange of nutrients and woody debris between land and water. This area is at least periodically influenced by flooding. Riparian areas, if

appropriately sized and managed, help to stabilize banks, limit erosion, reduce flood size flows and/ or filter and settle out runoff pollutants, or perform other functions consistent with the purposes of these regulations.

***SEDIMENT.*** Solid material, both mineral and organic, that is or was in suspension, is being or has been transported, or has been moved from its site of origin by air, water, gravity, or ice, and has come to rest on the earth's surface either above or below water.

***SEDIMENT BASIN.*** Sedimentation control devices such as ponds or traps that are designed to collect concentrated runoff from disturbed areas, settle and retain sediment in the runoff, and discharge the runoff water to a stabilized channel or pipe.

***SEDIMENTATION CONTROL DEVICE.*** Any structure or area which is designed to hold runoff water until suspended sediments have settled.

***SINKHOLE.*** A depression characterized by closed contours on a topographic map.

***SITE.*** Any lot or parcel, or a series of lots or parcels of land adjoining or contiguous or joined together under one ownership where clearing, stripping, grading or excavating is performed.

***STABILIZATION.*** The use of BMPs, such as seeding and mulching, that reduce or prevent soil erosion by water, wind, ice, gravity, or a combination of those forces.

***STORM EVENT.*** The storm of a specific duration, intensity, and frequency.

***STORMWATER*** or ***RUNOFF.*** Refers to the flow of water which results from, and which occurs during and immediately following a rainfall event.

***STORMWATER FACILITY.*** Any natural or constructed component of the stormwater management system.

***STORMWATER MANAGEMENT PLAN.*** Refers to the approved detailed analysis, design, and drawings of the stormwater management system, including erosion and sediment controls and other management practices for construction activities, required for all construction.

***STORMWATER MANAGEMENT SYSTEM.*** All natural and constructed facilities used for the conveyance and storage of stormwater through and from a drainage area, including, but not limited to, any and all of the following: channels, ditches, swales, flumes, culverts, streets, streams, watercourses, waterbodies, wetlands detention/retention facilities, and treatment devices.

***STORMWATER MASTER PLAN.*** The technical and policy manuals and any subsequent updates or amendments thereto used by the City Engineer to administer the stormwater regulations.

***STORMWATER QUALITY.*** Any liquid, solid, or semi-solid substance, or combination thereof, that enters stormwater runoff in concentrations or quantities large enough to contribute to the degradation of the beneficial uses of the body of water receiving the discharge.

***STORMWATER QUALITY TREATMENT.*** The removal of pollutants from urban runoff and improvement of water quality, accomplished largely by deposition and utilizing the benefits of natural processes.

***STREAM.*** A channel having a well-defined bed and bank, either natural or artificial which confines and conducts continuous or periodic flowing water in such a way that terrestrial vegetation cannot establish roots within the streambed. Includes intermittent, ephemeral and perennial streams and streams identified by USGS or NRCS maps.

***STREAM CORRIDOR PROTECTION ZONE (SCPZ).*** The area set back along a stream to protect the riparian area and stream from impacts of development, and streamside residents from impacts of flooding and land loss through erosion. SCPZs are those lands within the City of Dublin that fall within the area defined by the criteria set forth in these regulations.

***STRIPPING.*** Any activity which removes or significantly disturbs the vegetative surface cover.

***STRUCTURE.*** Anything constructed or installed with a fixed location on the ground, or attached to something having a fixed location on the ground.

***SUBGRADE.*** The top elevation of graded and compacted earth underlying roadway pavement.

***SUBSTANTIAL DAMAGE.*** Damage of any origin sustained by a structure whereby the cost of restoring the structure to its before damaged condition would be equal to, or would exceed, 50% of the market value of the structure before the damage occurred.

***SWALE.*** An artificial or natural waterway which may contain contiguous areas of standing or flowing water only following a rainfall event, or is planted with or has stabilized vegetation suitable for soil stabilization, stormwater treatment, and nutrient uptake, or is designed to take into account the soil erodibility, soil percolation, slope, slope length, and contributing area so as to prevent erosion and reduce the pollutant concentration of any discharge. Also see definitions for Open Channel and Ditch.

***TAILWATER.*** The water into which a spillway or outfall discharges.

***TEMPORARY SOIL EROSION AND SEDIMENT CONTROL MEASURES.*** Interim control measures installed or constructed to control soil erosion until permanent soil erosion control measures are established.

***TERRESTRIAL VEGETATION.*** Upland vegetation and facultative upland vegetation, as defined in the National Wetland Plant List.

***TOPSOIL.*** Surface and upper surface soils which presumably are darker colored, fertile soil materials, ordinarily rich in organic matter or humus debris.

***WAIVER.*** A permit of conditional exemption from the regulation in part or in whole, as specified by the approving agent, in a formal written statement. A waiver from the regulation shall not be assumed to be in effect, without the expressed written statement from the City.

***WATERBODY or RECEIVING WATERS.*** Any natural or artificial pond, lake, reservoir, or other area which ordinarily or intermittently contains water and which has a discernible shoreline and into which surface waters flow.

***WATERCOURSE***. Any natural or artificial waterway (including, but not limited to, streams, rivers, creeks, drainageways, waterways, gullies, ravines, or washes) in which waters flow in a definite direction or course, either continuously or intermittently; and including any area adjacent thereto which is subject to inundation by reason of overflow of flood water.

***WETLANDS.*** Those areas that are inundated or saturated by surface or groundwater with a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

***WORKS.*** All artificial structures, including, but not limited to, canals, ditches, swales, conduits, channels, culverts, pipes, and other construction that connects to, draws water from, drains water into, or is placed in or across the waters in the state.

## § 53.050 AUTHORITY.

The City Engineer is hereby authorized to administer the stormwater regulations. The City Engineer shall maintain and update this Stormwater Management and Stream Protection Ordinance and recommend to City Council for adoption modifications in this Stormwater Management and Stream Protection Ordinance. The City Engineer shall also develop and maintain a Stormwater Master Plan, administrative procedures, detailed design studies or procedures to reflect new construction (including building additions), and/or engineering design technology necessary to administer this Ordinance.

## § 53.060 REQUIRED APPROVALS.

(A) The requirements of the stormwater regulations shall be implemented, and shall be satisfied completely, prior to final project approval by the City Engineer. No person shall conduct any development activity, or subdivide or make any change in the use of land, or construct any stormwater management system or structure, or change the size of an existing structure or system, except as may be exempted in § 53.070 hereof.

(B) Any construction plans, specifications, building permits, or other documents approved by the City Engineer shall be constructed in accordance with all applicable state or federal permit requirements of the Ohio Environmental Protection Agency (OEPA), Ohio Department of Natural Resources (ODNR) and/or U.S. Army Corps of Engineers. No construction activity shall commence prior to obtaining applicable permits from these agencies.

## § 53.070 EXEMPTIONS.

With the approval of the City Engineer, the following activities may be exempted from on-site stormwater runoff control. An exemption shall apply only to the requirement for on-site

stormwater detention or retention facilities. All other design elements such as the storm sewer system, road culverts, erosion and sedimentation control, and runoff quality shall not be exempted.

(A) *Emergency exemption.* Emergency maintenance work performed for the protection of public health and welfare, however, if the earth-disturbing activity would have required an approved erosion and sediment control plan, if the activity were not an emergency, then the land area disturbed shall be shaped and stabilized in accordance with the requirements of the City.

(B) *Maintenance exemption.* Any maintenance to an existing system made in accordance with plans and specifications approved by the City Engineer.

(C) *Development-related exemptions.* The applicant shall provide to the City Engineer in writing a request for exemption which shall include a scaled site map, property tax number, and street address if applicable.

(1) Single-family or duplex exemption. Single-family or duplex residential construction on a single lot that is not part of a larger common plan of development.

(2) Any construction which adds less than 500 square feet through expansion of a building, structure or pavement which results in new impervious area on a project site.

(3) It is conceivable that development situations not automatically subject to exemption may exist such that development will have none of the harmful effects of sediment deposition. Such development situations, subject to City concurrence, are eligible for a waiver from this regulation. Waiver Requests shall be made in writing to the City Engineer and shall include sufficient detail to support that granting a wavier will not be detrimental to abutting properties or to watercourses, public waters, or to the sewer System.

(D) *Scioto River Corridor Exemption.* Parcels that are located between State Route 745 (Dublin Road) and State Route 257 (Riverside Drive) which are directly tributary to the Scioto River.

(E) Regular farming activities on land intended for such use, except when these activities involve practices which increase storm water runoff and exacerbate erosion and sedimentation.

(F) Tilling, planting or harvesting of agricultural, horticultural, or forest crops that employ soil conservations related to agriculture as follows: construction of terraces, terrace outlets, check dams, desilting basins, dikes, ponds, ditches, strip cropping, lister furrowing, contour cultivating, contour furrowing, and land drainage and land irrigation which does not cause an increase in storm water runoff and does not exacerbate erosion and sedimentation.

(G) Minor earth-disturbing activities such as home gardens and individual home landscaping, repairs, service connections and maintenance work.

(H) Installation, maintenance or repair of any underground public utility lines when such activity occurs on an existing hard surfaced road, street or sidewalk (provided the earth-disturbing activity is confined to the area of the road, street or sidewalk that is hard surfaced), and does not involve dewatering operations that produce sediment-laden effluent discharging to surface-lands and/or surface-waters.

~~(I)~~ Septic tank lines or drainage fields unless included in an overall plan for earth-disturbing activity relating to the construction of the building to be served by the septic tank system.

~~(J)~~ Repair or rebuilding of the tracks with-in the right-of-way of a railroad company.

~~(K)~~ *Stream Corridor Protection Zone.* Stream corridor protection zones are not required if a Preliminary Plan has already been approved for a site at the time this ordinance is passed.

(L) *Historic Dublin.* Development within this area, as defined in the Zoning Code, shall be exempt from compliance with the City's storm water quantity regulations but shall be held in compliance with the City's storm water quality regulations, described in **§** 53.090, if the construction activities disturb one (1) or more acres of total land.

**§ 53.080 GENERAL REQUIREMENTS.**

(A) A stormwater management system shall be designed and installed for the development that will contain features to provide for flood protection, erosion control, and pollution abatement. The stormwater management system design shall conform to the Stormwater Design Standards contained in § 53.090 hereof, the Stormwater Master Plan and other standards specified by the City Engineer. The intent of these design standards is to encourage environmentally sound stormwater management practices; they should go beyond providing drainage facilities. Developments that sacrifice recharge and upland controls in order to maximize the number of lots will not be allowed. The city's stormwater management perspective includes the management of both water quantity and water quality. Stormwater management design shall blend into the natural environment and be aesthetically integrated into site design.

(B) Streams and wetlands subject to protection under Section 404 of the Clean Water Act shall be protected from the impacts of development. Setbacks from streams and wetlands shall be established and regulated to protect structures from flooding and erosion as well as to maintain water quality within the stream and wetland. The stormwater system design shall ensure that the quantity and quality of stormwater flows directed to these stream and wetlands are maintained as previous to development. Constructed wetlands (including bio-retention basins) shall be considered subject to these requirements. Existing wetlands shall not be used for stormwater management or stormwater runoff quality treatment.

(C) All development activity within a special flood hazard area designated by the Federal Emergency Management Agency (FEMA) or any other area as designated by the City Engineer shall comply with Chapter 151 of the Dublin Code of Ordinances. All development shall be designed to maintain the flood carrying capacity of the floodway such that the base flood elevations are not increased, either upstream or downstream. Furthermore, no fill shall be allowed to be placed in the 100-year floodplain without an equivalent volume of soil removed to compensate for the loss of the flood storage as defined in **§**53.200 (G) of this regulation.

(D) The stormwater management system shall not create an adverse impact on stormwater quantity or quality in either upstream or downstream areas. Offsite areas which discharge to or across a site proposed for development shall be accommodated in the stormwater management plans for the development. No stormwater management plan shall be approved until it is demonstrated that the runoff from the project shall not overload or otherwise adversely impact any downstream areas.

(E) All proposed stormwater management systems shall be designed to prevent the pollution of groundwater resources by stormwater, promote safety, minimize health hazards, preserve natural features, and provide for recharge where appropriate. Neither submission of a plan under the provision herein nor compliance with the provisions of these regulations shall relieve any person from responsibility for damage to any person or property otherwise imposed by law.

(F) Where deemed necessary by the City Engineer, the applicant shall construct storm drains to handle on-site runoff; provide on-site drainage easements; provide off-site drainage easements; and provide for the conveyance of off-site runoff to an acceptable outlet in the same watershed. However, the on-site drainage easements may not encroach on required perimeter landscaping.

(G) Guidance on stream corridor protection zones (SCPZ) shall be referenced from § 53.200**.**

(H) Illicit discharges shall not be permitted**.** Any natural or man-made conveyance or drainage system, pipeline, conduit, inlet, or outlet (including natural surface flow patterns, depressions or channels traversing one or more properties) through which the discharge of any pollutant (including illegal sanitary sewer connections) to the stormwater management system shall not occur unless the connection is authorized under a discharge permit issued by the OEPA.

## § 53.090 STORMWATER DESIGN STANDARDS.

(A) *General.* The City Engineer shall develop and maintain administrative policies and manuals that define accepted design practices, procedures, and guidance materials that shall be used to satisfy the City's stormwater regulations.

## § 53.100 DEDICATION OF EASEMENTS AND RIGHTS-OF-WAY.

(A) Drainage easements or rights-of-ways, as specified in the Stormwater Design Standards, shall be conveyed by the applicant at no expense to the city for the stormwater facilities within the development.

(B) When a proposed stormwater management system will carry water across private land outside the development, the offsite drainage easements as specified in the Stormwater Design Standards shall be secured by the owner or applicant.

(C) When a development is bifurcated by a stream, wetland or watercourse, the applicant shall provide a drainage easement or right-of-way conforming substantially to the lines of such watercourse or open channel, which shall be a minimum width, as specified in **§** 53.200.

(D) Easements and rights-of-way shall include suitable access as specified herein for maintenance equipment from public rights-of-ways.

(E) All drainage easements, both on-site and offsite, shall be recorded on a final plat or a separate recorded document approved by the city. Recording costs shall be the responsibility of the Applicant. Recorded easements and rights-of-way documents shall be returned to the City's Finance Department.

(F) Outfall ditches, channels, and detention/retention facilities shall have sufficient rights-of-way and/or easements for the facility plus an unobstructed maintenance accessway on one or both sides. Said rights-of-way and/or easements shall be contiguous to public right-of-way or easement and shall allow for suitable access by maintenance equipment. Where the right-of-way and/or easement is provided for access only, the minimum width shall be as follows:

| **Ditch or Channel Top of Bank Width** | **Minimum Maintenance Accessway Required** |
|---|---|
| Less than 16 feet | 20 feet on one side |
| 16 feet to 32 feet | 20 feet on both sides |
| 32 feet to 55 feet | 20 feet on one side and 30 feet on the opposite side |
| Over 55 feet | 30 feet on both sides |

(G) Maintenance accessways shall be sloped no steeper than 1/4-inch per foot. Ponds shall have a sufficient right-of-way/easement to allow for installation plus an unobstructed maintenance accessways all around the perimeter of the pond.

(H) A 20-foot easement centered on a storm sewer shall be conveyed to the City when the storm sewer is not located within dedicated rights-of-way. Easements shall be contiguous to public rights-of-way and shall allow for suitable access by maintenance equipment.

(I) Overland flood routing paths shall be used to convey stormwater runoff from the 100-year, 24-hour storm event to an adequate receiving water body, stormwater system or stormwater detention basin such that the runoff is contained within the drainage easement for the flood routing path and does not cause flooding of residential or commercial buildings or related structures. Flood routing paths shall be evaluated using the peak 100 year water surface elevation such that it lies at least one foot below the finished floor elevation of adjoining structures. When designing the flood routing paths, the conveyance capacity of the site's storm sewers shall be taken into consideration.
Penalty, see § 53.999

## § 53.110 STORMWATER MANAGEMENT PLAN.

(A) A Stormwater Management Plan and Erosion and Sediment Control Plan shall be submitted for review and approval by the City Engineer. Details regarding the contents of the

documents will be created and maintained by the City Engineer in a manual or administrative policy.

## § 53.120 STORMWATER MANAGEMENT PLAN APPLICATION.

(A) It is strongly recommended that the applicant and the project engineer meet with city staff prior to generating detailed design calculations and construction drawings in order to review and plan design requirements for a particular project. This application is not a separate submittal from the stormwater management plan requirements outlined in Section 53.110.

(B) It is the responsibility of the applicant to include in the stormwater management plan application sufficient information for the city to evaluate:

(1) The environmental and hydraulic characteristics of the affected areas;

(2) The potential and predicted impacts of the proposed activity on community waters;

(3) The effectiveness and acceptability of those measures proposed by the applicant for eliminating or reducing adverse impacts; and

(C) The stormwater management plan application shall contain:

(1) The name, address, and telephone number of the owner and applicant, and the entity that will maintain the system;

(2) The maps, charts, graphs, tables, photographs, narrative descriptions, explanations, and citations to support references, as appropriate to communicate the information required by this chapter; and

(3) Construction plans and specifications for all components of the stormwater management system shall be included in the stormwater management plan application, which shall be prepared or directly supervised by, signed, and sealed by a professional engineer.

## § 53.130 ACCEPTANCE OF STORMWATER IMPROVEMENTS.

Subsequent to the applicant satisfying the requirements of the stormwater regulations and other applicable ordinances, and the issuances of appropriate permits and/or approvals, the applicant shall, during construction, arrange for and schedule the following inspections by the city.

(A) During the clearing operation, excavation, after significant rainfall, and at other times determined by the City Engineer, to assure that effective control practices relative to erosion and sedimentation are being followed.

(B) All public underground conveyance and control structures prior to backfilling, and all taps of private underground conveyance systems into public conveyance systems.

(C) Final inspection when all public systems required under the approved stormwater management plan have been installed.

(D) The professional engineer for the project shall submit a signed and sealed set of as-built plans, on electronic disk and reproducible mylar brand polyester film drawing sheets, to certify the system has been constructed as designed and satisfies all conditions of the stormwater management plan. Where changes have been made to the stormwater management system which deviate from the approved construction plans, the Professional Engineer shall submit supporting documentation with the as-built plans, which proves that the stormwater system shall be in compliance with the stormwater regulations.

(E) Maintenance and compliance inspections of stormwater management systems shall be conducted on a routine, periodic basis, as deemed appropriate by the city, or as complaints arise concerning the system. By seeking and obtaining plan approval under the stormwater regulations, the operator and owner shall be deemed to have consented to inspections by the city and other appropriate regulatory agencies or departments upon presentation of proper identification by the representative(s) of the agency(ies) conducting the inspections.

(F) Public improvements. Public stormwater conveyance and control systems may be accepted for public use after the following minimum conditions have been met:

(1) The applicant shall provide to the City Engineer security according to § 152.045 of the Dublin Code of Ordinances;

(2) The applicant shall provide to the City Engineer as-built plans according to § 53.130(D) of the stormwater regulations; and

(3) The as-built plans have been reviewed and approved by the City Engineer.

(G) Private improvements. Private stormwater conveyance and control systems may be approved for use after the following minimum conditions have been met:

(1) The applicant shall provide to the City Engineer as-built plans according to § 53.130(D) of the stormwater regulations; and

(2) The as-built plans have been reviewed and approved by the City Engineer. It shall not be legal to use the property (as opposed to the structure) until the as-built plans have been received and approved by the City Engineer and the stormwater improvements have been completed as shown on the approved as-built plans.

**§ 53.140 MAINTENANCE RESPONSIBILITY.**

(A) The installed stormwater system shall be properly maintained and operated by the legal entity responsible for maintenance in order to achieve compliance with the conditions outlined in this ordinance. All stormwater management plan applications shall contain documentation sufficient to demonstrate that the operation and maintenance entity is the legal entity empowered and obligated to perpetually maintain the stormwater management facilities. Details of this documentation, including maintenance responsibilities and agreements, shall be included in the Notes section of development plans and where applicable on the final plats. Final plats shall be

recorded in Delaware, Franklin, or Union County at no expense to the City and shall constitute a covenant running with the land and shall be binding on the legal entity responsible for maintenance. Where final plats are not recorded, stormwater management plan and development plan documentation regarding obligations to perpetually maintain stormwater management facilities shall be maintained by the City Engineer. The city considers the following entities acceptable to operate and maintain stormwater management facilities:

(1) Local governmental units, including the county, municipalities, or Municipal Service Taxing Units.

(2) Non-profit corporations, including homeowners associations, property owners associations or condominium owners associations, under certain conditions which ensure that the corporation has the financial, legal, and administrative capability to provide for the long-term operation and maintenance of the facilities.

(3) The property owner or developer is normally not acceptable as a responsible entity, especially when the property is to be sold to various third parties. However, the property owner or developer may be acceptable under one of the following circumstances:

(a) The property is wholly owned by said applicant and the ownership is intended to be retained. This would apply to a farm, corporate office, or single industrial facility, for example.

(b) The ownership of the property is retained by the applicant and is either leased to third parties (such as in some shopping centers), or rented to third parties (such as in some mobile home parks), for example.

(B) The stormwater management system shall be maintained by the legal entity. Public improvements shall have adequate easements, in accordance with § 53.100 hereof, to permit the city to inspect, and if necessary, to take corrective action should the legal entity fail to maintain the system properly. The City maintains the right to assess costs of labor and materials for such corrective action to the responsible party in accordance with usual and customary costs in place at the time of action.

(C) Maintenance of stormwater facilities shall allow the stormwater management system to perform as originally designed and permitted by the city and other appropriate governmental agencies and as set forth in the written plan.

(D) Maintenance shall include compliance with city building and construction codes, and all other applicable codes.

**§ 53.150 ENFORCEMENT.**

Guidance on enforcement of this ordinance, including those responsibilities agreed to under the maintenance agreements, shall be referenced in Section 153 of the Zoning Code. If at any time the City Engineer determines that the project is not in accordance with the approved plan, or if any project subject to the stormwater regulations is being carried out without an approved plan, the City Engineer is authorized to:

(A) Give the legal entity written notice of the corrective action required to be taken. Should the legal entity fail within 30 days of the date of the notice to complete such corrective action, the City Engineer may enter upon the property, and take the necessary corrective action and assess fees for such action to the violator. If fees are not paid by the violator at the time the service is provided, the City has the right to pursue collection of fees through certification to the County Auditor, remittance to a collection service, or any other appropriate pursuit for payment.

(B) Take appropriate corrective action in the event of an emergency situation which endangers persons or property, or both, as determined to exist by the City Engineer.

(C) Issue written notice to the applicant specifying the nature and location of the alleged noncompliance, with a description of the remedial actions necessary to bring the project into compliance within five working days.

(D) Issue a stop-work order directing the applicant or persons in possession to cease and desist all or any portion of the work which violates the provisions of the stormwater regulations if the remedial work is not completed within the specified time. The applicant shall then bring the project into compliance.

## § 53.200 ESTABLISHMENT OF A STREAM CORRIDOR PROTECTION ZONE.

(A) Stream Corridor Protection Zones (SCPZs) are established as provided in this section.

(B) Streams addressed by this ordinance are those that meet the definition of "stream" in Section 53.040 of these regulations.

(C) The SCPZ width shall be the width of the FEMA-designated 100-year floodway plus 20 feet, or in areas where a floodway has not been designated, a width defined by the following according to the contributing drainage area:

**MINIMUM SCPZ WIDTH**
**BY CONTRIBUTING DRAINAGE AREA OF STREAM**

| Contributing Drainage Area (ac) | SCPZ Width (ft) |
|---|---|
| <100 | 25 |
| 101-250 | 38 |
| 251-500 | 50 |
| 501-800 | 63 |
| 801-1200 | 75 |
| 1201-2000 | 88 |
| >2000 | 100 |

In most instances the calculated stream corridor protection zone shall be placed at the ordinary high water mark on each side of the channel and extend outward. This will result in a total SCPZ width of two times the minimum SCPZ width (stated in the guidance table above) plus the width of the stream. However, individual site conditions including, but not limited to, topography and slope must be considered when determining the precise location of the stream corridor protection zone and shall be left to the City's discretion.

(D) The width of the SCPZ may be extended to include slopes that are greater than 15% and begin at a point within the SCPZ. The maximum width of the SCPZ extension shall be to the top of the slope or to a point up slope, as measured horizontally, where the width of the SCPZ is doubled, whichever is less. Slope protection widths may be extended beyond these limits at the City's discretion on a case-by-case basis.

(E) The following are exempt from the terms and protection of this ordinance: grassy swales, drainage ditches created at the time of a subdivision to convey stormwater water to another system, tile drainage systems, and stream culverts.

(F) The following shall apply to the SCPZ:

(1) The width of the SCPZ shall be measured in a horizontal direction outward from the ordinary high water mark of each designated watercourse.

(2) Except as otherwise provided in this regulation, SCPZs shall be preserved in their natural state.

(3) The applicant shall be responsible for determining if jurisdictional wetlands have been identified within any proposed development site. Where existing wetlands protected under federal or state law are identified within the SCPZ, the SCPZ shall consist of the full extent of the wetlands plus any additional setback distance mandated by state or federal permit.

(4) The applicant shall be responsible for delineating a rough layout of the SCPZ, including any expansions or modifications as required by B through D of this section, and identifying this setback on all preliminary subdivision or land development plans, and/or building permit applications. Final development plans shall delineate the SCZP by a metes and bounds survey. This final delineation shall be subject to review and approval by the City Engineer or designee. As the result of this review, the Engineer or designee may require further studies from the applicant.

(5) Prior to any earth-disturbing activity, the SCPZ shall be clearly delineated with construction fencing or other suitable material by the applicant on site, and such delineation shall be maintained throughout earth-disturbing activities. The delineated area shall be maintained in an undisturbed state unless otherwise permitted by these regulations. All fencing shall be removed when a development project is completed.

(6) If earth-disturbing activities will occur within 50 feet of the outer boundary of the SCPZ, the SCPZ shall be clearly delineated by the applicant on site with construction fencing, and such delineation shall be maintained throughout earth-disturbing activities.

(7) No approvals or permits shall be issued by the City Engineer or designee prior to delineation of the SCPZ in conformance with these regulations.

(8) Upon completion of an approved subdivision, the SCPZ shall be permanently recorded on the plat records for the City of Dublin.

(G) In order to preserve floodplain storage volumes and thereby avoid increases in water surface elevations along FEMA regulated streams, filling within FEMA delineated 100-year

floodplains may only occur outside of the floodway plus 20 feet- and must be compensated by removing an equivalent volume of material. Compensating storage shall be determined by the volume of material removed above the ordinary high water table and below the 100-year flood elevation established for that area. Compensating storage shall be provided within the legal boundaries of the development. No stormwater management facilities required by the City shall be permitted in the floodplain unless, at City's discretion, the applicant demonstrates that it does not remove floodplain storage when operating at its design capacity. First consideration for the location(s) of compensatory floodplain volumes should be given to areas where the stream channel will have immediate access to the new floodplain within the limits of the development site. Embankment slopes used in compensatory storage areas must reasonably conform to the natural slopes adjacent to the disturbed area. The use of vertical retaining structures is specifically prohibited.

(H) Degraded SCPZs shall be regraded and revegetated such that riparian habitat is recovered and the streambank stabilized in a manner suitable for the native site conditions.

(I) *Stream Relocation*

(1) Streams may be relocated if the applicant's design demonstrates, to the satisfaction of the City, that the following criteria are met:

(a) Maintain or improve geomorphic stability.

(b) Maintain or improve flood storage capacity.

(c) Maintain or lower regulatory flood water surface elevations.

(d) Enhance aquatic and riparian habitats.

(e) Provide increased recreational opportunities.

(f) Produce zero or positive impacts on water and land resources.

(g) Minimize operations and maintenance requirements.

(h) Maximize safety conditions.

(2) The project's design shall be performed by a qualified Professional Engineer with experience in fluvial geomorphology.

(3) If floodplain boundaries change as a result of the relocation, the requirements of Chapter 151:Flood Control become applicable.

(J) SCPZ's shall be clearly delineated on preliminary development plans, final plats, final development plans final construction drawings, building permit site plans and stormwater management plans. Final plats or applicable portions of the final development plan documentation shall be recorded in Franklin, Deleware, or Union County at no expense to the City and shall constitute a covenant running with the land.

## § 53.210 USES PERMITTED IN THE STREAM CORRIDOR PROTECTION ZONE.

(A) Open space uses that are passive in character shall be permitted in the SCPZ including, but not limited to, those listed in 1 through 3 of this section. No use permitted under these regulations shall be construed as allowing trespass on privately held lands. Alteration of this natural area is strictly limited. Except as otherwise provided in these regulations, the SCPZ shall be preserved in its natural state.

(1) Recreational Activity. Passive recreational uses, as permitted by federal, state, and local laws, such as hiking, non-motorized bicycling, fishing, hunting, picnicking and similar uses and associated structures including boardwalks, pathways constructed of pervious material, picnic tables, playground equipment, athletic fields, and wildlife viewing areas.

(2) Removal of Damaged or Diseased Trees. Damaged or diseased trees may be removed. Because of the potential for felled logs and branches to damage downstream properties and/or block ditches or otherwise exacerbate flooding, logs and branches resulting from the removal of damaged or diseased trees that are greater than 6 inches in diameter, shall be anchored to the shore or removed from the 100-year floodplain.

(3) Revegetation and/or Reforestation. The revegetation and/or reforestation of the SCPZ shall be allowed without approval of the City Engineer or designee.

(B) Projects involving public utilities, transportation infrastructure, stormwater management, stream bank stabilization, or other projects where an environmental and public benefit is provided (including excavation for providing compensatory floodplain volume immediately adjacent to the channel) may be permitted within the SCPZ once the design has been approved by the City Engineer and/or all other applicable review authorities.

(C) Disturbances within the SCPZ (including provision of compensatory floodplain storage adjacent to the stream) as a result of a permitted use must be mitigated through revegetation/reforestation.

(D) Crossings of streams and SCPZs for roadways shall be minimized. Crossings shall be approved at the discretion of the City Engineer if the applicant can demonstrate that alternative roadway locations are infeasible and that disturbances within the SCPZ will be minimized and mitigated.

## § 53.220 USES PROHIBITED IN THE STREAM CORRIDOR PROTECTION ZONE.

The following uses are specifically prohibited within the SCPZ:

(A) Construction. There shall be no structures of any kind, except as permitted under these regulations.

(B) Dredging or Dumping. There shall be no drilling, filling, dredging, excavation, or dumping of soil, spoils, liquid, or solid materials, except for noncommercial composting of uncontaminated natural materials and except as permitted under this regulation.

(C) Roads or Driveways. There shall be no roads or driveways, except as permitted under these regulations.

(D) Motorized Vehicles. There shall be no use of motorized vehicles of any kind, except as permitted under these regulations.

(E) Disturbance of Natural Vegetation. There shall be no disturbance of natural vegetation within the SCPZ except for the following:

(1) Maintenance of lawns, landscaping, shrubbery, or trees existing at the time of passage of this regulation.

(2) Cultivation of lawns, landscaping, shrubbery, or trees in accordance with an approved Landscaping Plan submitted in conformance with this regulation.

(3) Conservation measures designed to remove damaged or diseased trees or to control noxious weeds or invasive species.

(F) Nothing in this section shall be construed as requiring a landowner to plant or undertake any other activities in the SCPZ provided the landowner allows for natural succession.

(G) Parking Spaces or Lots and Loading/Unloading Spaces for Vehicles. There shall be no parking spaces, parking lots, or loading/unloading spaces.

(H) New surface and/or subsurface sewage disposal or treatment area. SCPZs shall not be used for the disposal or treatment of sewage except for:

(1) Undeveloped parcels that have received site evaluation approval and / or permit approval prior to the enactment of this ordinance.

(2) Dwellings served by disposal / treatment systems existing at the time of passage of these regulations when such systems are properly sited (approved site evaluation) and permitted or in accordance with the Delaware, Franklin, or Union County Health Department and / or the Ohio Environmental Protection Agency. Existing failing systems which are located within the SCPZ can be upgraded with approval of the Franklin County Health Department and / or the Ohio Environmental Protection Agency.

(I) Fences and Walls. There shall be no fences or walls.

(J) Agriculture. There shall be no agricultural activities.

(K) Industry/commercial business. There shall be no industrial or commercial businesses operated.

(L) Ditching/diking. There shall be no ditching or diking of soil in order to convey water.

(M) Removal of topsoil, sand, gravel, rock, native ground cover/vegetation, oil or gas. There shall be no removal of any of these substances nor any other change in topography other than what is caused by natural forces (with the exception of permitted uses or as approved by the City Engineer).

(N) Herbicides/ pesticides. There shall be no use of herbicides or pesticides except as approved by the City Engineer.

## § 53.230 FACILITIES PROHIBITED IN THE STREAM CORRIDOR PROTECTION ZONE.

The following facilities are prohibited within the SCPZ:

(A) Buildings/structures;

(B) Swimming pools;

(C) Signs;

(D) Billboards;

(E) Utility lines or pipes (with the exception of necessary public sanitary, water, stormwater and public utility transmission lines as approved by the City);

(F) Electric lines (with the exception of transmission lines);

(G) Telecommunications lines (with the exception of transmission lines);

(H) Cable TV lines

(I) Stormwater management facilities; and

(J) Other improvements deemed unacceptable to the City.

## § 53.240 NON-CONFORMING STRUCTURES OR USES IN THE STREAM CORRIDOR PROTECTION ZONE.

(A) Non-conforming structures and uses within the SCPZ, existing at the time of passage of these regulations, that are not permitted under these regulations may be continued but shall not be expanded, changed or enlarged except as set forth in this title.

(B) If damaged, destroyed, terminated or abandoned, these structures or uses may be repaired or restored within six months from the date of damage /destruction or the adoption of these regulations, whichever is later, at the property owners own risk.

(C) A residential structure or use within the SCPZ existing at the time of passage of these regulations may be expanded subject to the following provisions:

(1) The expansion conforms to existing zoning regulations.

(2) The expansion must not impact the stream channel or the floodway plus 20 feet limit.

(3) The expansion must not exceed an area of 15% of the footprint of the existing structure (or use) that lies within the SCPZ. Expansions exceeding 15% of the footprint within the SCPZ must be obtained through the variance process.

(D) Non-residential structure (or use) expansions will be permitted only through the variance process.

## § 53.250 INSPECTION OF STREAM CORRIDOR PROTECTION ZONE.

(A) The Stream Corridor Protection Zone shall be inspected by the City Engineer or designee:

(1) When a preliminary subdivision plat or other land development plan is submitted to the City of Dublin.

(2) When a building or zoning permit is requested.

(3) Prior to any earth-disturbing activity to inspect the delineation of the SCPZ as required under these regulations.

(4) When evidence becomes available that the provisions of these regulations become violated.

(B) Violations of these regulations will be handled as noted in Section 53.210 C.

## § 53.260 VARIANCES, WAIVERS AND EXEMPTIONS

(A) Exemptions from this section shall be in accordance with Section 53.070 (E) and the following:

(1) Application for variances, waivers or interpretations regarding where SCPZ's may apply or SCPZ width shall be submitted to the City Engineer for examination and adjudication. The applicant may be required to provide analytical data or other scientific evidence to support variance requests.

(2) The City Engineer reserves the right to exempt some development areas from this regulation provided that best engineering judgement is used to protect property from flooding or erosion damage.

## § 53.270 APPEALS

(A) Appeals regarding prohibited uses and facilities, or rulings regarding modification of non-conforming structures, within SCPZ's, may be made to the Board of Zoning Appeals.

## § 53.300 EROSION AND SEDIMENT CONTROL REQUIREMENTS FOR CONSTRUCTION SITES

(A) This regulation of the City of Dublin, shall apply to earth-disturbing activities within the jurisdiction of the City of Dublin at the City Engineer's discretion, unless otherwise excluded within this regulation under Section 53.070 or unless expressly excluded by state law, including: land used or being developed for commercial, industrial, residential, recreational, public service or other non-farm purposes.

(B) Earth disturbing activities associated with construction contribute to the pollution of public waters through soil erosion and sedimentation. Other construction activities may cause the discharge or deposition of construction materials and wastes into storm drains and surface waters. Control programs designed to minimize these problems should incorporate the planning, inspection, enforcement, and best management practices defined in § 53.300 through § 53.399.

## § 53.310 GENERAL EROSION AND SEDIMENT CONTROL REQUIREMENTS.

(A) All development activity subject to these regulations shall be provided with erosion and sediment control (ESC) practices during all phases of construction.

(B) No construction activity such as grading, cutting, or filling shall be commenced until erosion and sedimentation control devices have been installed to the satisfaction of the City Engineer.

(C) Stormwater discharges during the five-year design storm shall be released to natural channels at a non-erosive velocity of less than three feet per second unless the channel is stabilized or otherwise able to withstand higher velocities, as determined by the City Engineer.

(D) No person shall cause or allow earth- disturbing activities on a development area except in compliance with the standards set out in this regulation and the applicable items below:

(1) An erosion and sediment control plan shall be submitted as part of the Stormwater Management Plan and approved prior to any earth-disturbing activities on development areas, including those development areas being a part of a larger common plan of development or sale. The person proposing such earth-disturbing activities shall develop and submit for approval a plan, as part of the final site improvement plans, containing erosion and sediment pollution control practices so that compliance with other provisions of this regulation shall be achieved during and after development. Such a plan shall address specific requirements contained with this regulation.

(2) The erosion and sediment control plan must contain a description of the controls appropriate for each construction operation covered by this regulation and the operator(s) must implement such controls. The terms must clearly describe for each major construction activity (a) appropriate control measures and the general timing (or sequence) during the construction process that the measures will be implemented; and (b) which contractor is responsible for implementation (e.g., contractor A will clear land and install perimeter controls and contractor B will maintain perimeter controls until final stabilization). The erosion, sediment, and storm water management practices used to satisfy the conditions of this regulation

shall meet the standards and specifications in the current edition of Ohio's Rainwater and Land Development manual or other standards acceptable to the City Engineer.

(3) Owners and/or operators of projects subject to OEPA's Permit No.: OHC000002 for storm water discharges associated with construction activities shall provide a copy of its OEPA notice of intent (NOI) submission and storm water pollution prevention plan (SWP3) to the City Engineer upon request.

(4) The standards outlined herein are general guidelines and shall not limit the right of the City to impose additional, more stringent requirements, nor shall the standards limit the right of the City to waive individual requirements.

## § 53.320 STANDARDS AND CRITERIA FOR EROSION AND SEDIMENT CONTROL

(A) The standards and criteria for ESC facilities will be contained in the same administrative policies and manuals, developed and maintained by the City Engineer, that define accepted design practices, procedures and guidance materials for stormwater management systems.

## § 53.330 SOIL EROSION AND SEDIMENT CONTROL PLAN REQUIREMENTS

(B) The ESC Plan for the site shall be an integral part of the site's stormwater management plan. ESC Plan requirements and approval processes are defined in §53.110.

## § 53.340 EROSION AND SEDIMENT CONTROL COMPLIANCE RESPONSIBILITY

(A) *Responsibility.*

(1) ESC Plan approval does not constitute assurance that the proposed BMPs will perform in the manner indicated by the design. The responsibility of the proper functioning operation and maintenance of the BMPs remains with the owner. The owner shall be responsible for providing any additional means or methods necessary to meet the intent of these regulations.

(2) It shall be the responsibility of the site owner to provide notification to the City 48-hours prior to commencement of initial site earth-disturbance. In addition, the site owner shall provide notification to the City, at least 48-hours prior to any work within or across a stream channel or SCPZ. Furthermore, within 45-days after Site Final Stabilization has been achieved, it shall be the responsibility of the site owner to inform the City Engineer that site activities are complete.

(B) *Performance Liability.* No provision of this standard shall limit, increase or otherwise affect the liabilities of the developer nor impose any liability upon the City not otherwise imposed by law.

(C) *Ownership and Maintenance.* The person(s) or entity responsible for the continued maintenance of temporary and permanent erosion control measures shall, prior to any earth -disturbance, be identified to the satisfaction of the City. This party, both during and after site development, shall be responsible for:

(1) Carrying out all provisions as approved on the erosion and sediment control plan and required by this standard,

(2) Promptly removing all soil, miscellaneous debris and other materials that may become spilled, dumped or otherwise deposited on any public thoroughfares during transport to and from the development site, and taking precautions to inhibit the deposition of sediment into any sewer system or natural watercourse.

(3) In addition, the developer shall assume responsibility and all costs for removing any sedimentation deposited in downstream drainage ways or facilities deemed objectionable by the City to the proper functioning of these downstream areas.

(4) The applicant shall provide a description of maintenance procedures needed to ensure the continued performance of control practices and shall ensure the responsible party has adequate funding to conduct maintenance activities as deemed necessary.

(5) All temporary and permanent erosion and sediment control practices shall be designed and constructed to minimize maintenance requirements. They shall be maintained and repaired as needed to assure continued performance of their intended function. All sediment control practices shall be maintained in a functional condition until all up slope areas they control reach final stabilization. Final stabilization shall be determined by the City Engineer.

(D) *Inspection and Enforcement.*

(1) General Inspection Requirements:

(a) The City Engineer may inspect all site development activities, including erosion and sediment control devices and facilities while a development site, when subject to this regulation, is under construction. When facilities are not constructed according to approved plans, the City Engineer has the explicit authority to compel compliance with the approved plan and the objectives and standards of this regulation.

(b) A copy of the approved erosion and sediment control plan shall be maintained on site, or in a location easily accessible by the applicant and the City's inspector.

(2) Final Inspection: Prior to final inspection, the developer's engineer shall provide the site grading plan documenting the intended site final grades.

(3) General Inspection Procedures:

(a) Erosion and sediment control practices for construction sites shall be inspected periodically by the City to ensure they are being properly

maintained and, if not, the City may compel the owners to make the necessary repairs at the expense of the owner. When inspections reveal the need for repair, replacement, or installation of erosion and sediment control BMPs, the following procedures shall be followed:

(b) When practices require repair or maintenance: If an internal inspection reveals that a control practice is in need of repair or maintenance, with the exception of a sediment-settling pond, it must be repaired or maintained with three (3) days of the inspection. Sediment settling ponds must be repaired or maintained within ten (10) days of the inspection.

(c) When practices fail to provide their intended function: If an internal inspection reveals that a control practice fails to perform its intended function as detailed in the ESC plan and that another, more appropriate control practice is required, the plan must be amended and the new control practice must be installed within ten (10) days of the inspection.

(d) When practices depicted on the ESC plan are not installed: In an internal inspection reveals that a control practice has not been implemented in accordance with the schedule, the control practice must be implemented with ten (10) days from the date of the inspection. If the internal 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.

(4) Internal Inspections:

(a) At a minimum, all controls on the site shall be inspected 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. The owner shall assign qualified inspection personnel (those with knowledge and experience in the installation and maintenance of sediment and erosion controls) to conduct these inspections to ensure that the control practices are functional and to evaluate whether the ESC Plan is adequate and properly implemented in accordance with the proposed permit schedule or whether additional control measures are required. The qualified inspection personnel shall inspect the following:

(b) Disturbed areas used for storage of materials exposed to precipitation shall be inspected for evidence of or the potential for pollutants entering the drainage system.

(c) Erosion and sediment control measures identified in the approved erosion and sediment control plan shall be observed to ensure proper operation.

(d) Discharge locations shall be inspected to determine whether erosion and sediment control measures are effective in preventing significant impacts to the receiving water resource or wetlands.

(e) Locations where vehicles enter or exit the site shall be inspected for evidence of off-site vehicle tracking.

(5) Inspection Reports: Inspectors shall prepare written reports after every inspection. The inspection report shall describe:

(a) The date and location of the site inspection

(b) Whether or not the approved plan has been properly implemented and maintained.

(c) Any practice deficiencies or erosion and sediment control plan deficiencies; and the agreed upon type(s) of corrective action necessary to rectify any identified deficiencies.

(d) If a violation exists, the City will decide upon the type of enforcement action taken.

(e) The site manager shall sign and receive a copy of the report before the inspector leaves the site.

(6) *Enforcement.* The City Engineer agency shall notify the on-site personnel or the owner/developer when deficiencies are observed, describing the nature of the deficiency, the agreed upon corrective action, and the time period in which to have the deficiency corrected. If after a reasonable amount of time for voluntary compliance, the corrective actions are not undertaken to the satisfaction of the City, the City may issue a Notice of Violation pursuant to Dublin City codes Section 153 and proceed with other enforcement remedies as provided by this and other applicable provisions of the Dublin City Codes. Where the violations and/or deficiencies represent an immediate and substantial threat to the public health, safety or welfare, the City may immediately proceed with enforcement remedies as provided by Dublin City Codes Section 153 and other applicable provisions of the Dublin City Codes.

(E) *Record Keeping.* The applicant shall maintain for three (3) years following final stabilization the results of these inspections, the names and qualifications of personnel making the inspections, the dates of inspections, major observations relating to the implementation of the erosion and sediment control plan, a certification stating whether the facility is in compliance with the ESC plan, and information on any incidents of non-compliance determined by these inspections.

**§ 53.999 PENALTY.**

(A) Whoever violates any provisions of this chapter is guilty of an unclassified misdemeanor with a maximum fine of $2,500 and/or six months in jail with each day of violation as a separate offense.

# ORGANIZATION CHART

City of Dublin

**CITY OF DUBLIN RESIDENTS**

**CITY COUNCIL**

**COMMUNITY SERVICES ADVISORY COMMISSION**

**CITY MANAGER**

**CITY ENGINEER**

**STORMWATER MANAGER**

## MCM #1
**Public Education and Outreach**

**Stormwater Manager**

**Sr. PIO**
- Social Media
- Website

**Econ. Dev't. Dept.**
- Commercial/ Business Resources

**Eng.**
- Construction
- Post-Construction
- IDDE

**Franklin Co. Health Dept.**
- IDDE/HSTS

## MCM #2
**Public Involvement**

**Stormwater Manager**

**Parks**
- Volunteer Resources
- Event Admin.

**Sr. PIO**
- Announcements
- Social Media

**Web Developer**
- Web Surveys

**Franklin SWCD**
- School Lessons Curriculum
- Rain Barrels

## MCM #3
**IDDE**

**Streets & Utilities**
- IDDE Identification, Containment & Tracing

**Franklin SWCD**
- Outfall Sampling
- Stream Inspections

**Franklin Co. Public Health**
- HSTS & Illicit Discharge Enforcement

**Engineering Inspectors**
- IDDE Identification & Tracing

**GIS**
- Comprehensive Storm Sewer & HSTS Mapping

**Washington Twp. Fire Department**
- Spill Response & Containment

## MCM #4
**Construction Site Stormwater Runoff Control**

**Engineering Site Inspectors**
- Site Inspections

**Engineering Dept.**
- Plan Reviews
- Enforcement

## MCM #5
**Post-Construction SW Mgmt. in New Development & Redevelopment**

**Planning Dept. Engineering Dept.**
- Plan Reviews

**Asset Engineer Utility Engineer**
- Existing BMP Inspection & Monitoring
- Enforcement
- Longterm O&M Plans


## MCM #6
**Pollution Prevention/ Good Housekeeping for Municipal Operations**

**Streets & Utilities**
- MS4 Maintenance
- Disposal of Wastes
- Salt Application & Storage
- Street Sweeping

**Park Operations**
- Pesticide & Herbicide Usage
- Fertilizer Usage

**Engineering Dept.**
- SWP3 Training
- SWP3 Review & Implementation
- Flood Maganement projects

City of Dublin

# Stormwater Management Design Manual

June 2013

# STORMWATER MANAGEMENT DESIGN MANUAL

Prepared for:

City of Dublin, Ohio
Department of Engineering
5800 Shier Rings Road
Dublin, Ohio 43016

Prepared by:

Tetra Tech

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# 1. INTRODUCTION

## A. Purpose and Intent

The purpose of this Manual is to set forth the City's standards for stormwater management, and to maintain uniformity in the design standards used for stormwater management. It is a further purpose of this Manual to enable the City to provide effective and efficient review of design data, and to provide applicants with clear guidance in preparing Stormwater Management Plans that further the City's goals for community development and stormwater management.

Stormwater management is an evolving science. The City's goal in preparing this Manual is to enact standards reflecting the most innovative, creative, environmentally effective, and cost-effective practices available. To achieve this goal as stormwater science evolves, this Manual will be revised and updated as necessary to reflect accepted new standard stormwater management practices and control measures (commonly called Best Management Practices or "BMPs", but referred to in this Manual as stormwater control measures).

Through the standards and practices incorporated in this Manual, the City encourages the use of stormwater treatment and engineering methods that allow for groundwater recharge and that manage stormwater as close to its source as possible. The use of Environmentally Sensitive Development (ESD) methods such as conservation design, smart growth, green infrastructure, integrated site design and sustainable development are practices and methods that can help achieve these goals, and are reflected in the standards in this Manual. Specifications for stormwater control measures that use vegetation and soil media to filter, treat or infiltrate stormwater, often referred to as "Low Impact Development" or "LID BMPs," have been incorporated into this Manual. These practices are encouraged to be used in Dublin where suited to site and development conditions, and consistent with the standards in this Manual.

This manual rescinds the previous Manual dated January 2007.

## B. Applicability

The provisions and standards of this Manual apply to all publicly- and privately-sponsored projects in the City of Dublin, regardless of the size of the project or the amount of area disturbed, unless exempted under the provisions of Chapter 53.070, Exemptions (See Appendix A, Section 53.070 Exemptions). This includes the alteration, construction, redevelopment, installation, demolition or removal of a structure, impervious surface or drainage facility; clearing, scraping, grubbing, killing or otherwise removing the vegetation from a site; or adding, removing, exposing, excavating, leveling, grading, digging, burrowing, dumping, piling, dredging or otherwise significantly disturbing the soil, mud, sand or rock of a site. Specific thresholds and standards for different types of projects, and standards applicable to specific areas of the City, are enumerated in the Manual.

## C. Organization of this Document

*Chapter 2, Hydrologic & Hydraulic Design Criteria*, addresses the specific design criteria required to design stormwater control measures in terms of the rate, volume and water quality. Climatological information is provided on the rainfall patterns and distribution to be used in preparing an application.

*Chapter 3, Special Conditions and Constraints*, highlights site conditions that require supplemental protection or that potentially represent a hazard to the public health, safety or welfare are identified and protective measures are incorporated into the design of site improvements and storm water management measures. This section also establishes standards and demonstrations for approval that are consistent with other regulatory requirements and procedures applicable to development within the City of Dublin.

*Chapter 4, Flow Conveyance*, provides standards and criteria to ensure the safe and effective flow of storm water through flow paths, treatment facilities and the physical storm drainage system in a manner consistent with protection of the public health, safety and welfare; the safety and function of properties,

roads and improvements; and maintaining and improving water and environmental quality in the City of Dublin and its surface waters.

*Chapter 5, Stormwater Control Measures*, defines the approved stormwater treatment and control measures and practices for use in the City of Dublin. Design guidance and requirements for each type of control measure are presented in a table with accompanying figures.

*Chapter 6, Bridge Street District Integration with Stormwater Management*, defines and describes the manner in which recommended stormwater treatment and control measures (as defined in Chapter 5) may be used in specific areas of the Bridge Street District. This Chapter is intended to support the general purpose, scope and intent of the Bridge Street District by promoting and facilitating the use of recommended stormwater control measures that are consistent with and suitable for particular street families, right-of-way elements, building types, building sites, and open space types, and which contribute to sound stormwater management in a walkable mixed-use development setting.

*Chapter 7, Stormwater Management Plan*, provides guidelines, standards and requirements for the orderly development, approval, and implementation of Stormwater Management Plans, including provisions for shared systems and ongoing maintenance. This Chapter sets forth the requirements for preparation and submittal of Stormwater Management Plans, and provides a framework by which property owners and public agencies may propose collectively an overall plan for managing stormwater from multiple properties, where such a management plan will enable greater consistency with the City's adopted plans and policies. It is a further purpose of this Chapter to provide sufficient standards and safeguards for associated plans, approvals and agreements to protect the public interest by ensuring long-term management and maintenance of stormwater management facilities.

*Chapter 8, Erosion and Sediment Control*, provides standards and guidelines for the preparation of erosion and sediment control plans that protect public health, safety and welfare, and the quality of Dublin's waters from excessive erosion and sedimentation resulting from the construction and operation of development.

# 2. HYDROLOGIC & HYDRAULIC DESIGN CRITERIA

This Chapter addresses the specific design criteria required to design stormwater control measures in terms of the rate, volume and water quality. Climatological information is provided on the rainfall patterns and distribution to be used in preparing an application under this Chapter.

## A. Applicability of Stormwater Requirements

1) Site Development Projects

The stormwater management design for site development projects shall comply with the post-construction water quality requirements of the Ohio EPA's NPDES Construction General Permit for storm water discharges for sites disturbing more than one acre, and with the requirements of this Manual:

a) For new development, use Table 2-1. See Figure 2-1 for graphical representation of the locations listed in Table 2-1. The requirements in Table 2-1 will be met on any new development (building, parking, roadways, site improvements, etc.) on a vacant parcel(s).

b) For redevelopment projects disturbing more than one acre, use Table 2-2 to determine the requirements of stormwater management controls for the site. These developments are ones which modify, expand, add, alter, or change an existing site, including and not limited to the building, parking, roadways and other site improvements.

c) For redevelopment projects disturbing less than one acre, use Table 2-3 to determine the requirements of stormwater management controls for the site.

d) The drainage area tributary to the required stormwater controls should include runoff from outside of the site that naturally flows overland onto the site, unless the City Engineer determines otherwise due to unique or site specific circumstances.

**TABLE 2-1 STORMWATER MANAGEMENT REQUIREMENTS BY LOCATION**

| Location | Quantity | Quality |
|---|---|---|
| Outside Bridge Street District | Per Dublin Stormwater Master Plan Rates | 0.75 inch event |
| Historic District Parcels < 1 acre | Not applicable | Not applicable |
| Historic District Parcels > 1 acre | Not applicable | 0.75 inch event |
| River Corridor | Not applicable | 0.75 inch event |
| Bridge Street District West | Not applicable | 1.00 inch event |
| Bridge Street District East A | Not applicable | 0.75 inch event |
| Bridge Street District East B | Per Dublin Stormwater Master Plan Rates | 0.75 inch event |

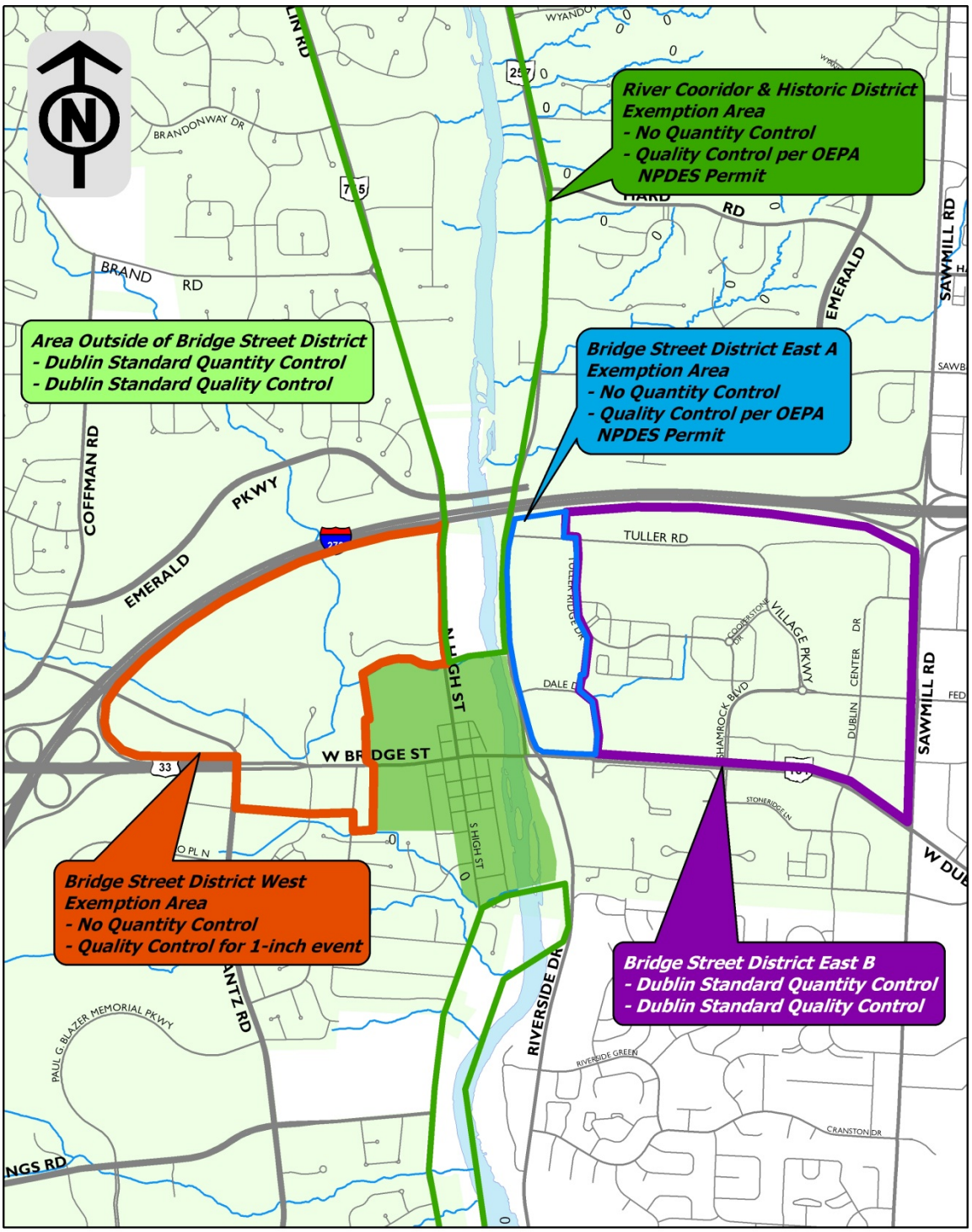


**FIGURE 2-1 STORMWATER MANAGEMENT REQUIREMENTS PER LOCATION**

**TABLE 2-2 REDEVELOPMENT SITES DISTURBING ONE OR MORE ACRES OF LAND**

| **Percent Change of Site Modifications** (includes building & site improvements)* | **Quantity Control Level** | **Quality Control Level** | **Additional Requirements** |
|---|---|---|---|
| 1 to 25 | Stormwater Master Plan rates for the modified area only | OEPA Redevelopment requirements (ie. 20% WQv or reduction of impervious area) | Apply Feasibility Assessment to entire site |
| 26 to 50 | Level dependent on location of project for the modified area only; refer to Table 2-1 | Provide control for 50% of Standard OEPA requirement (ie. 50% WQv) | None |
| 51 to 100 | Entire site must be brought into compliance with the requirements of Table 2-1 | Provide control for 75% of Standard OEPA requirement (ie. 75% WQv) | None |

*This is calculated based on the percent change of any and all improvements on the property including buildings and pavement. Example: An existing building occupies 55% of a site. It is being torn down and a new building constructed but the parking and rest of site is to remain unchanged, this would be a 55% change of the site and the 75% reduction of water quality volume (WQv) applies.

**TABLE 2-3 REDEVELOPMENT SITES DISTURBING LESS THAN ONE ACRE OF LAND**

| **Additional Impervious Area Created (square feet)[1]** | **Quantity Control Level** | **Quality Control Level** |
|---|---|---|
| Less than 2,000 SF | Apply Feasibility Assessment to entire site | |
| Greater than 2,000 SF | Level dependent on location of project for the new impervious area only; refer to Table 2-1 | Level dependent on location of project for the new impervious area only; refer to Table 2-1 |

[1] This number is the amount of impervious surface added to the site.

2) Right-of-Way Projects

The stormwater management design for projects within the right-of-way shall comply with the post-construction water quality requirements of the Ohio EPA's NPDES Construction General Permit for construction storm water discharges as follows:

a) For complete street reconstruction, all of the requirements must be met for the entire right-of-way.

b) For projects that increase the total area of impervious surfaces within a designated area, such as adding or widening lanes, adding bike facilities, or adding pedestrian facilities, all of the requirements must be met for the entire right-of-way.

c) For projects limited to roadway resurfacing, post-construction quality controls are not required.

d) The drainage area tributary to the required stormwater controls should include for calculation purposes any runoff from outside of the right-of-way that naturally flows overland into the right-of-way. At a minimum, the tributary area shall be defined as the full right-of-way, unless the City Engineer determines otherwise due to unique or site specific circumstances.

e) For new streets, use of the street right-of-way for stormwater management is limited to the management of the runoff from the street right-of-way and any tributary area as described in (d) above.

3) General Provisions

The stormwater management design for site development projects and projects within the right-of-way shall comply with the following general provisions:

a) No person shall:

i. Construct, maintain, operate, and/or utilize any illicit connection to the storm drainage system.

ii. Cause, allow or facilitate any prohibited discharge.

iii. Act, cause, permit, or suffer any agent, employee, or independent contractor to construct, maintain, operate or utilize any illicit connection, or cause, allow or facilitate any prohibited discharge.

b) Outdoor activity areas within the development site shall be delineated on the Stormwater Management Plan, and the activities that will be conducted within them shall be described in the Plan.

c) Runoff from outdoor activity areas shall not be allowed to co-mingle with runoff from the remainder of the site, and shall be directed to separate treatment systems, as approved by the City Engineer.

d) The site shall be designed to direct runoff from areas other than outdoor activity areas to one or more of the following stormwater control measures as described in Chapter 5:

i. Water Harvesting

ii. Filter Strips

iii. Media Filters

iv. Vegetated Stormwater Control Measures

v. Permeable Pavements

vi. Green Roofs

vii. Basins (Note: Detention/retention basins shall not be allowed in the Bridge Street District without prior approval from the City Engineer.)

viii. Underground Retention/Detention (Note: Underground retention/detention shall not be allowed in the Bridge Street District without prior approval from the City Engineer.)

ix. Prefabricated Devices

x. Other approved stormwater control measures

## B. Climatological Information

Rainfall depths for Central Ohio shall be used in conjunction with the appropriate hydrologic routing method or peak flow method to determine design runoff volumes and peak flows. Design rainfall hyetographs shall be developed using the 24-hour rainfall depths from Table 2-4, distributed over a 24-hour period with a NRCS Type II distribution. The 24-hour Type II rainfall distribution represents design rainfall intensities over a time of concentration range typical of a small urban watershed, coupled with wet antecedent conditions at the time of peak rainfall intensity. Refer to Section 2.C. for quantity control requirements and Chapter 4 for flow conveyance requirements.

1) Rainfall Depths

**TABLE 2-4 RAINFALL DEPTHS (39.972 N, 83.01 W)**

| Depths, inches | | | | | | |
|---|---|---|---|---|---|---|
| 1-yr | 2-yr | 5-yr | 10-yr | 25-yr | 50-yr | 100-yr |
| 2.20 | 2.63 | 3.24 | 3.74 | 4.44 | 5.02 | 5.63 |

Source: Bonnin, Martin, Lin, Parzybok, Yekta, Riley, *NOAA Atlas 14, Volume 2, Version 3.0*, 2004. and NOAA Precipitation Frequency Data Server http://dipper.nws.noaa.gov/hdsc/pfds/ June 10, 2012

2) Rainfall Distribution

The following are two acceptable methods of generating the NRCS Type II 24-hour design storms. More detail regarding these methods is located in Appendix C.

a) Optimal Rainfall Intensity Equation Coefficients and Time-to-Peak Intensity Ratios found in "Mathematical Formulations of NRCS 24-Hour Design Storms" by David C. Froehlich, Journal of Irrigation and Drainage Engineering, March/April 2009 (Errata 2010)

b) Tabular distribution from Applied Hydrology by Ven Te Chow, David R. Maidment, and Larry W. Mays, 1988.

## C. Quantity Control Requirements

The City's Stormwater Master Plan dated February 1999 shall be used to provide design flows and detention requirements for major drainage systems within the City.

For on-site drainage systems, hydrograph routing methods shall be used to design stormwater detention facilities and either hydrograph routing or peak flow methodologies may be used to design stormwater conveyance facilities.

1) Stormwater Control Measures

Stormwater control measures shall be installed on all development projects, unless the applicant demonstrates that the project will not increase the peak rate of runoff, volume, or frequency of the runoff hydrograph of the site prior to development.

Stormwater control measures shall be designed in the following manner:

a) *Studied areas.* Parcels located within drainage sub-basins established in the Stormwater Master Plan, or any subsequent update thereto, shall comply with the runoff release rate for each frequency storm specified in the Stormwater Master Plan. The applicant will need to supply project location information to Engineering Development Group Civil Engineers, who will supply the sub-basin information.

i. *Critical storm controls*. Determine the total volume of runoff from a 1 year, 24 hour storm, occurring over each of the site's drainage areas before and after development. Determine the percent of increase in runoff volume due to development:

Post – Pre /Pre * 100 = Critical Storm

ii. *Select critical storm.* Determine the percent of increase in runoff volume due to development and using this percentage, select the critical storm from the table:

**TABLE 2-5 CRITICAL STORM DETERMINATION**

| If the Percent of Increase in Runoff Volume is | | The Critical Storm Runoff Rate Will Be Limited to: |
|---|---|---|
| Equal to or Greater than | And less than | |
| -- | 10 | 1 year |
| 10 | 20 | 2 year |
| 20 | 50 | 5 year |
| 50 | 100 | 10 year |
| 100 | 250 | 25 year |
| 250 | 500 | 50 year |
| 500 | -- | 100 year |

iii. *Peak rate of runoff.* The peak rate of runoff from the critical storm occurring over the developed site shall not exceed the allowable peak rate of runoff from a 1 year, 24 hour storm occurring over the same area prior to development, as defined in the Stormwater Master Plan. Storms of less frequent occurrence (longer return period) than the critical storm shall have the allowable peak rate of runoff not greater than the allowable peak rate of runoff for the same storm as documented in the Stormwater Master Plan.

b) *Unstudied areas*. Stormwater control measures designed for parcels located outside drainage sub-basins established with the Stormwater Master Plan, or any subsequent update thereto shall comply to the following minimum design criteria:

i. Development of sites other than single-family residences and other development sites of less than or equal to 2.0 acres shall not release stormwater runoff greater than 0.2 cubic feet per second per acre of development. On-site storage shall be provided to achieve these peak flow rates.

ii. Development sites greater than 2.0 acres (including single-family lots) shall provide runoff controls as defined by the MORPC Stormwater Design Manual.

c) *Dam safety laws apply.* Stormwater detention and retention ponds which are considered by Ohio Department of Natural Resources (ODNR) to be dam structures regulated under the dam safety laws of the State of Ohio shall be designed to safely pass the design flood events as defined by ODNR. Where fill berms are proposed, calculations supporting the stability of the fill berms are to be submitted by a licensed professional engineer with demonstrated experience in geotechnical engineering. The applicant shall design all raised bermed stormwater ponds according to current ODNR dam safety criteria.

d) *Multiple drainage basins.* If the site has multiple drainage basins, the drainage basin divides that exist prior to development shall be used to determine predevelopment rates of discharge for each drainage area of the site.

e) *Fences.* Fenced stormwater facilities are strongly discouraged within the City and shall only be permitted if approved by the City. The City will consider fencing stormwater facilities only where steep slopes that potentially endanger human life are unavoidable. If fencing is required, the design shall conform to the City's fence code (Chapter 153 of the Zoning Code) along the right-of-way boundary around the entire perimeter, including maintenance berms with access for maintenance vehicles. Other designs may be permitted subject to the review and approval of the City Engineer.

f) *Grading requirements.* Areas adjacent to stormwater control measures shall be graded to restrict the entrance of stormwater except at planned locations. Where stormwater control measures,

particularly basins, are located on the project periphery, the developer may be required to provide additional landscaping or screening to adequately protect abutting properties.

g) *Maintenance berms.* The minimum requirement for publically-owned maintenance berms is as follows:

**TABLE 2-6 MINIMUM REQUIREMENT FOR MAINTENANCE BERMS**

| PONDS | MINIMUM MAINTENANCE ACCESSWAY REQUIRED |
|---|---|
| With perimeter fencing | 20 feet around perimeter |
| Without perimeter fencing | 15 feet around perimeter |
| Access easement | 20 feet along a designated corridor between the pond and a public right-of-way (lesser accessways are subject to the approval of the City Engineer) |

h) *Water quality requirements.* Stormwater control measures shall also be designed to meet the stormwater runoff quality requirements of Section 2.D.

i) *Headwalls.* Headwalls shall be required at all storm sewer inlets or outlets to and from stormwater management facilities. Stone and/or brick material approved by the City Engineer shall be provided on all visible headwalls and concrete structures. Refer to City of Dublin Standard Construction Drawings (Standard Drawings) for details.

## D. Stormwater Runoff Quality Requirements

1) The design water quality volume for all stormwater control measures shall be the runoff from the first three-quarter inch of rainfall of each and every storm event. Runoff calculations in this section shall use runoff quality coefficients appropriate for storm events of less than 1 inch of precipitation under average antecedent moisture conditions. Refer to OEPA Permit No.: OHC000004 or current version for values.

2) In addition, stormwater control measures shall be designed to accommodate flows exceeding their design capacity, either by bypassing excess flows, conveying excess flows through the facility without disrupting its stormwater quality control effectiveness, or storing excess flows as necessary to achieve the drainage, flood control, and erosion control objectives of this Chapter.

3) The Ohio Department of Natural Resources Rainwater and Land Development Manual may be referenced for additional design information.

4) Methodologies that incorporate infiltration and rainwater re-use and/or harvesting techniques are encouraged.

# 3. SPECIAL CONDITIONS AND CONSTRAINTS

The purpose of this Chapter is to identify a number of common site conditions that require supplemental protection or planning. Any site conditions that potentially represent a hazard to the public health, safety or welfare or require supplemental protection must be identified by the applicant in the Stormwater Management Plan, and protective measures must be incorporated into the design of site improvements and stormwater control measures. It is a further purpose of this Chapter to establish standards and demonstrations for approval that are consistent with other regulatory requirements and procedures within the City of Dublin.

## A. Existing Wetlands

Recognizing that jurisdiction for all activities affecting wetlands, including mitigation, lies with the Ohio EPA and U.S. Army Corps of Engineers (Corps), the City supports the preservation of existing wetlands and values the stormwater benefits these provide. Wetlands have been determined to provide flood and storm control by the hydrologic absorption and storage capacity; pollution treatment by nutrient uptake from wetland plants and the filtering of silt and organic matter by settlement; protection of subsurface water resources by recharging ground water supplies; and wildlife habitat in nesting areas, feeding grounds, and cover for many species including migratory waterfowl, rare, threatened, or endangered wildlife species.

Jurisdictional and isolated wetlands on development sites shall be delineated by a qualified professional as required by the Corps and the Ohio OEPA. Wetland boundaries shall be mapped in an acceptable electronic format and submitted to the City. Copies of all permit applications and any associated wetland mitigation plans shall also be submitted with the Stormwater Management Plan. The City may not approve stormwater management reports or plans prior to receipt of copies of approved Federal (404) and State (401) permits if any such permits are required.

Where wetlands protected under federal or state law are located partially within the Stream Corridor Protection Zone, the Stream Corridor Protection Zone shall be extended to include the full extent of the wetland area plus any setback from the wetland required by a Section 404 permit.

For impacted wetlands that fall outside the Stream Corridor Protection Zone, the City encourages the mitigation of proposed impacts to occur within the limits of the development site but not outside the boundaries of the same HUC-14 subwatershed. To encourage onsite or intra-watershed wetland mitigation, the City will consider the location of mitigation projects within the Stream Corridor Protection Zones of properties that are located adjacent to a tributary stream provided that:

1) Impacts to isolated wetlands and associated mitigation plans are approved/permitted by the Corps and/or OEPA, and

2) Wetlands constructed for Section 404/401 mitigation purposes are not used to serve as a stormwater control measures to treat stormwater runoff.

The stormwater system design for the project shall provide that the predevelopment quantity and quality of stormwater flows directed to any protected wetlands is maintained. Constructed wetlands (including bio-retention basins) shall not be considered subject to these requirements. Existing wetlands shall not be used for stormwater management or stormwater runoff quality treatment of the development site.

## B. Floodplain Encroachment

Floodplain encroachment calculations shall be presented in the following format:

1) 100-year HGL: The applicant shall demonstrate that development in a FEMA Special Flood Hazard Area (SFHA) flood plain does not increase the 100-year flood elevations. Show calculations or computer model output that demonstrates the pre-development and post-

development flood elevations. The applicant should include an SFHA permit and the appropriate fee with the Stormwater Management Plan.

2) Compensating storage: The applicant shall demonstrate that any volume of fill placed in the 100-year floodplain is compensated with an equal volume of material removed above the ordinary high water table and below the 100-year flood elevation. The applicant shall show the volume calculation for the fill and the compensating storage.

3) Note: Please refer to Chapter 151, City of Dublin Codified Ordinances for further information regarding floodplains and floodways.

### C. Stream Corridor Protection Zones

The Stream Corridor Protection Zone (SCPZ) is that which is described in § 53.200 Establishment of a Stream Corridor Protection Zone. The SCPZ is the area of setback along a stream established to protect the riparian area and stream from the impacts of development, and streamside residents from the impacts of flooding and land loss through erosion. Streams or channels to which these provisions apply are those having a well-defined bed and bank, either natural or artificial, which confines and conducts continuous or periodic flowing water in such a way that terrestrial vegetation cannot establish roots within the streambed, including intermittent, ephemeral, and perennial streams; and streams identified by USGS or NRCS maps. Prohibited uses of the SCPZ include construction, disturbance of natural vegetation, and generally any earth-disturbing activity. However, an SCPZ may be used for stormwater management upon approval from the City Engineer and/or all other applicable review authorities. Refer to . 53.200 for more detail regarding the defined width of a SCPZ, permitted uses, and prohibited uses.

### D. Karst and Sinkholes

1) Construction in Sinkhole Drainage Areas: The immediate area around a sinkhole should be disturbed as little as possible. The use of mechanized equipment near the sinkhole should be avoided. Sink areas are known to be unstable for construction. Structures placed on soil foundations in sink areas may be subject to both settling and collapse of the sink. Uncontrolled fill placement may present additional settlement hazards. It shall be required that appropriate geotechnical studies be done and measures taken to insure structure foundations are designed to take into account potential sinkhole locations and instability. Such studies shall account for potential foundation problems for both undisturbed sink areas and those previously filled by others.

2) The floodplain line for a sinkhole is defined by the sinkhole lip elevation. Therefore, the storage volume beneath this elevation is the sinkhole floodplain storage volume. *The pre-development floodplain storage volume must be preserved under post development conditions*. If any fill is added in the floodplain outside the no-fill lines, compensating excavation in the floodplain shall be required.

3) The no-fill line shall be established by the contour line or interpolated contour line for the elevation that defines 60% of the floodplain storage volume. The area encompassed by this line shall be defined as a no-fill zone for all construction activities. No construction fill will be allowed in this zone.

### E. Contaminated Sites

Direct infiltration on a brownfield site may introduce additional pollutant loads to groundwater and nearby surface waters. Stormwater control measures can be designed to retain, treat and then release stormwater without allowing it to ever come in contact with contaminated soils.

A key component of stormwater management on brownfield sites is the capture, treatment and storage of the stormwater, rather than complete infiltration. Most brownfields that have residual contamination require the use of a cap to prevent water from coming into contact with contaminated areas. Buildings and other impervious surfaces can be strategically located to act as caps over areas with known contamination. Areas with fill caps can include soils and vegetation above the cap in the form of stormwater control measures such as vegetated control measures (see Section 5). If fitted with an underdrain system to release treated stormwater without infiltration, these planted areas can safely allow filtration and evapotranspiration of stormwater. Additional features such as impermeable liners or gravel filter blankets can be coupled with modified stormwater control measures that safely filter stormwater without exposing the water to contaminated soils.

Green roofs are an ideal way to reduce the runoff from building roofs by encouraging evapotranspiration of rainwater. Another option for brownfield sites is the capture and reuse of stormwater for non-potable uses; this can include runoff storage in rain barrels for irrigation of green roofs or landscaped areas, or in cisterns that store rainwater for toilet flushing and other uses.

# 4. FLOW CONVEYANCE

The purpose of this Chapter is to provide standards and criteria to ensure the safe and effective flow of storm water through flow paths, treatment facilities and the physical storm drainage system in a manner consistent with protection of the public health, safety and welfare; the safety and function of properties, roads and improvements; and maintaining and improving water and environmental quality in the City of Dublin and its surface waters. Refer to Standard Drawings.

## A. Storm Sewers

1) Public storm sewers shall be designed such that they do not surcharge from runoff caused by the 5 year, 24 hour storm, and that the hydraulic grade line of the storm sewer stays below the gutter flow line of the overlying roadway, or below the top of drainage structures outside the roadway during a 10 year, 24 hour storm.

2) Private storm sewers shall be designed such that they do not surcharge from runoff caused by the 2 year, 24 hour storm, and that the hydraulic grade line of the storm sewer stays below the gutter flow line of the overlying roadway, or below the top of drainage structures outside the roadway during a 5 year, 24 hour storm. The system shall be designed to meet these requirements when conveying the flows from the contributory area within the proposed development and existing flows from offsite areas that are upstream from the development.

3) Stormwater runoff from offsite areas that discharge to or across a development site shall be conveyed through the stormwater facilities planned for the development site at their existing peak flow rates during each design storm. No Stormwater Management Plan will be approved until it is demonstrated that offsite runoff will be adequately conveyed through the development site in a manner that will not exacerbate upstream or downstream flooding and erosion.

4) The minimum inside diameter of pipe to be used in public storm sewer systems is 12 inches. Smaller pipe sizes may be used in private systems, subject to the approval of the City Engineer.

5) All storm sewers shall be designed and constructed to produce a minimum velocity of 3.0 feet per second (fps) when flowing full. The City Engineer may impose additional hydraulic design criteria for any storm sewer system or portion thereof designed at a supercritical slope and/or with a full-flow velocity in excess of 10 fps.

6) The outlet ends of all storm sewers shall be provided with sufficient energy dissipaters and erosion protection. See Standard Drawings for rock channel protection details; additional measures may be needed depending upon specific site conditions.

7) The following maximum lengths of pipe shall be used when spacing access structures of any type:

**TABLE 4-1 STRUCTURE SPACING**

| PIPE SIZE | STRUCTURE SPACING |
|---|---|
| 12 to 18 inches | 300 feet |
| 24 to 36 inches | 400 feet |
| 42 inches and larger | 500 feet |

8) All storm sewer systems shall be designed taking into consideration the tailwater of the receiving facility or waterbody. The tailwater elevation used shall be based on the design storm frequency.

9) The hydraulic grade line for the storm sewer system shall be computed with consideration for the design tailwater on the system defined in the Stormwater Management Plan and the energy

losses associated with entrance into and exit from the system, friction through the system, and turbulence in the individual manholes, catch basins, and junctions within the system.

10) The minimum cover for storm sewers within the right-of-way shall be one foot measured from the top outside of pipe to the bottom of underdrain at the back of curb. Should underdrains not be required, the minimum cover shall be one foot measured from the top outside of pipe to the top of subgrade at the back of curb. Outside the street right-of-way, a minimum two feet of cover shall be provided measured from the top of finished ground surface to the top outside of pipe.

11) All storm sewers shall be backfilled with Item 912 within the right-of-way and the area of influence of pedestrian paths, fire apparatus access roads, and maintenance berms. All others area shall be backfilled with Item 911.

12) The desired maximum distance for overland flow should be 300 feet before entering a storm structure.

13) The desired maximum overland drainage area tributary to the storm structure should be no greater than 1.5 acres.

14) The maximum spacing of curb inlets shall not exceed 300 feet, or that spacing which shall permit a maximum permissible spread. Spread calculations shall be provided with all storm drainage calculations. Maximum permissible spread is 6' from edge of pavement for streets less than 28 feet measured back to back of curb. A 12-foot clear lane shall be maintained for streets wider than 28 feet. A design storm of 5 years shall be used to determine allowable spread.

15) Within a residential subdivision, catch basins shall be installed in the rear lots approximately every third lot. The property shall be graded in such a way to provide that the stormwater can reach the catch basin through a swale or another measure as approved by the City Engineer.

16) The inverts of all curb and gutter inlets, manholes, catch basins, and other structures shall be formed and channelized.

17) Storm sewer structures shall have grates that permit safe crossing by bicycles as approved by the City Engineer.

18) In areas where public safety and welfare concerns (specifically with children) are an issue, the City Engineer may require that any storm sewer outlet greater than 18 inches in diameter accessible from stormwater management facilities or watercourses shall be provided with safety grates, as approved by the City Engineer. See Standard Drawings.

19) Headwalls shall be required at all storm sewer inlets or outlets to and from open channels or lakes unless otherwise approved by City Engineer.

20) Stone and/or brick approved by the City Engineer shall be provided on all visible headwalls and concrete structures, unless this requirement is specifically waived as part of a Stormwater Management Plan. See Standard Drawings.

## B. Culverts and Bridges

1) Roadway stream crossings other than bridges shall be designed to convey the stream's flow for the 25-year, 24-hour storm, with a maximum headwater depth that does not cause flooding or significantly pressurize the culvert, as defined by the Ohio Department of Transportation.

2) The minimum inside diameter of pipes to be used for culvert installations under roadways shall be 12 inches. The minimum inside diameter of pipes to be used for driveway crossings shall be 12 inches.

3) The maximum slope allowable shall be a slope that produces a 10-fps velocity within the culvert barrel. Erosion protection and/or energy dissipaters shall be required to properly control entrance and outlet velocities.

4) All culvert installations shall be designed with consideration for the tailwater of the receiving facility or waterbody. The recurrence frequency of the tailwater elevation shall be the same as the culvert design storm frequency.

5) The determination of the required size of a culvert installation can be accomplished by mathematical analysis or by the use of design nomographs.

6) Headwalls shall be required at all culvert inlets or outlets to and from open channels or lakes. Stone and/or brick approved by the City Engineer shall be provided on all visible headwalls and concrete structures unless specifically waived as part of a Stormwater Management Plan. See Standard Drawings.

7) The minimum cover for culverts within the right-of-way shall be one foot measured from the top outside of pipe to the bottom of underdrain at the back of curb. Should underdrains not be required, the minimum cover shall be one foot measured from the top outside of pipe to the top of subgrade at the back of curb. Outside the street right-of-way, a minimum two feet of cover shall be provided measured from the top of finished ground surface to the top outside of pipe. The structural design of culverts and bridges shall be the same as that required by the Ohio Department of Transportation.

8) Bridges shall be designed such that the hydraulic profile through a bridge shall be below the bottom chord of the bridge for either the 100-year, 24-hour storm, or the peak 100-year flood elevation, whichever is more restrictive.

9) 100-year HGL: The applicant shall demonstrate that the hydraulic grade line resulting from the 100-year, 24-hour storm does not encroach on the roadway above the culvert or above the low chord of bridge. The HGL shall be shown graphically on the storm sewer construction plans or on a tabulation spreadsheet.

10) Velocities: The applicant shall tabulate the culvert flow velocities, and demonstrate that the velocities do not exceed 10 feet per second within the culvert barrel.

11) Tailwater and energy loss: The applicant shall list all tailwater assumptions and their source for applicable design storm events, and the energy loss assumptions at the entrance/exit of the structure.

## C. Open Channels

1) Where applicable, streams within the City shall be preserved and protected according to the criteria in § 53.200. Requirements for increasing the conveyance capacity, repairing streambank erosion damage, restoring floodplain storage, and/or rehabilitating aquatic or riparian habitat shall be determined by the City Engineer based on the Stormwater Master Plan or other site-specific criteria necessary to protect the public health, safety and welfare or to satisfy pertinent state and federal regulatory requirements.

2) Wherever possible, drainage tributary to streams, wetlands, lakes, and detention facilities shall be maintained by an open channel with landscaped banks designed to carry the 10-year, 24-hour stormwater runoff from upstream contributory areas. The City Engineer may increase the design storm as conditions require.

3) Alterations to streams and other open channels within FEMA floodplains shall be designed according to the requirements of Chapter 151 of the Dublin City Code along with the requirements contained in this Chapter. All open channels shall be designed with one foot of freeboard above the design water surface elevation of the open channel flowing full.

4) Flood relief channels shall be designed to convey the runoff from the 100-year, 24-hour storm, such that a positive discharge of this runoff to an adequate receiving stream or conveyance system results without allowing this runoff to encroach into proposed or existing residential dwellings or places of business.

5) Roadside ditches along existing roadways may be required to be enclosed if ODOT standards for safety and maintenance cannot be satisfied.

6) Capacity: The applicant shall demonstrate that the hydraulic grade line resulting from the 10-year, 24-hour storm does not rise to within one foot of the top of bank.

7) 100-year HGL: The applicant shall demonstrate that the water elevation resulting from the 100-year, 24-hour storm does not encroach into proposed or existing residential dwellings or places of business. The flood elevation shall be shown on the Stormwater Management Plan and associated maps for the project.

# 5. STORMWATER CONTROL MEASURES

The purpose of this Chapter is to define the stormwater control measures recommended for use in the City of Dublin. Design requirements for each stormwater control measure are presented in a numbered guidance table with an accompanying figure. It is intended that landscape- or vegetation-based stormwater control measures, when designed in accordance with this Manual, be counted towards applicable landscaping requirements for quantity and spacing of plants under the provisions of the Bridge Street District and Sections § 153.130 - § 139 of the Code, recognizing that landscaping required for screening or installation of street trees [other than those in tree boxes per Section 4).d) below] may require landscaped areas or measures in addition to those used for stormwater control.

## A. Common Elements

While there are numerous variations and unique site-specific design elements for each stormwater control measure, several common elements exist that have been included in this section rather than repeated within each guidance table. These common elements include energy dissipation, underdrains, pedestrian areas, setbacks, outlets, and vector control considerations. Note that the discussion of the common design elements covered in this section is not intended to be comprehensive; the designer is expected to use sound engineering principles in the design of all elements of the stormwater control measures.

### 1) Energy Dissipation

Energy dissipation is expected to be incorporated at all inlets and outlets to prevent erosion, scour, or sloughing of the soil. A typical method used to dissipate energy from water flow is constructing a layer of rock for the water to flow over. The specified size, shape, and weight of the rock are a function of the velocity of the water, the geometry of the protected channel or bank, and the magnitude of wave energy. A geotextile blanket also must be placed beneath the rock. Only Rock Type or Riprap Type C or D shall be used within channels. See Standard Drawings. Forebays also may be used for energy dissipation as well as settling out sediment particles. A hard bottom surface is recommended for forebays.

### 2) Underdrains

Underdrains shall be a minimum of 6-inch Schedule 40 or SDR 35 smooth wall PVC pipe. Collection laterals shall be placed no greater than 10 feet on center with a minimum of 2 pipes for a given collection system. A minimum of 4 rows of 3/8-inch perforations shall be provided around the diameter of the pipe and the perforations shall be placed 6 inches on center within each row for the entire length of the drainage lateral. The underdrains shall be protected from blockage by including a filtering device. A fine aggregate filter layer is preferred over a filter fabric. A cleanout location shall be included and specified at the terminal ends of underdrains, or another appropriate interval in the case of linear stormwater control measures. Designers are encouraged to incorporate a valve at the underdrain outlet that may be opened for overflow and closed to promote greater infiltration and evapotranspiration from the stormwater control measure.

### 3) Pedestrian Areas

Care should be taken when designing near pedestrian access points so that pedestrians are able to safely exit from a vehicle onto a level surface without risking a large drop, or stepping into water. Designers are to include a 1.5- to 2-foot safety zone between sloped or uneven surfaces and pedestrian access points, such as sidewalks and curbside parking. Vehicle car doors must be able to be opened.

### 4) Siting of Stormwater Control Measures

Required setback distances of stormwater control measures from buildings, property lines and other site features are noted within each stormwater control measure guidance table. For stormwater

control measures other than the retention basin, pocket wetland, stormwater wetland, rain barrel, and cistern (SCMs which retain water), it is assumed that the entire facility (surface and subsurface) drains within 72 hours. Exceptions to the required distances are allowed only with approval by the City Engineer as part of a Stormwater Management Plan.

5) Outlet

The outlet to a stormwater control measure shall be designed to meet the hydraulic requirements and minimize vandalism, clogging from trash and debris, and the need for maintenance. Access for maintenance shall be provided. The outlet shall connect to the storm drainage system. Stormwater control measure outlet design should consider the characteristics of the contributing drainage area and the anticipated quantity and type of trash and debris. See Standard Drawings for details.

6) Vector Control Considerations

a) Mosquitoes

Stormwater control measures that are designed to temporarily hold water shall drain within 72 hours to prevent the establishment of mosquito colonies. Rain barrels and cisterns shall be covered and include appropriate screens and other features to prevent the entrance of mosquitoes.

b) Goose Population

Canada Geese are attracted to well-trimmed, urban lawns and shallow ponds where they can browse and roost without fear of predators. To deter geese, basins with a permanent pool shall be constructed with a perimeter buffer incorporating naturalized plantings. Turfgrass and rock edging in and around these stormwater control measures are not allowed, not only to discourage nuisance waterfowl but also to enhance the habitat value of these practices.

7) Naturalized Plantings

Naturalized plantings are encouraged to be incorporated into the design of all stormwater control measures involving vegetation.

8) Construction Staging for Vegetated Stormwater Control Measures

The use of vegetation and soil-based treatment systems as outlined in this Chapter requires careful attention to construction staging and phasing. Protection of soils from compaction and disturbance during site preparation and construction, soil amendment, the installation of soil and filter media, and the timing, placement and techniques used in planting, all affect the ultimate efficacy of these stormwater control measures. Therefore a construction and phasing plan must be included in the Stormwater Management Plan for all vegetated stormwater control measures to ensure proper construction, function, and treatment.

## B. Stormwater Control Measure Design Guidance

This section is intended to provide guidance for the design of stormwater control measures. A brief description is provided of each stormwater control measure accompanied by a design guidance table and a diagram. The guidance tables and diagrams follow at the end of this chapter.

1) Rainwater Harvesting (Guidance 1 and 2)

Rainwater harvesting is the practice of collecting rainwater and re-using it for purposes such as irrigation and non-potable building uses. With regard to stormwater, the City's standard does not allow rainwater harvesting systems to be used to meet stormwater requirements. However, rainwater harvesting is encouraged as a water conservation and efficiency practice.

Two rainwater harvesting systems are addressed in this Chapter: rain barrels and cisterns. A rain barrel is an above-ground prefabricated storage receptacle with an automatic overflow diversion system that collects and stores stormwater runoff from the roof of a structure that would have been otherwise routed into a storm drain. A cistern is an underground storage component of a rainwater harvesting system, and is typically larger than 80 gallons.

Pretreatment of rainwater prior to entering a storage tank is necessary to keep debris, particularly leaf litter, out of the rainwater harvesting system. Typically this is some type of leaf screen along the gutter or in the downspout. Regular cleaning of these devices is needed to prevent clogging and the buildup of bacteria housed in the leaf decay. It is also recommended that a first-flush diverter be installed to divert the first flow of water, which is typically laden with dust, leaves, twigs, insect bodies, animal feces, and pesticides, to a planted area. Care should be taken to ensure compliance with any potentially applicable plumbing and building codes.

2) Filter Strip (Guidance 3)

Filter strips are bands of dense, permanent vegetation with a uniform slope, primarily designed to provide water quality pretreatment between a runoff source (i.e., impervious area) and another stormwater control measure. The inflow source for a filter strip must be conveyed as sheet flow. Typically this is accomplished by installing a level spreader system immediately upstream of the filter strip. Filter strips are well suited for treating runoff from roads, parking lots, and disconnected downspouts. They may also be used along streams to treat agricultural runoff and may be referred to as buffer strips. Filter strips provide water quality improvement primarily through vegetative filtering and infiltration. Reductions in runoff volume from small storms can be achieved if the soils are sufficiently pervious, sheet flow is maintained along the entire length and width of the strip, and contact time is long enough for infiltration to occur.

3) Media Filter (Guidance 4)

A media filter preceded by a settling basin is a treatment system that is used to remove particulates and solids from stormwater runoff through settling and filtering. The system may be constructed underground in a concrete vault or above ground using earthen berms. Stormwater diverted to the system travels through a settling basin, across a level spreader, and into the media filter. Media is typically sand, peat, or other amended soil. Often, the water quality volume of runoff is temporarily stored above the filter bed. Once the stormwater flows through the filter, it can infiltrate into the native soils or be collected in an underdrain.

4) Vegetated Stormwater Control Measures

The vegetated stormwater control measures include traditional bioretention, bioretention swale, planter box, tree box, and bioretention curb extension. All are included in this category because they use vegetation as an integral part of the system design. It is expected that the growing layer depth for these facilities be tailored to meet the needs of the selected vegetation with a minimum depth of 12 inches.

a) Traditional Bioretention (Guidance 5)

Traditional bioretention describes a shallow stormwater basin or landscaped area that utilizes a soil media and vegetation to capture and treat runoff. It may also be referred to as a rain garden. There are numerous design applications for bioretention. These include use on single-family residential lots, on commercial/industrial sites, as off-line facilities adjacent to parking lots, and along highways and roads. Bioretention areas are designed primarily for the removal of stormwater pollutants from runoff. These facilities may sometimes be used to partially or completely meet quantity control requirements from smaller tributary areas.

b) Bioretention Swale (Guidance 6)

A bioretention swale is a modified swale that uses a soil media to improve water quality, reduce the runoff volume, and modulate the peak runoff rate while also providing conveyance of excess runoff. Bioretention swales are well suited for use within the rights-of-way of linear transportation corridors. They perform the same functions as grassed swales by serving as a conveyance structure and filtering and infiltrating runoff, but because soil media is used, they provide enhanced infiltration, water retention, and pollutant removal. Bioretention swales may be used in conjunction with pretreatment control measures such as filter strips or other sediment capturing devices to prevent sediment from accumulating in the swale.

c) Planter Box (Guidance 7)

A planter box is a variation of traditional bioretention. It performs the same function but is contained within a concrete box which allows it to be incorporated into tight areas such as along a street corridor or attached to a building along the foundation. Planter boxes are often categorized either as flow-through planter boxes or infiltrating planter boxes. Infiltrating planter boxes have an open bottom to allow infiltration into the underlying soils. Flow-through planter boxes are completely lined and have an underdrain system to convey flow that is not taken up by plants to areas that are appropriate for drainage, typically away from building foundations.

d) Tree Box (Guidance 8)

Tree boxes are urban applications of bioretention systems using the water-uptake benefits of a tree. They are generally installed along street corridors with curb inlets. Tree boxes have the ability to be incorporated immediately adjacent to street and sidewalks with the use of a structural soil, modular suspended pavement, or underground retaining wall to keep uncompacted soil in its place. The uncompacted media allows urban trees to thrive, providing shade and an extensive root system for water uptake. For low to moderate flows, stormwater enters through the tree box inlet and filters through the soil. For high flows, stormwater will bypass the tree box if it is full and flow directly to the downstream curb inlet.

e) Bioretention Curb Extension (Guidance 9)

A bioretention curb extension is another variation of traditional bioretention. It performs the same function as traditional bioretention but is contained at least partially within a curb, usually within a street corridor or in a parking lot. Unlike a planter box, curb extensions do not have retaining walls, and therefore comparatively require more space.

5) Permeable Pavements (Guidance 10)

Permeable pavements contain small voids that allow stormwater to drain through the pavement to an aggregate reservoir and then either infiltrate into the soil, or flow through an underdrain to the storm drain network. Permeable pavement includes permeable concrete, permeable asphalt, interlocking concrete pavers, concrete grid pavers, and plastic grid pavers.

Permeable pavement is typically used to replace traditional impervious pavement for most pedestrian and vehicular applications except high-volume/high-speed roadways. Permeable pavements have been used successfully in pedestrian walkways, sidewalks, driveways, parking lots, and low-volume roadways. Several design options are available for using permeable pavements to intercept, contain, filter, and where appropriate infiltrate stormwater on site. Permeable pavements can be installed across an entire street width or an entire parking area. Alternatively, they can be installed in combination with impermeable pavements to infiltrate runoff; several applications use permeable pavement in parking lot lanes or parking stalls to treat runoff from adjacent impermeable pavements.

6) Green Roof (Guidance 11)

Green roofs are used to introduce vegetation onto sections of roof to reduce imperviousness and absorb and filter rainfall. Green roofs consist of a layer of soil media and vegetation that filter, absorb, and retain/detain the rain that falls upon them. Rainfall that infiltrates into the green roof is lost to evaporation or transpiration by plants, or, once the soil has become saturated, percolates through to the drainage system and is discharged through the roof downspouts. Green roofs may cover large sections of a roof while maintaining access for utilities, maintenance, or recreation. Green roofs are most often applied to buildings with flat roofs, but can be installed on roofs with slopes with the use of mesh, stabilization panels, or battens.

7) Basins

The term "basins" includes pocket wetland, retention basin (wet pond), stormwater wetland, and dry extended detention. Common elements of these basins are the inclusion of a forebay and micropool to help settle out sediment. The basin inlet discharges into the forebay while the micropool is used before water leaves the basin through the outlet.

a) Pocket Wetland (Guidance 12)

Pocket wetlands are small constructed shallow marsh systems designed and placed to use the natural processes of wetland vegetation, soils, and their associated biological activity to provide treatment for stormwater runoff. As engineered facilities, stormwater wetlands have less biodiversity than natural wetlands but still require a base flow to support the aquatic vegetation present. Pocket wetlands rely on a high groundwater table to provide a perennial base flow.

Pollutant removal in these systems occurs through the settling of larger solids and coarse organic material and also by uptake in the aquatic vegetation. Wetlands can also be designed to remove ammonia through nitrification/denitrification processes, which may be particularly useful in agricultural settings. Wetlands can be used to enhance the aesthetics of a site and to increase the available habitat.

b) Retention Basin (Guidance 13)

Retention basins are large facilities designed with a permanent pool of water plus additional storage above the level of the permanent pool. During a storm event, water enters the basin and is stored temporarily as it is slowly released to the storm drain network. A safety bench and planted aquatic bench are required around the perimeter of the wet pool. The presence of a mechanical aerator, such as a fountain in the middle of the pond, may be used to make the site more attractive, deter the growth of unwanted vegetation, and make the habitat more suitable for fish.

c) Stormwater Wetland (Guidance 14)

Stormwater wetlands have a similar design and function as a pocket wetland but they depend on flow from the contributing drainage area rather than groundwater flow as their base flow source. Because of this, they tend to require large contributing drainage areas to obtain adequate base flow to function well.

d) Extended Dry Detention (Guidance 15)

Extended dry detention basins are large facilities designed without a permanent pool of water. The outlets are designed such that stormwater runoff is detained for a period of time, typically 24 hours to 72 hours. The temporary storage allows sediment to settle out; overall, however, extended dry detention basins are minimally effective in removing pollutants compared to other stormwater control measures.

8) Underground Retention/Detention (Guidance 16)

Underground retention/detention achieves the capture and temporary storage of stormwater collected from the tributary drainage area. Curb inlets or surface drains lead stormwater to underground vaults or systems of large diameter interconnected storage pipes. The stormwater is then released directly through an outlet pipe back into a stormwater drainage system or allowed to infiltrate to the groundwater table. The outlet system is designed to meet the quantity control requirements.

Underground retention/detention should not be expected to substantially improve water quality unless preceded by a pretreatment practice such as a swale or prefabricated device. Underground retention/detention may be useful for developments where land availability and land costs predicate against the development of surface stormwater control measures and in retrofit and redevelopment settings. Pretreatment is crucial for minimizing maintenance of the storage unit and should be designed to remove sediment, floatables, and oils if prevalent in the drainage area. Where an opening is provided that could allow the entry of personnel, the opening shall be marked, "DANGER-CONFINED SPACE".

9) Prefabricated Devices

Proprietary devices typically consist of catch basin controls or stand-alone vaults that prevent sediment, oils, floatable trash, and debris from being transmitted through the collection system. For instance, several catch basin insert devices are available that use screens, baffles, filter fabrics, and absorbents to capture and retain pollutants within the catch basin. Oil-water separators, sedimentation tanks, gross solids removal screens, and hydrodynamic separators (flow-through devices with a settling or separation unit) are examples of proprietary devices that can be used to remove sediments and other stormwater pollutants. A variety of devices and manufacturers exist, and new products are continuously emerging.

The use of prefabricated devices, other than for retrofit or redevelopment situations where site limitations limit the use of other stormwater control measures, generally is discouraged. Proprietary devices are recommended to be used in conjunction with other control measures as part of a stormwater treatment train. However, these controls are generally considered pretreatment devices, as they typically provide limited treatment when compared to other control measures.

10) Other Approved Stormwater Control Measures

Other stormwater control measures may be recommended to satisfy stormwater management requirements if the Stormwater Management Plan for the site demonstrates to the satisfaction of the City Engineer that these stormwater control measures achieve effluent quality and runoff volume reduction equivalent to recommended stormwater control measures, and can be adequately maintained.

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## Guidance (1) Rain Barrel

| | |
|---|---|
| 1. Siting Setbacks | |
| Pavement (1) | No requirement |
| Building (2) | ≤ 1 feet; side or rear of building; if visible from street, it must be screened with landscaping to the top |
| Property lines/ROW (3) | ≥ 3 feet |
| Groundwater/Karst/ Bedrock | Bottom of practice to be ≥ 2 feet above to prevent buoyancy |
| Septic System/Wells | No requirement |
| 2. Volume | |
| Surface Area | No requirement |
| Dimensions | ≤ 6 feet above grade including any supporting frame |
| Bottom slope | Not applicable |
| Side slopes (4) | Not applicable |
| Freeboard (5) | No requirement |
| 3. Vertical Component | |
| Storage (6) | ≤ 80 gallons |
| Growing Layer (7) | Not applicable |
| Filter Layer (8) | Not applicable |
| Drainage Layer (9) | Not applicable |
| Native Material (10) | Not applicable |
| 4. Drainage | |
| Inlet (11) | One or more downspouts from roof drainage only; No materials treated with fungicides or herbicides |
| Underdrain (12) | Not applicable |
| Outlet (13) | No requirement |
| Overflow (14) | Required; Must be directed away from the building foundation; Must not cause excessive erosion or water damage, or must be diverted to the public storm sewer or other approved location |
| Evapotranspiration | No requirement |
| Infiltration | No requirement |
| Dewatering | No requirement |
| 5. Composition | |
| Surface Treatment | Not applicable |
| Vegetation | Not applicable |
| Soil Media | Not applicable |
| Side Slopes | Not applicable |
| Mulch | Not applicable |
| 6. Pollutant | |
| Pretreatment (15) | Must include a debris excluder prior to entering the storage tank |
| Sediment Storage | No requirement |
| 7. Maintenance | |
| Access | Rain barrels shall be covered and protected from unintentional entry by humans, vermin, or insects |
| Requirements | 1) Harvested rainwater may only be used for irrigation and water features;<br>2) Drain and thoroughly clean at least once annually to avoid freezing in winter temperatures;<br>3) Rain barrels are not permitted as water quality controls |
| Aesthetics | 1) Plastic rain barrels must be neutral in color, painted to match the body or trim color of the home or match as closely as possible the attached building. Any connector hoses from the downspout to the rain barrel must match the color of the downspout<br>2) Rain barrels constructed of natural material or designed to appear similar to a wood barrel, planter, stone boulders, or similar may remain as constructed and are not required to match in color the attached building |
| 8. Calculations | None |

Notes: Preferably located to the side or rear of residence. No platform or raising structure is permitted to elevate the rain barrel forward of the residence (§ 153.071) Notes: There shall be no direct connection of any rainwater harvesting system and any domestic potable water system except when protected from cross-contamination in accordance with all applicable codes and requirements.

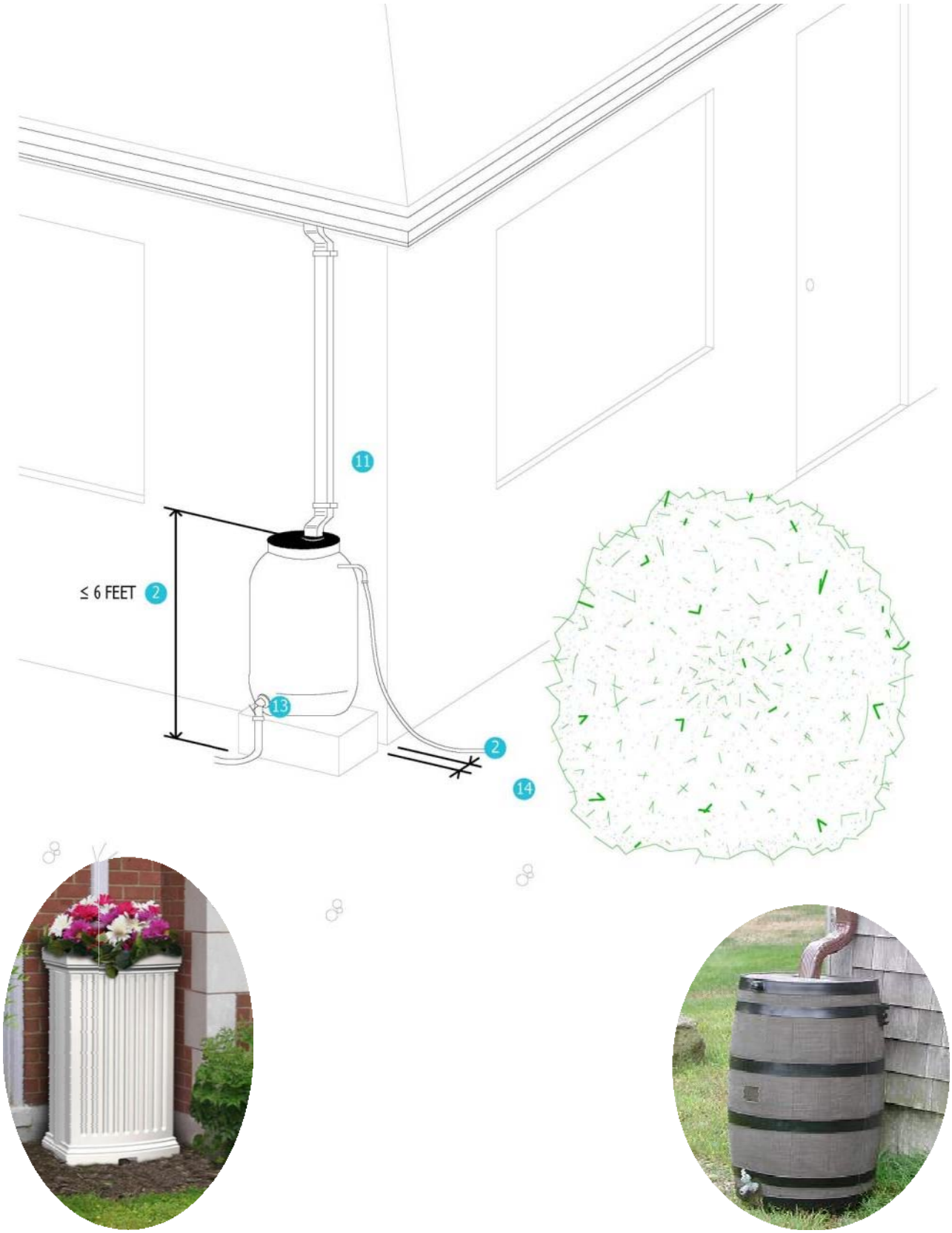



**FIGURE 5-1 RAIN BARREL DIAGRAM**

## Guidance (2) Cistern

| | |
|---|---|
| 1. Siting Setbacks | |
| Pavement (1) | No requirement |
| Building (2) | Basement: ≥ 10 feet<br>No Basement: ≥ 5 feet |
| Property lines/ROW (3) | ≥ 3 feet |
| Groundwater/Karst/ Bedrock | Bottom of practice to be ≥ 2 feet above to prevent buoyancy |
| Septic System/Wells | No requirement |
| 2. Volume | |
| Surface Area | No requirement |
| Dimensions | No requirement |
| Bottom slope | Not applicable |
| Side slopes (4) | Not applicable |
| Freeboard (5) | No requirement |
| 3. Vertical Component | |
| Storage (6) | No requirement |
| Growing Layer (7) | Not applicable |
| Filter Layer (8) | Not applicable |
| Drainage Layer (9) | Not applicable |
| Native Material (10) | Not applicable |
| 4. Drainage | |
| Inlet (11) | Gutters and downspouts from roof drainage only; No materials treated with fungicides or herbicides |
| Underdrain (12) | Not applicable |
| Outlet (13) | Designed to meet hydraulic requirements; minimize vandalism and maintenance. |
| Overflow (14) | Required; Must be directed away from the building foundation; Must not cause excessive erosion or water damage, or must be diverted to the public storm sewer or other approved location |
| Evapotranspiration | No requirement |
| Infiltration | No requirement |
| Dewatering | No requirement |

| | |
|---|---|
| 5. Composition | |
| Surface Treatment | Not applicable |
| Vegetation | Not applicable |
| Soil Media | Not applicable |
| Side Slopes | Not applicable |
| Mulch | Not applicable |
| 6. Pollutant | |
| Pretreatment (15) | Must include a debris excluder prior to entering the storage tank |
| Sediment Storage | No requirement |
| 7. Maintenance | |
| Access | Able to be accessed by a vehicle; Cisterns shall include manhole risers a minimum of 8 inches above surrounding grade; Cisterns shall be covered and protected from unintentional entry by humans, vermin, or insects; Manhole covers shall be provided and shall be secured and locked to prevent tampering; Where an opening is provided that could allow the entry of personnel, the opening shall be marked, "DANGER- CONFINED SPACE". |
| Requirements | 1) Harvested rainwater may only be used for irrigation and water features. Other usages may be allowed with City approval<br>2) Maintenance Plan shall be submitted w/ Stormwater Mgmt. Plan;<br>3) Cisterns are not permitted as water quality controls without prior approval from City Engineer |
| 8. Calculations | None |

Notes: There shall be no direct connection of any rainwater harvesting system and any domestic potable water system except when protected from cross-contamination in accordance with all applicable codes and requirements.

Only below-grade cisterns are permitted.

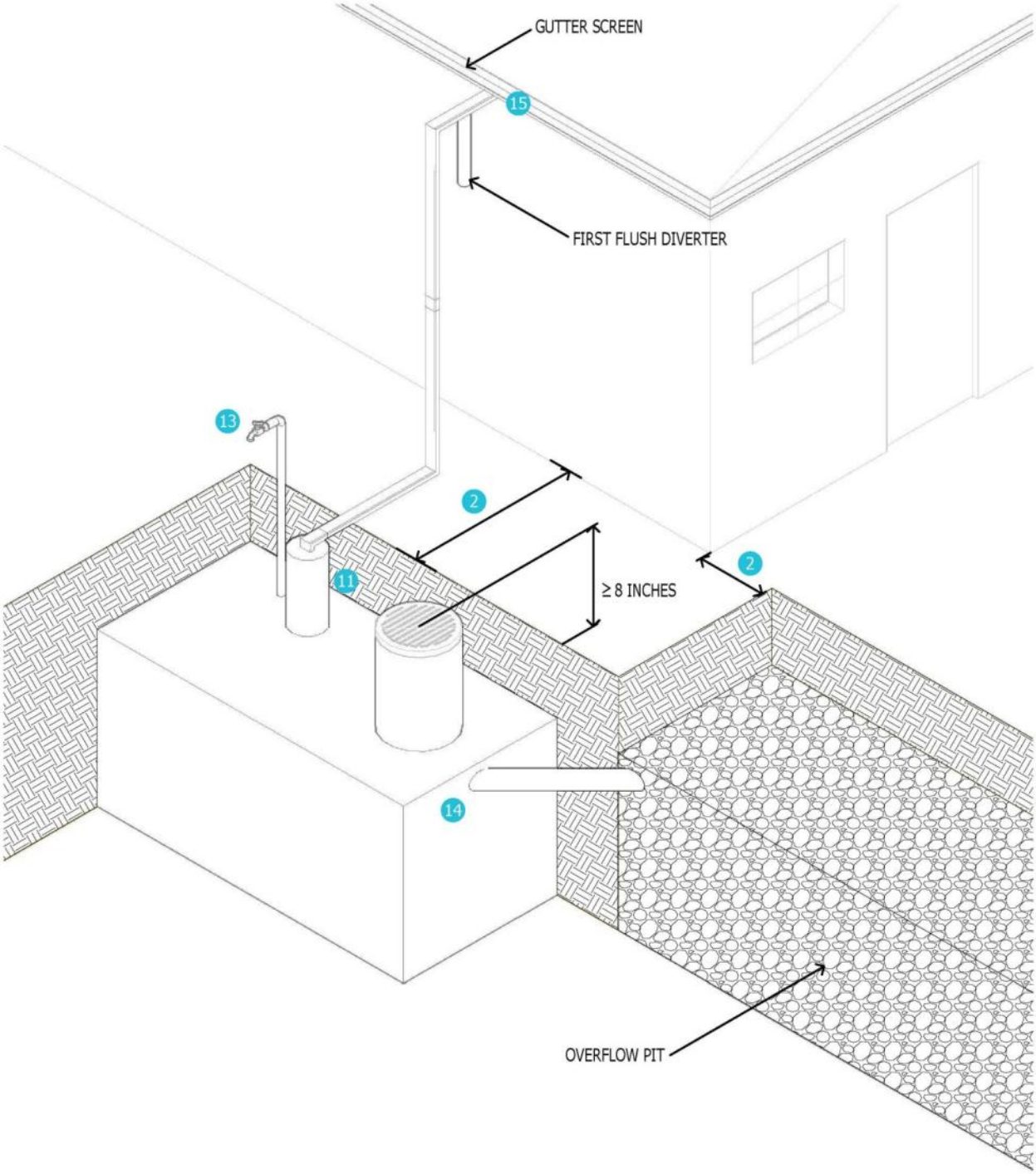



**FIGURE 5-2 CISTERN DIAGRAM**

## Guidance (3) Filter Strip

| | |
|---|---|
| 1. Siting Setbacks | |
| Pavement (1) | No requirement |
| Building (2) | Basement: ≥ 10 feet<br>No Basement: ≥ 5 feet |
| Property lines/ROW (3) | ≥ 2 feet / ≥0 feet |
| Groundwater/Karst/ Bedrock | Bottom of practice to be ≥2 feet above or use liner |
| Septic System/Wells | ≥ 50 feet / ≥ 100 feet |
| 2. Volume | |
| Surface Area | No requirement |
| Dimensions | Minimum length of 30 feet; Length must be less than that at which sheet flow concentrates; Depends on surface slope; Width is 10 to 100 feet |
| Surface slope | Filter Strip (longitudinal): 1% to 5%<br>Blind Swale/Level Spreader: 0% |
| Side slopes (4) | Not applicable |
| Freeboard (5) | Not applicable |
| 3. Vertical Component | |
| Surface Storage (6) | Depth of flow ≤ 3 inches |
| Growing Layer (7) | ≥ 6 inches of soil media |
| Filter Layer (8) | Not applicable |
| Drainage Layer (9) | Not applicable |
| Native Material (10) | Conduct soil analysis to determine if it is suitable soil media |
| 4. Drainage | |
| Inlet (11) | Blind swale and level spreader required |
| Underdrain (12) | Beneath blind swale; Drain to bypass |
| Outlet (13) | Catch basin, swale; receiving stream |
| Overflow (14) | High flow bypass upstream of blind swale |
| Evapotranspiration | No requirement |
| Infiltration | For BSD exemption areas, meet groundwater recharge requirement |
| Dewatering | ≥ 24 hours |

| | |
|---|---|
| 5. Composition | |
| Surface Treatment | Dense vegetation; able to withstand relatively high velocity flows and both wet and dry conditions; usually kept as lawn, 3 to 4 inches in height |
| Vegetation | Required |
| Soil Media | Must be able to sustain a grass cover and allow some infiltration |
| Side slopes | Not applicable |
| 6. Pollutant | |
| Pretreatment (15) | Sediment forebay or Riprap-lined blind swale |
| Sediment Storage | Not applicable |
| 7. Maintenance | |
| Access | Able to be accessed by a vehicle |
| Requirements | Designed and maintained to improve water quality; Maintenance Plan shall be submitted w/ Stormwater Management Plan |
| 8. Calculations | |
| Convey Water Quality Vol. (WQv) Hydrograph: C*(P/12)*A (ac-ft)<br><br>C=runoff quality coefficient (Refer to OEPA Permit No.: OHC000003 for values) or use $C=0.858i^3-0.78i^2+0.774i+0.04$<br>where i=fraction of post-const. impervious surface<br>P=0.75 Precipitation depth, inches<br>A=area tributary to the basin, acres | |
| Determine Design Flow Depth (≤ 1.5 inches):<br><br>Hydrograph Duration = 2 hours<br>Hydrograph Intensity (in/hr) = WQv*6/A<br>Design Peak Flow Rate = Use Rational Formula Method<br>Geometry = Use Manning's Equation to demonstrate that the flow depth is ≤ 1.5 inches while conveying the WQv hydrograph. | |

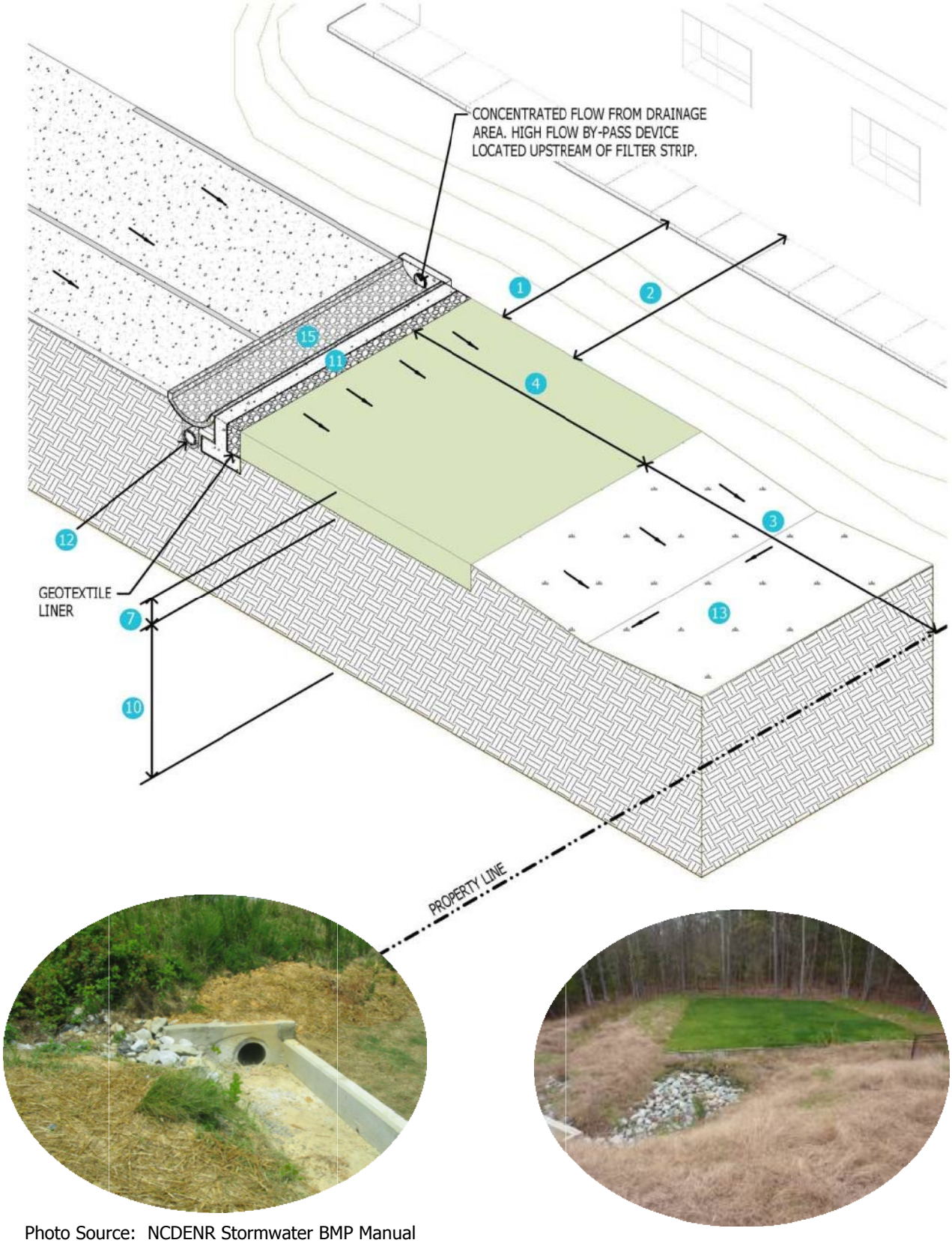
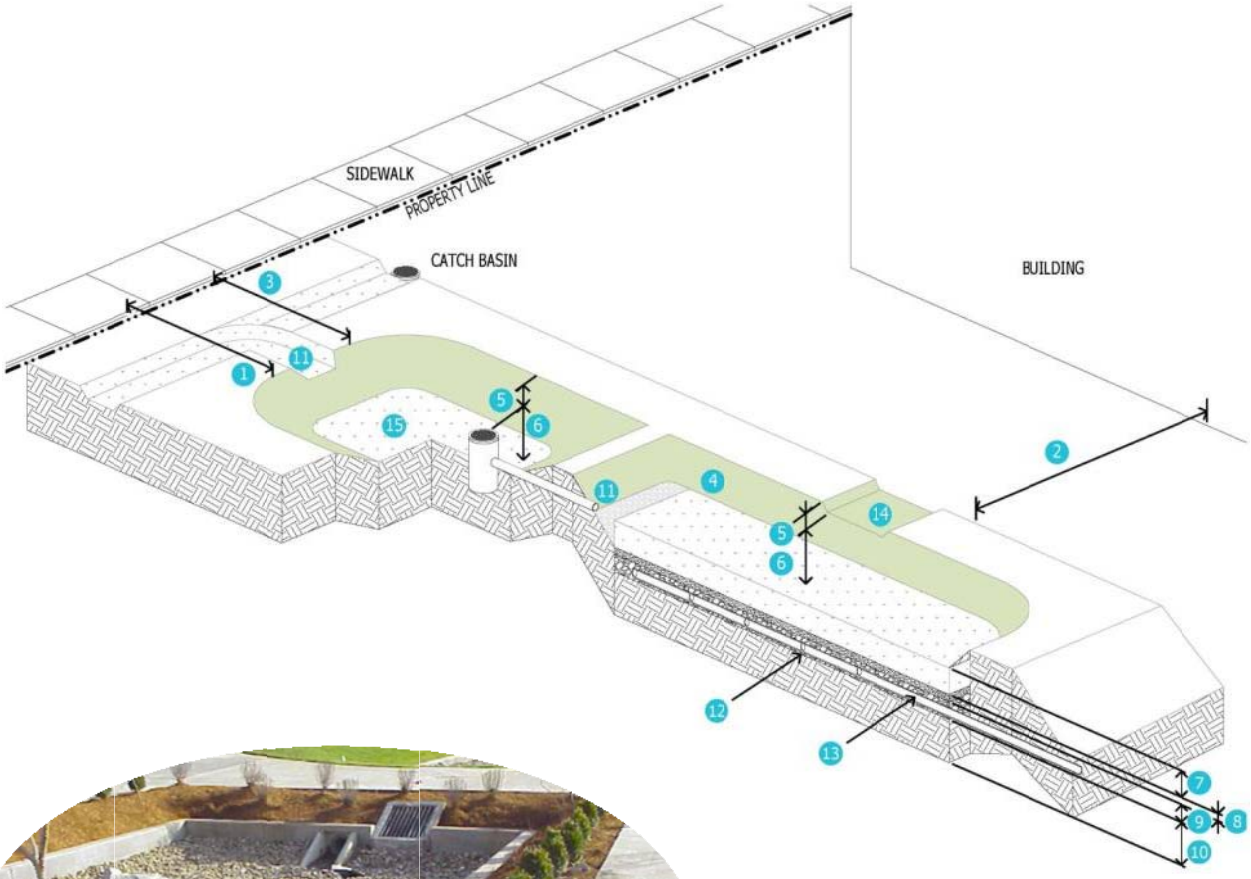



Photo Source: NCDENR Stormwater BMP Manual

**FIGURE 5-3 FILTER STRIP DIAGRAM**

## Guidance (4) Media Filter

| | |
|---|---|
| 1. Siting Setbacks | |
| Pavement (1) | No requirement |
| Building (2) | No requirement with lined bottom; otherwise, Basement: ≥ 10 feet<br>No Basement: ≥ 5 feet |
| Property Lines/ROW (3) | ≥ 2 feet / ≥0 feet |
| Groundwater/Karst/ Bedrock | Bottom of practice to be ≥ 2 feet above or use impermeable liner |
| Septic System/Wells | ≥ 50 feet / ≥ 100 feet |
| 2. Volume | |
| Surface Area | Settling Basin: Min. length to width ratio of 2:1 or use baffles<br>Media Filter: 600 $ft^2$ per tributary impervious acre |
| Dimensions | Total system requires 4 to 8 feet of elevation drop |
| Bottom slope | Settling Basin: No requirement<br>Media Filter: Flat |
| Side slopes (4) | 4H:1V or flatter and vegetated or vertical concrete walls |
| Freeboard (5) | Settling Basin: ≥ 0.5 foot<br>Media Filter: ≥ 1 foot |
| 3. Vertical Component | |
| Surface Storage Layer (6) | Settling Basin: 3 to 10 feet<br>Media Filter: 1 to 4 feet |
| Filter Media Layer (7) | ≥ 1.5 feet of sand, peat, amended soil, or other media w/ a diameter of 0.02 to 0.04 inches |
| Filter Stone Layer (8) | 3 to 4 inches of #8 or #78 washed stone |
| Drainage Layer (9) | ≥ 8 inches of clean coarse aggregate AASHTO #4, #5, or equivalent |
| Native Material (10) | No requirement |
| 4. Drainage | |
| Inlet (11) | ≤ 2 ft/sec into settling basin; Uniformly spread across filter from settling basin to filter |
| Underdrain (12) | 6-inch perforated PVC placed to meet dewatering requirement; cleanout at terminal ends |
| Outlet (13) | Required |
| Overflow (14) | Weir; Adhere to ODNR dam safety laws as applicable |
| Evapotranspiration | No requirement |
| Infiltration | For BSD exemption areas, meet groundwater recharge requirement |
| Dewatering | Settling basin releases volume to the filter within 24 hours;<br>Media Filter provides a filtration time of no less than 24 hours and no more than 40 hours |
| 5. Composition | |
| Surface Treatment | None |
| Vegetation | Side slopes only (typically grass) |
| Filter Media | Meets dewatering requirement |
| Mulch | Not applicable |
| 6. Pollutant | |
| Pretreatment (15) | Settling basin is required |
| Sediment Storage | Equal to 20% of water quality volume within settling basin |
| 7. Maintenance | |
| Access | A stable vehicular access way shall be provided |
| Requirements | 1) Designed and maintained to improve water quality; Maintenance Plan shall be submitted w/ Stormwater Management Plan<br>2) Install a fixed vertical sediment depth marker in settling basin |
| 8. Calculations | |
| Water Quality Volume (WQv) = C*(P/12)*A (ac-ft)<br><br>C=runoff quality coefficient (Refer to OEPA Permit No.: OHC000003 for values) or use<br>$C=0.858i^3-0.78i^2+0.774i+0.04$<br>where i=fraction of post-const. impervious surface<br>P=0.75 Precipitation depth, inches<br>A=area tributary to the basin, acres | |
| Settling Basin = WQv +0.2*WQv | |
| Quantity Control Requirements = Refer to Chapter 2 and Chapter 7. | |



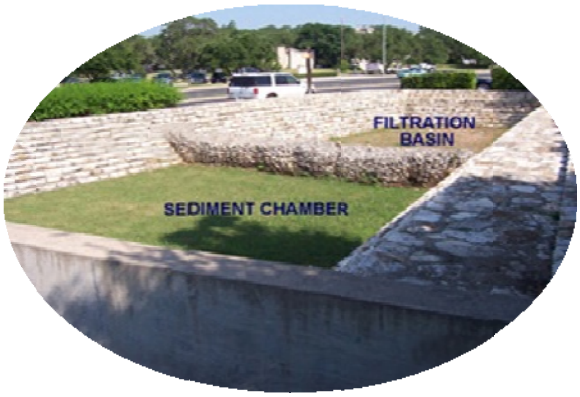




Photo Source: www.austintexas.gov

**FIGURE 5-4 MEDIA FILTER DIAGRAM**

## Guidance (5) Traditional Bioretention

| | |
|---|---|
| 1. Siting Setbacks | |
| Pavement (1) | No requirement |
| Building (2) | No requirement with lined bottom; otherwise, Basement: ≥ 10 feet<br>No Basement: ≥ 5 feet |
| Property lines/ROW (3) | ≥ 2 feet / ≥0 feet |
| Groundwater/Karst/ Bedrock | Bottom of practice to be ≥ 2 feet above or use impermeable liner |
| Septic System/Wells | ≥ 50 feet / ≥ 100 feet |
| 2. Volume | |
| Surface Area | No requirement |
| Dimensions | No requirement |
| Bottom slope | Flat |
| Side slopes (4) | 2H:1V or flatter |
| Freeboard (5) | 6 to 12 inches |
| 3. Vertical Component | |
| Surface Storage (6) | 6 to 12 inches |
| Growing Layer (7) | ≥ 12 inches soil media; 3 inches of mulch, max |
| Filter Layer (8) | 2 to 4 inches of clean medium sand (ASTM c-33) over 2 to 3 inches of #8 or #78 washed stone when drainage layer is used |
| Drainage Layer (9) | Recommended 12 to 30 in. of clean coarse aggregate AASHTO #4, #5, or equivalent |
| Native Material (10) | Test infiltration; ≥1/2 in/hr if designing with infiltration |
| 4. Drainage | |
| Inlet (11) | Curb inlet or sheet flow through grass filter strip |
| Underdrain (12) | 6-inch perforated PVC placed to meet dewatering requirement if needed; cleanout at terminal ends |
| Outlet (13) | Required |
| Overflow (14) | Catch basin set 6 to 12 inches above soil surface and connected to storm drainage network; Weir in berm placed to minimize property damage |
| Evapotranspiration | No requirement |
| Infiltration | For BSD exemption areas, meet groundwater recharge requirement |
| Dewatering | Between 24 and 56 hours; No more than 1/2 of the WQv is released in less than 1/3 of the minimum drawdown period of 40 hours |
| 5. Composition | |
| Surface Treatment | Vegetation and mulch |
| Vegetation | Required |
| Soil Media | With or without an underdrain, meets dewatering requirement; supports plant growth |
| Side Slopes | Grass or mulch, no stone |
| Mulch | Triple-shredded hardwood |
| 6. Pollutant | |
| Pretreatment (15) | Required. May include grass filter strip, stone trench, forebay, sump inlets |
| Sediment Storage | No requirement |
| 7. Maintenance | |
| Access | Able to be accessed by a vehicle |
| Requirements | Designed and maintained to improve water quality; Maintenance Plan shall be submitted w/ Stormwater Management Plan |
| 8. Calculations | |
| Water Quality Volume (WQv) = C*(P/12)*A (ac-ft)<br><br>C=runoff quality coefficient (Refer to OEPA Permit No.: OHC000003 for values) or use $C=0.858i^3-0.78i^2+0.774i+0.04$ where i=fraction of post-const. impervious surface<br>P=0.75 Precipitation depth, inches<br>A=area tributary to the basin, acres | |
| Ponding Area = $WQv*d_s/[k*(h_s+d_s)*t_s]$<br><br>$d_s$=soil media depth<br>k=coefficient of permeability of soil media (ft/day). Use lab values or projected values after settling and use.<br>$h_s$=average height of water above soil media and mulch, feet<br>$t_s$=facility drain time (days) | |
| Quantity Control Requirements = Refer to Chapter 2 and Chapter 7 | |

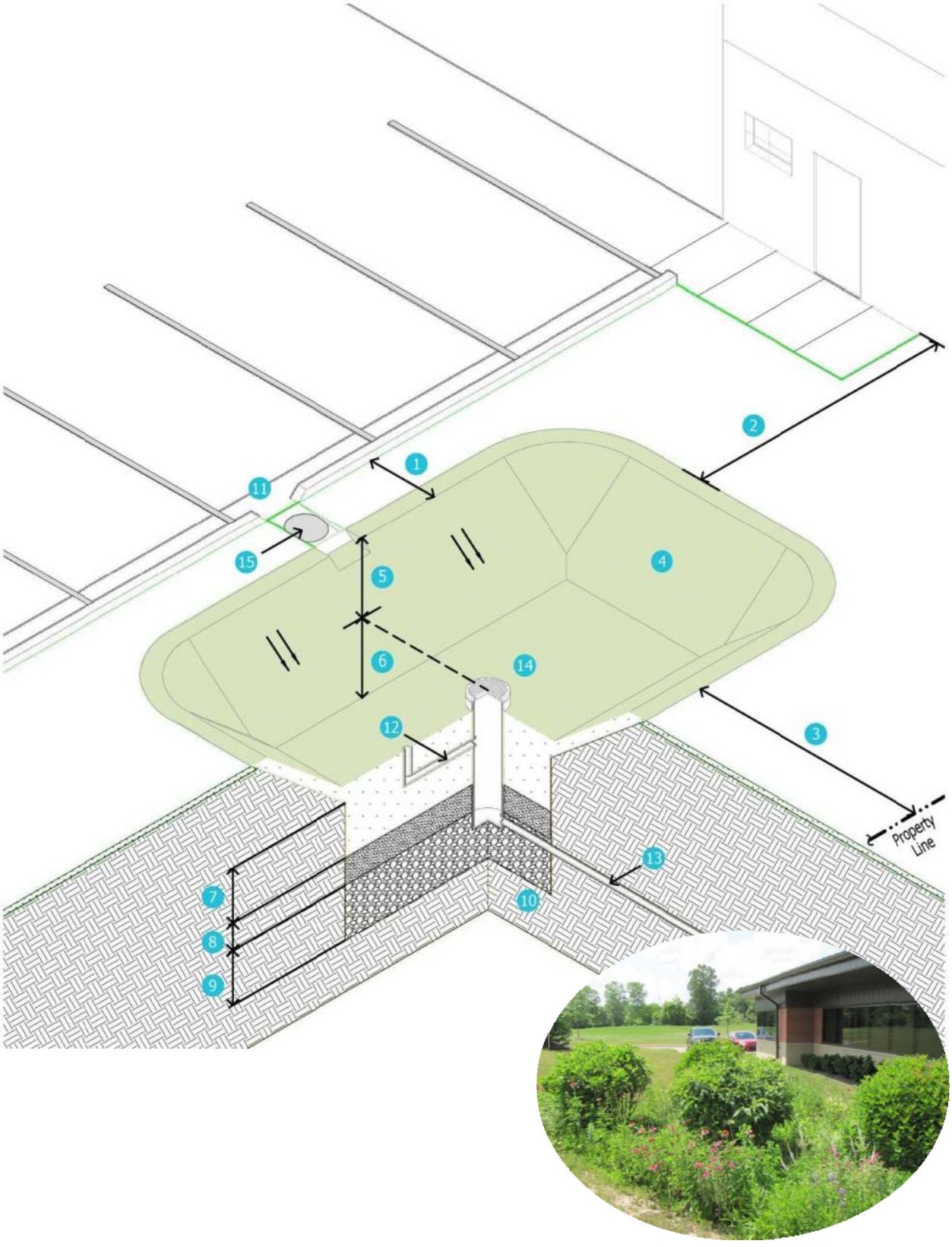



**FIGURE 5-5 TRADITIONAL BIORETENTION DIAGRAM**

## Guidance (6) Bioretention Swale

| | |
|---|---|
| 1. Siting Setbacks | |
| Pavement (1) | No requirement |
| Building (2) | No requirement with lined bottom; otherwise, Basement: ≥ 10 feet No Basement: ≥ 5 feet |
| Property lines/ROW (3) | ≥ 2 feet / ≥0 feet |
| Groundwater/Karst/ Bedrock | Bottom of practice to be ≥ 2 feet above or use impermeable liner |
| Septic System/Wells | ≥ 50 feet / ≥ 100 feet |
| 2. Volume | |
| Surface Area | No requirement |
| Dimensions | Minimum length of 25 feet |
| Bottom slope | ≥ 1%; Maximum slope is limited to that which does not cause scour |
| Side slopes (4) | 2H:1V or flatter above the surface |
| Freeboard (5) | 6 to 12 inches |
| 3. Vertical Component | |
| Surface Storage (6) | 6 to 12 inches |
| Growing Layer (7) | ≥ 12 inches soil media |
| Filter Layer (8) | *Optional:* 2 to 4 inches of clean medium sand (ASTM c-33) over 2 to 3 inches of #8 or #78 washed stone |
| Drainage Layer (9) | *Optional:* 12 to 30 in. of clean coarse aggregate AASHTO #4, #5, or equiv. |
| Native Material (10) | Test infiltration; ≥1/2 in/hr if designing w/ infiltration |
| 4. Drainage | |
| Inlet (11) | Curb inlet or sheet flow through grass filter strip |
| Underdrain (12) | *Optional:* 6-inch perforated PVC; cleanout at terminal ends |
| Outlet (13) | Required |
| Overflow (14) | Catch basin set 6 to 12 inches above soil surface and connected to storm drainage network; Weir in berm placed to minimize property damage |
| Evapotranspiration | No requirement |
| Infiltration | For BSD exemption areas, meet groundwater recharge requirement |
| Dewatering | Between 24 and 56 hours; No more than 1/2 of the WQv is released in less than 1/3 of the minimum drawdown period of 24 hours |
| 5. Composition | |
| Surface Treatment | Vegetation, no mulch |
| Vegetation | Required |
| Soil Media | With or w/o an underdrain, meets dewatering requirement; supports plant growth |
| Side slopes | Grass, no mulch, no stone |
| 6. Pollutant | |
| Pretreatment (15) | Required. May include grass filter strip or sump inlets |
| Sediment Storage | No requirement |
| 7. Maintenance | |
| Access | Able to be accessed by a vehicle; Possibly adjacent to parallel parking for convenience |
| Requirements | Designed and maintained to improve water quality; Maintenance Plan shall be submitted w/ Stormwater Management Plan |
| 8. Calculations | |
| Water Quality Volume (WQv) = C*(P/12)*A (ac-ft)<br>C=runoff quality coefficient (Refer to OEPA Permit No.: OHC000003 for values) or use<br>$C=0.858i^3-0.78i^2+0.774i+0.04$<br>where i=fraction of post-const. impervious surface<br>P=0.75 Precipitation depth, inches<br>A=area tributary to the basin, acres | |
| Ponding Area = $WQv*d_s/[k*(h_s+d_s)*t_s]$<br>$d_s$=soil media depth<br>k=coefficient of permeability of soil media (ft/day). Use lab values or projected values after settling and use.<br>$h_s$=average height of water above soil media and mulch, feet<br>$t_s$=facility drain time (days) | |
| Quantity Control Requirements = Refer to Chapter 2 and Chapter 7 | |

Notes:
[1]Use weirs, check dams, or equivalent to detain and treat the water quality volume for a minimum of 24 hours, promote pooling and infiltration, and aid in maintaining non-erosive flow velocities.

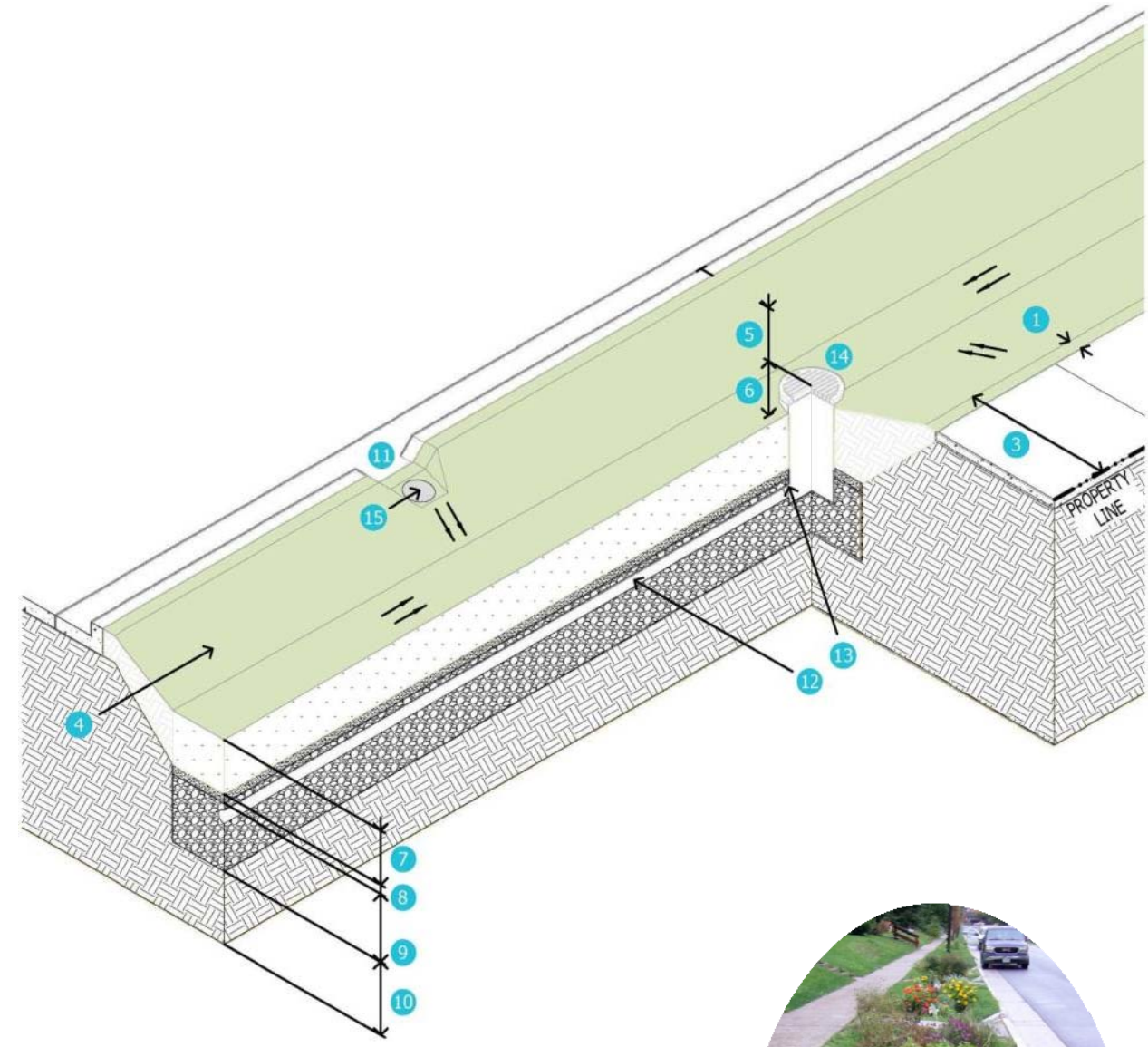



**FIGURE 5-6 BIORETENTION SWALE DIAGRAM**

## Guidance (7) Planter Box

| | |
|---|---|
| 1. Siting Setbacks | |
| Pavement (1) | No requirement |
| Building (2) | No requirement w/ solid or lined bottom; otherwise, Basement: ≥ 10 feet<br>No Basement: ≥ 5 feet |
| Property lines/ROW (3) | ≥ 2 feet / ≥0 feet |
| Groundwater/Karst/ Bedrock | Bottom of practice to be ≥2 feet above or use liner |
| Septic System/Wells | ≥ 50 feet / ≥ 100 feet |
| 2. Volume | |
| Surface Area | No requirement |
| Dimensions | No requirement |
| Bottom slope | Flat |
| Side slopes (4) | Vertical retaining wall |
| Freeboard (5) | 2 to 6 inches |
| 3. Vertical Component | |
| Surface Storage (6) | 6 to 12 inches |
| Growing Layer (7) | ≥ 12 inches soil media; 3 inches of mulch, max |
| Filter Layer (8) | *Optional:* 2 to 4 inches of clean medium sand (ASTM c-33) over 2 to 3 inches of #8 or #78 washed stone |
| Drainage Layer (9) | *Optional:* 12 to 30 in. of clean coarse aggregate AASHTO #4, #5, or equivalent |
| Native Material (10) | Test infiltration; ≥1/2 in/hr if designing with infiltration |
| 4. Drainage | |
| Inlet (11) | Curb inlet; downspout w/ energy dissipation |
| Underdrain (12) | 6-inch perforated PVC placed to meet dewatring-requirement if needed; cleanout at terminal ends |
| Outlet (13) | Required |
| Overflow (14) | Downstream inlet or stand pipe set 4-6 in. above soil |
| Evapotranspiration | No requirement |
| Infiltration | For BSD exemption areas, meet groundwater recharge requirement |
| Dewatering | Between 24 and 56 hours; No more than 1/2 of the WQv is released in less than 1/3 of the minimum drawdown period of 40 hours |
| 5. Composition | |
| Surface Treatment | Vegetation; Mulch-optional |
| Vegetation | Required |
| Soil Media | With or w/o an underdrain, meets dewatering requirement; supports plant growth |
| Retaining Wall | Coordinate with building materials. |
| Mulch | Triple-shredded hardwood |
| 6. Pollutant | |
| Pretreatment (15) | Required for street or parking lot runoff; may include sump inlets |
| Sediment Storage | No requirement |
| 7. Maintenance | |
| Access | Able to be accessed by a vehicle |
| Requirements | Designed and maintained to improve water quality; Maintenance Plan shall be submitted w/ Stormwater Management Plan |
| 8. Calculations | |
| Water Quality Volume (WQv) = C*(P/12)*A (ac-ft)<br><br>C=runoff quality coefficient (Refer to OEPA Permit No.: OHC000003 for values) or use $C=0.858i^3-0.78i^2+0.774i+0.04$<br>where i=fraction of post-const. impervious surface<br>P=0.75 Precipitation depth, inches<br>A=area tributary to the basin, acres | |
| Ponding Area = $WQv*d_s/[k*(h_s+d_s)*t_s]$<br><br>$d_s$=soil media depth<br>k=coefficient of permeability of soil media (ft/day). Use lab values or projected values after settling and use.<br>$h_s$=average height of water above soil media and mulch, feet<br>$t_s$=facility drain time (days) | |
| Quantity Control Requirements = Refer to Chapter 2 and Chapter 7 | |

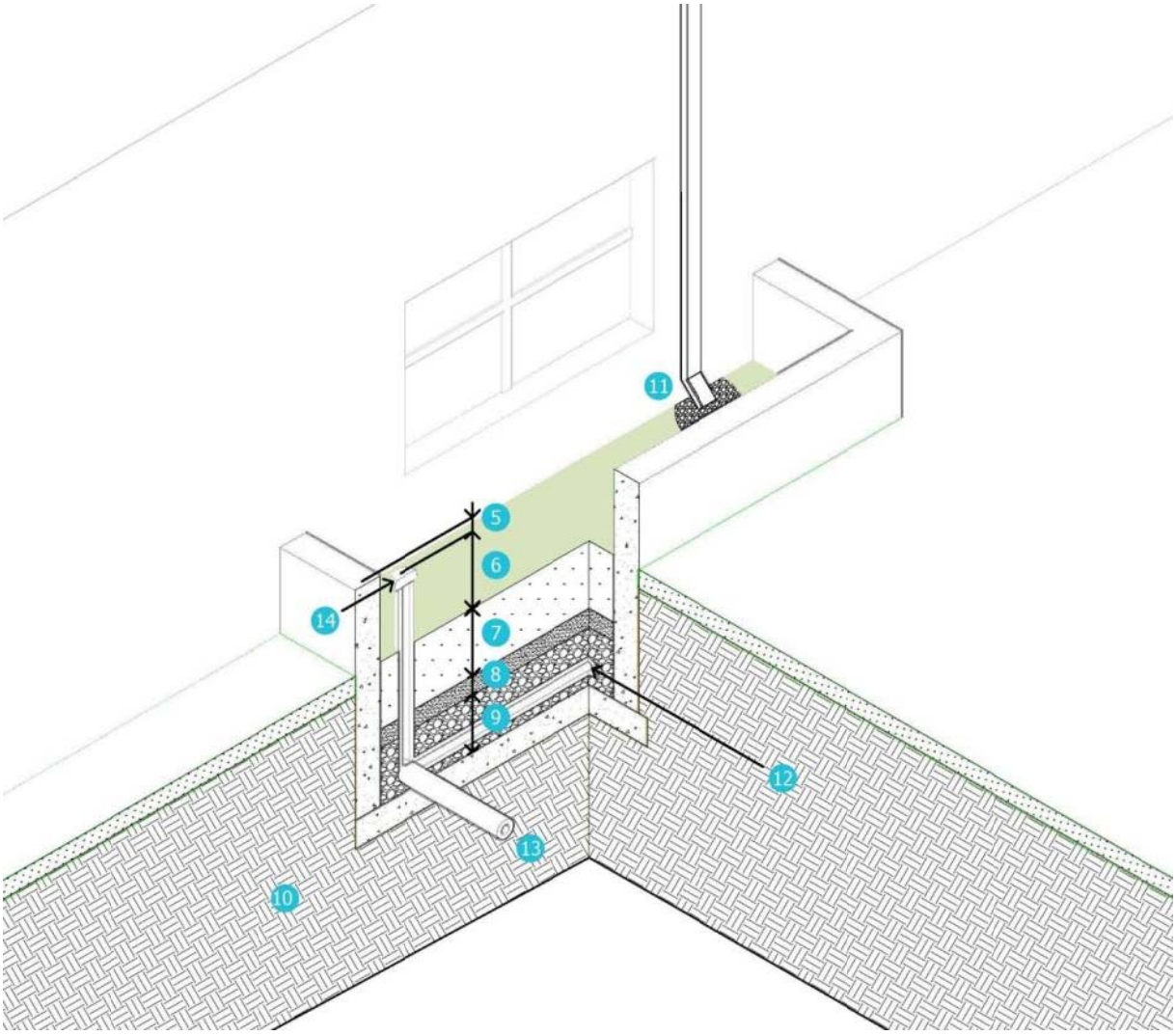



**FIGURE 5-7 PLANTER BOX DIAGRAM**

## Guidance (8) Tree Box

| | | |
|---|---|---|
| 1. Siting Setbacks | | |
| Pavement | 1 | ≥0 ft with structural soil, retaining wall, or modular suspended pavement |
| Building | 2 | No requirement with lined bottom; otherwise, Basement: ≥ 10 feet<br>No Basement: ≥ 5 feet |
| Property lines/ROW | 3 | ≥ 2 feet / ≥0 feet |
| Groundwater/Karst/ Bedrock | | Bottom of practice to be ≥2 feet above or use liner |
| Septic System/Wells | | ≥ 50 feet / ≥ 100 feet |
| 2. Volume | | |
| Surface Area | | Variable |
| Dimensions | | 1) ≥1000 $ft^3$ planting volume for single tree;<br>2) ≥600 $ft^3$ planting volume per tree for multiple trees |
| Bottom slope | | Not applicable |
| Side slopes | 4 | Not applicable |
| Freeboard | 5 | Not applicable |
| 3. Vertical Component | | |
| Surface Storage | 6 | ≤ 6 inches |
| Growing Layer | 7 | ≥3 feet root zone depth<br>Use: 1) Uncompacted soil w/ retaining wall 2) Structural soil, or 3) Modular suspended pavement |
| Filter Layer | 8 | *Optional:* 2 to 4 inches of clean medium sand (ASTM c-33) over 2 to 3 inches of #8 or #78 washed stone |
| Drainage Layer | 9 | *Optional:* 12 to 30 inches of clean coarse aggregate AASHTO #4, #5, or equivalent |
| Native Material | 10 | Test infiltration; ≥1/2 in/hr if designing with infiltration |
| 4. Drainage | | |
| Inlet | 11 | Curb inlet |
| Underdrain | 12 | *Optional:* 6-inch perforated PVC placed to meet dewatering requirement; cleanout at terminal ends |
| Outlet | 13 | Required |
| Overflow | 14 | Downstream inlet or stand pipe set 4-6 in. above soil |
| Evapotranspiration | | No requirement |
| Infiltration | | For BSD exemption areas, meet groundwater recharge requirement |
| Dewatering | | Between 24 and 56 hours; No more than 1/2 of the WQv is released in less than 1/3 of the minimum drawdown period of 40 hours |
| 5. Composition | | |
| Surface Treatment | | Tree approved by City;<br>2 to 4 in. of Mulch-*optional* |
| Vegetation | | Required |
| Soil Media | | With or w/o an underdrain, meets dewatering requirement; supports plant growth |
| Retaining Wall | | Concrete |
| Mulch | | Triple-shredded hardwood |
| 6. Pollutant | | |
| Pretreatment | 15 | Required for street or parking lot runoff; may include sump inlets |
| Sediment Storage | | No requirement |
| 7. Maintenance | | |
| Access | | Able to be accessed by a vehicle |
| Requirements | | Designed and maintained to improve water quality; Maintenance Plan shall be submitted w/ Stormwater Management Plan |
| 8. Calculations | | |
| Water Quality Volume (WQv) = C*(P/12)*A (ac-ft)<br><br>C=runoff quality coefficient (Refer to OEPA Permit No.: OHC000003 for values) or use<br>$C=0.858i^3-0.78i^2+0.774i+0.04$<br>where i=fraction of post-const. impervious surface<br>P=0.75 Precipitation depth, inches<br>A=area tributary to the basin, acres | | |
| Planting Soil Stormwater Storage = Soil Volume*Water Capacity Factor<br><br>Water Capacity Factor: silt loam=0.3; loam=0.25; clay loam=0.2; clay=0.15 | | |
| Quantity Control Requirements = Refer to Chapter 2 and Chapter 7 | | |

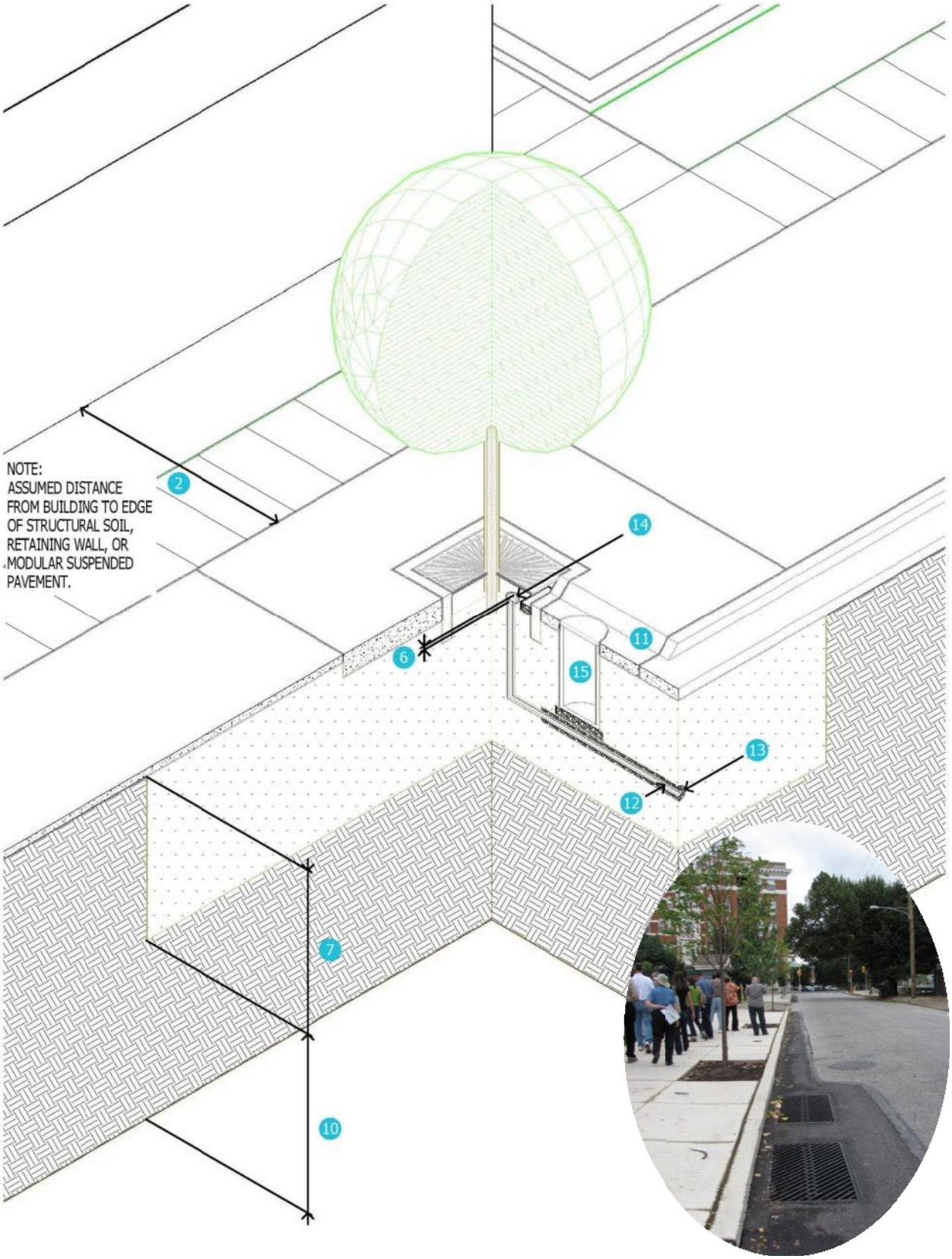



**FIGURE 5-8 TREE BOX DIAGRAM**

## Guidance (9) Bioretention Curb Extension

| | | |
|---|---|---|
| 1. Siting Setbacks | | |
| Pavement | 1 | No requirement |
| Building | 2 | No requirement with lined bottom; otherwise, Basement: ≥ 10 feet<br>No Basement: ≥ 5 feet |
| Property lines/ROW | 3 | ≥ 2 feet / ≥0 feet |
| Groundwater/Karst/ Bedrock | | Bottom of practice to be ≥2 feet above or use liner |
| Septic System/Wells | | ≥ 50 feet / ≥ 100 feet |
| 2. Volume | | |
| Surface Area | | No requirement |
| Dimensions | | No requirement |
| Bottom slope | | Flat |
| Side slopes | 4 | 2H:1V or flatter |
| Freeboard | 5 | 2 to 6 inches |
| 3. Vertical Component | | |
| Surface Storage | 6 | 6 to 12 inches |
| Growing Layer | 7 | ≥ 12 inches soil media; 3 inches of mulch, max |
| Filter Layer | 8 | 2 to 4 inches of clean medium sand (ASTM c-33) over 2 to 3 inches of #8 or #78 washed stone |
| Drainage Layer | 9 | 12 to 30 in. of clean coarse aggregate AASHTO #4, #5, or equivalent |
| Native Material | 10 | Test infiltration; ≥1/2 in/hr if designing with infiltration |
| 4. Drainage | | |
| Inlet | 11 | Curb inlet |
| Underdrain | 12 | 6-inch perforated PVC placed to meet dewatering requirement if needed; cleanout at terminal ends |
| Outlet | 13 | Required |
| Overflow | 14 | Downstream inlet or stand pipe set 4-6 in. above soil |
| Evapotranspiration | | No requirement |
| Infiltration | | For BSD exemption areas, meet groundwater recharge requirement |
| Dewatering | | Between 24 and 56 hours; No more than 1/2 of the WQv is released in less than 1/3 of the minimum drawdown period of 40 hours |
| 5. Composition | | |
| Surface Treatment | | Vegetation and mulch |
| Vegetation | | Required |
| Soil Media | | With or w/o an underdrain, meets dewatering requirement; supports plant growth |
| Side Slopes | | Grass or mulch, no stone |
| Mulch | | Triple-shredded hardwood |
| 6. Pollutant | | |
| Pretreatment | 15 | Required for street or parking lot runoff; may include sump inlets or forebay |
| Sediment Storage | | No requirement |
| 7. Maintenance | | |
| Access | | Able to be accessed by a vehicle |
| Requirements | | Designed and maintained to improve water quality; Maintenance Plan shall be submitted w/ Stormwater Management Plan |
| 8. Calculations | | |
| Water Quality Volume (WQv) = C*(P/12)*A (ac-ft)<br><br>C=runoff quality coefficient (Refer to OEPA Permit No.: OHC000003 for values) or use $C=0.858i^3-0.78i^2+0.774i+0.04$ where i=fraction of post-const. impervious surface<br>P=0.75 Precipitation depth, inches<br>A=area tributary to the basin, acres | | |
| Ponding Area = $WQv*d_s/[k*(h_s+d_s)*t_s]$<br><br>$d_s$=soil media depth<br>k=coefficient of permeability of soil media (ft/day). Use lab values or projected values after settling and use.<br>$h_s$=average height of water above soil media and mulch, feet<br>$t_s$=facility drain time (days) | | |
| Quantity Control Requirements = Refer to Chapter 2 and Chapter 7 | | |

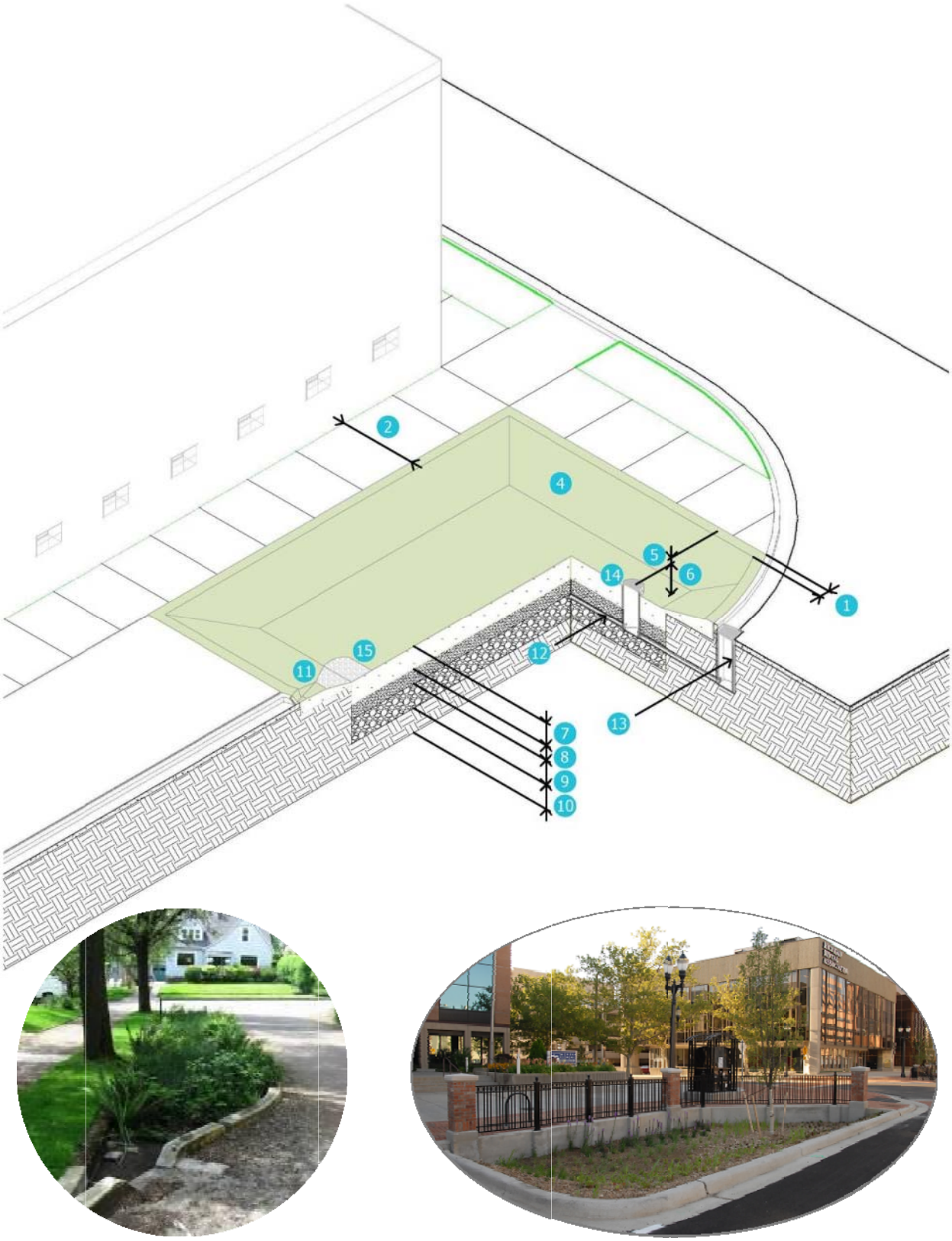



**FIGURE 5-9 BIORETENTION CURB EXTENSION DIAGRAM**

## Guidance (10) Permeable Pavement

| | |
|---|---|
| 1. Siting Setbacks | |
| Pavement (1) | No requirement |
| Building (2) | No requirement with lined bottom; otherwise, Basement: ≥ 10 feet<br>No Basement: ≥ 5 feet |
| Property lines/ROW (3) | ≥ 2 feet / ≥0 feet |
| Groundwater/Karst/ Bedrock | Bottom of practice to be ≥2 feet above or use liner |
| Septic System/Wells | ≥ 50 feet / ≥100 feet |
| 2. Volume | |
| Surface Area | No requirement |
| Dimensions | No requirement |
| Bottom slope | Minimal slope |
| Side slopes (4) | Not applicable |
| Freeboard (5) | Not applicable |
| 3. Vertical Component | |
| Surface Layer (6) | Interlocking Concrete Pavers; Concrete Grid Pavers; Plastic Grid Pavers; Concrete; Asphalt |
| Growing Layer (7) | No requirement |
| Filter Layer (8) | 1) Perm. Interlocking Conc. Pavers: 1.5 to 3 inches of #8 or #78 washed stone<br>2) Concrete and Plastic Grid Pavers: 1 to 1.5 inches of bedding sand<br>3) Permeable Concrete and Asphalt: None |
| Base Layer (9) | 12 to 30 in. of clean aggr. AASHTO #56 or equivalent; thickness depends on strength/storage needed; install geotextile separator where aggregate meets soil |
| Native Material (10) | Compacted as sub-base |
| 4. Drainage | |
| Inlet (11) | Pavement surface |
| Underdrain (12) | 6-inch perforated PVC; cleanout at terminal ends |
| Outlet (13) | Required |
| Overflow (14) | Downstream inlet |
| Evapotranspiration | No requirement |
| Infiltration | 48 hours per OEPA |
| Dewatering | Less than 24 hours per OEPA |
| 5. Composition | |
| Surface Treatment | For interlocking or grid-type pavers use fine aggregate, coarse sand, or top soil & grass in openings |
| Vegetation | Not applicable |
| Soil Media | Not applicable |
| Side Slopes | Not applicable |
| Mulch | Not applicable |
| 6. Pollutant | |
| Pretreatment (15) | Divert runoff from sediment sources away from pavement |
| Sediment Storage | Not applicable |
| 7. Installation and Maintenance | |
| Installation | Per manufacturer's recommendation |
| Load Bearing | 1) As directed by City Engineer<br>2) Designed for projected traffic loads using AASHTO methods |
| Requirements | Designed and maintained to improve water quality; Maintenance Plan shall be submitted w/ Stormwater Management Plan |
| 8. Calculations | |
| Water Quality Volume (WQv) = C*(P/12)*A (ac-ft)<br><br>C=runoff quality coefficient (Refer to OEPA Permit No.: OHC000003 for values) or use $C=0.858i^3-0.78i^2+0.774i+0.04$<br>where i=fraction of post-const. impervious surface<br>P=0.75 Precipitation depth, inches<br>A=area tributary to the basin, acres | |
| Base Layer Storage = assume 40% void space | |
| Quantity Control Requirements = Refer to Chapter 2 and Chapter 7 | |

Notes: A reinforced concrete header width is required where permeable pavement meets adjacent non-concrete pavement or soil. Use ODOT Type 6 curb.

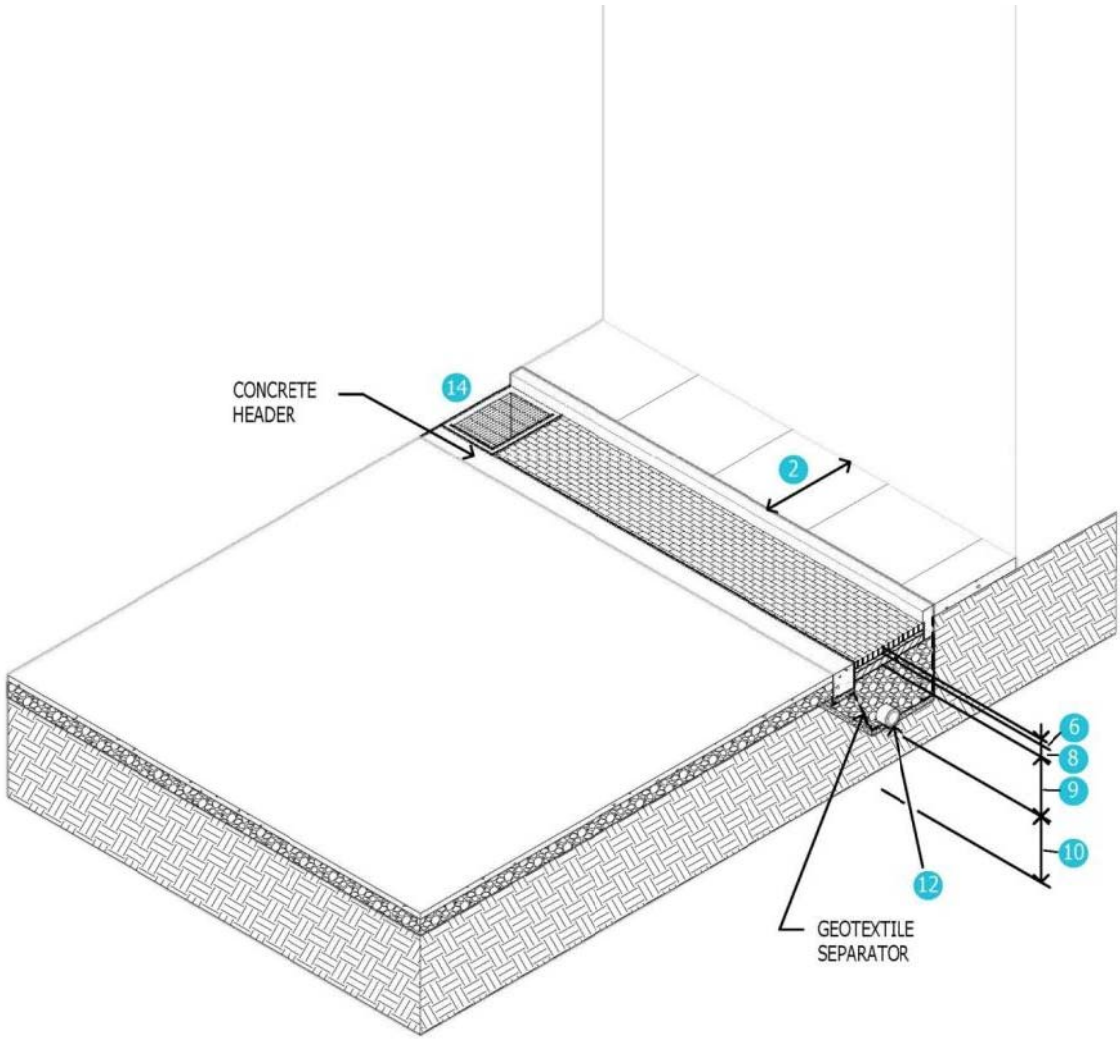



**FIGURE 5-10 PERMEABLE PAVEMENT DIAGRAM**

## Guidance (11) Green Roof

| | |
|---|---|
| 1. Siting Setbacks | |
| Pavement (1) | Not applicable |
| Building (2) | Not applicable |
| Property lines/ROW (3) | Not applicable |
| Groundwater/Karst/ Bedrock | Not applicable |
| Septic System/Wells | Not applicable |
| 2. Volume | |
| Contributing Drainage Area | Roof coverage |
| Surface Area | Roof coverage |
| Dimensions | Dependent on green roof use and manufacturer's specs |
| Bottom slope | Same as pitch of roof; Refer to manufacturer's specs for maximum pitch |
| Side slopes (4) | Not applicable |
| Freeboard (5) | Not applicable |
| 3. Vertical Component | |
| Surface Layer (6) | Wind blanket as needed |
| Growing Layer (7) | Minimum 2.5-inch thick; Dependent on green roof use and manufacturer's specs |
| Filter Layer (8) | No requirement |
| Drainage Layer (9) | Dependent on green roof use and manufacturer's specs |
| Native Material (10) | Not applicable |
| 4. Drainage | |
| Inlet (11) | Not applicable |
| Underdrain (12) | Perforated conduit and/or drainage layer per manufacturer's specs |
| Outlet (13) | Roof drain |
| Overflow (14) | Roof drain installed to protect roof from flooding per manufacturer's specs |
| Evapotranspiration | No requirement |
| Infiltration | May discharge to infiltrating BMP |
| Dewatering | ≤ 24 hours |

| | |
|---|---|
| 5. Composition | |
| Surface Treatment | Vegetation |
| Vegetation | Dependent on green roof use and manufacturer's specs |
| Soil Media | Meets dewatering requirement; supports plant growth |
| Side Slopes | Not applicable |
| Mulch | Not applicable |
| 6. Pollutant | |
| Pretreatment (15) | Not applicable |
| Sediment Storage | Not applicable |
| 7. Installation and Maintenance | |
| Installation | Per manufacturer's recommendation |
| Access | Able to be accessed from the building |
| Requirements | Designed and maintained to improve water quality; Maintenance Plan shall be submitted w/ Stormwater Management Plan |
| 8. Calculations | |
| Water Quality Volume (WQv) = C*(P/12)*A (ac-ft)<br><br>C=runoff quality coefficient (Refer to OEPA Permit No.: OHC000003 for values) or use $C=0.858i^3-0.78i^2+0.774i+0.04$<br>where i=fraction of post-const. impervious surface<br>P=0.75 Precipitation depth, inches<br>A=area tributary to the basin, acres | |
| Green Roof Storage = per manufacturer's specs | |
| Quantity Control Requirements = Refer to Chapter 2 and Chapter 7 | |

Notes: The building roof must be designed to safely support the saturated weight of the green roof.
An irrigation system is optional.

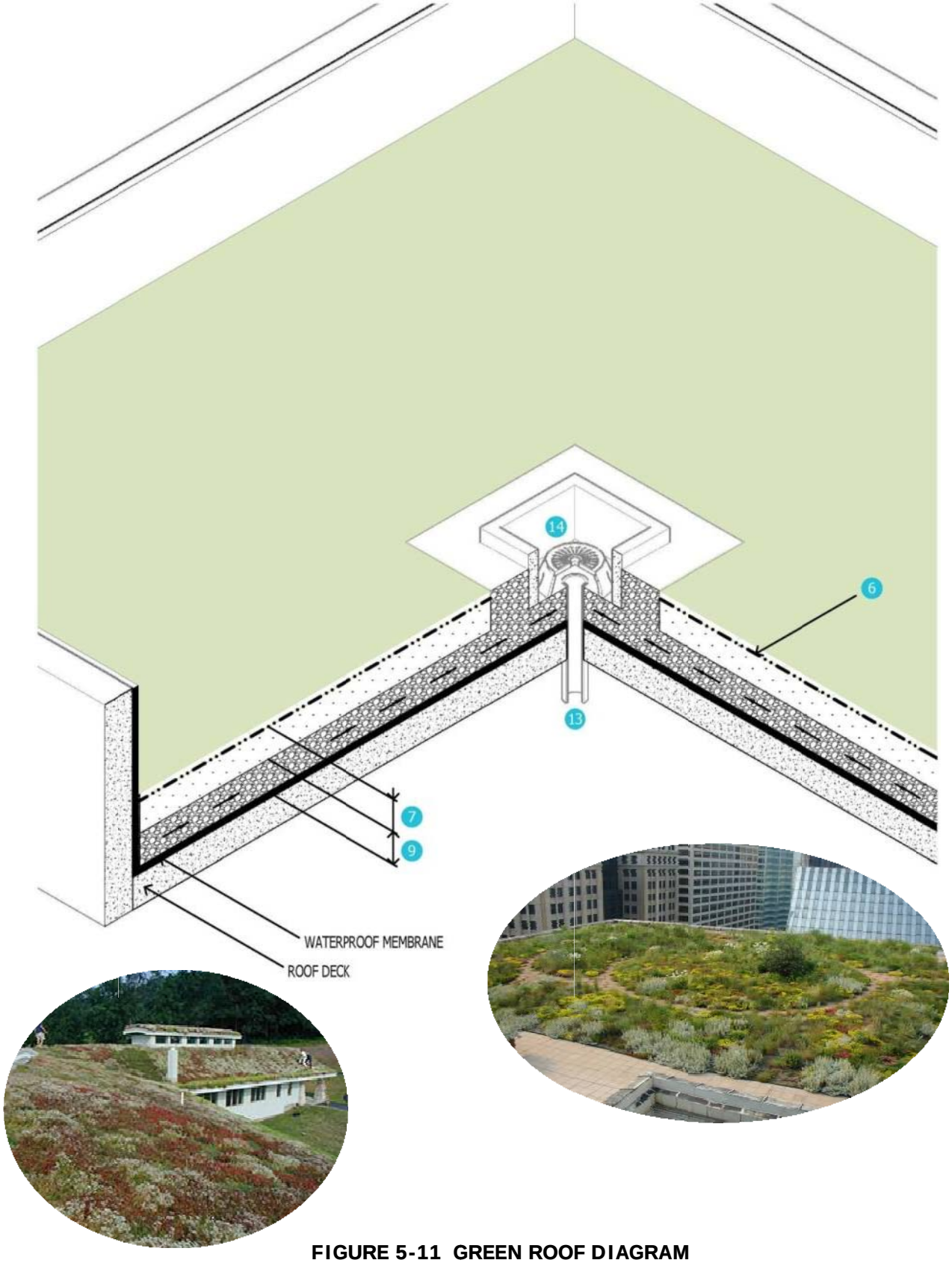



**FIGURE 5-11 GREEN ROOF DIAGRAM**

## Guidance (12) Pocket Wetland

| | |
|---|---|
| 1. Siting Setbacks | |
| Pavement (1) | ≥ 10 feet |
| Building (2) | Basement: ≥ 50 feet<br>No Basement: ≥ 20 feet |
| Property lines/ROW (3) | ≥ 10 feet / ≥ 50 feet |
| Groundwater/Karst/ Bedrock | Requires perennial base flow from groundwater |
| Septic System/Wells | ≥ 50 feet/100 feet |
| 2. Volume | |
| Surface Area | 1) Min. 35% of surface area w/ a depth ≤ 6 inches (marsh);<br>2) 10- to 20% of surface area to be 1.5- to 6-ft deep (pool)<br>3) provide irregular contours for a natural appearance |
| Dimensions | Min. flow path of 2L:1W; may use internal berms |
| Bottom slope | < 8%; 2- to 3- foot elevation drop from inlet to outlet |
| Side slopes (4) | 3H:1V or flatter; deep pool areas require a perimeter safety bench |
| Freeboard (5) | 6 to 12 inches above the 100-year return frequency storm level |
| 3. Vertical Component | |
| Surface Storage (6) | ≤ 3 feet above permanent pool |
| Permanent Pool and Sediment Storage Volume (7) | See Calculations |
| Extended Detention Volume (8) | See Calculations |
| Quantity Control Level (9) | See Calculations |
| Native Material (10) | Test to ensure low permeability soil and perennial high water table |
| 4. Drainage | |
| Inlet (11) | Curb inlet with energy dissipation and/or grass swale |
| Underdrain (12) | None |
| Outlet (13) | Required; Bottom drain required |
| Overflow (14) | Weir; Standpipe |
| Evapotranspiration | No requirement |
| Infiltration | Not applicable |
| Dewatering | 24 hours; No more than ½ of the extended detention volume in the first 8 hours; Provide method to drain the permanent pool to facilitate maintenance |
| 5. Composition | |
| Surface Treatment | Vegetation |
| Vegetation | Wetland vegetation |
| Soil Media | Typically "C" or "D" soils |
| Side Slopes | Vegetation |
| Mulch | None |
| 6. Pollutant | |
| Pretreatment (15) | Required. May include grass filter strip, swale, sump inlets |
| Sediment Storage | Equal to 20% of water quality volume |
| 7. Maintenance | |
| Access | A stable vehicular access way shall be provided to deep pools |
| Require-ments | 1) Designed and maintained to improve water quality;<br>2) Maintenance Plan shall be submitted w/ Stormwater Management Plan<br>3) Install a fixed vertical sediment depth marker |
| 8. Calculations | |
| Water Quality Volume (WQv) = C*(P/12)*A (ac-ft)<br><br>C=runoff quality coefficient (Refer to OEPA Permit No.: OHC000003 for values) or use $C=0.858i^3-0.78i^2+0.774i+0.04$<br>where i=fraction of post-const. impervious surface<br>P=0.75 Precipitation depth, inches<br>A=area tributary to the basin, acres | |
| Allocation of WQv: Pool: 25% Marsh: 75%<br>Pool allocation may include forebay and micropool volume. | |
| Permanent Pool Volume = WQv + groundwater table | |
| Extended Detention Volume = 0.75*WQv | |
| Sediment Storage Volume = 0.2*WQv | |
| Forebay/Micropool Volume = 0.1 in.*impervious area | |
| Quantity Control Requirements = Refer to Chapter 2 and Chapter 7 | |
| Note: If constructed within navigable waters of the U.S., a Section 404 permit under the Clean Water Act is required along with a state permit. | |

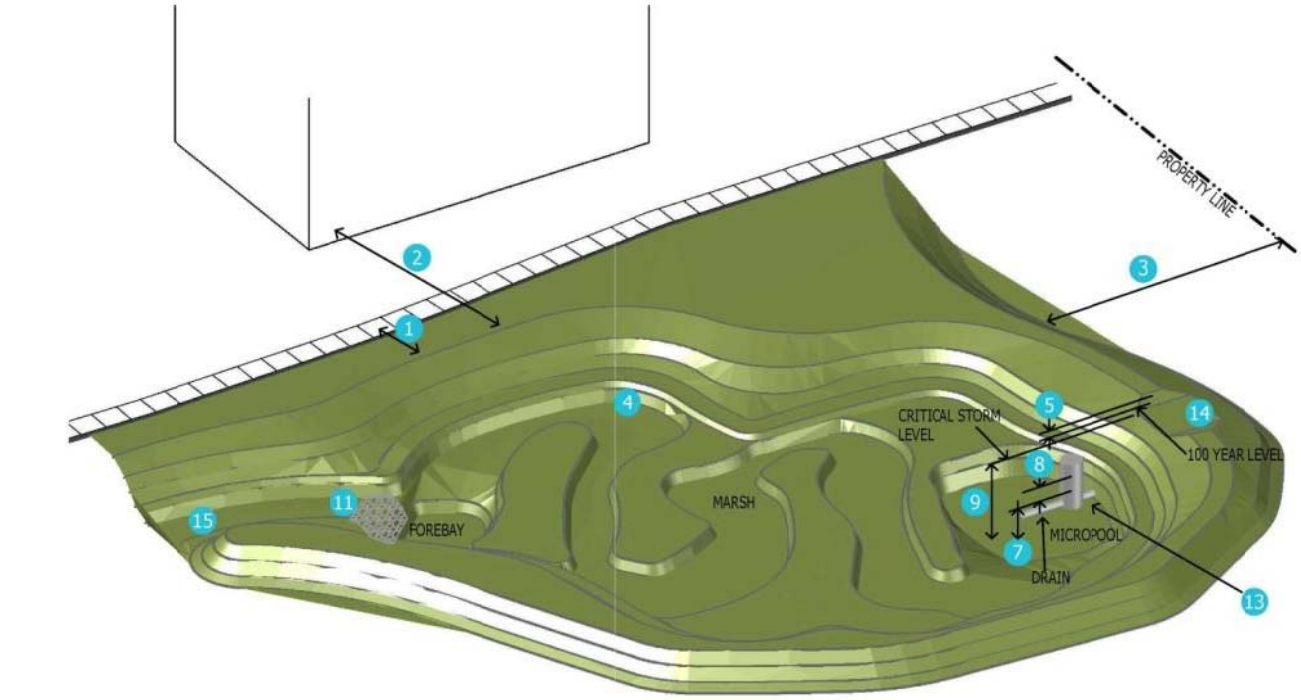



**FIGURE 5-12 POCKET WETLAND DIAGRAM**

## Guidance (13) Retention Basin

| | |
|---|---|
| 1. Siting Setbacks | |
| Pavement (1) | ≥ 10 feet |
| Building (2) | Basement: ≥ 50 feet<br>No Basement: ≥ 20 feet |
| Property Lines/ROW (3) | ≥ 10 feet / ≥ 50 feet |
| Groundwater/Karst/ Bedrock | Depending on underlying geology, may need liner to ensure water retention. |
| Septic System/Wells | ≥ 50 feet/ ≥ 100 feet |
| 2. Volume | |
| Surface Area | Inlet and outlet separated by at least 2 times the width of the pond |
| Dimensions | Aquatic bench over 25% to 50% of pond surface area with 10:1 side slopes and a max. depth of 18 in.; Min. width of 5 feet |
| Bottom slope | Flat |
| Side slopes (4) | 4H:1V or flatter above the permanent pool; 2H:1V or flatter below the permanent pool |
| Freeboard (5) | 6 to 12 inches |
| 3. Vertical Component | |
| Surface Storage (6) | Basin depths in open water areas shall not exceed 12 feet; The mean depth shall be 3 to 6 feet |
| Permanent Pool and Sediment Storage Volume (7) | See Calculations |
| Extended Detention Volume (8) | See Calculations |
| Quantity Control Level (9) | See Calculations |
| Native Material (10) | Low permeability |
| 4. Drainage | |
| Inlet (11) | Include forebay or other sediment removal device |
| Underdrain (12) | None |
| Outlet (13) | Required; Bottom drain required |
| Overflow (14) | Weir; Standpipe; Adhere to ODNR dam safety laws as applicable. |
| Evapotranspiration | No requirement |
| Infiltration | Not applicable |
| Dewatering | 24 hours; No more than ½ of the extended detention volume in the first 8 hours; Provide method to drain the permanent pool to facilitate maintenance |
| 5. Composition | |
| Surface Treatment | Open water |
| Vegetation | Aquatic bench planted with wetland vegetation. |
| Soil Media | Typically "C" or "D" soils |
| Side Slopes | Vegetation |
| Mulch | None |
| 6. Pollutant | |
| Pretreatment (15) | Forebay; Hard bottom forebays required for facilities maintained by the City |
| Sediment Storage | Equal to 20% of water quality volume |
| 7. Maintenance | |
| Access | A stable vehicular access way shall be provided to forebays and outlets |
| Requirements | 1) Designed and maintained to improve water quality (oxygen levels);<br>2) Maintenance Plan shall be submitted w/ Stormwater Management Plan;<br>3) Install a fixed vertical sediment depth marker in forebay |
| 8. Calculations | |
| Water Quality Volume (WQv) = C*(P/12)*A (ac-ft)<br><br>C=runoff quality coefficient (Refer to OEPA Permit No.: OHC000003 for values) or use $C=0.858i^3-0.78i^2+0.774i+0.04$<br>where i=fraction of post-const. impervious surface<br>P=0.75 Precipitation depth, inches<br>A=area tributary to the basin, acres | |
| Permanent Pool Volume = WQv | |
| Extended Detention Volume = 0.75*WQv | |
| Sediment Storage Volume = 0.2*WQv | |
| Forebay Volume = 0.1*0.75*WQv | |
| Flood Control Requirements = Refer to Chapter 2 and Chapter 7. | |

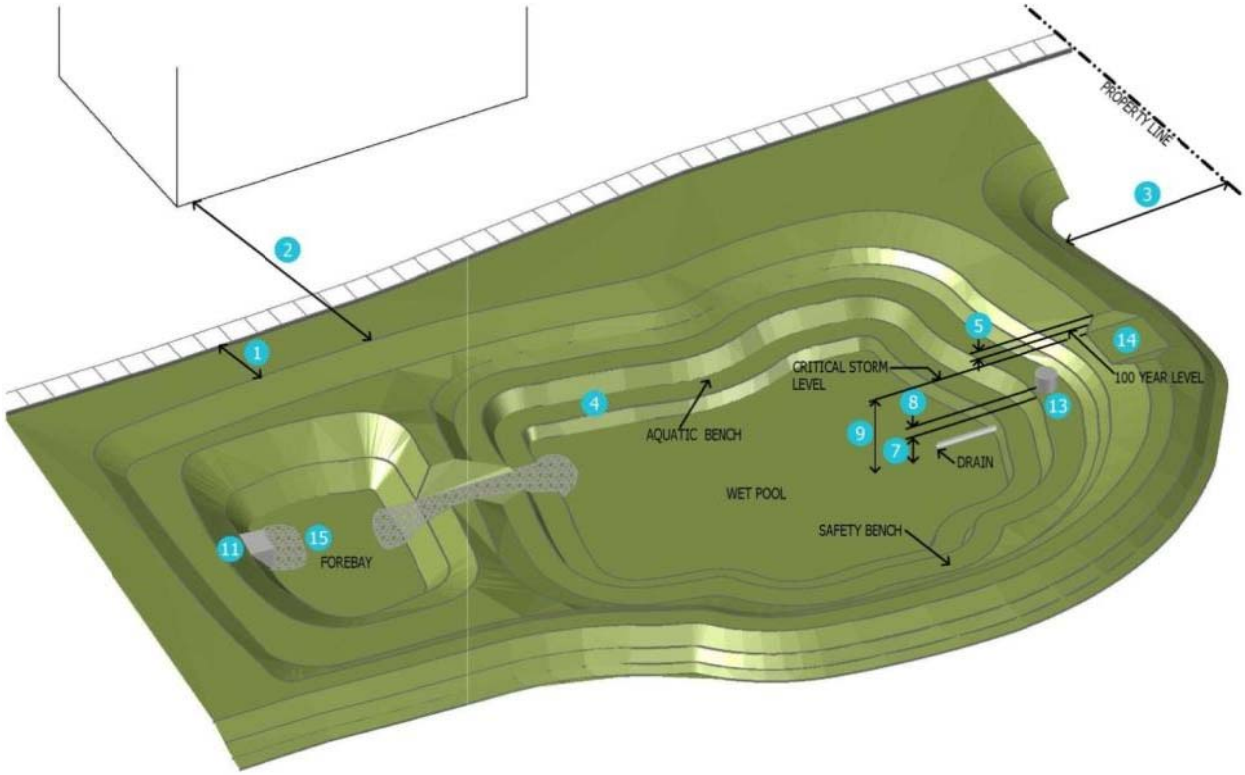



**FIGURE 5-13 RETENTION BASIN DIAGRAM**

## Guidance (14) Stormwater Wetland

| | |
|---|---|
| 1. Siting Setbacks | |
| Pavement (1) | ≥ 10 feet |
| Building (2) | Basement: ≥ 50 feet<br>No Basement: ≥ 20 feet |
| Property Lines/ ROW (3) | ≥ 10 feet / ≥ 50 feet |
| Groundwater/Karst/ Bedrock | ≥2 feet |
| Septic System/Wells | ≥ 50 feet / ≥ 100 feet |
| 2. Volume | |
| Surface Area | 1) Min. 35% of surface area w/ a depth ≤ 6 inches (marsh);<br>2) 10- to 20% of surface area to be 1.5- to 6-ft deep (pool)<br>3) provide irregular contours for a natural appearance |
| Dimensions | Min. flow path of 2L:1W; may use internal berms |
| Bottom slope | < 8%; 3- to 5-foot elevation drop from inlet to outlet |
| Side slopes (4) | 3H:1V or flatter; deep pool areas require a perimeter safety bench |
| Freeboard (5) | 6 to 12 inches |
| 3. Vertical Component | |
| Surface Storage (6) | ≤ 3 feet above permanent pool |
| Permanent Pool (7) and Sediment Storage Volume | See Calculations |
| Extended Detention Volume (8) | See Calculations |
| Quantity Control Level (9) | See Calculations |
| Native Material (10) | Test to ensure low permeability soil and perennial high water table |
| 4. Drainage | |
| Inlet (11) | Curb inlet with energy dissipation and/or grass swale |
| Underdrain (12) | None |
| Outlet (13) | Required; Bottom drain required |
| Overflow (14) | Weir; Standpipe; Adhere to ODNR dam safety laws as applicable. |
| Evapotranspiration | No requirement |
| Infiltration | Not applicable |
| Dewatering | 24 hours; No more than ½ of the extended detention volume in the first 8 hours; Provide method to drain the permanent pool to facilitate maintenance |
| 5. Composition | |
| Surface Treatment | Vegetation |
| Vegetation | Wetland vegetation |
| Soil Media | Typically "C" or "D" soils |
| Side Slopes | Vegetation |
| Mulch | None |
| 6. Pollutant | |
| Pretreatment (15) | Forebay; Hard bottom forebays recommended for maintenance |
| Sediment Storage | Equal to 20% of water quality volume |
| 7. Maintenance | |
| Access | A stable vehicular access way shall be provided to deep pools |
| Require-ments | 1) Designed/maintained to improve water quality;<br>2) Maintenance Plan shall be submitted w/ Stormwater Management Plan<br>3) Install a fixed vertical sediment depth marker |
| 8. Calculations | |
| Water Quality Volume (WQv) = C*(P/12)*A (ac-ft)<br><br>C=runoff quality coefficient (Refer to OEPA Permit No.: OHC000003 for values) or use $C=0.858i^3-0.78i^2+0.774i+0.04$<br>where i=fraction of post-const. impervious surface<br>P=0.75 Precipitation depth, inches<br>A=area tributary to the basin, acres | |
| Allocation of WQv: Pool: 70% Marsh: 30%<br>Pool allocation may include forebay and micropool | |
| Permanent Pool Volume = WQv | |
| Extended Detention Volume = 0.75*WQv | |
| Sediment Storage Volume = 0.2*WQv | |
| Forebay/Micropool Volume = 0.1 in.*impervious area | |
| Quantity Control Requirements = Refer to Chapter 2 and Chapter 7 | |

Note: If constructed within navigable waters of the U.S., a Section 404 permit under the Clean Water Act is required along with a state permit.

A water balance must be performed to demonstrate that the wetland can withstand a 30-day drought at summer evap. rates without completely drawing down.

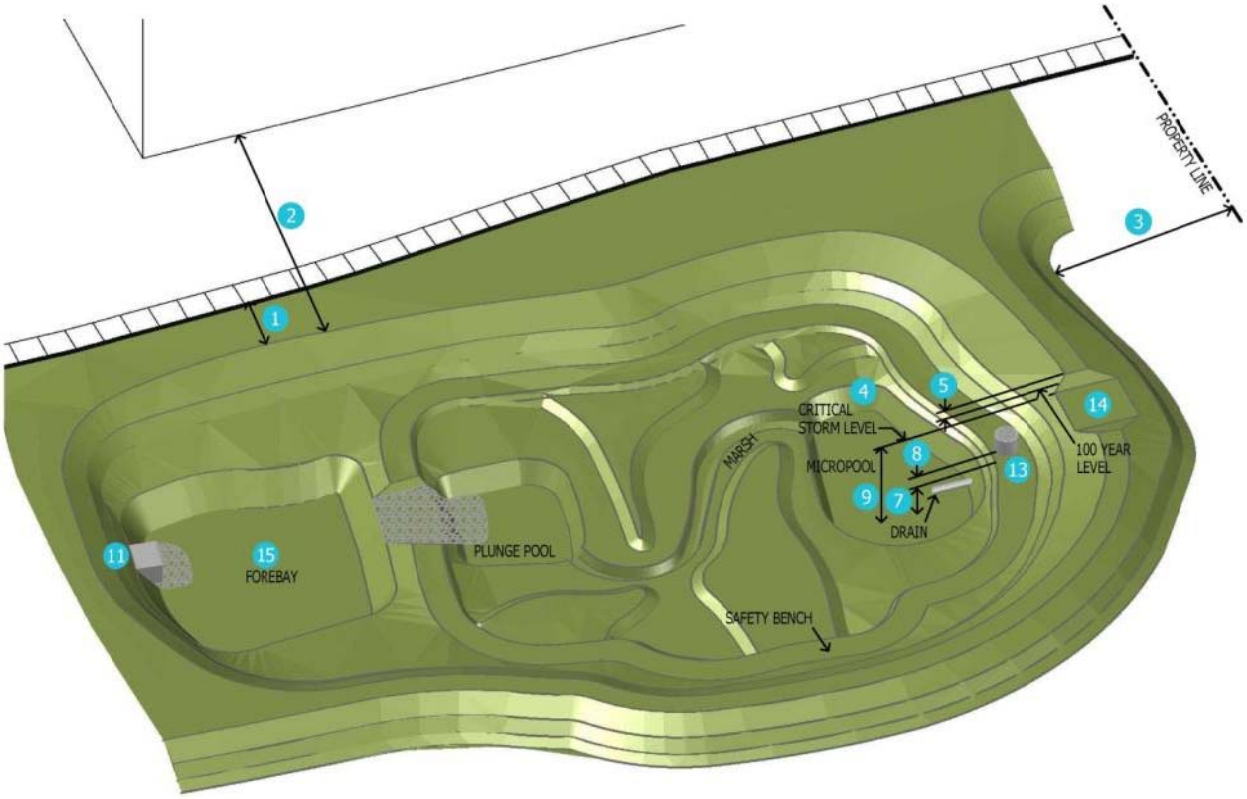



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**FIGURE 5-14 STORMWATER WETLAND DIAGRAM**

## Guidance (15) Extended Dry Detention

| | |
|---|---|
| 1. Siting Setbacks | |
| Pavement (1) | No requirement |
| Building (2) | No requirement w/ solid or lined bottom; otherwise, Basement: ≥ 10 feet<br>No Basement: ≥ 5 feet |
| Property Lines/ROW (3) | ≥ 2 feet / ≥0 feet |
| Groundwater/Karst/ Bedrock | None |
| Septic System/Wells | ≥ 50 feet / ≥ 100 feet |
| 2. Volume | |
| Surface Area | No requirement |
| Dimensions | Inlet and outlet separated by at least 2 times the width of the pond |
| Bottom slope | No requirement |
| Side slopes (4) | 4H:1V or flatter and vegetated |
| Freeboard (5) | 6 to 12 inches |
| 3. Vertical Component | |
| Surface Storage (6) | The mean depth shall be 3 to 6 feet |
| Sediment Storage Volume (7) | See Calculations |
| Extended Detention Volume (8) | See Calculations |
| Quantity Control Level (9) | See Calculations |
| Native Material (10) | Test infiltration; ≥1/2 in/hr if designing with infiltration |
| 4. Drainage | |
| Inlet (11) | Include forebay or other sediment removal device |
| Underdrain (12) | No requirement |
| Outlet (13) | Required; Micropool recommended |
| Overflow (14) | Weir; Standpipe; Adhere to ODNR dam safety laws as applicable. |
| Evapotranspiration | No requirement |
| Infiltration | No requirement |
| Dewatering | 48 hours; No more than ½ of the extended detention volume in the first 16 hours; Provide method to drain pools to facilitate maintenance |

| | |
|---|---|
| 5. Composition | |
| Surface Treatment | Vegetation |
| Vegetation | Aquatic bench planted with wetland vegetation. |
| Soil Media | Not applicable |
| Mulch | Not applicable |
| 6. Pollutant | |
| Pretreatment (15) | Forebay; Hard bottom forebays required for facilities maintained by the City |
| Sediment Storage | Equal to 20% of water quality volume |
| 7. Maintenance | |
| Access | A stable vehicular access way shall be provided to forebays and outlets |
| Requirements | 1) Designed and maintained to improve water quality; Maintenance Plan shall be submitted w/ Stormwater Management Plan<br>2) Install a fixed vertical sediment depth marker in forebay |
| 8. Calculations | |
| Water Quality Volume (WQv) = C*(P/12)*A (ac-ft)<br><br>C=runoff quality coefficient (Refer to OEPA Permit No.: OHC000003 for values) or use $C=0.858i^3-0.78i^2+0.774i+0.04$<br>where i=fraction of post-const. impervious surface<br>P=0.75 Precipitation depth, inches<br>A=area tributary to the basin, acres | |
| Extended Detention Volume = 0.75*WQv | |
| Sediment Storage Volume = 0.2*WQv | |
| Forebay/Micropool Volume (each) = 0.1*0.75*WQv | |
| Quantity Control Requirements = Refer to Chapter 2 and Chapter 7. | |

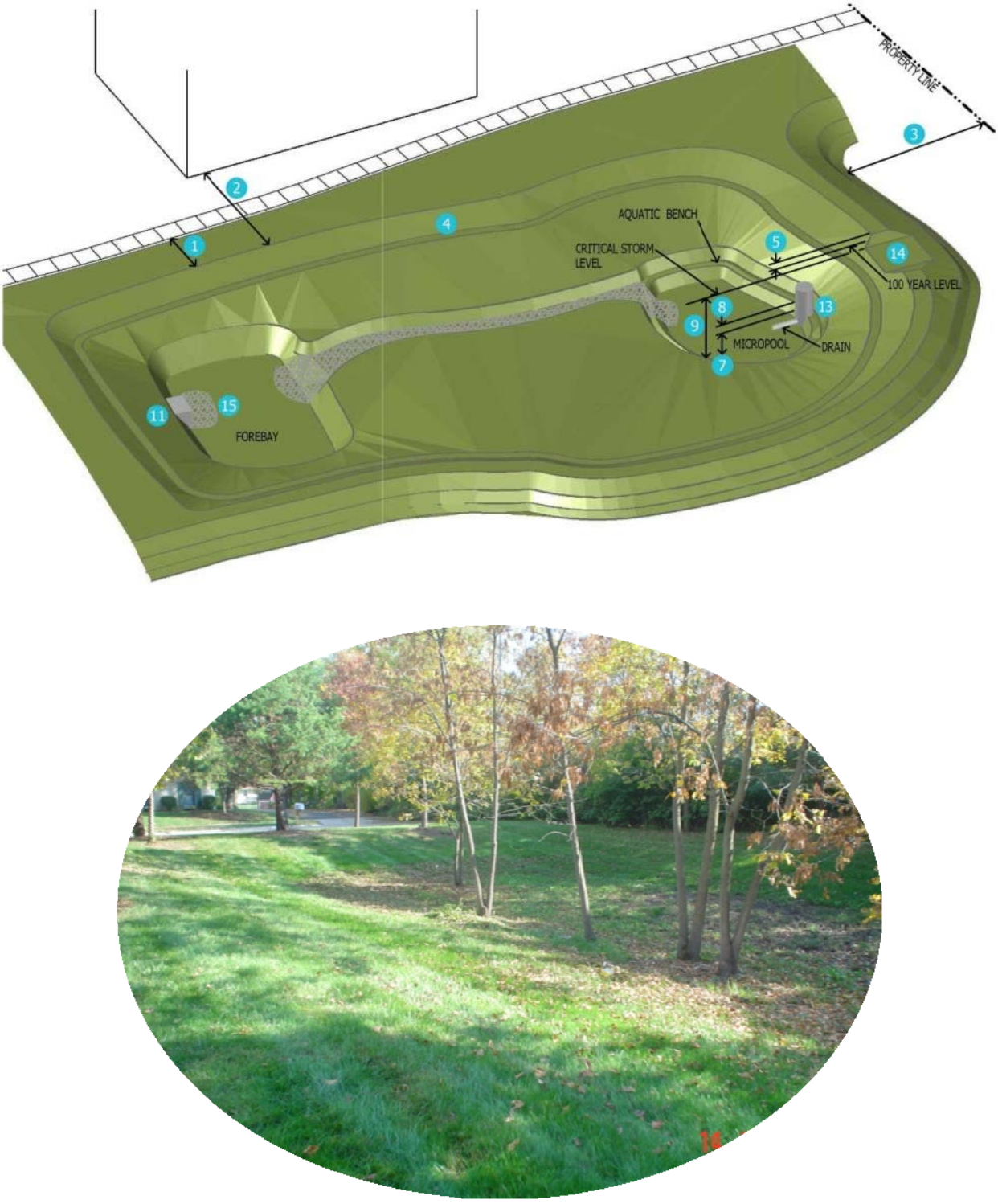



**FIGURE 5-15 EXTENDED DRY DETENTION DIAGRAM**

## Guidance (16) Underground Retention/Detention

| | |
|---|---|
| 1. Siting Setbacks | |
| Pavement (1) | No requirement |
| Building (2) | No requirement w/ solid bottom; otherwise, Basement: ≥ 10 feet No Basement: ≥ 5 feet |
| Property Lines/ROW (3) | ≥ 2 feet / ≥0 feet |
| Groundwater/Karst/ Bedrock | No requirement w/ solid bottom; otherwise, ≥ 2 feet |
| Septic System/Wells | ≥ 50 feet / ≥ 100 feet |
| 2. Volume | |
| Surface Area | No requirement |
| Dimensions | No requirement |
| Bottom slope | Positive slope toward outlet |
| Side slopes (4) | No requirement |
| Freeboard (5) | No requirement |
| 3. Vertical Component | |
| Surface Storage (6) | The mean depth shall be 3 to 6 feet |
| Sediment Storage Volume (7) | See Calculations |
| Extended Detention Volume (8) | See Calculations |
| Quantity Control Level (9) | See Calculations |
| Native Material (10) | Test infiltration; ≥1/2 in/hr if designing with infiltration |
| 4. Drainage | |
| Inlet (11) | Include sediment removal device |
| Underdrain (12) | No requirement |
| Outlet (13) | Required |
| Overflow (14) | Back-up aboveground; Weir; Standpipe |
| Evapotranspiration | No requirement |
| Infiltration | No requirement |
| Dewatering | 48 hours per OEPA; No more than ½ of the extended detention volume in the first 16 hours |
| 5. Composition | |
| Surface Treatment | Not applicable |
| Vegetation | Not applicable |
| Soil Media | Not applicable |
| Mulch | Not applicable |
| 6. Pollutant | |
| Pretreatment (15) | Required; May be swale, prefabricated device, or forebay |
| Sediment Storage | Equal to 20% of water quality volume |
| 7. Maintenance | |
| Access | At a minimum, access points are to be installed near each inlet and outlet; Where an opening is provided that could allow the entry of personnel, the opening shall be marked, "DANGER-CONFINED SPACE". |
| Requirements | 1) Designed and maintained to improve water quality; Maintenance Plan shall be submitted w/ Stormwater Management Plan<br>2) Install a fixed vertical sediment depth marker |
| 8. Calculations | |
| Water Quality Volume (WQv) = C*(P/12)*A (ac-ft)<br><br>C=runoff quality coefficient (Refer to OEPA Permit No.: OHC000003 for values) or use $C=0.858i^3-0.78i^2+0.774i+0.04$ where i=fraction of post-const. impervious surface<br>P=0.75 Precipitation depth, inches<br>A=area tributary to the basin, acres | |
| Extended Detention Volume = 0.75*WQv | |
| Sediment Storage Volume = 0.2*WQv | |
| Quantity Control Requirements = Refer to Chapter 2 and Chapter 7. | |

Notes:
If the facility is designed to infiltrate via a subsurface fluid distribution system, it is likely considered a Class V well and will need a permit. The Class V permitting agency for Ohio is the Ohio EPA.

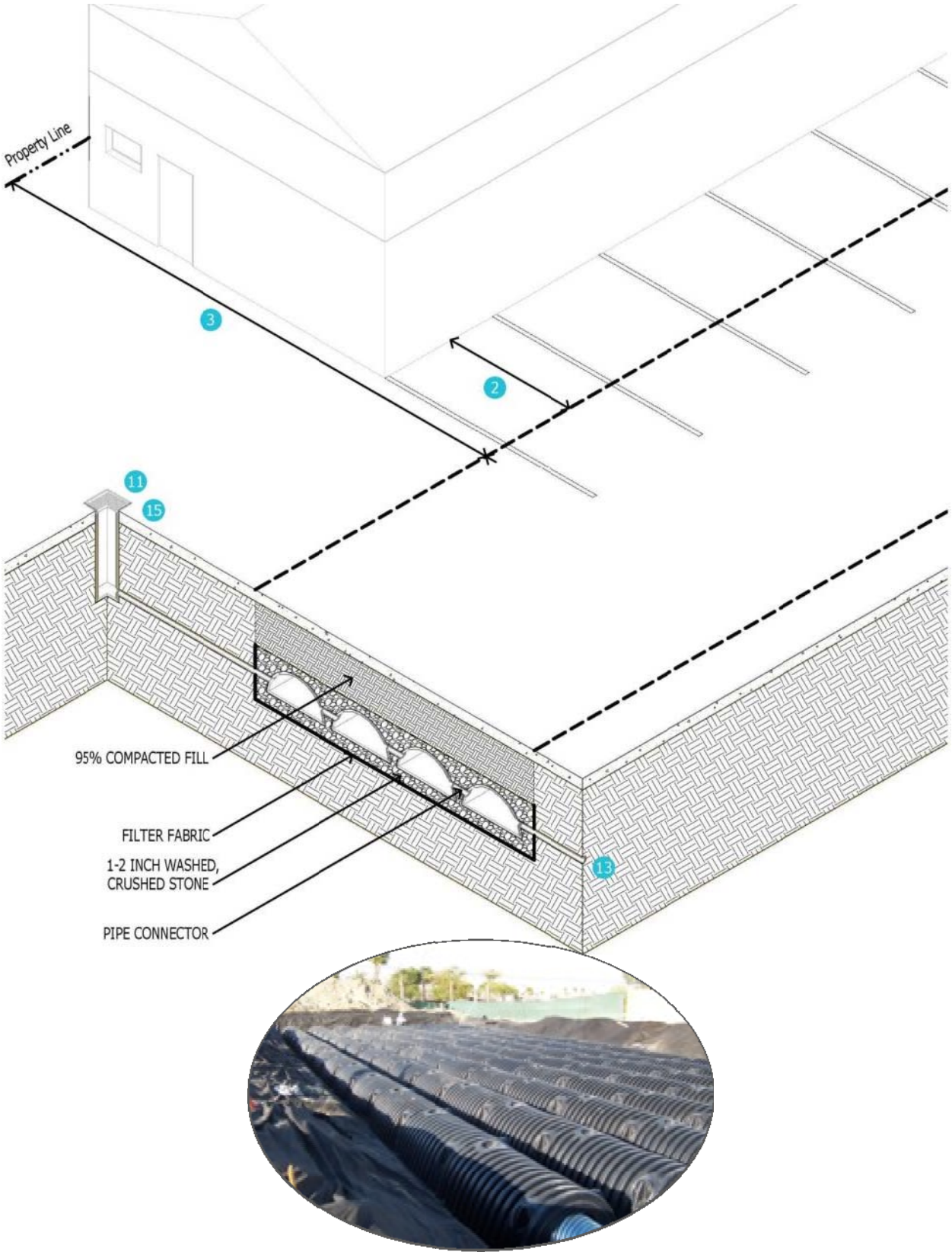



**FIGURE 5-16 UNDERGROUND RETENTION/DETENTION**

# 6. BRIDGE STREET DISTRICT INTEGRATION WITH STORMWATER MANAGEMENT

## A. Purpose

The purpose of this Chapter is to define and describe the manner in which recommended stormwater control measures as defined in Chapter 5 may be used in specific areas of the Bridge Street District, and to provide flexible and effective standards for the integration of these practices into new development, redevelopment, and public improvement projects within the Bridge Street District. This Chapter is intended to support the General Purpose, Scope and Intent of the Bridge Street District and associated development areas by promoting and facilitating the use of recommended measures that are consistent with and suitable for particular street families, right-of-way elements, building types, building sites, and open space types, and which contribute to sound stormwater management in a walkable mixed-use development setting.

## B. General Provisions

For purposes of this Chapter, the term "effective impervious area" shall mean those impervious surfaces from which stormwater runoff is conveyed directly to surface water or the storm drainage system, without an opportunity to be infiltrated or otherwise retained.

From a stormwater management perspective, minimizing the amount of effective impervious area is preferred because it helps to minimize the extent of stormwater infrastructure that must be constructed and maintained, and to reduce water quantity and water quality impacts on receiving waters. Therefore, it is the intent of this Chapter to promote design techniques that reduce the total impervious area and effective impervious area in public rights-of-way and on developed sites, but to do so in the context of creating a walkable, urban mixed-use area and without compromising pedestrian, bicycle and vehicle safety. It is also recognized that minimum widths, areas and structural requirements of impervious surfaces will in many cases be required to meet other standards such as Americans with Disabilities Act (ADA) and emergency vehicle accessibility. Therefore, while an important goal for water quality, the directive to minimize the total area of impervious surfaces and effective impervious area does not in and of itself supersede other planning goals, objectives and standards adopted by the City of Dublin.


**FIGURE 6-1 BRIDGE STREET DISTRICT**

In presenting the recommended integration of stormwater control measures with development within the Bridge Street District, the tables in this Chapter identify those stormwater control measures that are most feasible for the District. Common reasons a control measure may *not* be considered "most feasible" may include an inability to contribute to quantity control requirements, the lack of a treatment mechanism, lower cost-effectiveness in terms of cost per volume unit of stormwater controlled, and the need for more space than typically available. Table 6-1 provides guidance for the consideration of recommended stormwater control measures. Note that the information provided in Table 6-1 is not meant to discourage use but rather provide an explanation as to why a recommended stormwater control measure is generally not noted as "most feasible" in the following tables. It is recognized that each development is unique and there are many possible stormwater control measures that might meet the code and design criteria.

**TABLE 6-1 STORMWATER CONTROL MEASURE FEASIBILITY**

| | | COMMON REASONS FOR LACK OF FEASIBILITY | | | |
|---|---|---|---|---|---|
| | | **Inability to Contribute to Quantity Control Requirements** | **Limited Treatment Mechanism** | **Not Cost-Effective** | **Need for More Space than Available** |
| **RECOMMENDED STORMWATER CONTROL MEASURES** | **Water Harvesting** | | | | |
| | Rain Barrels | ● | ● | | |
| | Cisterns | ● | ● | | |
| | **Filter Strips** | ● | | | |
| | **Media Filter** | | | | |
| | **Vegetated Bioretention** | | | | |
| | Traditional | | | | |
| | Bioretention Swales | | | | |
| | Planter Boxes | | | | |
| | Tree Boxes | | | ● | |
| | Curb Extension | | | | |
| | **Permeable Pavements** | | | | |
| | **Green Roofs** | | | ● | |
| | **Basins** | | | | |
| | Pocket Wetland | | | | ● |
| | Stormwater Wetland | | | | ● |
| | Retention Basin | | ● | | |
| | Extended Dry Detention | | ● | | |
| | **Underground Retention/Detention** | | ● | | |
| | **Prefabricated Devices** | | | | |
| | Hydrodynamic Devices | ● | | | |
| | Inlet Traps | ● | | | |
| | Gross Solids Removal | ● | | | |

## C. Lots and Blocks

The section of the Bridge Street District Code (Code) applicable to lot and block layouts (§ 153.060) is intended to promote the establishment of a network of interconnected streets with walkable block sizes and continuous pedestrian-oriented block faces, and to promote multiple modes of transportation through street design and connectivity. Irrespective of lot and block type, stormwater management will be addressed at the site level either on an individual site or project basis or through a cooperative Stormwater Management Plan among multiple properties per the guidance in Section 7.E. For more

detailed guidance on stormwater management design in specific street settings, refer to the subsequent sections in Section 6 on Street Types, Buildings Types, Open Space Types, and Site Development Standards.

## D. Street Types

This section addresses the requirements and opportunities for incorporating stormwater management within the street right-of-way. Provisions are made for incorporating stormwater control measures into specific street families and street types as defined in § 153.061 and the suitable placement of stormwater control measures within the right-of-way.

1) Right-of-Way Impervious Surfaces

For street projects, opportunities to minimize the total area of impervious surface constructed may include designing with minimum or reduced travel lane, parking lane, pedestrian (sidewalk) and bike facility widths where deemed appropriate by the City Engineer.

2) Recommended Stormwater Control Measures

Street families, as defined in the Code, are comprised of multiple street types, each configured to accommodate specific transportation needs while reinforcing the intended character and function of the applicable street family. Street families, street types, and the street network within the Bridge Street District are defined in § 153.061. The street types within each street family are distinguished by the absence or presence of right-of-way elements such as parking lanes, planting zone medians, curb extensions, and bike facilities. Figure 6-2 illustrates the potential elements of the right-of-way; specific street type configurations will be determined as part of the development review process.

Stormwater shall be managed using one or more of the control measures applicable to that street family as shown in Table 6-2. It is important to note that some control measures may be applicable only to a certain street type within a given street family.

3) Placement of Stormwater Control Measures

The following section provides guidance on the placement of stormwater control measures within the street right-of-way. Refer to Table 6-3 accompanied by Figure 6-2 for appropriate placement of stormwater control measures.

**TABLE 6-2 RECOMMENDED STORMWATER CONTROL MEASURES BY STREET FAMILY[1]**

| | | STREET FAMILIES | | | |
|---|---|---|---|---|---|
| | | **Corridor Connector Streets** | **District Connector Streets** | **Neighborhood Streets** | **Alleys & Service Streets** |
| RECOMMENDED STORMWATER CONTROL MEASURES | **Water Harvesting** | | | | |
| | Rain Barrels | NOT APPLICABLE | | | |
| | Cisterns | | | | |
| | **Filter Strips** | | | | |
| | **Media Filter** | ● | | | |
| | **Vegetated Bioretention** | | | | |
| | Traditional | ● | | | |
| | Bioretention Swales | ● | ● | ● | |
| | Planter Boxes | ● | ● | ● | ● |
| | Tree Boxes | ● | ● | ● | |
| | Curb Extension | ● | ● | ● | ● |
| | **Permeable Pavements[2]** | ● | ● | ● | ● |
| | **Green Roofs** | NOT APPLICABLE | | | |
| | **Basins** | | | | |
| | Pocket Wetland | | | | |
| | Stormwater Wetland | | | | |
| | Retention Basin | NOT PERMITTED | | | |
| | Extended Dry Detention | | | | |
| | **Underground Retention/Detention** | | | | |
| | **Prefabricated Devices** | | | | |
| | Hydrodynamic Devices | ● | ● | ● | ● |
| | Inlet Traps | ● | ● | ● | ● |
| | Gross Solids Removal | ● | ● | ● | ● |

[1] While SCMs with a ● are all permissible for a given street family depending on the street type, the most feasible and cost-effective SCMs are denoted with a ●. A blank cell indicates that the SCM is not suitable.
[2]Within the street right-of-way, the proposed type of permeable pavement must be approved by the City Engineer.

**TABLE 6-3 PLACEMENT OF STORMWATER CONTROL MEASURES WITHIN THE STREET RIGHT-OF-WAY**

| | | TYPICAL ELEMENTS OF THE RIGHT-OF-WAY | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Median | Travel Lane | Parking Lane | Curb/ Gutter | Curb Extension | Bike Facility | Planting Zone | Pedestrian Facility |
| RECOMMENDED STORMWATER CONTROL MEASURES | **Water Harvesting** | | | | | | | | |
| | Rain Barrels | | | | | | | | |
| | Cisterns | | | | | | | | |
| | **Filter Strips** | ● | | | | | | | |
| | **Media Filter** | ● | | | | | | | |
| | **Vegetated Bioretention** | | | | | | | | |
| | Traditional | ● | | | | | | | |
| | Bioretention Swales | ● | | | | | | | |
| | Planter Boxes | | | | | | | | |
| | Tree Boxes | ● | | | | | | ● | |
| | Curb Extension | | | | | ● | | | |
| | **Permeable Pavements** | | ● (alley/ service) | ● | | | ● | ● | ● |
| | **Green Roofs** | | | | | | | | |
| | **Basins** | | | | | | | | |
| | Pocket Wetland | | | | | | | | |
| | Stormwater Wetland | | | | | | | | |
| | Retention Basin | NOT PERMITTED | | | | | | | |
| | Extended Dry Detention | | | | | | | | |
| | **Underground Retention/Detention** | | | | | | | | |
| | **Prefabricated Devices**[1] | | | | | | | | |
| | Hydrodynamic Devices | ● | | | ● | ● | ● | | ● |
| | Inlet Traps | ● | | | ● | | | | |
| | Gross Solids Removal | ● | | | ● | ● | ● | | ● |

[1] With verification that no other suitable location exists, Hydrodynamic Devices and Gross Solids Removal may be located within the travel lane and parking lane with prior approval by the City Engineer.

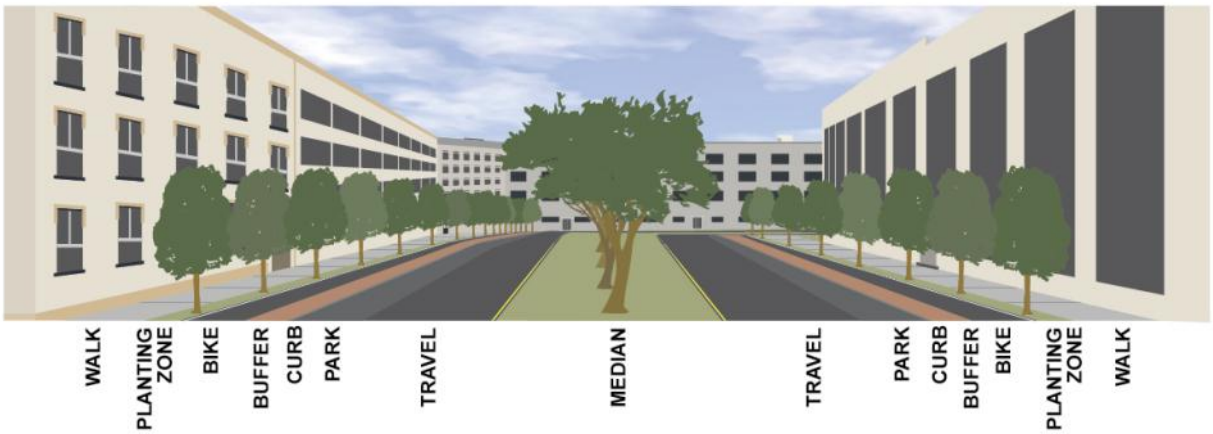



**FIGURE 6-2 POTENTIAL ELEMENTS OF THE TYPICAL STREET RIGHT-OF-WAY**

## E. Building Types

This section addresses the requirements and opportunities for incorporating stormwater management within a Bridge Street District development site and the suitable placement of stormwater control measures within that site. There are thirteen defined building types within the code and stormwater management for each type is addressed in this section.

1) Building Type and Impervious Surfaces

Applicants are encouraged to use available opportunities to reduce effective impervious surface related to buildings (e.g., minimizing building and parking lot footprints, promoting disconnection of rooftops and other impervious surfaces from directly discharging into the stormwater drainage system). The Stormwater Treatment and Control Feasibility Assessment for Redevelopment in Appendix D offers guidance on site techniques that are potentially applicable in new development settings as well as for redevelopment. Applicable design techniques may include, as appropriate:

- designing for the minimum number of parking stalls, incorporating compact parking spaces, and maximizing the use of shared parking arrangements or other methods to reduce surface parking;
- using permeable surfacing for all or portions of parking areas, walkways, and driveways as appropriate; and
- minimizing the extent and length of interior driveway networks without compromising circulation and connectivity requirements.

2) Permitted Stormwater Control Measures

The Code defines various building types, with each having specific requirements as defined in § 153.062. While keeping within the building type requirements, a stormwater management system meeting the applicable requirements shall be incorporated into the site design. Figure 6-3 illustrates the elements of a typical site layout. Stormwater shall be managed using one or more of the control measures applicable to each building type as shown in Table 6-4. Note that some control measures are more appropriate for certain building types than others. Refer to Table 6-5 for appropriate placement of control measures within the site.

3) Placement of Stormwater Control Measures

The following provides guidance on placement of stormwater control measures within a building site. Refer to Table 6-3 accompanied by Figure 6-3 for appropriate placement of stormwater control measures.

**TABLE 6-4 RECOMMENDED STORMWATER CONTROL MEASURES BY BUILDING TYPE[1]**

| RECOMMENDED STORMWATER CONTROL MEASURES | BUILDING TYPES | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Single Family Detached | Single Family Attached | Apartment | Loft | Corridor | Mixed Use | Commercial Center | Large Format Commercial | Historic Mixed Use | Historic Cottage Commercial | Civic | Parking Structure | Podium Apartment |
| **Water Harvesting** | | | | | | | | | | | | | |
| Rain Barrels | ● | ● | | | | | | | | | | | |
| Cisterns | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Filter Strips** | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Media Filter** | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Vegetated Bioretention** | | | | | | | | | | | | | |
| Traditional | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| Bioretention Swales | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| Planter Boxes | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| Tree Boxes | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | ● |
| Curb Extension | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | ● |
| **Permeable Pavements** | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Green Roofs** | | ● | ● | ● | ● | ● | ● | ● | | | ● | ● | ● |
| **Basins** | | | | | | | | | | | | | |
| Pocket Wetland | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| Stormwater Wetland | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| Retention Basin | NOT PERMITTED | | | | | | | | | | | | |
| Extended Dry Detention | | | | | | | | | | | | | |
| **Underground Retention/Detention** | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Prefabricated Devices** | | | | | | | | | | | | | |
| Hydrodynamic Devices | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| Inlet Traps | | ● | | ● | ● | ● | ● | ● | ● | ● | ● | | |
| Gross Solids Removal | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |

[1] While SCMs with a ● are all permissible for a given building type depending on the details of that development, the most feasible and cost-effective SCMs are denoted with a ●. A blank cell indicates that the SCM is not suitable.

**TABLE 6-5 PLACEMENT OF STORMWATER CONTROL MEASURES WITHIN A BUILDING SITE**

| | | TYPICAL ELEMENTS OF A BUILDING SITE | | | | | |
|---|---|---|---|---|---|---|---|
| | | Side Yard | Rear Yard | Required Building Zone (RBZ)[1] | Roof | Attached to Building | Surface Parking Lot |
| RECOMMENDED STORMWATER CONTROL MEASURES | **Water Harvesting** | | | | | | |
| | Rain Barrels[3] | ● | ● | ● | | ● | |
| | Cisterns | ● | ● | ● | ● | | |
| | **Filter Strips** | ● | ● | ● | | | ● |
| | **Media Filter** | ● | ● | ● | | | ● |
| | **Vegetated Bioretention** | | | | | | |
| | Traditional | ● | ● | ● | | | ● |
| | Bioretention Swales | ● | ● | ● | | | ● |
| | Planter Boxes | | | ● | | ● | |
| | Tree Boxes | | | ● | | | ● |
| | Curb Extension | | | | | | ● |
| | **Permeable Pavements[2]** | ● | ● | ● | | | ● |
| | **Green Roofs** | | | | ● | | |
| | **Basins** | | | | | | |
| | Pocket Wetland | ● | ● | | | | ● |
| | Stormwater Wetland | ● | ● | | | | ● |
| | Retention Basin | NOT PERMITTED | | | | | |
| | Extended Dry Detention | | | | | | |
| | **Underground Retention/Detention** | ● | ● | | | | ● |
| | **Prefabricated Devices** | | | | | | |
| | Hydrodynamic Devices | ● | ● | ● | | | ● |
| | Inlet Traps | ● | ● | ● | | | ● |
| | Gross Solids Removal | ● | ● | ● | | | ● |

[1] Filter Strips, Traditional Bioretention, Bioretention Swale, Planter Boxes, and Tree Boxes are permissible in landscape RBZ treatments as described in § 153.065(D)(6).
[2] Permeable Pavements are permissible in the side yard and rear yard subject to parking location (as applicable) and setback requirements of § 153.062(N)(1)(C).
[3] Rain Barrels are permissible in the side yard and rear yard subject to setback requirements of § 153.071(B)(1)(f).

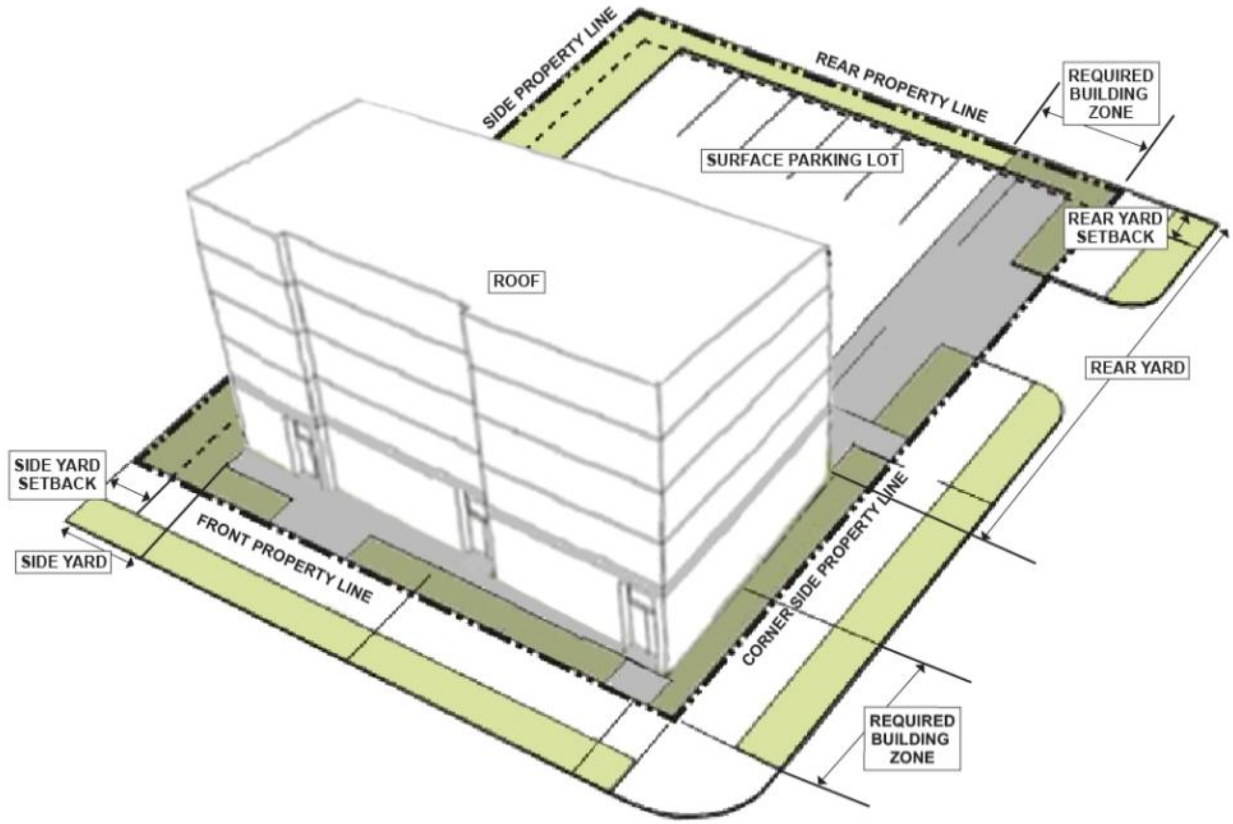



**FIGURE 6-3 POTENTIAL ELEMENTS OF A BUILDING SITE**

## F. Neighborhood Standards

The section of the Code applicable to neighborhood standards (§ 153.063) is intended to promote the creation of signature places in the City consistent with the Bridge Street Corridor Vision Report. The neighborhood standards guide the development of streets, buildings, and open spaces, although not to the extent that precise location is dictated. Guidance on specific allowable stormwater control measures is provided within this Section for the fundamental elements of neighborhood districts including street family, building type, and open space. However, detailed stormwater control measure correlation with neighborhood districts is not presented. By following the guidance on allowable stormwater control measures by element (street family, etc.) the overall placement of stormwater control measures should be consistent with the objectives of the Code.

## G. Open Space Types

This section addresses the requirements and opportunities for incorporating stormwater management within open space as defined in § 153.064, Open Space Types. The Code include provisions for incorporating one or more of the defined open space types within a site development as a function of neighborhood district and building type. The intent is to create a variety of functional, well-designed open spaces carefully distributed throughout the Bridge Street District to enhance the quality of life for residents, businesses, and visitors.

There are seven defined open space types within the Code and stormwater management for each is addressed in this section, including recommended stormwater BMPs for each open space type and the suitable placement of stormwater BMPs within the open space.

1) Open Space and Impervious Surfaces

Including open space within a development provides an opportunity to decrease the effective impervious surface of a site or project by directing runoff from impervious surfaces such as roofs, parking lots, and sidewalk into an open space area. Care should be taken during construction and maintenance activities to maintain soil permeability by keeping heavy equipment out of the designated open space as much as possible.

2) Recommended Stormwater BMPs

The Code defines various open space types and presents the requirements for each in § 153.064. While staying within the open space type requirements, a stormwater management system meeting the applicable requirements of a site development project shall be incorporated into the site design. Stormwater shall be managed using one or more of the stormwater control measures applicable to each open space type as shown in Table 6-6.

3) Placement of Stormwater Control Measures

The permitted stormwater control measures may be placed anywhere within the open space as long as it follows the guidance in Chapter 5 for siting.

**TABLE 6-6 RECOMMENDED STORMWATER CONTROL MEASURES IN EACH OPEN SPACE TYPE[1]**

| | | OPEN SPACE TYPE | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | **Pocket Plaza** | **Pocket Park** | **Green** | **Square** | **Plaza** | **Park** | **Greenway** |
| **RECOMMENDED STORMWATER CONTROL MEASURES** | **Water Harvesting** | | | | | | | |
| | Rain Barrels | ● | ● | ● | ● | ● | ● | ● |
| | Cisterns | ● | ● | ● | ● | ● | ● | ● |
| | **Filter Strips** | | ● | ● | ● | | ● | ● |
| | **Media Filter** | | ● | ● | ● | | ● | ● |
| | **Vegetated Bioretention** | | | | | | | |
| | Traditional | | ● | ● | ● | | ● | ● |
| | Bioretention Swales | | ● | ● | ● | | ● | ● |
| | Planter Boxes | ● | ● | ● | ● | ● | ● | ● |
| | Tree Boxes | ● | ● | ● | ● | ● | ● | ● |
| | Curb Extension | ● | ● | ● | ● | ● | ● | ● |
| | **Permeable Pavements** | ● | ● | ● | ● | ● | ● | ● |
| | **Green Roofs** | ● | ● | ● | ● | ● | ● | ● |
| | **Basins** | | | | | | | |
| | Pocket Wetland | | | ● | | | ● | ● |
| | Stormwater Wetland | | | ● | | | ● | ● |
| | Retention Basin | NOT PERMITTED | | | | | | |
| | Extended Dry Detention | | | | | | | |
| | **Underground Retention/Detention** | ● | ● | ● | ● | ● | ● | ● |
| | **Prefabricated Devices** | | | | | | | |
| | Hydrodynamic Devices | ● | ● | ● | ● | ● | ● | ● |
| | Inlet Traps | ● | ● | ● | ● | ● | ● | ● |
| | Gross Solids Removal | ● | ● | ● | ● | ● | ● | ● |

[1] While SCMs with a ● are all permissible for a given open space type depending on the details of that development, the most feasible and cost-effective SCMs are denoted with a ●. A blank cell indicates that the SCM is not suitable.

## H. Site Development Standards

An important aspect of this Manual is to promote the integration of stormwater control measures into the design of each site and its site development features, as defined in Section § 153.065 of the Code. The provisions below for integrating stormwater control measures with site development features is intended to maximize water quality treatment through recommended stormwater control measures, eliminate the future use of retention/detention ponds, and create multi-functional landscapes in the Bridge Street District.

This Section describes the recommended approaches and opportunities for integrating stormwater management with specific required site features, including parking and loading, landscaping area and street tree requirements, and Required Building Zones (RBZs); and for the coordination of stormwater management with site features such as fencing, walls and screening, exterior lighting, utility undergrounding, and signs.

1) Parking

The use of permeable pavement and surfacing, bioretention, and other stormwater control measures for surface parking as listed in Table 6-5 is encouraged. Stormwater control measures meeting the standards in this Manual may be incorporated into parking areas, drive aisles, landscaped islands, required pedestrian walkways, landscaped edges, and turn-around or other access areas, except for driveway aprons as provided in § 153.065(B)(c)(5). Specific design standards and review guidance on design standards for parking are listed in Table 6-7 Below:

**TABLE 6-7 PARKING AND STORMWATER STANDARDS**

| Code Sections (153.065) | Code Provision | Stormwater Control Measure Objectives and Standards |
|---|---|---|
| (B)(1)(a)(4)(a) | Parking areas that cannot be finished due to weather or other conditions shall be 'adequately surfaced' to accommodate stormwater | Surfacing of parking areas with permeable pavement shall follow City Standard Construction Drawings and shall be designed for projected traffic loads using AASHTO methods. |
| B(1)(b)(2) | Surfacing of off-site parking | Same as for on-site parking |
| B(6)(b)(1) and (2) | Surfacing of parking areas | Surfacing of parking areas with permeable pavement shall follow City Standard Construction Drawings and shall be designed for projected traffic loads using AASHTO methods. |
| B(6)(c)(5) | Driveway aprons connecting parking lots to public roadways may not be constructed with permeable materials. | |
| B(6)(d)(1) | Raised or rolled concrete curbs or wheel stops at least five inches high shall be installed where necessary to prevent vehicle conflicts with abutting landscape areas, sidewalks, streets, buildings or lot lines. The minimum distance from a curb or wheel stop to a property line or protected area shall be two and one-half feet. | Breaks in curbing shall be designed to enable flow to be directed into landscaped areas or stormwater control measures that are designed and installed to manage stormwater runoff.<br>The design and location of curb breaks should not convey sheet flow or concentrated drainage into landscaped areas that would be damaged or dislodged by the flow. Energy dissipation measures that may be incorporated into curb breaks are described in Section 5(a), Common Elements. |
| B(6)(d)(2) | If a curb is located at the edge of a landscaped area, planted areas shall be installed at a lower grade than the parking lot pavement and curbing shall have openings or | |

| Code Sections (153.065) | Code Provision | Stormwater Control Measure Objectives and Standards |
|---|---|---|
| | gaps allowing drainage from the pavement to enter and percolate through the landscaped areas. | |
| B(8)(a)(5) | All permeable paving materials shall be maintained in an unbroken condition and shall be regularly swept and vacuumed to prevent blockages of sand, sediment, or other materials that would impair their permeability to water as originally designed. | Maintenance standards or a maintenance plan will be submitted with the Stormwater Management Plan. Where a proprietary product is used, the manufacturer's specifications shall be submitted with the Stormwater Management Plan. |

2) Landscaping

The integration, co-location and integrated design of stormwater control measures indicated in Table 6-2 through Table 6-6 with required landscaping areas is strongly encouraged in order to promote high-density development patterns, maximize the utility, aesthetic and environmental function of landscaped areas in the City and District. This Manual provides for the review of stormwater control measures in required landscape areas, including landscape planting plans, plant and ground cover materials, and landscaped buffers in a holistic manner that provides guidance on appropriate waivers and other discretionary approvals under Section . 153.065(D) and the applicable provisions of Section § 153.132 through § 153.148.

a) Interpretation of Code and Manual Landscaping Requirements for Stormwater Features

*Stormwater features counting towards required landscaping*. Any approved Filter Strips, Vegetated Bioretention, Traditional Bioretention Swales, Planter Boxes, Tree Boxes and surrounding planted areas, planted Curb Extensions, and Constructed Wetlands that are designed and approved in accordance with the standards in this Manual shall be considered 'rain gardens' or 'vegetated site features created to meet stormwater management requirements' as described in section § 153.065(D)(2)(f) of the Code (at right).

In evaluating potentially conflicting landscape requirements applicable to the same area under the provisions of section § 153.065D(2)(i), if the area in question has been designed as a Filter Strip, Vegetated Bioretention, Traditional Bioretention Swale, Planter Box, Tree Box and surrounding planted area, planted Curb Extension, or Constructed Wetland, consideration shall be given to the design requirements of the specific stormwater practice in determining the amount of required landscaping so that stormwater management objectives are not compromised or adversely affected by specific plant material, quantity or spacing requirements.

§ 153.065(D)(2)(f)

Areas included in rain gardens or vegetated site features created to meet stormwater management requirements may be counted towards any landscaping required by § 153.065(D)(4) - (6) if landscaped to meet the requirements.

§ 153.065(D)(2)(i)

If two or more conflicting landscape requirements apply to the same area, the one requiring the most landscaping shall apply.

**TABLE 6-8 LANDSCAPING AND STORMWATER CODE PROVISIONS**

| Code Sections (153.065) | Code Provision | Stormwater Control Measure Objectives and Standards |
|---|---|---|
| D(1) | Unless otherwise specified, these requirements should not be interpreted as requiring regular, symmetrical or standardized intervals of vegetation within landscape areas. Required landscaping should be creatively and architecturally designed to add visual interest and preserve natural integrity, as appropriate to the character of the surrounding area. | A plan sheet showing the integration of stormwater treatment features with required landscaping shall be submitted with the application package at each stage of plan review. For Basic Plan Review and Development Plan Review, general locations for landscaping and stormwater treatment, and the general approach to stormwater treatment, shall be indicated on the plan. Site Plan Review submittals shall include details of all proposed plant materials for stormwater treatment and landscaping areas. Sheets shall include a landscape plan with detail, a grading and drainage plan, and a combined plan showing the integration of these features. |
| D(2)(b) | Each application for development or redevelopment shall include a landscape plan showing compliance with the provisions of § 153.065(D). | |
| D(2)(e) | In all areas where landscaping is required, a minimum of 80% of the surface area of any landscape bed shall be covered within four years after installation by living materials, rather than bark, mulch, gravel or other non-living materials. Areas included in rain gardens or other vegetated site features to meet stormwater management requirements are excluded from this requirement with prior approval from the Director | Landscaping and surface area coverage shall be consistent with the standards for each stormwater control measure per Section 5 of this Chapter. |

3) Perimeter Landscape Buffering

Perimeter Landscape Buffering areas represent a potential area of opportunity for the integration of recommended stormwater control measures. § 153.065(D)(4) states: "The buffering is intended to obscure the higher-intensity land use from view and block potential negative impacts related to noise, lighting levels, and activity through the use of denser landscape screening and/or a fence or wall visually softened by clustered plantings, creatively and architecturally designed, as appropriate to the character of the surrounding area." The integration of stormwater control measures specified for perimeter landscape buffering areas is encouraged, provided the primary visual and buffering functions of the Perimeter Landscape Buffer are achieved.

4) Street Trees and Tree Preservation

a) Purpose

The integration of trees as functional components of a site or area Stormwater Management Plan is strongly encouraged. Street trees are recognized in this Manual as an integral and essential feature of stormwater management, aesthetic enhancement and environmental protection in the City of Dublin and the Bridge Street District. The intent of this Section is to provide guidance for determining where deviation from the strict dimensional and numeric requirements for street trees, including but not limited to standards for tree protection, removal, replacement, spacing, and tree lawn planting areas, supports the integration of recommended stormwater treatment measures with high quality site design supporting the City's goals for the District.

b) Tree and Stormwater Standards

This section of the Manual is intended to provide guidance on specific technical issues related to the incorporation of trees into specific stormwater control measures, and overall Stormwater Management Plans. The standards in this Manual are intended to provide guidance for varying the calculation of street tree planter box requirements, spacing, removal and replacement, species and calipers in service of an integrated overall street tree and Stormwater Management Plan.

In the event an application is made to modify an approved stormwater system that affects any tree, shrub or tree radius for which approval is required pursuant to . 153.065(D)(3), verification to the City Engineer that the amended Stormwater Management Plan meets the standards and requirements of this Manual shall be provided in addition to the required City Forester approvals.

**TABLE 6-9 TREE PRESERVATION AND STORMWATER STANDARDS**

| **Code Sections (153.065)** | **Code Provision** | **Stormwater Control Measure Objectives and Standards** |
|---|---|---|
| D(2)(b) | The siting of buildings shall avoid the removal of desirable trees in good or fair condition where alternatives consistent with the provisions of § 153.062 are available | In the event tree removal represents the only feasible option for siting a recommended stormwater treatment measure rather than a wet pond, consideration shall be given to options for replacement that accommodate the recommended method. |
| D(2)(c) | Protected trees, as defined in this Chapter, removed from any portion of a lot consistent with an approved Site Plan Review shall be replaced in accordance with § 153.146 except as provided by § 153.065(D)(9) | |
| D(2)(d) | Existing trees which are incorporated into the landscape plan shall be protected during construction as required by § 153.145 | Standards for protecting trees and soils during construction shall be observed; areas of the site where soils are to be protected from compaction during construction shall be indicated on the tree preservation plan and grading plan or an equivalent per the provisions of Section § 153.140. |

# 7. STORMWATER MANAGEMENT PLAN

The purpose of this Chapter is to provide guidelines, standards and requirements for the orderly development, approval, and implementation of Stormwater Management Plans, including provisions for shared systems and ongoing maintenance, that will enable development consistent with the vision for the City. This Chapter sets forth the requirements for preparation and submittal of Stormwater Management Plans, and provides a framework by which property owners and public agencies may propose collectively an overall plan for managing stormwater from multiple properties, where such a management plan will enable greater consistency with the City of Dublin's adopted plans and policies. It is a further purpose of this Chapter to provide sufficient standards and safeguards for associated plans, approvals and agreements to protect the public interest by ensuring long-term management and maintenance of stormwater management facilities.

## A. General Requirements

1) A Stormwater Management Plan shall be prepared by the applicant for each proposed development activity and approved by the City Engineer in accordance with § 53.120 if the plan demonstrates that the proposed development activity has been planned and designed, and shall be implemented and maintained, to meet the performance criteria described herein.

2) For concept plans in stormwater management areas, possible methods of management and applicable Stream Corridor Protection Zones shall be included and represented.

3) Subdivision Development - Preliminary stormwater management plans (drawings and calculations) shall be submitted with preliminary development plans and preliminary plats for planning commission review. Stream corridor protection plans shall also be determined at this time. With submission of final development plan and plats, updated stormwater management plans shall be submitted. Stormwater Management shall be approved prior to approval of public improvement plans by the City Engineer.

4) Commercial sites – Preliminary stormwater management plans (drawings and calculations) shall be submitted with preliminary development plans and updated preliminary stormwater management plans with final development plans for planning commission or Administrative Review Team review. Stream corridor protection plans shall also be determined at this time. Stormwater Management plans shall be approved prior to approval of the private site improvements by the City Engineer and issuance of the building permit.

5) If applicable, the feasibility assessments shall be submitted with first submission of any documents to the City for review.

6) This Stormwater Management Plan shall be part of the overall submitted improvement plan and not a separate submittal. Supporting calculations for each design storm specified in § 53.090 hereof shall be submitted (hard copy and electronic copy) and will contain, at a minimum, a runoff hydrograph for the undeveloped and developed site, stage-storage calculations for the stormwater control measure, stage-discharge calculations for the outlet structure, and a runoff hydrograph after routing through the proposed stormwater control measure. All routing calculations shall account for tailwater conditions of the receiving facility, and shall be submitted to the City.

7) The stormwater management plan shall be a bound report containing all pertinent stormwater calculations for detention/retention basins, storm sewers, culverts, open channels, and other stormwater management system features, including stormwater control measures specified in this Manual. The report shall be signed and sealed by a Professional Engineer registered in the

state of Ohio. A stormwater management map shall be included in a sleeve page or pocket of the plan. The construction plans shall be submitted with the report, but not attached to it. The plan shall contain divider pages with labeled tabs that clearly identify the calculations contained in each section.

8) Stormwater Pollution Prevention Plans (SWP3) as required by OEPA shall be submitted to the City prior to the start of construction.

**B. Map Content**

The project engineer shall include in the construction plans a master stormwater management map showing all existing and proposed features, including trees and, where integrated with the stormwater management design, landscaping. The map is to be prepared on a 22-inch by 34-inch sheet on a scale not to exceed 1-inch equal's 400-feet (1"=400'). The map shall be based on state plane coordinate system. Listed below are the features that are to be included on the map.

1) Existing and proposed contours at one-foot intervals.

2) North arrow and scale.

3) Pre-development and post-development sub-basins overlaid on the same map including on and offsite contributory area. The acreages shall be shown.

4) Downstream receiving waterway of drainage system.

5) Pre-development and post-development overland flow paths to and from the management basins.

6) Soil type by sub-basin including hydrologic soil group designation of A, B, C or D.

7) Hydrologic boundaries, including all areas flowing to the proposed project.

8) Project boundaries and area.

9) Sufficient topographical information with elevations to verify the location of all ridges, streams, etc. (one-foot contour intervals within the project's boundaries and for proposed offsite improvements).

10) High water data or critical flood elevations on existing structures upstream of, within, and downstream of the project.

11) Notes indicating sources of high water data and critical flood elevations.

12) Notes pertaining to existing standing water, areas of heavy seepage, springs, wetlands, streams, and hydrologically sensitive areas.

13) Existing stormwater management features (ditches, pipes, roadways, ponds, and control measures). Existing stormwater management features are to be shown a minimum of 1,000 feet downstream of the proposed development unless the ultimate outfall system is a lesser distance.

14) Subdivision layouts with horizontal and vertical controls.

15) Proposed and existing stormwater management features, including locations of inlets, swales, pipes, detention/retention facilities, control measures, ponding areas, and all works.

16) Delineation and area of pre-development and post-development sub-basins.

17) Delineate retention/detention facilities and ingress/egress areas for facilities maintenance.

18) General type of soils by sub-basin and location of soil borings.

19) 10-, 25-, and 100-year flood elevations for any areas in or within 100 feet of the property. The source of these elevations shall also be shown on the plans.

20) Description of current ground cover, land use, and landscaping, and an estimate of the impervious area and percent imperviousness created by the construction activity by sub-basin.

21) Delineated stream corridor protection zone along any streams within or adjacent to the site.

### C. Calculations

Stormwater calculations (hard copy and original copy) shall be signed and sealed by a professional engineer registered in the State of Ohio indicating that the plan has been prepared in accordance with the regulations of the Manual, and in accordance with good engineering practices and principles for all stormwater works, including design high water elevations for all applicable storm events. Software/models that utilize this methodology and technique and which are deemed acceptable to the City include but are not limited to SWMM, TR-55, PONDPAK, HEC-1, etc. The City will not accept methodologies that do not perform dynamic routing of hydrographs, which include but are not limited to the Bowstring Methodology, Mass Diagram Analysis, etc. The calculations shall include the following:

1) If quantity control is required;
   a) Pre- and post-development stormwater flows and stages for the stormwater control measures for all design storm frequencies pertinent to the project based upon the requirements of the stormwater regulations, including, but not limited to, the following:
   b) Critical Storm Calculation: Show the calculation of the total volume of runoff from a 1-year, 24-hour storm, before and after development for the entire site. Show the calculation of percent increase in runoff volume, and reference Table 2-5 to determine the critical storm.
   c) On-Site and Off-Site Area Allocation(s): Contact Engineering Development Group Civil Engineers for the applicable Stormwater Master Plan peak flow rates. Show the allocation of on-site and off-site area contributory to the facility for each Stormwater Master Plan sub-basin as shown in Table 7-1:

**TABLE 7-1 EXAMPLE SUB-BASIN ON-SITE AND OFF-SITE AREA ALLOCATIONS**

| Sub-Basin Identifier # | On-Site Area (acre) | Off-Site Area (acre) | Total (acre) |
|---|---|---|---|
| 2150 | 4.9 | 3.5 | 8.4 |
| 2030 | 0.2 | 0.0 | 0.2 |
| 2020 | 1.4 | 0.0 | 1.4 |
| Total (acre) | 6.5 | 3.5 | 10.0 |

   d) Pre-development runoff hydrograph, post-development runoff hydrograph to each stormwater control measure, and the routed post-development hydrograph discharged from each stormwater control measure.

e) Pre-development and post-development runoff volumes.

f) Stage-area-storage calculations for each stormwater control measure.

g) Stage-discharge calculations for the outfall control structure, including tailwater assumptions.

h) *Release rate calculation*: Calculate the maximum release rate for each design storm using the critical storm criteria and referencing Appendix C of the Stormwater Master Plan and the Area Allocation table. Include a summary of the release rates as shown in Table 7-2:

**TABLE 7-2 STORMWATER MANAGEMENT SUMMARY TABLE**

| | 1-year | 2 year | 5 year | 10 year | 25 year | 50 year | 100 year |
|---|---|---|---|---|---|---|---|
| Predeveloped Q | | | | | | | |
| Postdeveloped Q | | | | | | | |
| Allowable Release | | | | | | | |
| Actual Release | | | | | | | |
| Control Measure Depth/Elev | | | | | | | |

i) Show the calculation that is used to determine the maximum release rate for each storm.

j) Stormwater control measure volumes and recovery calculations. Show calculations or model output that demonstrates the storage and release of the water quality and quantity volumes over the time period specified in Chapter 5.

k) Show the calculation adding together the volume required for quantity control and quality control. Stormwater control measure shall be sized to contain both volumes.

l) Soil storage or curve number calculations per sub-basin, including impervious calculations.

m) Time of concentration calculations per sub-basin.

n) 100-year floodplain compensating calculations, if applicable.

o) Storm sewer, culvert, open channel and stormwater control measure tabulations, including, but not limited to, the following:

   i. Location and type of structures.

   ii. Length of facility and dimensions, including diameter, height, and/or width for pipes.

   iii. Cross-sections for-open channels.

   iv. Sub-basin areas tributary to each structure.

   v. Runoff coefficients or curve numbers per sub-basin for both the pre-construction and post-construction site conditions.

   vi. Time of concentration to the inlet of each structure.

   vii. Stormwater flow to and from the stormwater structure or junction point.

   viii. Hydraulic gradient for the applicable storm event, including losses through structures with friction and local loss coefficients.

   ix. Estimated receiving water elevation with sources of information, if available.

   x. Velocities for all facilities and details for provisions to control erosion.

p) Construction plans including, but not limited to, the following:

   i. Overall project plan of roads, lots, and stormwater control measures.

ii. Staging and sequencing of construction of stormwater control measures.

iii. Cross-section of stormwater control measures.

iv. Typical swale, ditch, or canal sections.

v. Drainage rights-of-way.

vi. Road plan and profile with groundwater elevation shown in profile.

vii. Overall project grading plan (at 1-foot contours) and individual lot grading plans.

viii. Density of the project.

2) If quantity control is not required:

Refer to Chapter 2 for an explanation of when quantity control is not required.

a) Stormwater control measure volumes and recovery calculations. Show calculations or model output that demonstrates the storage and release of the water quality volume over the time period specified in Chapter 5.

b) 100-year floodplain compensating calculations, if applicable.

c) Storm sewer, culvert, open channel and stormwater control measure tabulations, including, but not limited to, the following:

i. Location and type of structures.

ii. Length of stormwater control measure and dimensions, including diameter, height, and/or width for pipes.

iii. Cross-sections for-open channels.

iv. Sub-basin areas tributary to each structure.

v. Runoff coefficients per sub-basin for both the pre-construction and post-construction site conditions.

vi. Time of concentration to the inlet of each structure.

vii. Stormwater flow to and from the stormwater structure or junction point.

viii. Hydraulic gradient for the applicable storm event, including losses through structures with friction and local loss coefficients.

ix. Estimated receiving water elevation with sources of information, if available.

x. Velocities for all facilities and details for provisions to control erosion.

d) Construction plans including, but not limited to, the following:

i. Overall project plan of roads, lots, and stormwater control measures.

ii. Staging and sequencing of construction of stormwater control measures.

iii. Cross-section of stormwater control measures.

iv. Typical swale, ditch, or canal sections.

v. Drainage rights-of-way.

vi. Road plan and profile with groundwater elevation shown in profile.

vii. Overall project grading plan (at 1-foot contours) and individual lot grading plans.

viii. Density of the project.

## D. Maintenance Plans

Maintenance Plans shall be submitted to the City prior to occupancy or acceptance of public improvements. The maintenance plan shall 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; and

5) A map showing all access and maintenance easements.

## E. Shared Systems Allowed

The City of Dublin finds that enabling the coordination of shared stormwater treatment facilities between two or more properties may be desirable in cases where shared systems promote greater efficiency in land use, support the design goals of the Bridge Street District, reduce the total area of land consumed by stormwater treatment areas, or enable greater use of recommended treatment approaches, including vegetation-based control measures.

1) Design Standards Apply

All design standards and requirements in this Manual shall apply to the design, approval and construction of shared stormwater treatment facilities.

2) Consent of All Property Owners Required

Any group of two or more property owners may apply for approval of a shared system. The record owner of each property whose improvements would discharge into the proposed system, or whose land would be utilized for any component of the treatment system, including surface or underground conveyance or discharge, shall be required to sign the application for a Stormwater Management Plan that involves a shared system.

3) Use of the Public Right-of-Way Prohibited

Use of the public right-of-way to meet water quality and quantity requirements, as described in Chapter 2, in conjunction with a shared system solely serving privately-owned properties, is prohibited.

4) Allocation of Capacity in the Shared System.

The allocation of capacity in the shared stormwater system, described in terms of the amount of impervious area discharging to the system from each property and any rights-of-way, shall be stated in the Stormwater Management Plan application and incorporated into the written approval of the Stormwater Management Plan and associated development(s).

In the event of an application to amend any approval for a property or properties party to the shared stormwater system that would increase or decrease the system capacity used by one or more property owners, a revised Stormwater Management Plan application shall be submitted stating the proposed change in the allocation of capacity, and all property owners party to the Stormwater Management Plan shall sign the application indicating consent to the change.

At the time of application for a Stormwater Management Plan, a shared stormwater treatment system may be designed for a greater capacity than would be required to treat the existing and proposed development(s) utilizing the system. In the event such an application is made, the applicants shall

state clearly the total design capacity required to manage runoff from existing and proposed development, and the capacity proposed to be constructed that would serve future development. At such time as additional development is proposed to utilize the system, amendment of the Stormwater Management Plan shall be required in conjunction with other development approvals.

5) Recording of Agreement and Required Terms and Conditions

A binding agreement in a form suitable to the City Attorney shall be recorded in the land records prior to issuance of any permit to construct the system and associated improvements. Such an agreement shall, at a minimum:

a) State that the property owners consent to the terms and conditions of the Stormwater Management Plan and conditions of development approval relevant to the shared system;

b) Bind the parties to make the land available for, and maintain the system as intended per its approved design, in perpetuity, unless the land development permits attached thereto are amended by the applicable City or State authorities upon the written consent of all property owners using the shared system;

c) Stipulate the terms and conditions under which the parties shall be responsible for maintenance of the system, and the penalties and remedies in the event one or more parties damages the system or otherwise violates the terms of the agreement; and

d) Authorize the City, upon written notice to the property owners, to enter, repair and maintain the system and recover all associated costs in the event the system deteriorates in the sole judgment of the City Engineer to the point of posing a threat to surface waters, public improvements, health, safety or property.

# 8. EROSION AND SEDIMENT CONTROL

## A. Purpose

It is the purpose of this Section to provide standards and guidelines for the preparation of erosion and sediment control plans that protect public health, safety and welfare, and the quality of Dublin's waters from excessive erosion and sedimentation resulting from the construction and operation of development.

## B. Applicability

When required by this regulation, a soil erosion and sediment control plan shall be prepared for the earth disturbance activities. Furthermore, in accordance with the appropriate requirements of § 53.310, the plan shall be prepared, submitted to the City, and approved by the City, prior to any earth- disturbance.

The plan shall serve as a basis for all subsequent grading and stabilization and be incorporated as part of the final construction drawings.

## C. Plan Content

1) Any person seeking approval of an earth disturbance proposal shall, on a map rendered from a base derived from the site Stormwater Management Plan or site grading plan, at a scale not to exceed 1" – 100', provide the following information:
   a) A description of the nature and type of the construction activity (e.g., low density residential, shopping mall, highway, etc.)
   b) 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).
   c) Existing data describing the soil and, if available, the quality of any discharge from the site.
   d) A description of prior land uses at the site.
   e) An implementation schedule which describes the sequence of major construction operations (i.e., grubbing, excavating, grading, utilities and infrastructure installation) and the implementation of erosion, sediment and storm water management practices or facilities to be employed during each operation of the sequence.
   f) The name and/or location of the immediate receiving stream or surface water(s) and the first subsequent named receiving water(s) and the aerial extent and description of wetlands or other special aquatic sites at or near the site which will be disturbed or which will receive discharges from disturbed areas of the project.

2) For subdivided developments where the Stormwater Management Plan does not call for a centralized sediment control capable of controlling multiple individual lots, a detail drawing of a typical individual lot showing standard individual lot erosion and sediment control practices. This does not remove the responsibility to designate specific erosion and sediment control practices in the Stormwater Management Plan for critical areas such as steep slopes, stream banks, drainage ways and stream corridor protection zones.

3) Location and description of any storm water discharges associated with dedicated, on-site asphalt and concrete plants covered by this permit and the best management practices to address pollutants in these storm water discharges.

4) A description of the intended maintenance plan with associated frequencies shall be required for the site.

5) Site map showing:
   a) 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 Stormwater Management Plan.
   b) Soils types for all areas of the site, including locations of unstable or highly erodible soils.
   c) Existing and proposed contours.
   d) A delineation of drainage watersheds expected during and after major grading activities as well as the size of each drainage watershed, in acres.
   e) 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.
   f) Existing and planned locations of buildings, roads, parking facilities and utilities.
   g) The location of all erosion and sediment control practices, including the location of areas likely to require temporary stabilization during the course of site development.
   h) Sediment and storm water management basins noting their sediment settling volume and contributing drainage area.
   i) Permanent storm water management practices to be used to control pollutants in storm water after construction operations have been completed.
   j) Areas designated for the storage or disposal of solid, sanitary and toxic wastes, including dumpster areas, areas designated for cement truck washout, vehicle fueling, and lay down areas.
   k) The location of designated construction entrances where the vehicles will access the construction site.
   l) The location of any in-stream activities including stream crossings.

6) Additionally, the plan, as part of the overall Stormwater Management Plan, shall provide space for signatures of City of Dublin officials. These signature blocks shall be placed on the Stormwater Management Plan drawings.

7) Statement identifying the name, address, and telephone number of the person(s) preparing the plan, the owner of the property where the grading is proposed and the developer and/or person responsible for the development area.

8) A statement indicating that the owner will notify the City forty-eight (48) hours before commencing any earth-disturbing activity. At the time this notice is given, the owner shall identify the site manager.

9) The City Engineer may waive specific requirements for plan detail or may require additional information to show that work will conform to basic requirements of this regulation.

### D. Calculations

Any person seeking approval of an Erosion and Sediment Control Plan (ESCP) shall submit design computations and applicable assumptions for all structural measures for erosion and sediment control. Volume and velocity of flow shall be provided for all surface water conveyance. This information shall also be provided for surface water outlets. Specific guidance for Erosion and Sediment Control Plan calculations referenced in § 53.320.

## E. Standards and Criteria

1) Non-Structural Preservation Methods

The ESCP must make use of practices that preserve the existing natural condition as much as feasible. No construction shall be allowed within the Stream Corridor Protection Zone defined by these regulations unless explicitly allowed under Section § 53.210. In addition, construction operations shall be phased in order to minimize the amount of disturbed land at any one time. Within zones designated for active construction, tree preservation areas under § 153.140 through § 153.148, soil preservation areas, or other protective clearing or grubbing practices shall be designated.

2) Timing of Sediment-Control Practices

Sediment control practices shall be functional throughout earth-disturbing activities. Sediment ponds (including sediment basins and traps) and perimeter controls intended to trap sediment shall be implemented as the first step of grading and within seven days from the start of grubbing. They shall continue to function until the upslope development area is re-stabilized.

3) Stabilization

Disturbed areas must be stabilized as specified in the sections that follow.

| **PERMANENT STABILIZATION** | |
|---|---|
| **Area requiring permanent stabilization** | **When to implement controls** |
| Any areas that will lie dormant for one year or more | Within seven days of the most recent disturbance |
| Any areas within 50 feet of a stream and at final grade | Within two days of reaching final grade |
| Any other areas at final grade | Within seven days of reaching final grade within that area |

| **TEMPORARY STABILIZATION** | |
|---|---|
| **Area requiring temporary stabilization** | **When to implement controls** |
| Any disturbed areas within 50 feet of a stream and not at final grade | Within two days of the most recent disturbance if the area will remain idle for more than 14 days |
| For all construction activities, any disturbed areas that will be dormant for more than 14 days but less than one year, and not within 50 feet of a stream | Within seven days of the most recent disturbance within the area<br>For residential subdivisions, disturbed areas must be stabilized at least seven days prior to transfer of permit coverage for the individual lot(s). |
| Disturbed areas that will be idle over winter | Prior to the onset of winter weather |

Where vegetative stabilization techniques may cause structural instability or are otherwise unobtainable, alternative stabilization techniques must be employed.

4) Construction Access Routes

Measures shall be taken to prevent soil transport onto surfaces or onto public roads where runoff is not checked by sediment controls. Off-site tracking of sediments and dust generator shall be minimized, as required under the City's Ordinance, § 97.38.

5) Sloughing and Dumping

No soil, rock, debris, or any other material shall be dumped or placed into a stream or into such proximity that it may readily slough, slip, or erode into a stream, unless such dumping or placing is

authorized by the City Engineer and when applicable, the U.S. Army Corps of Engineers, for such purposes as, but not limited to, construction of bridges, culverts, and erosion control structures.

Unstable soils that, in the opinion of the City Engineer, are prone to slipping or landsliding shall not be graded, excavated, filled or have loads imposed upon them unless the work is done in accordance with a qualified professional engineer's recommendations to correct, eliminate, or adequately address the problems.

6) Cut and Fill Slopes

Cut and fill slopes shall be designed and constructed in a manner that will minimize erosion. Consideration shall be given to the length and steepness of the slope, soil type, upslope drainage area, groundwater conditions, and slope stabilization.

7) Stabilization of Outfalls and Channels

Outfalls and constructed or modified channels shall be designed and constructed to withstand the expected velocity of flow from a post-development, five-year frequency storm without eroding.

8) Establishment of Permanent Vegetation

Permanent vegetation shall not be considered established until ground cover is achieved which, in the opinion of the City Engineer, provides adequate cover with a density of at least 70% and is mature enough to control soil erosion satisfactorily and to survive adverse weather.

9) Sediment Deposition

Sediment deposition caused by accelerated stormwater runoff over a development site or by accelerated erosion due to the sloughing or sliding of surface soil that has been exposed by grading, dumping, stockpiling or any other excavation-related earth disturbances shall be retarded and confined to within the boundaries of the development site, during site development.

10) Sediment Control Practices During Construction

The ESCP shall include a description of structural practices that shall store runoff during construction, allowing sediments to settle and/or diverting flows away from exposed soils or otherwise limiting runoff from exposed areas. Structural practices shall be used to control erosion and trap sediment from a site remaining disturbed for more than 14 days. Such practices may include, among others: sediment settling ponds, silt fences, earth diversion dikes or channels which direct runoff to a sediment settling pond and storm drain inlet protection. All sediment control practices must be capable of ponding runoff in order to be considered functional. Earth diversion dikes or channels alone are not considered a sediment control practice unless those are used in conjunction with a sediment settling pond. The ESCP must contain detailed drawings for all structural practices.

11) Timing

Sediment control structures shall be functional throughout the course of earth-disturbing activity. Sediment basins and perimeter sediment barriers shall be implemented prior to grading and within seven days from the start of grubbing. They shall continue to function until the up slope development area is restabilized according to requirements in Section § 53.320(C)(1) As construction progresses and the topography is altered, appropriate controls must be constructed or existing controls altered to address the changing drainage patterns.

12) Sediment Settling Ponds

Concentrated storm water runoff and runoff from drainage areas, which exceed the design capacity of silt fence or inlet protection, shall pass through a sediment settling pond. For common drainage locations that serve an area with 10 or more acres disturbed at one time, a temporary sediment settling pond must be provided until final stabilization of the site. The permittee may request

approval from Ohio EPA to use alternative controls if it can demonstrate the alternative controls are equivalent in effectiveness to a sediment settling pond. It is recommended that smaller sediment basins and/or sediment traps be used for drainage locations serving less than 10 acres.

The sediment settling pond shall be sized to provide at least 67 cubic yards of storage per acre of total contributing drainage area. When determining the total contributing drainage area, off-site areas and areas which remain undisturbed by construction activity must be included unless runoff from these areas is diverted away from the sediment settling pond and is not co-mingled with sediment-laden runoff. The depth of the sediment settling pond must be less than or equal to five feet. The configuration between inlets and the outlet of the basin must provide at least two units of length for each one unit of width (> 2:1 length:width ratio). Sediment must be removed from the sediment settling pond when the design capacity has been reduced by 40 percent (This is typically reached when sediment occupies one-half of the basin depth). When designing sediment settling ponds, the permittee must consider public safety, especially as it relates to children, as a design factor. Alternative sediment controls must be used where site limitations would preclude a safe design. The use of a combination of sediment and erosion control measures in order to achieve maximum pollutant removal is encouraged.

13) Silt Fence and Diversions

Sheet flow runoff from denuded areas shall be intercepted by silt fence or diversions to protect adjacent properties, streams, and stream corridor protective zones from sediment transported via sheet flow. Where intended to provide sediment control, silt fence shall be placed on a level contour. The use of other sediment barriers designed to control sheet flow runoff shall be at the discretion of the City Engineer. The relationship between the maximum drainage areas to silt fence for a particular slope range is shown in the following:

| **SILT FENCE CRITERIA** | |
|---|---|
| Maximum drainage area (in acres) to 100 linear feet of silt fence | Range of slope for a particular drainage area (by percent) |
| 0.5 | < 2% |
| 0.25 | > 2% but < 20% |
| 0.125 | > 20% but < 50% |

Stormwater diversion practices shall be used to keep runoff away from disturbed areas and steep slopes where practicable. Such devices, which include swales, dikes or berms, may receive storm water runoff from areas up to 10 acres.

14) Inlet Protection

Inlet protection control measures shall minimize sediment laden water entering active storm drain systems, unless the storm drain system drains to a sediment settling pond. Sediment shall be removed from the storm sewer, to the extent possible, prior to final approval.

15) Other Controls

*Non-Sediment Pollutant Controls.* No solid (other than sediment) or liquid waste, including building materials, shall be discharged in storm water runoff. The permittee must implement all necessary control measures to prevent the discharge of non-sediment pollutants to the stormwater management system of the site or surface waters of the state. Under no circumstance shall concrete trucks wash out directly into an open channel, storm sewer or surface waters of the state. No exposure of storm water to waste materials is recommended.

16) Compliance with Other Requirements

The Stormwater Management Plan shall be consistent with applicable State and/or local waste disposal, sanitary sewer or septic system regulations, including provisions prohibiting waste disposal

by open burning and shall provide for the proper disposal of contaminated soils to the extent these are located within the permitted area.

17) Trench and Ground Water Control

There shall be no turbid discharges resulting from dewatering activities. If trench or ground water contains sediment, it must pass through a sediment settling pond or other equally effective sediment control device, prior to being discharged from the construction site. Alternatively, sediment may be removed by settling in place or by dewatering into a sump pit, filter bag or comparable practice. Ground water dewatering which does not contain sediment or other pollutants is not required to be treated prior to discharge. However, care must be taken when discharging ground water to ensure that it does not become pollutant-laden by traversing over disturbed soils or other pollutant sources.

18) Disposition of Temporary Practices

All temporary erosion and sediment control practices shall be disposed of within thirty days after final site stabilization is achieved or after the temporary practices are no longer needed, unless otherwise authorized by the City Engineer. Trapped sediment shall be removed or permanently stabilized to prevent further erosion.

19) Maintenance

All temporary and permanent erosion and sediment control practices shall be designed and constructed to minimize maintenance requirements. They shall be maintained and repaired as needed to assure continued performance of their intended function. The person or entity responsible for continued maintenance of permanent and temporary erosion controls shall be identified on the Stormwater Management Plan to the satisfaction of the City.

# 9. REFERENCES

## A. Books, Manuals and Reports

Bonnin, Martin, Lin, Parzybok, Yekta, Riley. 2004. *NOAA Atlas 14, Volume 2, Version 3.0*

Chow, V. T., Maidment, D. R., Mays, L. W. 1988. *Applied Hydrology.*

England, G. and Stein, S. 2007. *Stormwater BMPs: Selection, Maintenance, and Monitoring*. Santa Barbara, CA: ForesterPress

Froehlich, D.C. (March/April 2009, Errata 2010). Mathematical Formulations of NRCS 24-Hour Design Storms. *Journal of Irrigation and Drainage Engineering.* ASCE. Vol. 135, No. 2, pp. 241-247

North Carolina Department of Environment and Natural Resources. March 2010. *Stormwater BMP Manual: Chapter 8 Level Spreader – Vegetative Filter Strip System.*

North Carolina Division of Water Quality. 2007. *Stormwater Best Management Practices Manual.*

Texas Water Development Board. 2005. *The Texas Manual on Rainwater Harvesting, Third Edition.*

## B. Web Sites

NOAA Precipitation Frequency Data Server http://dipper.nws.noaa.gov/hdsc/pfds/ June 10, 2012

# APPENDIX A
# Section 53.070 EXEMPTIONS

## § 53.070 Exemptions

With the approval of the City Engineer, the following activities may be exempted from on-site stormwater runoff control. An exemption shall apply only to the requirement for on-site stormwater detention or retention facilities. All other design elements such as the storm sewer system, road culverts, erosion and sedimentation control, and runoff quality shall not be exempted.

(A) *Emergency exemption.* Emergency maintenance work performed for the protection of public health and welfare, however, if the earth-disturbing activity would have required an approved erosion and sediment control plan, if the activity were not an emergency, then the land area disturbed shall be shaped and stabilized in accordance with the requirements of the city.

(B) *Maintenance exemption.* Any maintenance to an existing system made in accordance with plans and specifications approved by the City Engineer.

(C) *Development-related exemptions.* The applicant shall provide to the City Engineer in writing a request for exemption which shall include a scaled site map, property tax number, and street address if applicable.

(1) Single-family or duplex exemption. Single-family or duplex residential construction on a single lot that is not part of a larger common plan of development.

(2) Any construction which adds less than 500 square feet through expansion of a building, structure or pavement which results in new impervious area on a project site.

(3) It is conceivable that development situations not automatically subject to exemption may exist such that development will have none of the harmful effects of sediment deposition. Such development situations, subject to city concurrence, are eligible for a waiver from this regulation. Waiver requests shall be made in writing to the City Engineer and shall include sufficient detail to support that granting a wavier will not be detrimental to abutting properties or to watercourses, public waters, or to the sewer system.

(D) *Scioto River Corridor Exemption.* Parcels that are located between State Route 745 (Dublin Road) and State Route 257 (Riverside Drive) which are directly tributary to the Scioto River.

(E) Regular farming activities on land intended for such use, except when these activities involve practices which increase storm water runoff and exacerbate erosion and sedimentation.

(F) Tilling, planting or harvesting of agricultural, horticultural, or forest crops that employ soil conservations related to agriculture as follows: construction of terraces, terrace outlets, check dams, desilting basins, dikes, ponds, ditches, strip cropping, lister furrowing, contour cultivating, contour furrowing, and land drainage and land irrigation which does not cause an increase in stormwater runoff and does not exacerbate erosion and sedimentation.

(G) Minor earth-disturbing activities such as home gardens and individual home landscaping, repairs, service connections and maintenance work.

(H) Installation, maintenance or repair of any underground public utility lines when such activity occurs on an existing hard surfaced road, street or sidewalk (provided the earth-disturbing activity is confined to the area of the road, street or sidewalk that is hard surfaced), and does not involve dewatering operations that produce sediment-laden effluent discharging to surface-lands and/or surface-waters.

(I) Septic tank lines or drainage fields unless included in an overall plan for earth-disturbing activity relating to the construction of the building to be served by the septic tank system.

(J) Repair or rebuilding of the tracks within the right-of-way of a railroad company.

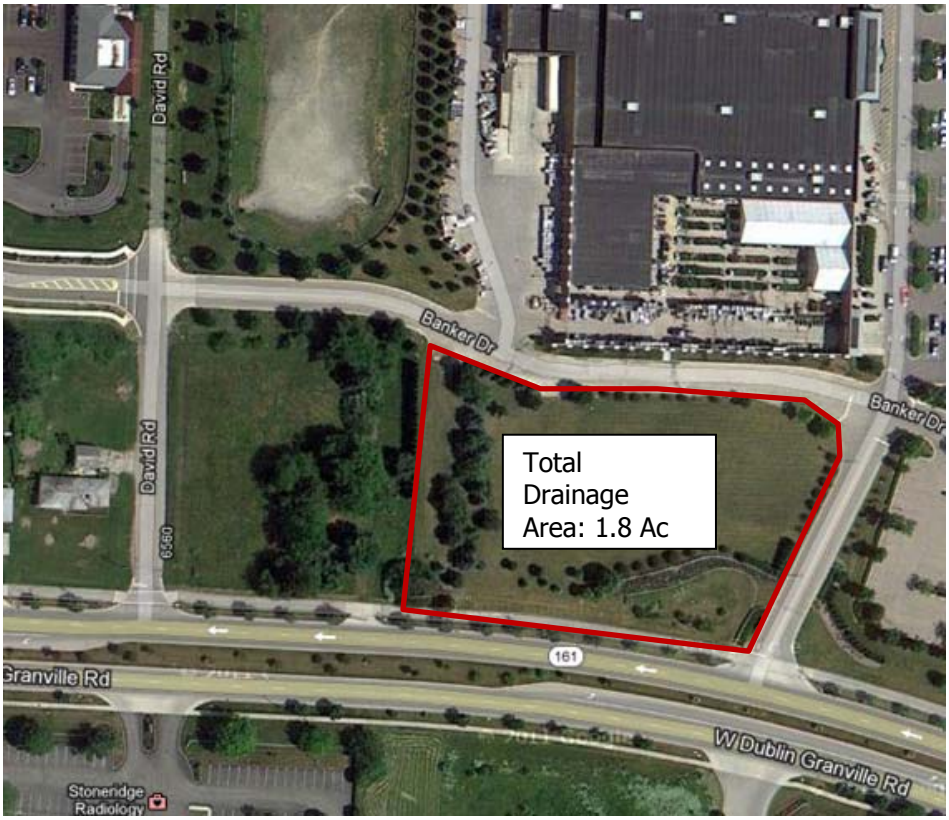
(K) *Stream Corridor Protection Zone.* Stream corridor protection zones are not required if a preliminary plan has already been approved for a site at the time this chapter is passed.

(L) *Historic Dublin.* Development within this area, as defined in the Zoning Code, shall be exempt from compliance with the city's stormwater quantity regulations but shall be held in compliance with the city's storm water quality regulations, described in § 53.090, if the construction activities disturb one or more acres of total land.

(Ord. 48-05, passed 9-6-05)

# APPENDIX B
# EXAMPLE STORMWATER APPROACH AND CALCULATIONS

**EXAMPLE 1: NEW DEVELOPMENT**



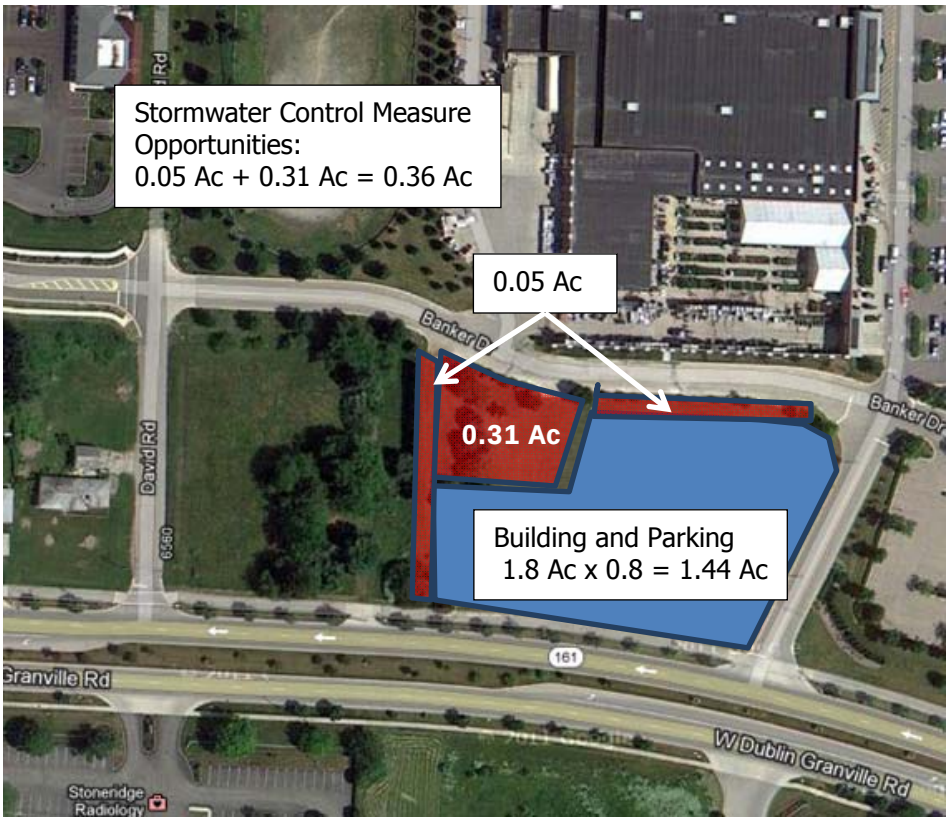

**Pre-Development Data**

Site Area = Total Drainage Area (A) = 1.8 Ac
Impervious Area = 0%
Soils Type "D" http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm

Land Use = Urban | Open Space (lawns, parks, golf, cemeteries) | Good (grass cover >50%)
Curve Number = 80 (NEH Part 630, Chapter 9, Table 9-1 and Table 9-5)

**Compute Time of Concentration:** (NEH Part 630, Chapter 15, Velocity Method)

Sheet Flow: 300 feet at 0.019 ft/ft, Dense grasses
Shallow Concentrated Flow: 105 feet at 0.019 ft/ft, Grassed waterways
Tc = 0.66 hours




**Post-Development Data**

Site Area = Total Drainage Area (A) = 1.8 Ac
Building Type: Corridor Building
Impervious Area = 80% = 1.44 Ac (maximum for Corridor Building)
Pervious Area:
Assume 5-foot side yard and rear yard = 0.05 Ac
Assume "Green Space" = 0.31 Ac
Soils Type "D" http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm

Land Use = Urban | Commercial and Business (est. 85% imperv.)
Curve Number = 95 (NEH Part 630, Chapter 9, Table 9-1 and Table 9-5)

**Compute Time of Concentration:** (NEH Part 630, Chapter 15, Velocity Method)
Sheet Flow: 65 feet at 0.019 ft/ft dense grasses
Tc = 0.19 hours

## Critical Storm Calculation

This example uses a unit hydrograph approach as described in the National Engineering Handbook (NEH) Part 630, Chapter 16, Hydrographs. Per City standards, a NRCS Type II 24-hour design storm is used. The curve number method is used to estimate runoff volume per NEH Part 630, Chapter 10, Estimation of Direct Runoff from Storm Rainfall.

Pre-development: 1-year, 24-hour storm runoff volume = 4,538 CF
Post-Development: 1 year, 24 hour storm runoff volume = 10,645 CF

(Post – Pre)/Pre x 100 = Percent of Increase in Runoff Volume = Critical Storm
(10,645 – 4,538)/4,538 x 100 = 135%
**Critical Storm = 25-year storm**

**TABLE B-1 CRITICAL STORM DETERMINATION**

| If the Percent of Increase in Runoff Volume is | | The Critical Storm Runoff Rate Will Be Limited to: |
|---|---|---|
| Equal to or Greater than | And less than | |
| -- | 10 | 1 year |
| 10 | 20 | 2 year |
| 20 | 50 | 5 year |
| 50 | 100 | 10 year |
| 100 | 250 | 25 year |
| 250 | 500 | 50 year |
| 500 | -- | 100 year |

## On-Site and Off-Site Area Allocation

Supply project location information to Engineering Development Group Civil Engineers, and they will supply the sub-basin information.

---

Supplied Information:
Studied Area = East Unconsolidated Watersheds Sub-Basin 2600

**TABLE B-2 EXCERPT FROM CITY OF DUBLIN STORMWATER MASTER PLAN**

| | Design Storm (CFS/Ac) | | | | | | |
|---|---|---|---|---|---|---|---|
| Sub-basin | 1 | 2 | 5 | 10 | 25 | 50 | 100 |
| 2600 | 0.1 | 0.2 | 0.3 | 0.4 | 0.6 | 0.8 | 1.1 |

---

Allowable release rate for the critical storm is 0.1 CFS x 1.8 Ac = 0.18 CFS

Show the allocation of on-site and off-site area contributory to the facility for each applicable Stormwater Master Plan sub-basin as follows:

**TABLE B-3 ON-SITE AND OFF-SITE AREA ALLOCATION**

| Sub-Basin Identifier # | On-Site Area (acre) | Off-Site Area (acre) | Total (acre) |
|---|---|---|---|
| 2600 | 1.8 | 0 | 1.8 |
| Total (acre) | 1.8 | 0 | 1.8 |

## Stormwater Control Measure (SCM) Design

This section describes several stormwater management alternatives that could be used to meet the water quality and quantity requirements as described in Chapter 2. The three alternatives are provided explicitly for these example calculations and are not to imply a requirement for submittal of design alternatives.

### Alternative 1: Traditional Bioretention

Available construction area: 0.36 acres = 15,682 SF
Water Quality Volume (WQv): C*(P/12)*A = (1.6)*(0.75/12)*1.8 = 0.18 (ac-ft) = **7,841 CF**

C=runoff quality coefficient (Refer to OEPA Permit No.: OHC000003 for values) or use
$C=0.858i^3-0.78i^2+0.774i+0.04 = 1.6$
where i=fraction of post-const. impervious surface = 0.8
P=0.75 Precipitation depth, inches
A=area tributary to the basin, acres

In this example, storage volume is calculated assuming vertical movement of water within the bioretention facility is ignored. Hence the time required for the water to filter through a soil or aggregate layer is ignored. Infiltration rates are only used at the bottom of the bioretention facility to release the water back into the native soil. The facility is sized to control the allowable peak rate of runoff from the critical storm and the less frequent storm events. Allowable peak rates are included in Table B-4. Following the determination of the size of the bioretention facility to meet the peak rate of runoff requirements, a cross-check is performed to ensure that the facility volume is at least as great as the water quality volume.

**Model Results Summary: (see results tables and graphs below)**
Bioretention surface area required: 11,449 SF (98 ft x 98 ft)
Bioretention total water storage volume: 19,905 CF
Surface Storage: 10 inches (3H:1V side slope)
Growing Layer: 24 inches (1H:1V side slope)
Drainage Layer: 30 inches (Vertical side slope)
Orifice 1 Offset: 3 inches from bottom of storage layer
Orifice 1 Area: 0.015 SF (1.7-inch diameter)
Orifice 2 Offset: 63.5 inches from bottom of storage layer
Orifice 2 Area: 0.5 SF (9.6-inch diameter)
Evapotranspiration: 0.1 inches/day
Infiltration through bottom of SCM: 0.06 inches/hr

**TABLE B-4 TRADITIONAL BIORETENTION STORMWATER DATA**

| | 1-year | 2 year | 5 year | 10 year | 25 year | 50 year | 100 year |
|---|---|---|---|---|---|---|---|
| Predeveloped Q (cfs) | 0.86 | 1.26 | 1.88 | 2.42 | 3.21 | 3.89 | 4.62 |
| Postdeveloped Q (cfs) | 3.74 | 4.64 | 5.88 | 6.92 | 8.35 | 9.54 | 10.8 |
| Allowable Release (cfs) | 0.18 | 0.18 | 0.18 | 0.18 | 0.18 | 1.44 | 1.98 |
| Actual Release (cfs) | 0.08 | 0.09 | 0.10 | 0.10 | 0.11 | 0.49 | 1.96 |
| Surface Water Dewater Time (hr) | Before end of storm | Before end of storm | 1.5 | 8.5 | 18 | 20.4 | 20.5 |
| Total Dewater Time (hr) | 25.1 | 31.2 | 39.4 | 46.3 | 56 | 58.3 | 58.4 |

# EXAMPLE CALCULATIONS

Stormwater Control Measure 1

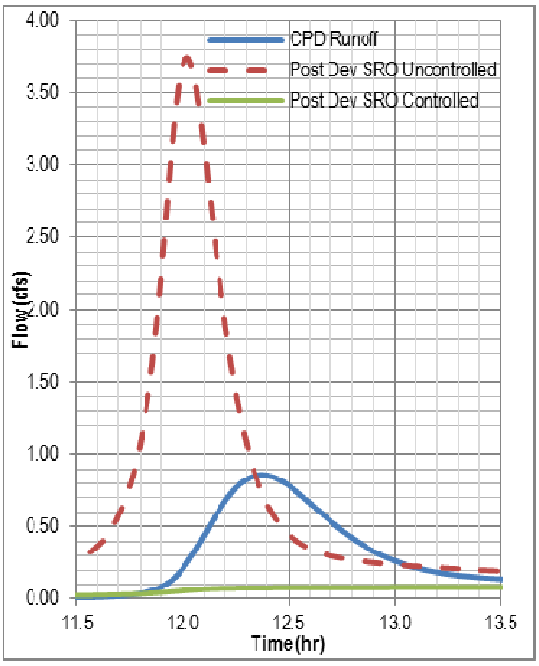
| | |
|---|---|
| Practice Type | Bioretention |
| Drainage Area (ac) | 1.8 |
| Discharge To | Offsite |
| Len:Width (xL:1W) | 1 |

| | Allowed | Area (sf) |
|---|---|---|
| Evaporation | Yes | 11449 |
| Infiltration (through bottom) | Yes | 9604 |

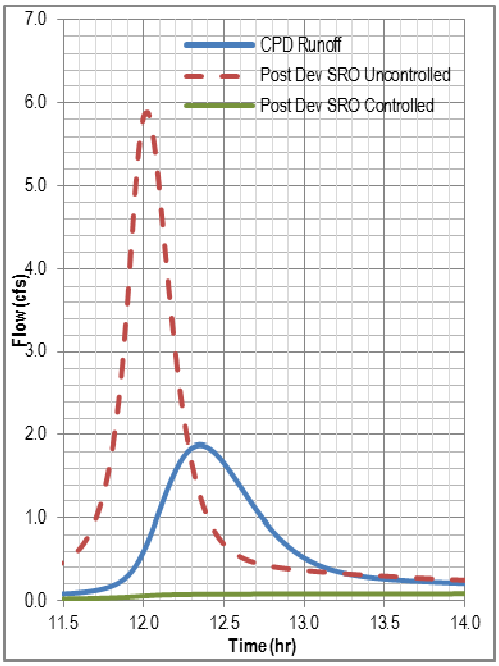
| | Cross Section Media | Layer (in) | Side Slope xH:1V | Width (ft) | Len (ft) | Surface Area (sf) | Void Ratio | Total Vol (cf) | Water Storage Vol (cf) |
|---|---|---|---|---|---|---|---|---|---|
| Top | | | | 107.0 | 107.0 | 11,449 | | | |
| | NA | | 0 | 107.0 | 107.0 | 11,449 | 100% | 0 | 0 |
| | NA | | 0 | 107.0 | 107.0 | 11,449 | 100% | 0 | 0 |
| | Surface Storage | 10 | 3 | 102.0 | 102.0 | 10,404 | 100% | 9,102 | 9,102 |
| | Planting Soil Sandy Loam | 24 | 1 | 98.0 | 98.0 | 9,604 | 30% | 20,003 | 6,001 |
| Bottom | Planting Soil Sandy Clay Loam | 30 | 0 | 98.0 | 98.0 | 9,604 | 20% | 24,010 | 4,802 |
| | Total | 64 | | | | | Total | 53,115 | 19,905 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Outlet Type | Orifice | Orifice | None | None | None | |
| Offset from bottom (in) | 3 | 63.5 | | | | |
| coefficient c | 0.6 | 3 | | | | |
| Area (sf) or Length (ft) | 0.01 | 0.5 | | | | |
| Volume below the offset (cf) | 480.2 | 19429 | NA | NA | NA | |

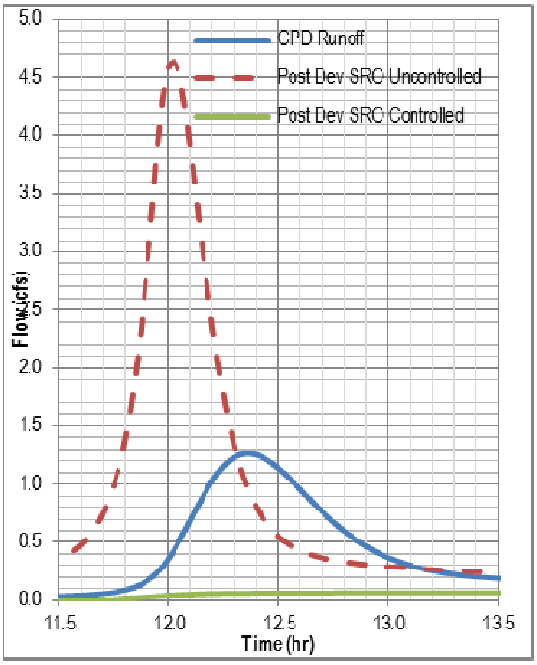
| | |
|---|---|
| Surface Storage (in) | 10 |



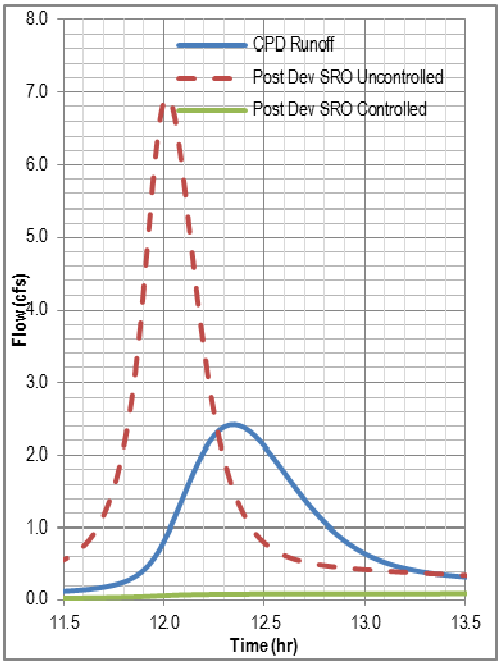

**1-year 24-hour Runoff Hydrographs**




**5-year 24-hour Runoff Hydrographs**




**2-year 24-hour Runoff Hydrographs**

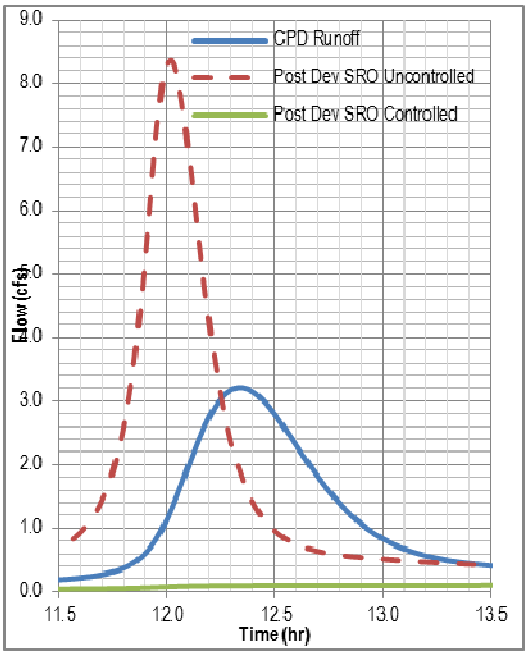



**10-year 24-hour Runoff Hydrographs**

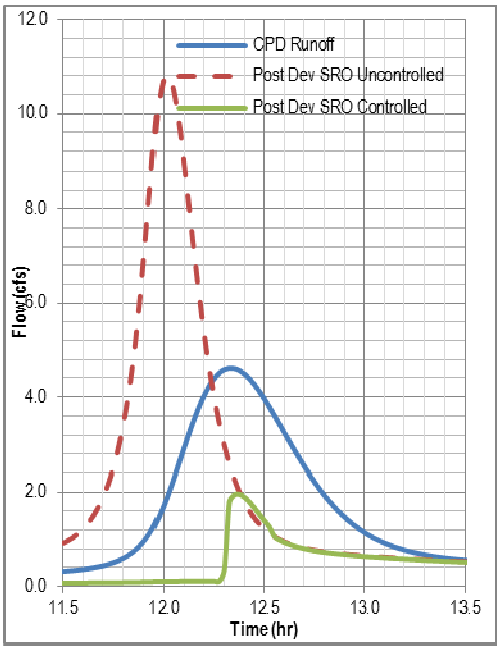
## TOTAL SYSTEM RESULTS

| | Recurrence Interval | 1-year | 2-year | 5-year | 10-year |
|---|---|---|---|---|---|
| **PEAK FLOW** | CPD Runoff (cfs) | 0.86 | 1.26 | 1.88 | 2.42 |
| | Post Dev SRO Uncontrolled (cfs) | 3.74 | 4.64 | 5.88 | 6.92 |
| | Post Dev SRO Controlled (cfs) | **0.08** | **0.09** | **0.10** | **0.10** |
| | Difference CPD - Post Dev (cfs) | 0.8 | 1.2 | 1.8 | 2.3 |
| | Criteria | Qpost<= 0.18 cfs | Qpost<= 0.18 cfs | Qpost<= 0.18 cfs | Qpost<= 0.18 cfs |
| | Criteria Met (Y/N) | **Yes** | **Yes** | **Yes** | **Yes** |
| **VOLUME** | CPD Runoff (cf) | 4,538 | 6,449 | 9,362 | 11,950 |
| | Post Dev Runoff (cf) | 10,645 | 13,337 | 17,138 | 20,331 |
| | ET (cf) | 215 | 242 | 277 | 306 |
| | Infiltration (cf) | 2,541 | 2,877 | 3,312 | 3,673 |
| | Outflow (cf) | 7,889 | 10,218 | 13,548 | 16,352 |
| | Remaining Storage (cf) | 0 | 0 | 0 | 0 |
| | Continuity | 0.00% | 0.00% | 0.00% | 0.00% |
| | Criteria | Okay | Okay | Okay | Okay |
| | Criteria Met (Y/N) | NA | NA | NA | NA |
| **DEWATER TIME**[1] | Surface Water Dewater Time (hr) | -24.0 | -24.0 | 1.0 | 8.8 |
| | Criteria | <= 24 hrs | <= 24 hrs | <= 24 hrs | <= 24 hrs |
| | Criteria Met (Y/N) | **Yes** | **Yes** | **Yes** | **Yes** |
| | Complete Drainage Dewater Time (hr) | 32.7 | 40.8 | 51.0 | 58.9 |
| | Criteria | <= 72 hrs | <= 72 hrs | <= 72 hrs | <= 72 hrs |
| | Criteria Met (Y/N) | **Yes** | **Yes** | **Yes** | **Yes** |

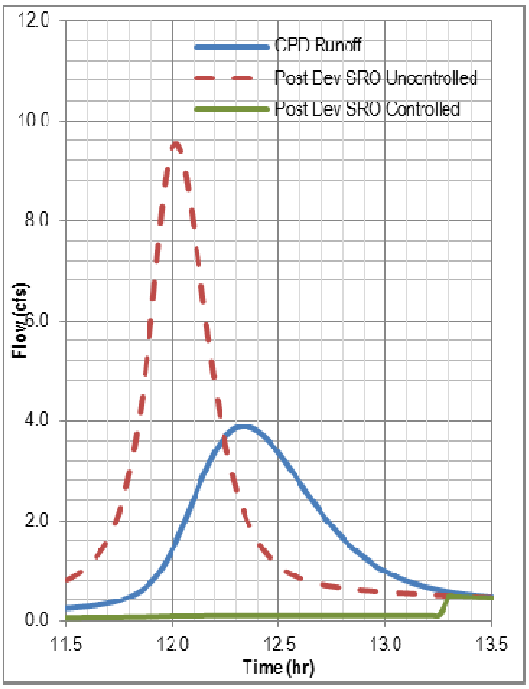
[1]Duration since the end of the rainfall event. Rainfall events are set at 24 hours. Negative values mean that the dewatering is completed before the rainfall ends.




**25-year 24-hour Runoff Hydrographs**




**100-year 24-hour Runoff Hydrographs**




**50-year 24-hour Runoff Hydrographs**

## TOTAL SYSTEM RESULTS

| | Recurrence Interval | 25-year | 50-year | 100-year |
|---|---|---|---|---|
| PEAK FLOW | CPD Runoff (cfs) | 3.21 | 3.89 | 4.62 |
| | Post Dev SRO Uncontrolled (cfs) | 8.35 | 9.54 | 10.80 |
| | Post Dev SRO Controlled (cfs) | **0.11** | **0.49** | **1.96** |
| | Difference CPD - Post Dev (cfs) | 3.1 | 3.4 | 2.7 |
| | Criteria | Qpost<= 0.18 cfs | Qpost<= 1.44 cfs | Qpost<= 1.98 cfs |
| | Criteria Met (Y/N) | **Yes** | **Yes** | **Yes** |
| VOLUME | CPD Runoff (cf) | 15,750 | 19,016 | 22,595 |
| | Post Dev Runoff (cf) | 24,828 | 28,568 | 32,577 |
| | ET (cf) | 346 | 356 | 357 |
| | Infiltration (cf) | 4,159 | 4,286 | 4,302 |
| | Outflow (cf) | 20,323 | 23,926 | 27,917 |
| | Remaining Storage (cf) | 0 | 0 | 0 |
| | Continuity | 0.00% | 0.00% | 0.00% |
| | Criteria | Okay | Okay | Okay |
| | Criteria Met (Y/N) | NA | NA | NA |
| DEWATER TIME[1] | Surface Water Dewater Time (hr) | 19.0 | 21.8 | 21.9 |
| | Criteria | <= 24 hrs | <= 24 hrs | <= 24 hrs |
| | Criteria Met (Y/N) | **Yes** | **Yes** | **Yes** |
| | Complete Drainage Dewater Time (hr) | 69.1 | 71.9 | 72.0 |
| | Criteria | <= 72 hrs | <= 72 hrs | <= 72 hrs |
| | Criteria Met (Y/N) | **Yes** | **Yes** | **Yes** |

[1]Duration since the end of the rainfall event. Rainfall events are set at 24 hours. Negative values mean that the dewatering is completed before the rainfall ends.

**Alternative 2: Permeable Pavement**

Available construction area: (1.8 ac*0.9) – (1.8 ac*0.8) = 0.18 ac = 7,841 SF (This is the additional 10% of semi-pervious coverage allowed for a Corridor Building Type.)
Water Quality Volume (WQv): C*(P/12)*A = (1.6)*(0.75/12)*1.8 = 0.18 (ac-ft) = **7,841 CF**

C=runoff quality coefficient (Refer to OEPA Permit No.: OHC000003 for values) or use
$C=0.858i^3-0.78i^2+0.774i+0.04 = 1.6$
where i=fraction of post-const. impervious surface = 0.8
P=0.75 Precipitation depth, inches
A=area tributary to the basin, acres

In this example, permeable pavement storage volume is calculated assuming vertical movement of water within the permeable pavement facility is ignored. Hence the time required for the water to filter through a soil or aggregate layer is ignored. Infiltration rates are only used at the bottom of the facility to release the water back into the native soil. The facility is sized to control the allowable peak rate of runoff from the critical storm and the less frequent storm events. Allowable peak rates are included in Table B-5. Following the determination of the size of the permeable pavement facility to meet the peak rate of runoff requirements, a cross-check is performed to ensure that the facility volume is at least as great as the water quality volume.

**Initially, the available storage is calculated within the additional 10% of semi-pervious coverage, which is allowed per the Corridor Building within §153.062(O)(5).**

**In this case, the semi-pervious area is not large enough to meet the requirements, so it is assumed that semi-pervious coverage will extend into the area reserved for surface parking (assuming this development will have surface parking).**

**To meet the requirements, the permeable pavement storage must equal 18,818 SF. The design will require an extra 18,818 SF – 7,841 SF = 10,977 SF of permeable pavement beyond the additional 10% of semi-pervious space allowed. (~96 parking spaces)**

**Model Results Summary:**
Permeable Pavement total water storage: 18,818 CF
Surface Storage: 0 inches
Growing Layer: 0 inches
Drainage Layer: 30 inches (vertical side slopes)
Orifice 1 Offset: 0 inches from bottom of storage layer
Orifice 1 Area: 0.025 SF (2.1-inch diameter)
Orifice 2 Offset: 28 inches from bottom of storage layer
Orifice 2 Area: 0.27 SF (7-inch diameter)
Infiltration through bottom of SCM: 0.06 inches/hr

**TABLE B-5 PERMEABLE PAVEMENT STORMWATER DATA**

| | 1-year | 2 year | 5 year | 10 year | 25 year | 50 year | 100 year |
|---|---|---|---|---|---|---|---|
| Predeveloped Q (cfs) | 0.86 | 1.26 | 1.88 | 2.42 | 3.21 | 3.89 | 4.62 |
| Postdeveloped Q (cfs) | 3.74 | 4.64 | 5.88 | 6.92 | 8.35 | 9.54 | 10.8 |
| Allowable Release (cfs) | 0.18 | 0.18 | 0.18 | 0.18 | 0.18 | 1.44 | 1.98 |
| Actual Release (cfs) | 0.11 | 0.13 | 0.14 | 0.16 | 0.18 | 0.46 | 1.76 |
| Surface Water Dewater Time (hr) | NA | NA | NA | NA | NA | NA | NA |
| Total Dewater Time (hr) | 14.8 | 18.7 | 23.8 | 27.8 | 32.9 | 34.8 | 35.4 |

**Stormwater calculations must be included per Chapter 7. See Alternative 1 for example calculations.**

**Alternative 3: Planter Box (attached to building)**

Available construction area: Assume 4-foot width around 450 feet of building perimeter = 1,800 SF
Water Quality Volume (WQv): C*(P/12)*A = (1.6)*(0.75/12)*1.8 = 0.18 (ac-ft) = **7,841 CF**

C=runoff quality coefficient (Refer to OEPA Permit No.: OHC000003 for values) or use
$C=0.858i^3-0.78i^2+0.774i+0.04 = 1.6$
where i=fraction of post-const. impervious surface = 0.8
P=0.75 Precipitation depth, inches
A=area tributary to the basin, acres

In this example, planter box storage volume is calculated assuming vertical movement of water within the planter box facility is ignored. Hence the time required for the water to filter through a soil or aggregate layer is ignored. With a planter box attached to a building, infiltration to the underlying soil is not allowed. The facility is sized to control the allowable peak rate of runoff from the critical storm and the less frequent storm events. Allowable peak rates are included in Table B-6. Following the determination of the size of the facility to meet the peak rate of runoff requirements, a cross-check is performed to ensure that the facility volume is at least as great as the water quality volume.

**Initially, the available storage is calculated within the planter box.**

**In this case, the planter box alone is not enough to meet the requirements, so for this example, bioretention will be added to the site. It is assumed that runoff from the impervious area will first discharge to the planter box, which will overflow to a bioretention area.**

**Model Results Summary:**
Planter Box surface area available: 1,800 SF
Planter Box total water storage: 4,410 CF
Drainage Area: 1.44 Ac
Surface Storage: 12 inches (vertical side slope)
Growing Layer: 18 inches (vertical side slope)
Drainage Layer: 30 inches (vertical side slope)
Orifice Offset: 0 inches from bottom of storage layer
Orifice Area: 0.09 SF (4-inch diameter)
Evapotranspiration: 0.1 inches/day
Infiltration through bottom of BMP: Not allowed

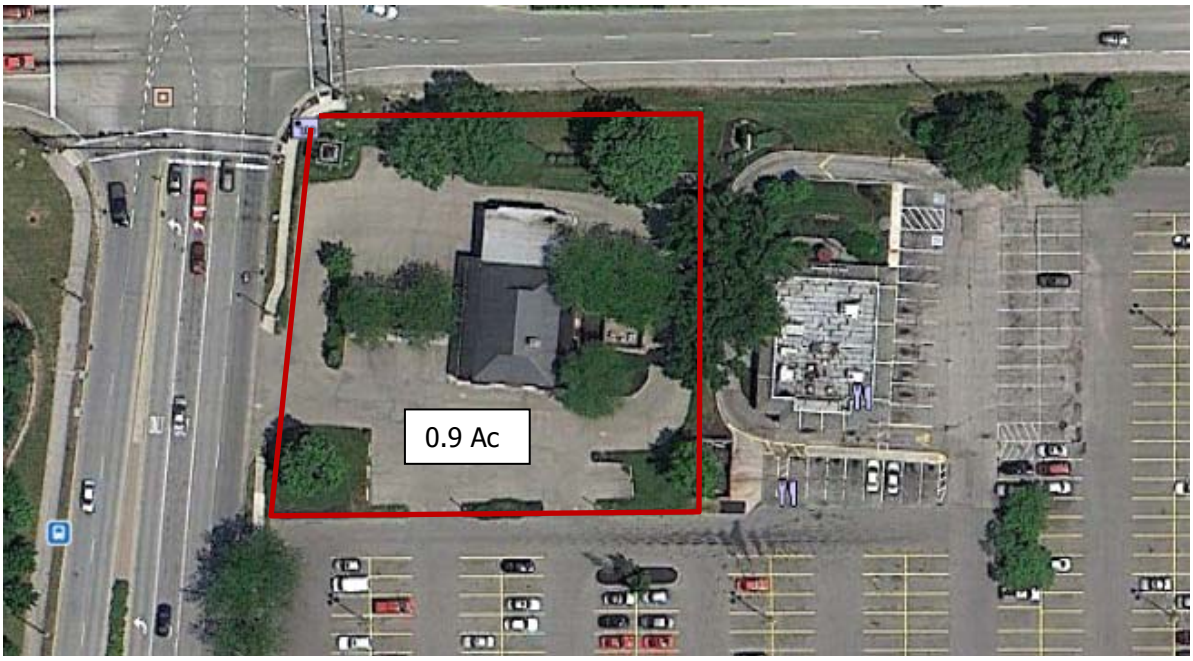
Bioretention surface area required: 9,604 SF
Bioretention total water storage: 20,492 CF
Drainage Area: 0.36 Ac
Surface Storage: 10 inches (3H:1V side slope)
Growing Layer: 24 inches (1H:1V side slope)
Drainage Layer: 30 inches (vertical side slope)
Orifice 1 Offset: 0 inches from bottom of storage layer
Orifice 1 Area: 0.016 SF (1.7-inch diameter)
Orifice 2 Offset: 60 inches from bottom of storage layer
Orifice 2 Area: 2 SF (1.6-foot diameter)
Evapotranspiration: 0.1 inches/day
Infiltration through bottom of SCM: 0.06 inches/hr

**TABLE B-6 PLANTER BOX AND BIORETENTION STORMWATER DATA**

| | 1-year | 2 year | 5 year | 10 year | 25 year | 50 year | 100 year |
|---|---|---|---|---|---|---|---|
| Predeveloped Q (cfs) | 0.86 | 1.26 | 1.88 | 2.42 | 3.21 | 3.89 | 4.62 |
| Postdeveloped Q (cfs) | 3.74 | 4.64 | 5.88 | 6.92 | 8.35 | 9.54 | 10.8 |
| Allowable Release (cfs) | 0.18 | 0.18 | 0.18 | 0.18 | 0.18 | 1.44 | 1.98 |
| Actual Release (cfs) | 0.11 | 0.13 | 0.15 | 0.17 | 0.17 | 0.82 | 1.06 |
| Surface Water Dewater Time (hr) | Before end of storm | Before end of storm | Before end of storm | Before end of storm | 4.2 | 5.1 | 5.8 |
| Total Dewater Time (hr) | 20.8 | 25.3 | 30.6 | 34.6 | 40.7 | 41.6 | 42.2 |

**Stormwater calculations must be included per Chapter 7. See Alternative 1 for example calculations.**

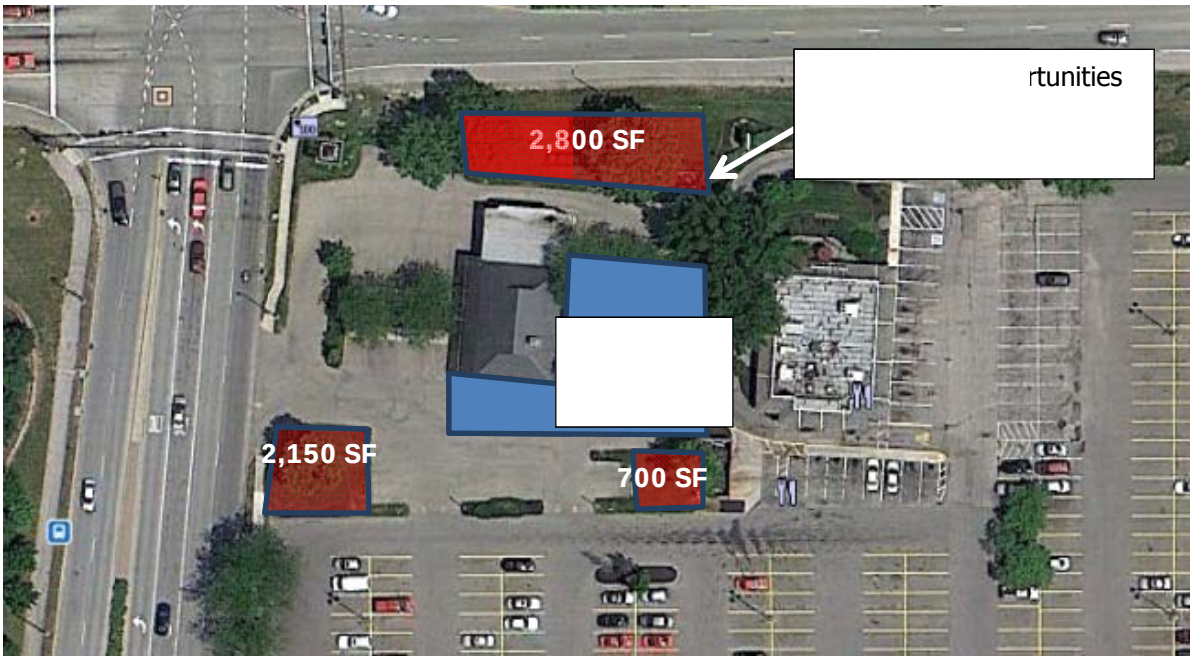
## EXAMPLE 2: REDEVELOPMENT




**Pre-Development Data**
Site Area = Total Drainage Area (A) = 0.9 Ac
Impervious Area = 72% = 0.65 Ac
Soils Type "D" http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm

Urban | Paved Parking, Roofs, Driveways (excl. ROW) | 100% impervious = 0.65 Ac
Urban | Open Space (lawns, parks, golf, cemeteries) | Good (grass cover >50%) = 0.25 Ac
Curve Number = 93 (NEH Part 630, Chapter 9, Table 9-1 and Table 9-5)

**Compute Time of Concentration:** (example uses NEH Part 630, Chapter 15, Velocity Method)
Sheet Flow: 175 feet at 0.019 ft/ft smooth surface
Tc = 0.1 hours




**The redevelopment on this site constitutes reconstruction of more than fifty percent of an existing building or structure. Therefore, all of the stormwater requirements, including quantity and quality control, must be met for the entire site.**

**Post-Development Data**

Site Area = Total Drainage Area (A) = 0.9 Ac
Impervious Area = 74% = 0.67 Ac
Soils Type "D" http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm

Urban | Paved Parking, Roofs, Driveways (excl. ROW) | 100% impervious = 0.67 Ac
Urban | Open Space (lawns, parks, golf, cemeteries) | Good (grass cover >50%) = 0.23 Ac
Curve Number = 93.4 (NEH Part 630, Chapter 9, Table 9-1 and Table 9-5)

**Compute Time of Concentration:** (example uses NEH Part 630, Chapter 15, Velocity Method)
Sheet Flow: 175 feet at 0.019 ft/ft smooth surface
Tc = 0.1 hours

**Critical Storm Calculation**

This example uses a unit hydrograph approach as described in the National Engineering Handbook (NEH) Part 630, Chapter 16, Hydrographs. Per City standards, a NRCS Type II 24-hour design storm is used. The curve number method is used to estimate runoff volume per NEH Part 630, Chapter 10, Estimation of Direct Runoff from Storm Rainfall.

Pre-development: 1-year, 24-hour storm runoff volume = 4,927 CF
Post-development: 1-year, 24-hour storm runoff volume = 5,038 CF

(Post – Pre)/Pre x 100 = Percent of Increase in Runoff Volume = Critical Storm
(5,038 – 4,927)/ 4,927 x 100 = 2.2%
**Critical Storm = 1-year storm**

**TABLE B-7 CRITICAL STORM DETERMINATION**

| CRITICAL STORM DETERMINATION | | |
|---|---|---|
| If the Percent of Increase in Runoff Volume is | | The Critical Storm Runoff Rate Will Be Limited to: |
| Equal to or Greater than | And less than | |
| -- | 10 | 1 year |
| 10 | 20 | 2 year |
| 20 | 50 | 5 year |
| 50 | 100 | 10 year |
| 100 | 250 | 25 year |
| 250 | 500 | 50 year |
| 500 | -- | 100 year |

## On-Site and Off-Site Area Allocation

Supply project location information to Engineering Development Group Civil Engineers, and they will supply the sub-basin information.

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Supplied Information:

**TABLE B-8 EXCERPT FROM CITY OF DUBLIN STORMWATER MASTER PLAN**

| | Design Storm (CFS/Ac) | | | | | | |
|---|---|---|---|---|---|---|---|
| Sub-basin | 1 | 2 | 5 | 10 | 25 | 50 | 100 |
| 80 | 1.8 | 2.4 | 3.1 | 3.7 | 4.6 | 5.5 | 6.4 |

---

Allowable release rate for the critical storm is 1.8 CFS x 0.9 Ac = 1.62 CFS

Show the allocation of on-site and off-site area contributory to the facility for each applicable Stormwater Master Plan sub-basin as follows:

**TABLE B-9 ON-SITE AND OFF-SITE AREA ALLOCATION**

| Sub-Basin Identifier # | On-Site Area (acre) | Off-Site Area (acre) | Total (acre) |
|---|---|---|---|
| 80 | 0.9 | 0 | 0.9 |
| Total (acre) | 0.9 | 0 | 0.9 |

## Maximize Treatment Opportunities

**Convert turf areas to bioretention.**

Available construction area: 0.13 acres = 5,650 SF
Water Quality Volume (WQv): C*(P/12)*A = (1.4)*(0.75/12)*0.9 = 0.079 (ac-ft) = **3,441 CF**

C=runoff quality coefficient (Refer to OEPA Permit No.: OHC000003 for values) or use
$C=0.858i^3-0.78i^2+0.774i+0.04 = 1.4$
where i=fraction of post-const. impervious surface = 0.74
P=0.75 Precipitation depth, inches
A=area tributary to the basin, acres

In this example, bioretention storage volume is calculated assuming vertical movement of water within the bioretention facility is ignored. Hence the time required for the water to filter through a soil or aggregate layer is ignored. Infiltration rates are only used at the bottom of the facility to release the water back into the native soil. The facility is sized to control the allowable peak rate of runoff from the critical storm and the less frequent storm events. Allowable peak rates are included in Table B-10. Following the determination of the size of the bioretention facility to meet the peak rate of runoff requirements, a cross-check is performed to ensure that the facility volume is at least as great as the water quality volume.

**Note that the bioretention total water storage required to control the allowable peak rate of runoff from the critical storm and the less frequent storm events is less than the water quality volume. Therefore, the bioretention facilities will need to be designed with an additional 3,441 CF – 1,903 CF = 1,538 CF of added storage to meet the water quality requirement.**

**Model Results Summary:**
Bioretention surface area required: 1,225 SF
Bioretention total water storage: 1,903 CF
Surface Storage: 8 inches (3H:1V side slope)
Growing Layer: 18 inches (1H:1V side slope)
Drainage Layer: 30 inches (vertical side slopes)
Orifice 1 Offset: 0 inches from bottom of storage layer
Orifice 1 Area: 0.2 SF (6-inch diameter)
Orifice 2 Offset: 55 inches from bottom of storage layer
Orifice 2 Area: 1.6 SF (1.4-foot diameter)
Evapotranspiration: 0.1 inches/day
Infiltration through bottom of SCM: 0.06 inches/hr

**TABLE B-10 TRADITIONAL BIORETENTION STORMWATER DATA**

| | 1-year | 2 year | 5 year | 10 year | 25 year | 50 year | 100 year |
|---|---|---|---|---|---|---|---|
| Predeveloped Q (cfs) | 2.05 | 2.58 | 3.31 | 3.92 | 4.77 | 5.47 | 6.21 |
| Postdeveloped Q (cfs) | 2.09 | 2.62 | 3.35 | 3.96 | 4.8 | 5.5 | 6.24 |
| Allowable Release (cfs) | 1.62 | 2.16 | 2.79 | 3.33 | 4.14 | 4.95 | 5.76 |
| Actual Release (cfs) | 1.38 | 1.65 | 1.95 | 2.03 | 3.84 | 4.88 | 5.67 |
| Surface Water Dewater Time (hr) | Before end of storm | Before end of storm | Before end of storm | Before end of storm | Before end of storm | Before end of storm | Before end of storm |
| Total Dewater Time (hr) | 0.2 | 0.2 | 0.2 | 0.2 | .02 | .02 | .02 |

**Stormwater calculations must be included per Chapter 7. See Example 1: New Development, Alternative 1 for example calculations.**

# APPENDIX C
# SUPPLEMENTAL RAINFALL INFORMATION

**TABLE C-1 RAINFALL INTENSITIES (39.972 N, 83.01 W)**

| Duration | | Intensity, inches/hour | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 1-yr | 2-yr | 5-yr | 10-yr | 25-yr | 50-yr | 100-yr |
| Minutes | 5 | 4.25 | 5.06 | 6.06 | 6.84 | 7.85 | 8.62 | 9.37 |
| | 10 | 3.30 | 3.95 | 4.71 | 5.28 | 6.00 | 6.53 | 7.06 |
| | 15 | 2.70 | 3.22 | 3.86 | 4.33 | 4.94 | 5.39 | 5.84 |
| | 30 | 1.78 | 2.16 | 2.64 | 3.01 | 3.49 | 3.85 | 4.22 |
| Hours | 1 | 1.09 | 1.32 | 1.66 | 1.91 | 2.26 | 2.54 | 2.82 |
| | 2 | 0.636 | 0.771 | 0.966 | 1.12 | 1.34 | 1.51 | 1.70 |
| | 3 | 0.450 | 0.542 | 0.678 | 0.789 | 0.943 | 1.07 | 1.20 |
| | 6 | 0.269 | 0.322 | 0.401 | 0.467 | 0.560 | 0.638 | 0.722 |
| | 12 | 0.156 | 0.187 | 0.232 | 0.270 | 0.323 | 0.368 | 0.416 |
| | 24 | 0.092 | 0.110 | 0.135 | 0.156 | 0.185 | 0.209 | 0.235 |

Source: Bonnin, Martin, Lin, Parzybok, Yekta, Riley, *NOAA Atlas 14, Volume 2, Version 3.0*, 2004. and NOAA Precipitation Frequency Data Server http://dipper.nws.noaa.gov/hdsc/pfds/ June 10, 2012

**OPTIMAL RAINFALL INTENSITY EQUATION COEFFICIENTS AND TIME-TO-PEAK INTENSITY RATIOS**

Source: Froehlich, D.C. (March/April 2009, Errata 2010). Mathematical Formulations of NRCS 24-Hour Design Storms. *Journal of Irrigation and Drainage Engineering.* ASCE. Vol. 135, No. 2, pp. 241-247

| | |
|---|---|
| $i_{p*} = 39.261$ | $rainfall\ intensity\ equation\ coefficient\ (dimensionless)$ |
| $i_{o*} = 0.311$ | $rainfall\ intensity\ equation\ coefficient\ (dimensionless)$ |
| $\eta = 0.0522$ | $rainfall\ intensity\ equation\ coefficient\ (dimensionless)$ |
| $\eta' = 1 - \eta$ | $rainfall\ intensity\ equation\ coefficient\ (dimensionless)$ |
| $m_1 = 0.264$ | $rainfall\ intensity\ equation\ coefficient\ (rainfall\ depth\ units/hr)$ |
| $m_2 = 4.098$ | $rainfall\ intensity\ equation\ coefficient\ (rainfall\ depth\ units/hr)$ |
| $r = 0.493$ | $time - to - peak\ rainfall\ intensity\ ratio\ (dimensionless)$ |
| $t$ | $time\ (hours)$ |
| $t_d$ | $design\ storm\ duration\ (hours)$ |
| $\hat{P}_*$ | $cumulative\ design\ storm\ precipitation\ depth$ |

$$\hat{P}_*(t) = \begin{cases} r\left(i_{p*} - i_{o*}\right)\left[\eta \dfrac{e^{\frac{(-m_1)(rt_d - t)}{r}} - e^{-m_1 t_d}}{m_1 t_d} + \eta' \dfrac{e^{\frac{(-m_2)(rt_d - t)}{r}} - e^{-m_2 t_d}}{m_2 t_d}\right] + i_{o*}\left(\dfrac{t}{t_d}\right) & for\ 0 \le t \le rt_d \\ (1-r)\left(i_{p*} - i_{o*}\right)\left[\eta \dfrac{1 - e^{\frac{(-m_1)(t - rt_d)}{1-r}}}{m_1 t_d} + \eta' \dfrac{1 - e^{\frac{(-m_2)(t - rt_d)}{1-r}}}{m_2 t_d}\right] + i_{o*}\left(\dfrac{t}{t_d} - r\right) + r & for\ rt_d < t \le t_d \end{cases}$$

## TABULAR DISTRIBUTION

Distribution Source: Chow, V. T., Maidment, D. R., Mays, L. W. (1988). Applied Hydrology.

Rainfall Depth Source: Bonnin, Martin, Lin, Parzybok, Yekta, Riley, *NOAA Atlas 14, Volume 2, Version 3.0*, 2004. and NOAA Precipitation Frequency Data Server http://dipper.nws.noaa.gov/hdsc/pfds/ June 10, 2012

### TABLE C-2 NRCS TYPE II DESIGN STORM HYETOGRAPH

| Hour | Type II Mass Curve | Delta Rain | Type II 24-Hour Distribution Rainfall (inches) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Frequency (Depth in inches) | | | | | | |
| | | | 100yr (5.63) | 50yr (5.02) | 25yr (4.44) | 10yr (3.74) | 5yr (3.24) | 2yr (2.63) | 1yr (2.20) |
| 0:00 | 0 | | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 0:15 | 0.002 | 0.002 | 0.011 | 0.010 | 0.009 | 0.007 | 0.006 | 0.005 | 0.004 |
| 0:30 | 0.005 | 0.003 | 0.017 | 0.015 | 0.013 | 0.011 | 0.010 | 0.008 | 0.007 |
| 0:45 | 0.008 | 0.003 | 0.017 | 0.015 | 0.013 | 0.011 | 0.010 | 0.008 | 0.007 |
| 1:00 | 0.0108 | 0.0028 | 0.016 | 0.014 | 0.012 | 0.010 | 0.009 | 0.007 | 0.006 |
| 1:15 | 0.014 | 0.0032 | 0.018 | 0.016 | 0.014 | 0.012 | 0.010 | 0.008 | 0.007 |
| 1:30 | 0.017 | 0.003 | 0.017 | 0.015 | 0.013 | 0.011 | 0.010 | 0.008 | 0.007 |
| 1:45 | 0.02 | 0.003 | 0.017 | 0.015 | 0.013 | 0.011 | 0.010 | 0.008 | 0.007 |
| 2:00 | 0.023 | 0.003 | 0.017 | 0.015 | 0.013 | 0.011 | 0.010 | 0.008 | 0.007 |
| 2:15 | 0.026 | 0.003 | 0.017 | 0.015 | 0.013 | 0.011 | 0.010 | 0.008 | 0.007 |
| 2:30 | 0.029 | 0.003 | 0.017 | 0.015 | 0.013 | 0.011 | 0.010 | 0.008 | 0.007 |
| 2:45 | 0.032 | 0.003 | 0.017 | 0.015 | 0.013 | 0.011 | 0.010 | 0.008 | 0.007 |
| 3:00 | 0.0347 | 0.0027 | 0.015 | 0.014 | 0.012 | 0.010 | 0.009 | 0.007 | 0.006 |
| 3:15 | 0.038 | 0.0033 | 0.019 | 0.017 | 0.015 | 0.012 | 0.011 | 0.009 | 0.007 |
| 3:30 | 0.041 | 0.003 | 0.017 | 0.015 | 0.013 | 0.011 | 0.010 | 0.008 | 0.007 |
| 3:45 | 0.044 | 0.003 | 0.017 | 0.015 | 0.013 | 0.011 | 0.010 | 0.008 | 0.007 |
| 4:00 | 0.0483 | 0.0043 | 0.024 | 0.022 | 0.019 | 0.016 | 0.014 | 0.011 | 0.009 |
| 4:15 | 0.052 | 0.0037 | 0.021 | 0.019 | 0.016 | 0.014 | 0.012 | 0.010 | 0.008 |
| 4:30 | 0.056 | 0.004 | 0.023 | 0.020 | 0.018 | 0.015 | 0.013 | 0.011 | 0.009 |
| 4:45 | 0.06 | 0.004 | 0.023 | 0.020 | 0.018 | 0.015 | 0.013 | 0.011 | 0.009 |
| 5:00 | 0.064 | 0.004 | 0.023 | 0.020 | 0.018 | 0.015 | 0.013 | 0.011 | 0.009 |
| 5:15 | 0.068 | 0.004 | 0.023 | 0.020 | 0.018 | 0.015 | 0.013 | 0.011 | 0.009 |
| 5:30 | 0.072 | 0.004 | 0.023 | 0.020 | 0.018 | 0.015 | 0.013 | 0.011 | 0.009 |
| 5:45 | 0.076 | 0.004 | 0.023 | 0.020 | 0.018 | 0.015 | 0.013 | 0.011 | 0.009 |
| 6:00 | 0.0797 | 0.0037 | 0.021 | 0.019 | 0.016 | 0.014 | 0.012 | 0.010 | 0.008 |
| 6:15 | 0.085 | 0.0053 | 0.030 | 0.027 | 0.024 | 0.020 | 0.017 | 0.014 | 0.012 |
| 6:30 | 0.09 | 0.005 | 0.028 | 0.025 | 0.022 | 0.019 | 0.016 | 0.013 | 0.011 |
| 6:45 | 0.095 | 0.005 | 0.028 | 0.025 | 0.022 | 0.019 | 0.016 | 0.013 | 0.011 |
| 7:00 | 0.1 | 0.005 | 0.028 | 0.025 | 0.022 | 0.019 | 0.016 | 0.013 | 0.011 |
| 7:15 | 0.105 | 0.005 | 0.028 | 0.025 | 0.022 | 0.019 | 0.016 | 0.013 | 0.011 |
| 7:30 | 0.11 | 0.005 | 0.028 | 0.025 | 0.022 | 0.019 | 0.016 | 0.013 | 0.011 |
| 7:45 | 0.115 | 0.005 | 0.028 | 0.025 | 0.022 | 0.019 | 0.016 | 0.013 | 0.011 |

| Hour | Type II Mass Curve | Delta Rain | Type II 24-Hour Distribution Rainfall (inches) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Frequency (Depth in inches) | | | | | | |
| | | | 100yr (5.63) | 50yr (5.02) | 25yr (4.44) | 10yr (3.74) | 5yr (3.24) | 2yr (2.63) | 1yr (2.20) |
| 8:00 | 0.1203 | 0.0053 | 0.030 | 0.027 | 0.024 | 0.020 | 0.017 | 0.014 | 0.012 |
| 8:15 | 0.126 | 0.0057 | 0.032 | 0.029 | 0.025 | 0.021 | 0.018 | 0.015 | 0.013 |
| 8:30 | 0.133 | 0.007 | 0.039 | 0.035 | 0.031 | 0.026 | 0.023 | 0.018 | 0.015 |
| 8:45 | 0.14 | 0.007 | 0.039 | 0.035 | 0.031 | 0.026 | 0.023 | 0.018 | 0.015 |
| 9:00 | 0.1467 | 0.0067 | 0.038 | 0.034 | 0.030 | 0.025 | 0.022 | 0.018 | 0.015 |
| 9:15 | 0.155 | 0.0083 | 0.047 | 0.042 | 0.037 | 0.031 | 0.027 | 0.022 | 0.018 |
| 9:30 | 0.163 | 0.008 | 0.045 | 0.040 | 0.036 | 0.030 | 0.026 | 0.021 | 0.018 |
| 9:45 | 0.172 | 0.009 | 0.051 | 0.045 | 0.040 | 0.034 | 0.029 | 0.024 | 0.020 |
| 10:00 | 0.1808 | 0.0088 | 0.050 | 0.044 | 0.039 | 0.033 | 0.029 | 0.023 | 0.019 |
| 10:15 | 0.191 | 0.0102 | 0.057 | 0.051 | 0.045 | 0.038 | 0.033 | 0.027 | 0.022 |
| 10:30 | 0.203 | 0.012 | 0.068 | 0.060 | 0.053 | 0.045 | 0.039 | 0.032 | 0.026 |
| 10:45 | 0.218 | 0.015 | 0.084 | 0.075 | 0.067 | 0.056 | 0.049 | 0.039 | 0.033 |
| 11:00 | 0.236 | 0.018 | 0.101 | 0.090 | 0.080 | 0.067 | 0.058 | 0.047 | 0.040 |
| 11:15 | 0.257 | 0.021 | 0.118 | 0.105 | 0.093 | 0.079 | 0.068 | 0.055 | 0.046 |
| 11:30 | 0.283 | 0.026 | 0.146 | 0.131 | 0.115 | 0.097 | 0.084 | 0.068 | 0.057 |
| 11:45 | 0.387 | 0.104 | 0.586 | 0.522 | 0.462 | 0.389 | 0.337 | 0.274 | 0.229 |
| 12:00 | 0.6632 | 0.2762 | 1.555 | 1.387 | 1.226 | 1.033 | 0.895 | 0.726 | 0.608 |
| 12:15 | 0.707 | 0.0438 | 0.247 | 0.220 | 0.194 | 0.164 | 0.142 | 0.115 | 0.096 |
| 12:30 | 0.735 | 0.028 | 0.158 | 0.141 | 0.124 | 0.105 | 0.091 | 0.074 | 0.062 |
| 12:45 | 0.758 | 0.023 | 0.129 | 0.115 | 0.102 | 0.086 | 0.075 | 0.060 | 0.051 |
| 13:00 | 0.776 | 0.018 | 0.101 | 0.090 | 0.080 | 0.067 | 0.058 | 0.047 | 0.040 |
| 13:15 | 0.791 | 0.015 | 0.084 | 0.075 | 0.067 | 0.056 | 0.049 | 0.039 | 0.033 |
| 13:30 | 0.804 | 0.013 | 0.073 | 0.065 | 0.058 | 0.049 | 0.042 | 0.034 | 0.029 |
| 13:45 | 0.815 | 0.011 | 0.062 | 0.055 | 0.049 | 0.041 | 0.036 | 0.029 | 0.024 |
| 14:00 | 0.825 | 0.01 | 0.056 | 0.050 | 0.044 | 0.037 | 0.032 | 0.026 | 0.022 |
| 14:15 | 0.834 | 0.009 | 0.051 | 0.045 | 0.040 | 0.034 | 0.029 | 0.024 | 0.020 |
| 14:30 | 0.842 | 0.008 | 0.045 | 0.040 | 0.036 | 0.030 | 0.026 | 0.021 | 0.018 |
| 14:45 | 0.849 | 0.007 | 0.039 | 0.035 | 0.031 | 0.026 | 0.023 | 0.018 | 0.015 |
| 15:00 | 0.856 | 0.007 | 0.039 | 0.035 | 0.031 | 0.026 | 0.023 | 0.018 | 0.015 |
| 15:15 | 0.863 | 0.007 | 0.039 | 0.035 | 0.031 | 0.026 | 0.023 | 0.018 | 0.015 |
| 15:30 | 0.869 | 0.006 | 0.034 | 0.030 | 0.027 | 0.022 | 0.019 | 0.016 | 0.013 |
| 15:45 | 0.875 | 0.006 | 0.034 | 0.030 | 0.027 | 0.022 | 0.019 | 0.016 | 0.013 |
| 16:00 | 0.881 | 0.006 | 0.034 | 0.030 | 0.027 | 0.022 | 0.019 | 0.016 | 0.013 |
| 16:15 | 0.887 | 0.006 | 0.034 | 0.030 | 0.027 | 0.022 | 0.019 | 0.016 | 0.013 |
| 16:30 | 0.893 | 0.006 | 0.034 | 0.030 | 0.027 | 0.022 | 0.019 | 0.016 | 0.013 |
| 16:45 | 0.898 | 0.005 | 0.028 | 0.025 | 0.022 | 0.019 | 0.016 | 0.013 | 0.011 |
| 17:00 | 0.903 | 0.005 | 0.028 | 0.025 | 0.022 | 0.019 | 0.016 | 0.013 | 0.011 |
| 17:15 | 0.908 | 0.005 | 0.028 | 0.025 | 0.022 | 0.019 | 0.016 | 0.013 | 0.011 |
| 17:30 | 0.913 | 0.005 | 0.028 | 0.025 | 0.022 | 0.019 | 0.016 | 0.013 | 0.011 |
| 17:45 | 0.918 | 0.005 | 0.028 | 0.025 | 0.022 | 0.019 | 0.016 | 0.013 | 0.011 |

| Hour | Type II Mass Curve | Delta Rain | Type II 24-Hour Distribution Rainfall (inches) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Frequency (Depth in inches) | | | | | | |
| | | | 100yr (5.63) | 50yr (5.02) | 25yr (4.44) | 10yr (3.74) | 5yr (3.24) | 2yr (2.63) | 1yr (2.20) |
| 18:00 | 0.922 | 0.004 | 0.023 | 0.020 | 0.018 | 0.015 | 0.013 | 0.011 | 0.009 |
| 18:15 | 0.926 | 0.004 | 0.023 | 0.020 | 0.018 | 0.015 | 0.013 | 0.011 | 0.009 |
| 18:30 | 0.93 | 0.004 | 0.023 | 0.020 | 0.018 | 0.015 | 0.013 | 0.011 | 0.009 |
| 18:45 | 0.934 | 0.004 | 0.023 | 0.020 | 0.018 | 0.015 | 0.013 | 0.011 | 0.009 |
| 19:00 | 0.938 | 0.004 | 0.023 | 0.020 | 0.018 | 0.015 | 0.013 | 0.011 | 0.009 |
| 19:15 | 0.942 | 0.004 | 0.023 | 0.020 | 0.018 | 0.015 | 0.013 | 0.011 | 0.009 |
| 19:30 | 0.946 | 0.004 | 0.023 | 0.020 | 0.018 | 0.015 | 0.013 | 0.011 | 0.009 |
| 19:45 | 0.95 | 0.004 | 0.023 | 0.020 | 0.018 | 0.015 | 0.013 | 0.011 | 0.009 |
| 20:00 | 0.953 | 0.003 | 0.017 | 0.015 | 0.013 | 0.011 | 0.010 | 0.008 | 0.007 |
| 20:15 | 0.956 | 0.003 | 0.017 | 0.015 | 0.013 | 0.011 | 0.010 | 0.008 | 0.007 |
| 20:30 | 0.959 | 0.003 | 0.017 | 0.015 | 0.013 | 0.011 | 0.010 | 0.008 | 0.007 |
| 20:45 | 0.962 | 0.003 | 0.017 | 0.015 | 0.013 | 0.011 | 0.010 | 0.008 | 0.007 |
| 21:00 | 0.9653 | 0.0033 | 0.019 | 0.017 | 0.015 | 0.012 | 0.011 | 0.009 | 0.007 |
| 21:15 | 0.968 | 0.0027 | 0.015 | 0.014 | 0.012 | 0.010 | 0.009 | 0.007 | 0.006 |
| 21:30 | 0.971 | 0.003 | 0.017 | 0.015 | 0.013 | 0.011 | 0.010 | 0.008 | 0.007 |
| 21:45 | 0.974 | 0.003 | 0.017 | 0.015 | 0.013 | 0.011 | 0.010 | 0.008 | 0.007 |
| 22:00 | 0.977 | 0.003 | 0.017 | 0.015 | 0.013 | 0.011 | 0.010 | 0.008 | 0.007 |
| 22:15 | 0.98 | 0.003 | 0.017 | 0.015 | 0.013 | 0.011 | 0.010 | 0.008 | 0.007 |
| 22:30 | 0.983 | 0.003 | 0.017 | 0.015 | 0.013 | 0.011 | 0.010 | 0.008 | 0.007 |
| 22:45 | 0.986 | 0.003 | 0.017 | 0.015 | 0.013 | 0.011 | 0.010 | 0.008 | 0.007 |
| 23:00 | 0.9892 | 0.0032 | 0.018 | 0.016 | 0.014 | 0.012 | 0.010 | 0.008 | 0.007 |
| 23:15 | 0.992 | 0.0028 | 0.016 | 0.014 | 0.012 | 0.010 | 0.009 | 0.007 | 0.006 |
| 23:30 | 0.995 | 0.003 | 0.017 | 0.015 | 0.013 | 0.011 | 0.010 | 0.008 | 0.007 |
| 23:45 | 0.998 | 0.003 | 0.017 | 0.015 | 0.013 | 0.011 | 0.010 | 0.008 | 0.007 |
| 0:00 | 1 | 0.002 | 0.011 | 0.010 | 0.009 | 0.007 | 0.006 | 0.005 | 0.004 |

# APPENDIX D

# STORMWATER TREATMENT AND CONTROL FEASIBILITY ASSESSMENT FOR REDEVELOPMENT

The objective of the feasibility assessment is to achieve the maximum practicable degree of treatment and control for Water Quality Volume and Peak Rate of Runoff, while accommodating the space, development, and natural resource constraints on previously-developed sites, and supporting the City of Dublin's community development objectives.

In preparing a Stormwater Management Plan, applicants for redevelopment will evaluate the degree to which stormwater treatment and control can be incorporated to treat runoff from existing and proposed impervious surfaces using the stormwater control measures outlined in this Manual. The final feasibility assessment shall reflect the assessment of the degree to which the treatment and control goals in Table D-1 (as further defined in Chapter 2) can be achieved using the design approaches in Table D-2. In no case shall any applicant be required to undertake any of the measures listed in Table D-3 in developing a Stormwater Management Plan.

**TABLE D-1 TREATMENT AND CONTROL OBJECTIVES**

| | |
|---|---|
| Water Quality Volume (WQv) | Provide treatment of the water quality volume. |
| Peak Rate of Runoff Control | Provide peak rate of runoff control of the critical storm and the less frequent storms. |

**TABLE D-2 ANALYSIS REQUIREMENTS**

| | |
|---|---|
| The objective of the analysis is to identify opportunities to treat and control impervious surface runoff through the use of stormwater control measures, including consideration of the following design techniques:<br>Refer to Example 2: Redevelopment in Appendix B. | |
| 1. | Disconnection or redirection of rooftop drainage or gutters into infiltration areas or vegetated stormwater control measures. |
| 2. | Substitution of vegetated stormwater control measures for curb-and-drain systems, or installation of vegetated stormwater control measures where runoff currently drains overland into surface waters, particularly at edges of impervious surfaces such as parking lots, sidewalks, patios, or buildings. |
| 3. | Substitution of permeable surfacing for impervious surfacing for parking areas, patios, driveways, or public safety access areas. |
| 4. | Substitution of engineered and designed vegetated stormwater control measures for existing turfgrass or other landscaped areas that do not function as stormwater treatment areas. |
| 5. | Maximize treatment by routing flows through bioretention swales whenever possible. |
| 6. | Maximize control of runoff from the critical storm and the less frequent storms through the above techniques and through re-design, retrofit and/or expansion of existing detention structures. If there are no existing detention structures or modification is infeasible, this standard is met. |

**TABLE D-3 DESIGN, TREATMENT AND CONTROL MEASURES NOT REQUIRED**

| | The following measures are NOT required to be utilized for redevelopment sites: |
|---|---|
| 1. | Installation of sub-surface storage or treatment structures. |
| 2. | Purchase or acquisition of additional land. |
| 3. | Demolition of buildings or removal/substitution of existing impervious surfaces to point of interference with either the existing land use or material conditions of any existing land use permits. |
| 4. | Substitution of existing impervious surfaces that are not otherwise planned to be renovated or replaced as part of the redevelopment plan. |
| 5. | Off-site treatment of stormwater. |
| 6. | Site re-grading or site re-contouring to the point of permanent interference with either the existing use of the site or the material conditions of any existing land use permits. |
| 7. | Pumping or otherwise mechanical re-routing of stormwater runoff. |
| 8. | Mechanical or chemical treatment of stormwater. |
| 9. | Infiltration where basement flooding or subsurface pollutant plume transport will occur. |
| 10. | Construction of any infrastructure within the Fluvial Erosion Hazard area of any receiving water or within any wetland or its 50-foot buffer zone. |
| 11. | Removal of mature trees. |

# FRANKLIN COUNTY STORM WATER MANAGEMENT PROGRAM

# Illicit Discharge Detection and Elimination Plan

## Version 2.0
## November 25, 2013

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## Appendix

## SECTION 1.0 Introduction

This document outlines the process that Franklin County and the Townships within Franklin County are taking to address public health concerns and water quality issues related to illicit discharges in their respective jurisdictional areas of unincorporated Franklin County. **Effluent from illicitly connected or malfunctioning Household Sewage Treatment Systems (HSTS) is considered the primary pollutant of concern within the unincorporated area of Franklin County**.

A substantial investment in time, money, and energy is responsible for the progress made to date with defining and documenting the issues surrounding HSTS. These efforts have involved identifying the locations of HSTS throughout Franklin County, Field Verification and Dry Weather Screening (DWS) of Municipal Separate Storm Sewer (MS4) outfalls, mapping of the stormwater sewer system, establishing ordinances and zoning requirements, and planning for community education, outreach and the means for addressing illicit discharges.

The National Pollution Discharge Elimination System (NPDES) Small MS4 Stormwater General Permit (OHQ000002) defines regulated MS4s as MS4s which are owned and operated by the permittee and located within the Urbanized Areas as defined by the 2010 census. Figure 1.0 shows the Urbanized Areas of Franklin County; refer to Appendix B– Definition of Urbanized Areas.

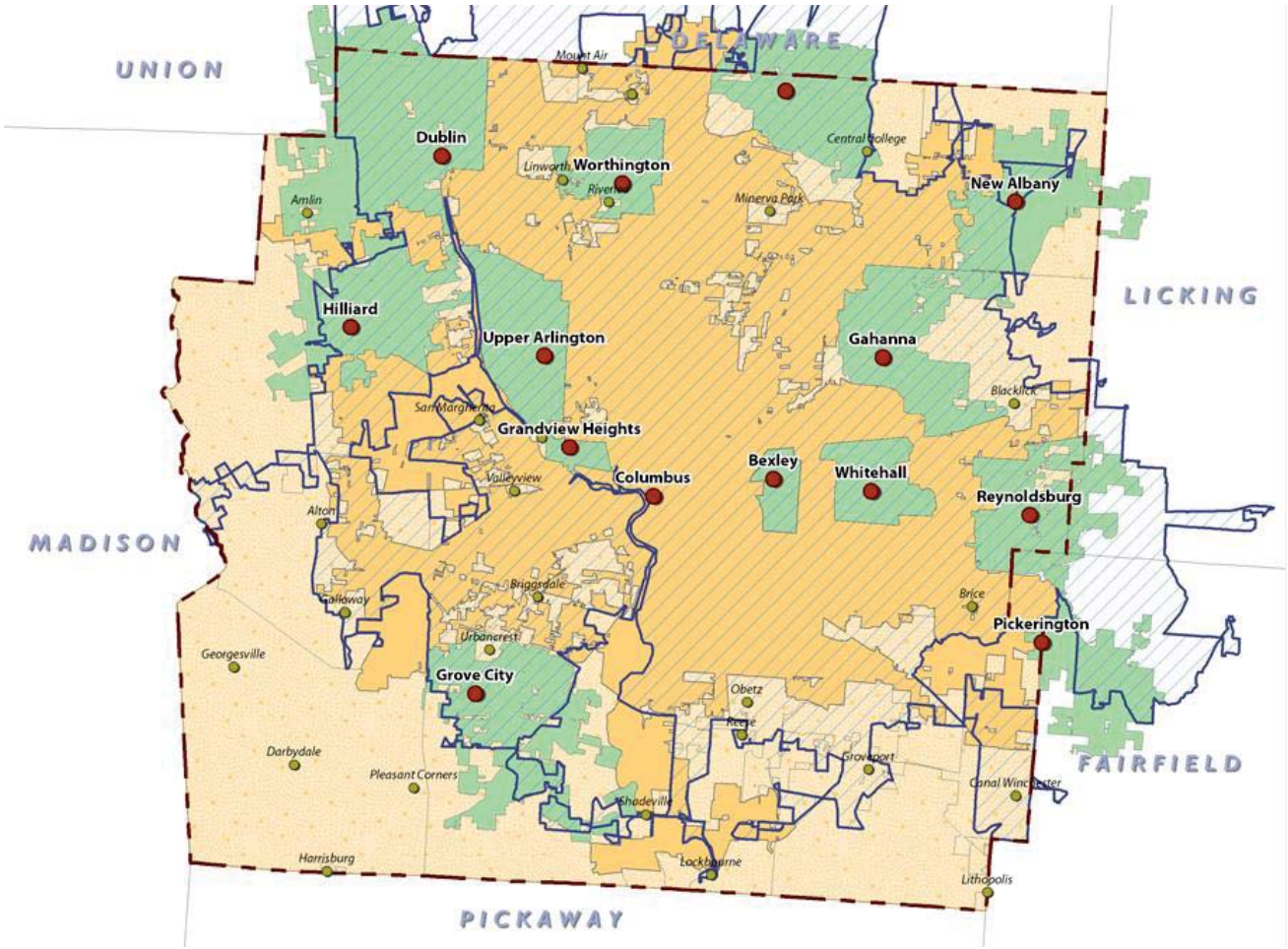



**Figure 1.0 Urbanized Areas of Franklin County. The urbanized areas are the 'hatched' areas within the blue boundary. Shown with pre-2010 census update for urbanized area.**

While it is the obligation of Franklin County and its co-permittees to address illicit discharges in the areas defined by these two criteria**, a more comprehensive goal was determined to be appropriate for the permittees' water quality efforts**. This decision was based on two predominant factors. First, many of the entities contributing to meeting the requirements of the permit are responsible for the whole of their jurisdiction, not only the areas designated as Urbanized Areas. As such, the belief is that all residents are due the efforts of the various county agencies and none should be ignored when public health risks exist. Secondly, due to the irregular boundaries of the municipalities in Franklin County, the areas of responsibility are disparate. Including another 'imposed' boundary only adds to greater segregation and increased difficulty in planning and tracking process. As such, it is the goal of Franklin County and its co-permittees to address illicit discharge issues within their entire jurisdictions.

Within the unincorporated areas of Franklin County, the use of HSTS is prevalent and widespread. The identification, permitting and regulation of illicitly connected, discharging and malfunctioning HSTS very costly to address both financially and in terms of human resources. However, in keeping with the published guidelines for the NPDES Small MS4 Stormwater General Permit (OHQ000002), Franklin County and its co-permittees are undertaking the task of addressing illicit discharges to the maximum extent practical and as is legally, feasibly, and economically, viable.

## *SECTION 2.0 Policy Statements and Guiding Principles*

FCPH, FSWCD, and the Franklin County officials responsible for the implementation of the Franklin County NPDES Storm Water Program developed policy statements and guiding principles for the community to understand the framework and strategies that will be adhered to when working towards meeting the permit requirements summarized. These policy statements and guiding principles are outlined as follows:

1. Empower the public by distributing educational materials and information about the impacts of stormwater discharges on water bodies and the steps they can take to reduce pollutants in stormwater runoff. Inform public employees, businesses and the general public of the hazards associated with illegal discharges, improper disposal of waste and the improper operation and maintenance of HSTS.
2. The OEPA through NPDES Permit No. OHQ000002 requires that permittees identify on-site sewage disposal systems connected to discharge to their regulated MS4. FCPH is identifying these systems and conducting an operation and maintenance program to identify and correct systems causing a public health nuisance as defined by ORC 3718 and Franklin County Public Health Regulation 720.
3. As required by Ohio law and the OEPA NPDES Permit No. OHQ000002, FCPH will enforce the public health nuisance statute as defined in ORC Chapter 3718 and Franklin County Public Health Regulation 720.
4. It is recommended that citizens monitor their access to and exposure in ditches and streams that may be contaminated with bacteria from discharging HSTS, and that those living in homes with drinking water supplied by private wells test their well water frequently if there is any concern that contamination may be occurring from any source, including soil absorption HSTS.
    a. Bacterial contamination standards for streams and ditches are set by the OEPA and are applied to exposures (ingestion of surface water) from recreational use of that stream or other waterways such as canoeing, fishing, wading, and swimming.
5. Franklin County officials will continue to work with townships, surrounding communities, and the City of Columbus to identify pollution sources from these jurisdictions entering Franklin County's MS4s, opportunities for sewer extensions, and alternatives for treating household sewage. County and Township officials will also continue to look for funding opportunities to

finance sewer extensions as well as address economic hardship situations for low-income residents to connect to sanitary sewer or to upgrade or replace their HSTS.

6. FCPH and the FSWCD will develop long-range strategies to minimize illicit discharges and promote proper operation/maintenance of HSTS countywide. Franklin County officials realize that any long-range plan needs to be flexible and reviewed annually to adapt to changes in the regulatory environment, the availability of funding mechanisms, and other unforeseen social, political, or economic conditions.
7. FCPH maintains an operation/maintenance program for all aeration treatment systems that discharge to MS4s, watercourses, field tiles or other sources. This program includes permitting, annual observations of the discharging system, and enforcement of applicable laws and regulations when malfunctioning aeration treatment systems that create illicit discharges and/or public health nuisances.
8. FCPH is evaluating the development of a countywide operation/maintenance program for all soil absorption systems. This program may require owners of soil absorption systems to have an operation permit. The permit period and frequency of inspections is to be determined.
9. FCPH has been granted authority by Ohio EPA through a MOU to conduct inspections of semi-pubic treatment systems in Franklin County. FCPH also has authority under ORC 3718 to inspect small-flow treatment systems. Some of these treatment systems are discharging systems. These systems are to be inspected on an annual basis and enforcement of public health nuisances caused by these systems is the responsibility of FCPH.

See **Figure 3.1 HSTS in unincorporated Franklin County**, below, showing the distribution of various types of HSTS throughout Unincorporated Franklin County.

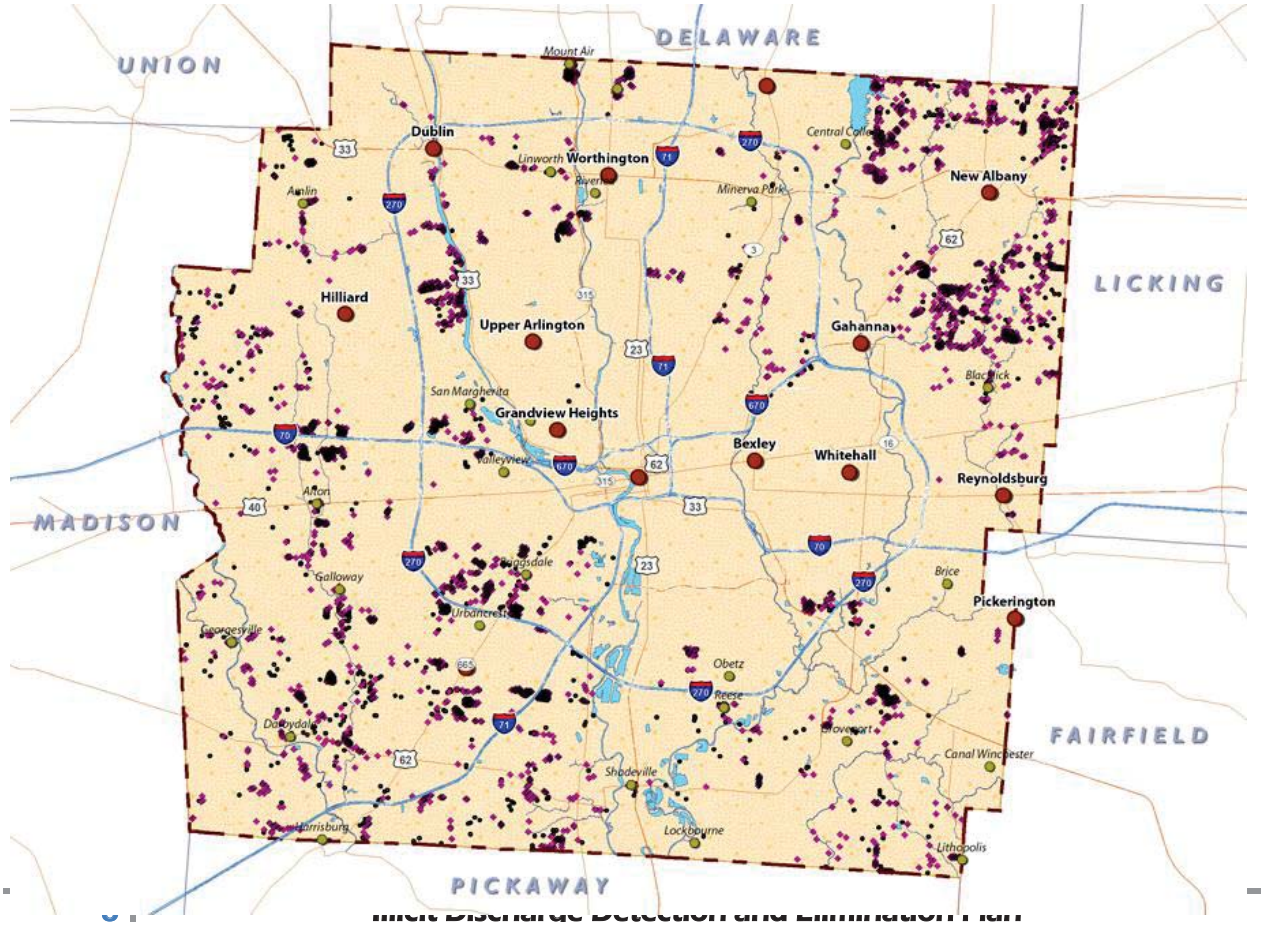



**Figure 3.1 – HSTS in unincorporated Franklin County**

## SECTION 3.0 General Permit Information

This document was produced to communicate steps being taken to improve water quality and meet the requirements of NPDES Small MS4 Stormwater General Permit (OHQ000002) through which stormwater discharges of Franklin County and the townships within Franklin County are permitted. General Permit (OHQ00002) was made effective on January 30, 2009, and is to remain in effect until January 29, 2014. This document is subject to periodic updates as progress is made with the various requirements of the permit and as OEPA clarifies or modifies the language of the permit.

> "*As authorized by the Clean Water Act, the National Pollutant Discharge Elimination System (NPDES) permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States. Point sources are discrete conveyances such as pipes or man-made ditches…. Since its introduction in 1972, the NPDES permit program is responsible for significant improvements to our Nation's water quality."* (Source: http://cfpub.epa.gov/npdes/index.cfm )

Franklin County and the townships work cooperatively as co-permittees to meet the requirements of NPDES Small MS4 Stormwater General Permit (OHQ000002), the Franklin County Commissioners are the Permittee with the County Engineer and the 17 townships as Co-Permittees. Through this arrangement, the co-permittees meet or exceed the requirements of the permit utilizing a more comprehensive approach and a more efficient use of resources than would be possible if each co-permittee operated individually. The Franklin County Drainage Engineer is the primary contact for all concerns related to the NPDES Permit.

In accordance with Part III of NPDES Small MS4 Stormwater General Permit (OHQ000002), a Stormwater Management Program (SWMP) was designed to reduce the discharge of pollutants to the maximum extent practicable (MEP) from the permitted MS4 owned and operated by the co-permittees and to satisfy the appropriate water quality requirements of Ohio Revised Code (ORC) Chapter 6111, related to water pollution control, and the Federal Clean Water Act. The SWMP addresses the following six Minimum Control Measures (MCM):

1) Public education and outreach
2) Public participation / involvement,
3) Illicit discharge detection and elimination (IDDE)
4) Construction site runoff control
5) Post-construction runoff control
6) Pollution prevention / good housekeeping for municipal operations.

This document memorializes the plan specified in Part III, Section 3.e of the NPDES Small MS4 Stormwater General Permit.

## SECTION 3.1 Supporting Documents

This document does not stand in isolation but rather supports the greater water quality efforts as described in the document titled Franklin County and Township Stormwater Management Program (SWMP)

## SECTION 3.2 Coordinating Agencies

This document reflects the cooperative effort by several departments and agencies dedicated to addressing public health issues and protecting and managing water resources. The following partner agencies are involved with this effort:

Franklin County Commissioners
Franklin County Engineer (FCE)
Franklin County Drainage Engineer (FCDE)
Franklin County Townships:
Blendon, Brown, Clinton, Franklin, Hamilton, Jackson, Jefferson, Madison, Mifflin, Norwich, Perry, Plain, Pleasant, Prairie, Sharon, Truro, Washington
Franklin County Sanitary Engineer (FCSE)
Franklin County Public Health (FCPH)
Franklin Soil and Water Conservation District (FSWCD)
Franklin County Economic Development and Planning (FCEDP)
Franklin County Public Facilities Management (FCPFM)
Franklin County Fleet Management (FCFM)
Mid-Ohio Regional Planning Commission (MORPC)

## SECTION 4.0 Public Health Nuisance

Franklin County Public Health staff has the authority to enforce Franklin County Public Health Regulation 720 (http://myfcph.org/pdfs/regs/720Sewage.pdf) and Ohio Revised Code 3718.011 and 6111 for the resolution of illicit discharges determined to be causing a public health nuisance. It is important to note that while various HSTS discharge effluent; these discharges may or may not be illicit discharges. As a general rule of thumb, if the HSTS discharging effluent is 'operating as intended', the resulting discharge is NOT an illicit discharge. These determinations are undertaken by FCPH.

## SECTION 5.0 Local Controls Related to Stormwater Regulation

Ohio Revised Code; Chapters:

3707
3709
3718
3767

Franklin County Public Health Regulation 720

## SECTION 6.0 HSTS, and Stormwater Mapping

Franklin County Phase II NPDES Stormwater Permit partner agencies have made significant strides in mapping stormwater infrastructure and HSTS in the unincorporated areas of Franklin County. This effort has developed as three separate, but interactive and overlapping efforts which used "*Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessments"*, developed by Center for Watershed Protection as a guiding document at the inception of the efforts.

To date, these three efforts are referred to as: 1. Stream Resource Geodatabase, 2. Outfall Reconnaissance Inventory (ORI), and 3. MS4 mapping. Each of these efforts were developed by means of a Geographic Information System (GIS) utilizing, field data, engineering plans, geo-referenced aerial photography, and various other shared digital data sets.

## SECTION 6.1 Stream Resource Geodatabase

The Stream Resource Geodatabase project was initiated in 1995 to map petitioned drainage improvements in Frankly County. From 2001 through 2007, this dataset was greatly expanded in conjunction with the ORI (See below) to include a much higher resolution drainage layer developed from field verification work and increased access to high-resolution aerial photography. This enhanced dataset includes directionality of flow, United States National Hydrography Dataset nomenclature, stormwater connectors, and a variety of other descriptive attributes. This dataset documents the 'Waters of the State' as defined in the NPDES permit as well as subsurface drainage components when these data layers are available.

The connectivity and directionality inherent in this data set allows users to discern directions of flow for all segments of the dataset. This ability allows users to determine where the stormwater will flow from any given location, as well as the structures and/or features that contribute flow to any given location. All of the features within this dataset are associated with stream names as well as the larger watersheds.

This dataset continues to be updated as additional data is obtained through field work and as new stormwater sewer locations are made available. FSWCD has dedicated a full time staff position to this effort since 2001.

## SECTION 6.2 Outfall Reconnaissance Inventory (ORI)

The ORI was undertaken from 2001 through 2007. This project required extensive field work, as Franklin Soil and Water staff walked over 1,600 miles of stream and using Global Positioning System (GPS) data loggers with sub-meter accuracy, collected the geospatial location and descriptive attributes of all public and private drainage features. All data was differentially corrected, manually adjusted to match current aerial photography and imported into a file geodatabase with links to digital photos from the field. This point database is currently comprised of over 40,000 data points categorized by watershed. In excess of permit requirements, the ORI included an initial Dry Weather Screening (DWS) of all drainage features. This process requires field inspection of drainage features during periods of dry weather. Dry weather for this screening is defined as having a maximum of 0.1" of rain during the previous 72 hours. This 'dry weather' protocol helps to minimize flows due to rain or snow melt events and highlights illicit discharges.

The DWS conducted with the ORI entailed recording a variety of characteristics for each feature screened, including a physical description of the drainage feature, any indicators suggesting an illicit discharge, and a digital photograph of the feature. GPS data loggers were used to record the location and descriptive information of the features. The data was then processed, analyzed, and mapped utilizing GIS. The analysis assisted in determining which drainage features are likely to contain illicit discharges. **(Refer to Appendix D for the specific characteristics recorded for the various drainage features during DWS)**

The groups of features screened during ORI were:

**Flowing Pipes**: outfalls with flow at the time of screening

Note: outfalls with flow within catch basins are included in this group

**Non-Flowing Pipes**: outfalls with no flow at the time of screening

Note: outfalls without flow within catch basins are included in this group

**Flowing Channels**: constructed or man-made channels with flow at the time of screening

**Non-Flowing Channels**: constructed or man-made channels without flow at the time of screening

**Catch Basins**: catch basins with or without flow at the time of screening

**Generic Points**: locations not fitting into the above categories, but which are of interest to stormwater management and illicit discharges: i.e. seeps, unknown water sources, dump sites, etc.

In addition to the features dry weather screened, the locations of crossovers (drainage passing under roadways or structures), and manholes were collected to assist in developing stormwater flow lines in the Stream Resource Geodatabase. To allow efficient referencing and tracking of the features dry weather screened, a nomenclature was developed for the various types of features screened which associated each feature with the year it was screened and the township in which it is located**.** FSWCD has coordinated with FCPH and the FCEO on the ORI since 2006 and has dedicated one full time employee and at least two additional seasonal staff on a yearly basis to this effort. **(Refer to Appendix C for an explanation of the nomenclature used with ORI/DWS)**

### SECTION 6.2.1 *Identifying Potential Illicit Discharges*

Features are categorized by their potential to be a source of illicit discharge and whether or not they are an obvious (severe) source of an illicit discharge. The criteria used to identify potentially illicit discharges are considered stand-alone indicators. These are odor, color, floatables, poor pool quality, benthic growth, and deposits and stains. The presence of at least one of these criteria can designate the outfall as potentially illicit.

It is important to identify obvious (severe) sources of illicit discharge during dry weather screening, because the presence of obvious indicators (e.g. raw sewage) allows that feature to be prioritized for future follow-up investigation and resolution. For a location to be determined as an obvious (severe) source of an illicit discharge, it must have at least one of several specific, pre-defined stand-alone indicators. **(Refer to Appendix E for criteria used for classifying illicit discharges)**

### SECTION 6.2.2 Effluent Sampling

To better understand what was being observed during ORI and to verify the accuracy of the dry weather screening conducted with the ORI, follow-up effluent sampling of potential illicit discharges was done for the first several years of the ORI. These water samples were processed at an OEPA certified lab to determine the amounts of pollutants such as Ammonia, Ammonia Nitrogen, E. Coli, Fecal Strep, Fecal Coliform, Methylene Blue Active Substances (MBAS), and Ortho Phosphates. These lab results were included in the GIS and provided to FCPH.

This additional step confirmed the accuracy of the dry weather screening process and due to this has been discontinued as part of the screening process.

### SECTION 6.2.3 Dry Weather Screening of MS4 Outfalls

The permit requires permittees to conduct an initial Dry Weather Screening of their regulated MS4 outfalls during the term of the permit. With the consent of the OEPA, the far more comprehensive ORI conducted by FSWCD and the co-permittees during the terms of the first and current generations of the NPDES Small MS4 general permits was substituted for this permit requirement. With the ORI now complete, DWS of regulated MS4 outfalls will be conducted such that each outfall is screened at least once during each permit term.

## SECTION 6.3 MS4 Mapping

Starting in 2010, a cooperative effort between the FCDE and FSWCD was initiated to develop stormwater sewer mapping (MS4) for areas of Franklin County and the 17 townships. This mapping involves referencing engineering drawings as well as field verification of features and feature locations for the development of several GIS data layers. This data is being developed for incorporation into the existing Stream Resource Geodatabase, and will be added to the Stream Resource Geodatabase as the data becomes available.

This effort will also require cooperation and coordination with the townships due to the lack of storm sewer mapping through a majority of the township jurisdictions. There is considerable institutional knowledge on the location and condition of the storm sewers, but this knowledge has not historically been translated into plans (hard copy or digital).

## SECTION 7.0 FCPH Operation and Maintenance Program

FCPH maintains an operation/maintenance program for all aeration treatment systems that discharge to MS4s, watercourses, field tiles or other sources. This program includes permitting, annual observations of the discharging system, and enforcement of aeration treatment systems that create public health nuisances and/or illicit discharges. Water Quality environmental health technicians conduct annual observations of all aeration treatment units in Franklin County as per the operation/maintenance program. If by the second observation, the system does not appear to be functioning correctly, a referral to a registered sanitarian for further investigation and enforcement.

## Section 7.1 FCPH IDDE Program Investigations and Enforcement

IDDE Program staff sanitarians are responsible for investigating all sewage nuisance complaints. The nuisance complaints investigated by staff sanitarians come from the FCPH Operation and Maintenance Program, complaints from the general public, and referrals from partner agencies. When it is alleged or a complaint is made that an HSTS is causing a public health nuisance as defined in R.C. 3718.011 and/or Regulation 720, then Public Health has the authority to investigate such complaints and allegations. Upon staff verification of a public health nuisance , the abatement process for public health nuisances will be followed as outlined in Appendix G and the "Franklin County And Township Stormwater Management Program 2009 – 2013" document.

## Section 7.2 Connection to Central Sanitary Sewer

Public Health possesses the authority to require that whenever a central sanitary sewerage system is determined to be available and accessible to a property with an HSTS, the household sewage treatment system shall be abandoned and the house sewer directly connected to the central sewerage system. This authority applies regardless of the manner by which the sanitary sewerage system was constructed, or the operational condition of the HSTS. A similar process of enforcement will be followed as outlined in the "Franklin County And Township Stormwater Management Program 2009 – 2013" document, which may include issuing to the property owner Notice(s) of Violation, a Board of Health Order, or filing for injunctive relief in Franklin County Municipal Court, Environmental Division.

## SECTION 7.3 Identified Areas of Concern

In addressing the topic of prioritizing IDDE activities, a historical perspective of public health risks and sanitary sewer needs in Franklin County needs to be explored. Efforts were initiated in 1990 by the FCSE to address several areas identified as having the worst 'known' sewage problems. It must be remembered that at this point in time, there were no comprehensive datasets or objective analysis of these problems; these areas were derived from subjective interpretation of the then-current staff. These areas were known as Water Quality Partnership Areas (WQP) and were divided into Tier I and Tier II areas. The Tier I areas consisted of 21 locations for which the City of Columbus agreed that they would provide sanitary sewer services without requiring annexation to the City of Columbus. The Tier II areas consisted of eight areas with the same severity of pollution issues as the Tier I areas, however the City of Columbus would not agree to provide sanitary sewer services to these areas unless they agreed to be annexed into the City of Columbus.

Between 1990 and 2010, all but 5 of these Tier I and Tier II areas received sanitary sewers, or had active sanitary sewer projects. This effort, while not originally part of the NPDES purview, served as a point of origin for the efforts which are now part of the NPDES Small MS4 Stormwater General Permit (OHQ000002). As the ORI and associated DWS was conducted, it was discovered that there were many other locations in Franklin County, aside from the original 28 WQP areas, that had discharging and non-discharging (soil absorption) HSTS that were aging and potentially causing public health nuisances. As the terminology of the NPDES permits came into use, illicitly connected or malfunctioning HSTS became known as illicit discharges. By default, as plans were implemented to provide sanitary sewer services to these areas, hundreds of discharging HSTS were disconnected from the MS4s, an explicit goal of the NPDES.

Through the ORI activities, it became apparent that there were areas throughout Franklin County that equaled or exceeded the number and/or density of marginal HSTS found in the original WQP areas, and it was decided that a means of quantifying and visualizing the ORI data needed to be developed even though it only showed a specific point in time. Starting in 2010 GIS analysis was undertaken in an attempt to define relative health risk related to environmental variables for the unincorporated areas of Franklin County. This analysis took into account variables related to the results of the ORI, locations of aeration HSTS (Figure 3.1), and density of housing. Through this relative health risk analysis, it was determined that there were areas throughout Franklin County that equaled or exceeded the original water quality partnership areas in terms of public health risks, and it became apparent that a multitude of approaches was needed to address the illicit discharges. A ranked list of Identified Areas of Concern was developed using the results of the analysis.

This analysis provided a more holistic understanding of potential HSTS issues throughout unincorporated Franklin County which the County has been able to use to continue outreach to and education of county residents. As FCPH advances its IDDE Program Investigations and Enforcement activities, these areas will be used as a reference for assisting with planning and approaches to investigating and addressing HSTS related issues. Refer to **Appendix F** for a map of the Identified Areas of Concern. The lower area numbers (i.e. 1,2,3) are the locations with the 'highest' rankings.

## SECTION 7.4 Public Health Nuisance Abatement Process

Franklin County and its co-permittees, have made great strides in documenting and analyzing the extent of illicit discharges in Franklin County – the overwhelmingly predominant issue being HSTS. In addressing the health risks to Franklin County residents, and in keeping pace with the NPDES permit requirements, a thorough, cooperative, multi-faceted approach between Franklin County and co-permittees to address these illicit discharges is underway.

Franklin County Public Health staff has the authority to enforce Franklin County Public Health Regulation 720 (http://myfcph.org/pdfs/regs/720Sewage.pdf) and Ohio Revised Code 3718.011 and 6111 for the resolution of illicit discharges determined to be causing a public health nuisance.

**FCPH will continue to investigate all public health nuisance complaints** related to failed or failing HSTSs reported by normal channels, though the failed HSTS hotline, FCPH website and e-mail as they are received **whether or not the complaints are affecting the MS4**. Any aeration treatment system that fails its annual observations/inspections will be referred to IDDE Program sanitarians to investigate and determine if a public health nuisance exists. Enforcement and abatement processes will proceed as outlined in Appendix G and the *"Franklin County And Township Stormwater Management Program 2009 – 2013"*.

***See Appendix G for a flow chart of the Public Health Nuisance Abatement Process***

## SECTION 8.0 Identifying Aeration systems Connected to the MS4

During 2011 and 2012, FCPH Water Quality Program staff verified aeration system connections to the MS4 using various investigation methods. Please note that the complete inventory of MS4's have not been identified and mapped as of 2013 and it is expected that the effort for the first pass at mapping will take several additional years. Staff used a current billing list of all aerators on the FCPH annual operational inspection program. They reviewed permit records for notations regarding the discharge point of the aeration system (storm sewer, ditch, stream, waterway, etc.). Staff members then field verified the discharge point of any aeration systems that they could not be 100% certain were not connected to the MS4. To field verify these potential connections, staff may have used dye tests, probing for discharge pipes, and sampling results from the Dry Weather Screening of storm sewers. Upon the determination of connections to the MS4, staff from FCPH created a database layer that will be mapped using Geographic Information System (GIS) software to meet NPDES requirements. These identified potential connections to MS4s will be routinely checked, and this list further refined by staff of the IDDE and Water Quality Programs as routine aeration treatment system observations and complaint investigations are conducted.

## SECTION 9.0 Communication and Outreach

The success of the IDDE plan depends, in part, on communicating it to the stakeholders and the public affected, and on providing the opportunity for community participation and input from various venues. The goal of this communication and outreach is for the community to understand the IDDE plan, why it is required and its purpose, who is responsible for its implementation, when and how it will be implemented, and how it may affect their lives.

Franklin Soil and Water Conservation District is facilitating a communication and outreach advisory group composed of the Public Information Officers (PIO's) from FCPH, Franklin County, and FSWCD. The purpose of this group is to prepare consistent messages and communication strategies for the agencies involved in meeting the requirements of the Franklin County NPDES Storm Water Permit to use in outreach and educational efforts for the community.

The following is the Communication Planning Tool that will be used to guide our outreach and education efforts.

## SECTION 9.1 IDDE Communication Plan

**Communication Goal**

Franklin County will continue to provide education and outreach regarding the operation, maintenance, and discharge of home sewage treatment systems. Citizens and property owners living within unincorporated Franklin County (with a focus on the urbanized areas subject to the Franklin County Phase II Storm Water Permit) will have a better understanding of the environmental and public health concerns associated with illicit discharges such as hazardous chemicals and failed Household Sewage Treatment Systems (HSTS) and semi-public sewage treatment systems discharging into a MS4. This understanding will include: the NPDES Storm Water Permit requirements that require specific actions by homeowners of failing HSTS, including application to Ohio EPA for new HSTS systems; the scientific facts about the risks associated with failed HSTS; the options available to residents in areas at higher risk for exposure to waterborne pathogens as a result of failing systems to protect their health and the environment; and where citizens can report illicit discharges and failed HSTS.

**Communication Objectives**

Franklin County, through its MOUs with FCPH and the FSWCD will meet the goal of the communication plan by continuing to develop and maintain resources and activities in the form of written materials for community forums, websites, mailings, brochures, news releases, and displays. FCPH and the FSWCD will make these resources available to county and township partners for use in conjunction with their community outreach and education programs and venues.

**Future Communication and Outreach**

This communication plan outlines action steps for the second-generation permit. Franklin County intends this Plan to serve as a blueprint for its activities, but recognizes that communication plans often require adjustment to deliver effective messages. As such, it intends to review this plan periodically to ensure effective outreach and education. The central hub of the communication plan is an IDDE information website hosted at FCPH (myfcph.org) with a link to the Franklin County Storm Water Program website. This website provides education and information for the public including definitions, background of the problem, areas of concern for public health risks from failing HSTS, tips for homeowners to reduce their risk of disease, and plans for addressing these concerns.

Educational brochures, displays, and presentations for property owners and communities will supplement these websites. These educational tools will increase awareness about identifying and reporting illicit discharges, eliminating illicit discharges, and managing private and semi-public sewage treatment systems to minimize environmental and public health risks.

As previously stated, communication planning will continue to evolve with input from the Franklin County Storm Water Executive Committee (FCSWEC) and county Public Information Officers to educate communities and individuals on the implementation of the broader IDDE Plan and other NPDES Permit requirements.

**a) Communication to all Residents of Townships**

The general requirement in the NPDES Permit mandating communications on illicit discharges is to inform our citizens of the hazards associated with illegal discharges and improper disposal of waste.

FCPH has developed a website dedicated to providing an overview of the County's NPDES Storm Water Permit, information about HSTS, the process of identifying and eliminating failing HSTS, health risks associated with failing HSTS, enforcement methodology being employed by FCPH and an interactive map showing identified areas of concern related to concentrations of HSTS. This website will be periodically updated and can be found on the web at: http://myfcph.org/npdes.php

Brochures, designed by FCPH, focus on operation and maintenance of HSTS, especially those HSTS that discharge to the MS4. These brochures include information about the potential for public health risks caused by failing HSTS, and how citizens can identify and report public health nuisances caused by failing HSTS. FCPH will provide a phone number, e-mail address, and web address for reporting failing HSTS or for additional information on questions or concerns related to HSTS

**b) Direct communication to owners of aeration treatment systems**

Beginning in 2013, FCPH will include an educational brochure in all annual operation and maintenance permit applications for aeration treatment systems. This brochure will focus on how to maintain an aeration treatment system, prevent water pollution, and how to report failing HSTSs.

## SECTION 10.0 Reporting Illicit Discharges

The IDDE Program benefits from citizen reports regarding spills, illegal dumping, sewage and other observed pollution. Various avenues for reporting are available to the community depending on the material or liquid being discharged. The Franklin County Engineer, Franklin County Drainage Engineer, Franklin Soil and Water Conservation District, Franklin County Economic Development and Planning, Franklin County Sanitary Engineer and Franklin County Public Health receive reports regarding pollution in storm sewers, ditches and waterways. The corresponding agencies take this information and forward it to the responsible agency. Specific information on agency responsibility can be found below and is published in educational information found on websites and in brochures.

Citizens are encouraged to report any water pollution related complaint or concern outside of HSTS and emergency chemical spills to Franklin Soil and Water Conservation District (614) 486-9613.

Non- emergencies can also be report to Ohio EPA Central District Office at 1-800-686-2330.

Questions or concerns regarding the county storm water management program can be directed to the county drainage engineer's office at 614-525-3030.

In addition, the Board of Commissioners' new Franklin County app has a water-pollution-reporting function that can send location information and a photograph directly to FSWCD for dissemination to appropriate agencies. There is an iOS version and an Android version of the app available for download.

## SECTION 10.1 Reporting Chemical Spills and Illegal Dumping Into Storm Sewers

The OEPA maintains a task force of responders for complaints of emergency chemical spills into the waters of the state. The toll-free 24/7 hotline is 800-282-9378. More information can be found at http://www.epa.ohio.gov/derr/ersis/er/er.aspx. FCPH has an after-hours emergency phone number for calls outside of business hours for emergency chemical spills **affecting the Franklin County MS4** at 614-525-3965.

## SECTION 10.2 Reporting Sewage in Storm Sewers from Aeration Treatment Systems or Failed HSTS

This pollution source is a priority pollutant for our IDDE program. The Franklin County Engineer, the Franklin County Drainage Engineer, the Franklin Soil and Water Conservation District, and Franklin County Public Health will receive complaints about sewage found in storm water or storm sewers. If the complainant calls any one of these agencies, the complaint will be forwarded to FCPH for investigation. Intra-agency reports of non-functioning HSTS will also be forwarded to FCPH.

The Franklin County Public Health, IDDE Program staff are responsible for addressing pollution reports related to sewage. They can be contacted by calling 614-525-HSTS, reporting online at http://www.fcbhforms.org/view.php?id=31 or e-mailing HSTS@franklincoluntyohio.gov.

## SECTION 11 Complaint Management, Tracking and Response

Upon receiving sewage related complaints, IDDE Program staff at FCPH will log the complaint into an Environmental Health tracking software system which automatically assigns a unique complaint number to track it until abated or dismissed. All the activity related to that complaint number will be logged and tracked using the same software package and/or additional software as necessary. Staff will determine the source of the sewage by dye testing or other methods, and work to remove or mitigate the pollution source from the MS4 through notice of violations, Board of Health orders, or legal mechanisms though the court system if necessary. In addition, the Franklin County Drainage Engineers Office is developing a Service Request Manager to be used in the IDDE program for tracking complaints, coordinating and tracking responses from the Franklin County Stormwater Partnership agencies.

# FRANKLIN COUNTY STORM WATER MANAGEMENT PROGRAM

# Illicit Discharge Detection and Elimination Plan

# Appendix

List of Appendices:

# Appendix A: Definitions and Acronyms

# Appendix A: Definitions and Acronyms

**ATU:** Alternative Treatment Unit :An onsite wastewater treatment system that provides enhanced treatment beyond the level of treatment provided by a conventional septic system. Alternative treatment systems may consist of multiple components and achieve higher levels of treatment by providing an aerobic environment for bacteria to break down wastewater i.e. 'aeration'.

**BMP**: Best Management Practices: means schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of surface waters of the State. BMPs also include treatment requirements, operating procedures, and practices to control runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

**CC:** Colony Count

**CWA:** Clean Water Act (33 U.S.C. §1251 et seq. (1972)): establishes the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters. The basis of the CWA was enacted in 1948 and was called the Federal Water Pollution Control Act, but the Act was significantly reorganized and expanded in 1972. The "Clean Water Act" became the Act's common name with its amendments in 1977 (US EPA). The CWA provides the statutory basis for the NPDES permit program and the basic structure for regulating the discharge of pollutants from point sources to waters of the United States. Section 402 of the CWA specifically requires EPA to develop and implement the NPDES program.

**DWS:** Dry Weather Screening; the in-field process undertaken to fix the geospatial location of outfalls, record basic characteristics of the outfalls, and screen for illicit discharges and their relative severity. This field work is conducted only during periods of dry weather.

**E.coli:** An indicator often screened for during IDDE programs; Escherichia coli, is a species of fecal coliform bacteria that is specific to fecal material from humans and other warm-blooded animals. EPA recommends E. coli as the best indicator of health risk from water contact in recreational waters. Ohio's surface water quality standards are in the process of being revised. In the Draft Revisions to Water Quality Standards Ohio Administrative Code (OAC) Chapter 3745-1 E. coli will be used as the sole indicator for public health nuisances.

**EPA:** Environmental Protection Agency

**FCBOH**: Franklin County Board of Health – Previous Name for Franklin County Public Health

**FCDE:** Franklin County Drainage Engineers

**FCE**: Franklin County Engineer

**FCEDP:** Franklin County Economic Development and Planning

FCFM: Franklin County Fleet Management

**FCPFM:** Franklin County Public Facilities Management

**FCPH:** Franklin County Public Health – previously referred to as Franklin County Board of Health

**FCSE**: Franklin County Sanitary Engineer

**FCSWEC:** Franklin County Storm Water Executive Committee

**FCSWMP:** Franklin County Storm Water Management Plan

**Fecal coliform:** An indicator often screened for during IDDE programs; Subset of total coliform bacteria which are more fecal-specific in origin. In current Water Quality Standards Ohio Administrative Code (OAC) Chapter 3745-1 fecal coliform is use in conjunction with E. coli to determine public health nuisances.

**FSWCD:** Franklin Soil and Water Conservation District

# Appendix A: Definitions and Acronyms - cont.

**GIS:** Geographic Information System

GPS: Global Positioning System

**HSTS**: Home Sewage Treatment System; a means of treating waste water and sewage on site. These systems do not connect into municipal sanitary sewer systems. Types of systems include: aeration units, septic tanks, leach fields, mound systems and drip systems. There are 2 general classifications of HSTS systems Off-Lot and On-Lot. Off-Lot Home Sewage Treatment Systems are designed to treat home sewage on-site and discharges treated wastewater off-lot. On-Lot Home Sewage Treatment Systems are designed to treat home sewage on-lot with no discharges leaving the lot

**IDDE:** Illicit Discharge Detection and Elimination; a program mandated by the NPDES program developed to detect and eliminate illicit discharges

**Illicit Connection:** any man-made conveyance connecting an illicit discharge directly to a municipal separate storm sewer (MS4)

**Illicit Discharge:** defined at 40 CFR 122.26(b)(2) and refers to any discharge to a municipal separate storm sewer that is not entirely composed of storm water, except discharges authorised under an NPDES permit (other than the NPDES permit for discharges from the MS4) and discharges resulting from fire fighting activities.

MBAS: An indicator often screened for during IDDE programs; Methylene Blue Active Substances, (surfactant) detergent indicator.

MCM: Minimum Control Measures; terminology utilized by OEPA in permit requirements

**MEP**: Maximum Extent Practicable; the technology-based discharge standard for Municipal Separate Storm Sewer Systems to reduce pollutants in storm water discharges that was established by CWA ‘402(p). A discussion of MEP as it applies to small MS4s is found at 40 CFR 122.34.

**MORPC:** Mid Ohio Regional Planning Commission

**MS4:** Municipal Separate Storm Sewer System; a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters,ditches, man-made channels, or storm drains) that are:

> Owned or operated by the federal government, state, municipality, township, county, district, or other public body (created by or pursuant to state or federal law) including special district under state law such as a sewer district, flood control district or drainage districts, or similar entity, or a designated and approved management agency under section 208 of the act that discharges into surface waters of the state; and
>
> > Designed or used for collecting or conveying solely storm water,
> >
> > Which is not a combined sewer, and
> >
> > Which is not a part of a publicly owned treatment works

**MS4 Outfall:** a point source at the point where a municipal separate storm sewer discharges to surface waters of the State and does not include open conveyances connecting two municipal separate storm sewers, or pipes, tunnels or other conveyances that connect segments of the same stream or other surface waters of the state and are used to convey waters of the state.

**NH3:** An indicator often screened for during IDDE programs; Ammonia, pollutant and an indicator of sewage.

**NHD:** National Hydrography Dataset

# Appendix A: Definitions and Acronyms - cont.

**NPDES:** National Pollutant Discharge Elimination System, Federal regulation implemented at the state and local level to regulate point sources of pollution into surface waters. The Franklin SWCD assists the county in regulating soil and erosion sediment control from construction sites. The authority to regulate this comes from the NPDES Program. For more information, refer to: http://cfpub.epa.gov/npdes/index.cfm

**OAC:** Ohio Administrative Code

**OEPA:** Ohio Environmental Protection Agency

**ORC:** Ohio Revised Code

**ORI**: Outfall Reconnaissance Inventory. For FSWCD, this was the previous terminology used for DWS.

**Orthophosphate:** An indicator often screened for during IDDE programs; sewage, detergent, and fertilizer indicator.

**PIO:** Public Information Officer

**POTW:** Publically Owned Treatment Works

**RC:** Revised Code

**Sanitary Sewer:** a pipe or conduit (sewer) intended to carry wastewater or water-borne wastes from homes, businesses, and industries to the POTW.

**SNP:** Suburban News Publication

**SRG:** Stream Resource Geodatabase; the database under construction by FSWCD which includes both surface and subsurface drainage throughout franklin county

**Storm Water:** defined at 40 CFR 122.26(b)(13) and means storm water runoff, snow melt runoff, and surface runoff and drainage.

**STS:** Sanitary Sewage System

**SWMP:** Storm Water Management Program; refers to a comprehensive program to manage the quality of storm water discharged from the municipal separate storm sewer system.

**TMDL:** Total Maximum Daily Loads, Federal regulation implemented at the state and local level to identify and reduce non-point source pollutants. This program is still being developed at the state level and is not yet being enforced.

**Waters of the United States** (receiving waters): All waters that are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters subject to the ebb and flow of the tide. Waters of the United States include all interstate waters and intrastate lakes, rivers, streams (including intermittent streams), mudflats, sand flats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds. [See 40 CFR 122.2 for the complete definition.] The NPDES permit regulates flows to the Waters of the United States.

**WQP**: Water Quality Partnership Areas

# Appendix B: Definition of Urbanized Area

# Appendix B: Definition of Urbanized Area

United States Environmental Protection Agency
Office of Water (4203)
EPA 833-F-00-004
December 1999 (revised December 2005)
Fact Sheet 2.2

# Storm Water Phase II Final Rule

## Urbanized Areas: Definition and Description



As discussed in Fact Sheet 2.1, *Who's Covered? Designation and Waivers of Regulated Small MS4s*, the Phase II Final Rule covers all small municipal separate storm sewer systems (MS4s) located within an "urbanized area" (UA). Based on the 2000 Census, there are 464 UAs in the United States that cover approximately 2 percent of total U.S. land area and contain nearly 70 percent of the Nation's population. These numbers include Puerto Rico and the Commonwealth of the Northern Mariana Islands — the two U.S. Territories with UAs.

UAs constitute the largest and most dense areas of settlement. UA calculations delineate boundaries around these dense areas of settlement and, in doing so, identify the areas of concentrated development. UA designations are used for several purposes in both the public and private sectors. For example, the Federal Government has used UAs to calculate allocations for transportation funding, and some planning agencies and development firms use UA boundaries to help ascertain current, and predict future, growth areas.

### What Is an Urbanized Area (UA)?

The Bureau of the Census determines UAs by applying a detailed set of published UA criteria (see 55 *FR* 42592, October 22, 1990) to the latest decennial census data. Although the full UA definition is complex, the Bureau of the Census' general definition of a UA, based on population and population density, is provided below.

> An ***urbanized area*** is a land area comprising one or more places — central place(s) — and the adjacent densely settled surrounding area — urban fringe — that together have a residential population of at least 50,000 and an overall population density of at least 1,000 people per square mile.

The basic unit for delineating the UA boundary is the census block. Census blocks are based on visible physical boundaries, such as the city block, when possible, or on invisible political boundaries, when not. An urbanized area can comprise places, counties, Federal Indian Reservations, and minor civil divisions (MCDs - towns and townships).

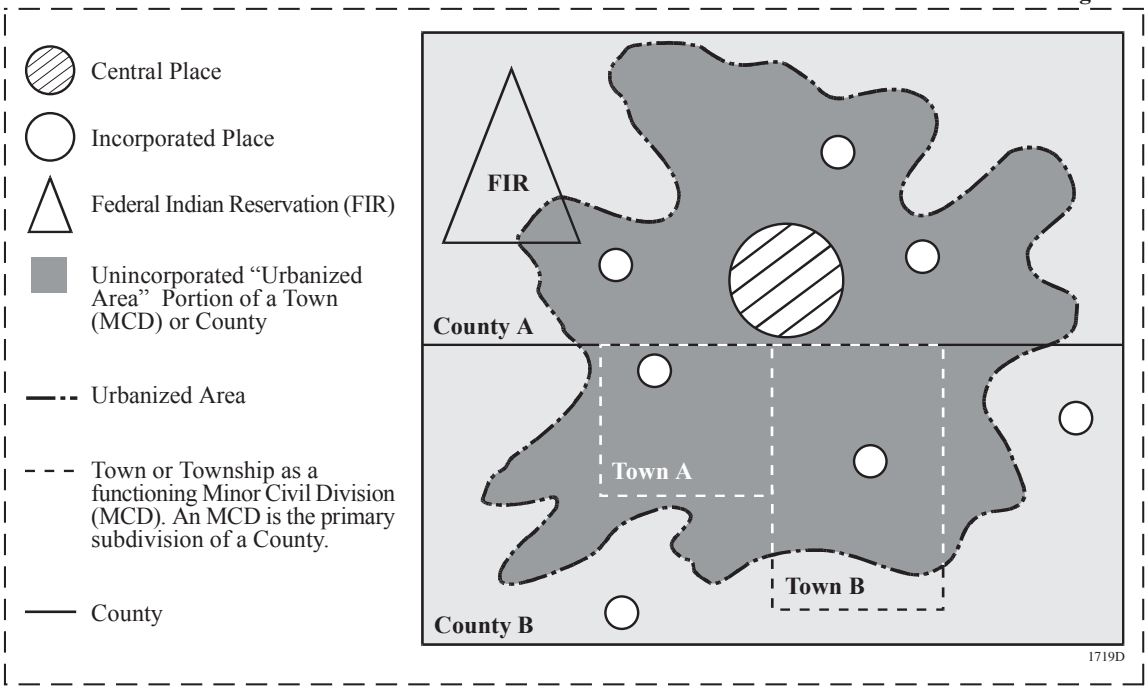
### How Can Status as a Regulated Small MS4 Be Determined?

The drawing below (see Figure 1) is a simplified UA illustration that demonstrates the concept of UAs in relation to the Phase II Final Rule. The "urbanized area" includes within its boundaries incorporated places, a portion of a Federal Indian reservation, an entire MCD, a portion of another MCD, and portions of two counties. Any and all operators of small MS4s located within the boundaries of the UA are covered under the Phase II Final Rule, regardless of political boundaries. Operators of small MS4s located outside of the UA are subject to potential designation into the Phase II MS4 program by the NPDES permitting authority.

# Appendix A: Definition of Urbanized Area - cont.



**Figure 1**




Operators of small MS4s can determine if they are located within a UA, and therefore covered by the Phase II storm water program, by contacting one or more of the institutions listed below for more detailed information on the location of the UA boundary. At this time, the States and EPA have compiled a list of municipalities to be covered under the Phase II Rule, but the urbanized area boundaries are important in some cases for determining the specific area within a municipality's boundaries that is covered (e.g., a county included in Phase II might only be required to implement their program for the urbanized area of the county).

❑ **The State or NPDES Permitting Authority (may be the State or the U.S. EPA Region)**

***Storm Water Coordinators*:** The NPDES permitting authority may be the State or the U.S. EPA Region. The Storm Water Coordinators for each U.S. EPA Region are listed in the *For Additional Information* section in Fact Sheet 2.9. These regional contacts can assist with UA information and provide the names of State storm water contacts. Regional and State contact information can also be obtained from OWM.

***State Data Centers***: Each State's Data Center receives listings of all entities that are located in UAs, as well as detailed maps and electronic files of UA boundaries. The Bureau of the Census web site includes a list of contact names and phone numbers for the data in each State at www.census.gov/sdc/www.

***State Planning/Economic/Transportation Agencies***: These agencies typically use UAs to assess current development and forecast future growth trends and, therefore, should have detailed UA information readily available to help determine the UA boundaries in any given area.

❑ **County or Regional Planning Commissions/ Boards**

As with State agencies, these entities are likely to have detailed UA data and maps to help determine UA boundaries.

❑ **U.S. EPA**

***NPDES Web Site***: EPA has developed a set of digitized maps for each urbanized area as defined by the 2000 U.S. Census. These maps are organized by state and are available at http://www.epa.gov/npdes/stormwater/urbanmaps.

***Enviromapper Web Site***: EPA modified a Web-based geographic program called *Enviromapper*. This allows MS4 operators to enter a location and see a detailed map of the UA boundary (called "city boundaries"). *Enviromapper* can be accessed at http://www.epa.gov/enviro/html/em/index.html.

❑ **The Bureau of the Census**

***Urbanized Areas Staff***: 301-457-1099

***Web Site***: The site allows users to obtain free UA cartographic boundary files (Arc/Info export format) for Geographical Information System (GIS) use at http://www.census.gov/geo/www/ua/ uaucbndy.html. Also, detailed UA maps are available to download in PDF for printing in large format. Each map is intended to be printed on a 36- by 33-inch sheet. For a listing of UAs for download, visit http://www.census.gov/geo/www/ maps/ua2kmaps.htm.

## How Will Subsequent Censuses Affect the Determination of Status as a Regulated Small MS4?

Any additional automatic designations of small MS4s based on subsequent census years is governed by the Bureau of the Census' definition of a UA in effect for that year and the UA boundaries determined as a result of the definition.

Once a small MS4 is designated into the Phase II storm water program based on the UA boundaries, it can not be waived from the program if in a subsequent UA calculation the small MS4 is no longer within the UA boundaries. An automatically designated small MS4 will remain regulated unless, or until, it meets the criteria for a waiver (see Fact Sheet 2.1 for more information on the regulated small MS4 waiver option).

**For Additional Information**

***Contacts***

☞ U.S. EPA Office of Wastewater Management
http://www.epa.gov/npdes/stormwater
Phone: 202-564-9545

☞ Your NPDES Permitting Authority. Most States and Territories are authorized to administer the NPDES Program, except the following, for which EPA is the permitting authority:

| | |
|---|---|
| Alaska | Guam |
| District of Columbia | Johnston Atoll |
| Idaho | Midway and Wake Islands |
| Massachusetts | Northern Mariana Islands |
| New Hampshire | Puerto Rico |
| New Mexico | Trust Territories |
| American Samoa | |

☞ A list of names and telephone numbers for each EPA Region and State is located at http://www.epa.gov/npdes/stormwater (click on "Contacts").

***Reference Documents***

☞ EPA's Stormwater Web Site
http://www.epa.gov/npdes/stormwater
- Stormwater Phase II Final Rule Fact Sheet Series
- Stormwater Phase II Final Rule (64 *FR* 68722)
- National Menu of Best Management Practices for Stormwater Phase II
- Measurable Goals Guidance for Phase II Small MS4s
- Stormwater Case Studies
- EPA Urbanized Area Maps: http://www.epa.gov/npdes/stormwater/urbanmaps

☞ Census 2000 Urbanized Area Information
- General Information: http://www.census.gov/geo/www/ua/uaucbndy.html
- Maps: http://www.census.gov/geo/www/maps/ua2kmaps.htm

# Appendix C: Dry Weather Screening Nomenclature

# Appendix C: Dry Weather Screening Nomenclature

## Guidelines for FSWCD_ID formatting for the "IDDE_DATA" database

The naming convention for the FSWCD_ID is as follows:

**[Type of Feature]-[Year Collected]-[Township]-[ORI_ID]**

**[Type of Feature]**

- **[ PI ]** for Pipe Flows and Pipe No Flows
- **[ CH ]** for Channel Flows and Channel No Flows
- **[ CB ]** for Catch Basins
- **[ PG ]** for Point Generics
- **[ MH]** for Manholes
- **[ HS]** for Household Sewer Treatment Systems
- **[ CO]** for Drainage Cross Overs

**[Year Collected]**

| | | |
|---|---|---|
| **[ 06 ]** 2006 | **[ 08 ]** 2008 | **[ 10 ]** 2010 |
| **[ 07 ]** 2007 | **[ 09 ]** 2009 | **[ 11 ]** 2011 |

**[Township Code]**

| *Township* | *Township Code* |
|---|---|
| Blendon | **BL** |
| Brown | **BR** |
| Clinton | **CL** |
| Franklin | **FR** |
| Hamilton | **HA** |
| Jackson | **JA** |
| Jefferson | **JE** |
| Madison | **MA** |
| Mifflin | **MI** |
| Montgomery | **MO** |
| Norwich | **NO** |
| Perry | **PE** |
| Plain | **PN** |
| Pleasant | **PT** |
| Prairie | **PR** |
| Sharon | **SH** |
| Truro | **TR** |
| Washington | **WA** |

**[ORI_ID]:** the ORI IDs are unique by year but not by feature i.e. in the year 2006, there will only be (1) instance of 100, but if you look at the years 2006, 2007 and 2008, the number 100 will also be represented. The ORI IDs are given by features in sequences of 2,000 as follows:

| | |
|---|---|
| Pipe Flow | **[ 1 - 1,999]** |
| Pipe No Flow | **[ 2,000 - 3,999]** |
| Channel Flow | **[4,000 – 5,999]** |
| Channel No Flow | **[6,000 – 7,999]** |
| Catch Basin | **[8,000 – 9,999]** |
| Point Generic | **[10,000 – 11,999]** |
| Manholes | **[12,000 – 13,999]** |
| HSTS | **[14,000 – 15,999]** |
| Cross Overs | **[16,000 – 17,999]** |

# Appendix D: Dry Weather Screening Criteria by Feature

# Appendix D: Dry Weather Screening Criteria by Feature: Catch Basins

## Dry Weather Screen for Catch Basins

### Background Data

Landuse — *Predominant landuse where screening*
- 0 Other
- 1 Industrial
- 2 Ultra-Urban Residential
- 3 Suburban Residential
- 4 Commercial
- 5 Open Space
- 6 Institutional

Rainfall — *Time elapsed since last rainfall*
- 1 <24 hours
- 2 <48 hours
- 3 >48 hours
- 4 >72 hours

Air Temperature — Current air temperature

### Outfall Description

Catch_Basin_Type — *Type of catch basin structure*
- 1 Square
- 2 Curb Inlet
- 3 Curb Inlet - Bicycle
- 4 Circular
- 5 Cone
- 6 Dome
- 7 Other

Outfall_Damage — *Predominant damage to outfall*
- 0 None
- 1 Cracked or Chipped
- 2 Peeling Paint
- 3 Corrosion
- 4 Other

Water_Standing — *Is water standing in the catch basin - yes or no*
- 0 No
- 1 Yes

Water_Flowing — *Is water flowing through the catch basin - yes or no*
- 0 No
- 1 Yes

Flow_Direction — *Direction of flow in catch basin*
- 0 Unknown
- 1 North
- 2 Northeast
- 3 East
- 4 Southeast
- 5 South
- 6 Southwest
- 7 West
- 8 Northwest

# Appendix D: Dry Weather Screening Criteria by Feature: Catch Basins - cont.

Flow_Description — *Quantitative description of flow*
0 None
1 Trickle
2 Moderate
3 Substantial

Outfall_Damage — *Predominant damage to outfall*
0 None
1 Cracked or Chipped
2 Peeling Paint
3 Corrosion
4 Other

### Physical Indicators

Deposits_and_Stains — *Deposits or stains observed during screening*
0 None
1 Oily
2 Flow Line
3 Pain
4 Other

Benthic_Growth — *Color of benthic growth observed*
0 None
1 Brown
2 Orange
3 Green
4 Gray
5 Other

Poor_Pool_Quality — *Poor pool conditions observed*
0 None
1 Odors
2 Colors
3 Floatables
4 Oil Sheen
5 Suds
6 Excessive Algae
7 Other

Abnormal_Vegetation — *Abnormal vegetation observed*
0 None
1 Excessive
2 Inhibited

Odor — *Odor present during screening*
0 None
1 Sewage
2 Sulfide
3 Rancid/Sour
4 Petroleum/Gas
5 Other

Odor_Index — *Extent of odor present during screening*
0 None
1 Faint
2 Easily Detected
3 Notice at a Distance

# Appendix D: Dry Weather Screening Criteria by Feature: Catch Basins - cont.

| | |
|---|---|
| Color | *Color of water during screening*<br>0 Clear<br>1 Brown<br>2 Gray<br>3 Yellow<br>4 Green<br>5 Orange<br>6 Red<br>7 Other |
| Color_Index | *Extent of color observed during screening*<br>0 None<br>1 Faint in Bottle<br>2 Clearly Visible<br>3 Colored Flow |
| Floatables | *Floatables present during screening*<br>0 None<br>1 Sewage-Toilet Paper<br>2 Petroleum Sheen<br>3 Other |
| Floatables_Index | *Extent of floatables present during screening*<br>0 None<br>1 Few or Slight<br>2 Some<br>3 Clear Origin |
| Turbidity | *Turbidity of water during screening*<br>0 Clear<br>1 Slightly Cloudy<br>2 Cloudy<br>3 Opaque |

### General Information

| | |
|---|---|
| Investigator | Agency collecting the data |
| Notes | Relevant notes about observations |
| Photo | Photo of feature |

# Appendix D: Dry Weather Screening Criteria by Feature: Flowing Pipes

## Dry Weather Screen for Flowing Pipes

### Background Data

Landuse — *Predominant landuse where screening*
- 0 Other
- 1 Industrial
- 2 Ultra-Urban Residential
- 3 Suburban Residential
- 4 Commercial
- 5 Open Space
- 6 Institutional

Rainfall — *Time elapsed since last rainfall*
- 1 <24 hours
- 2 <48 hours
- 3 >48 hours
- 4 >72 hours

Air Temperature — Current air temperature

### Outfall Description

Pipe_Material — *Predominant material of flow structure*
- 0 Unknown
- 1 PVC (white)
- 2 PVC (black)
- 3 PVC (green)
- 4 PVC (yellow)
- 5 Corrugated Plastic
- 6 Clay
- 7 Concrete
- 8 Concrete (headwall)
- 9 N-12
- 10 N-12 (headwall)
- 11 Metal
- 12 Corrugated Metal

Pipe_Shape — *Shape of flow structure*
- 0 Other
- 1 Round
- 2 Elliptical
- 3 Box

Pipe Diameter — Measured diameter of pipe in inches

Submerged_Water — *Percent of structure obscured by water*
- 1 <25%
- 2 <50%
- 3 <75%
- 4 >75%
- 5 100%

Submerged_Sediment — *Percent of structure obscured by sediment*
- 1 <25%
- 2 <50%
- 3 <75%
- 4 >75%
- 5 100%

# Appendix D: Dry Weather Screening Criteria by Feature: Flowing Pipes - cont.

Outfall_Damage — *Predominant damage to outfall*

0 None
1 Cracked or Chipped
2 Peeling Paint
3 Corrosion
4 Other

## Physical Indicators

Deposits_and_Stains — *Deposits or stains observed during screening*

0 None
1 Oily
2 Flow Line
3 Pain
4 Other

Benthic_Growth — *Color of benthic growth observed*

0 None
1 Brown
2 Orange
3 Green
4 Gray
5 Other

Poor_Pool_Quality — *Poor pool conditions observed*

0 None
1 Odors
2 Colors
3 Floatables
4 Oil Sheen
5 Suds
6 Excessive Algae
7 Other

Abnormal_Vegetation — *Abnormal vegetation observed*

0 None
1 Excessive
2 Inhibited

Odor — *Odor present during screening*

0 None
1 Sewage
2 Sulfide
3 Rancid/Sour
4 Petroleum/Gas
5 Other

Odor_Index — *Extent of odor present during screening*

0 None
1 Faint
2 Easily Detected
3 Notice at a Distance

# Appendix D: Dry Weather Screening Criteria by Feature: Flowing Pipes - cont.

Color — *Color of water during screening*
0 Clear
1 Brown
2 Gray
3 Yellow
4 Green
5 Orange
6 Red
7 Other

Color_Index — *Extent of color observed during screening*
0 None
1 Faint in Bottle
2 Clearly Visible
3 Colored Flow

Floatables — *Floatables present during screening*
0 None
1 Sewage-Toilet Paper
2 Petroleum Sheen
3 Other

Floatables_Index — *Extent of floatables present during screening*
0 None
1 Few or Slight
2 Some
3 Clear Origin

Turbidity — *Turbidity of water during screening*
0 Clear
1 Slightly Cloudy
2 Cloudy
3 Opaque

Pipe Flow — *Direction pipe flows from*
0 Unknown
1 North
2 Northeast
3 East
4 Southeast
5 South
6 Southwest
7 West
8 Northwest

Flow_Description — *Quantitative description of flow*
0 None
1 Trickle
2 Moderate
3 Substantial

In_Catch_Basin — *Is feature in catch basin - yes or no*
0 No
1 Yes

# Appendix D: Dry Weather Screening Criteria by Feature: Flowing Pipes - cont.

| | |
|---|---|
| Catch Basin Flow | *Direction pipe flows from*<br>0 Unknown<br>1 North<br>2 Northeast<br>3 East<br>4 Southeast<br>5 South<br>6 Southwest<br>7 West<br>8 Northwest |

## General Information

| | |
|---|---|
| Investigator | Agency collecting the data |
| Notes | Relevant notes about observations |
| Photo | Photo of feature |

# Appendix D: Dry Weather Screening Criteria by Feature: Non- Flowing Pipes

## Dry Weather Screen for Non-Flowing Pipes

### Background Data

Landuse — *Predominant landuse where screening*
- 0 Other
- 1 Industrial
- 2 Ultra-Urban Residential
- 3 Suburban Residential
- 4 Commercial
- 5 Open Space
- 6 Institutional

Rainfall — *Time elapsed since last rainfall*
- 1 <24 hours
- 2 <48 hours
- 3 >48 hours
- 4 >72 hours

Air Temperature — Current air temperature

### Outfall Description

Pipe_Material — *Predominant material of flow structure*
- 0 Unknown
- 1 PVC (white)
- 2 PVC (black)
- 3 PVC (green)
- 4 PVC (yellow)
- 5 Corrugated Plastic
- 6 Clay
- 7 Concrete
- 8 Concrete (headwall)
- 9 N-12
- 10 N-12 (headwall)
- 11 Metal
- 12 Corrugated Metal

Pipe_Shape — *Shape of flow structure*
- 0 Other
- 1 Round
- 2 Elliptical
- 3 Box

Pipe Diameter — Measured diameter of pipe in inches

Submerged_Water — *Percent of structure obscured by water*
- 1 <25%
- 2 <50%
- 3 <75%
- 4 >75%
- 5 100%

Submerged_Sediment — *Percent of structure obscured by sediment*
- 1 <25%
- 2 <50%
- 3 <75%
- 4 >75%
- 5 100%

# Appendix D: Dry Weather Screening Criteria by Feature: Non- Flowing Pipes - cont.

Outfall_Damage — *Predominant damage to outfall*

0 None
1 Cracked or Chipped
2 Peeling Paint
3 Corrosion
4 Other

## Physical Indicators

Deposits_and_Stains — *Deposits or stains observed during screening*

0 None
1 Oily
2 Flow Line
3 Pain
4 Other

Benthic_Growth — *Color of benthic growth observed*

0 None
1 Brown
2 Orange
3 Green
4 Gray
5 Other

Poor_Pool_Quality — *Poor pool conditions observed*

0 None
1 Odors
2 Colors
3 Floatables
4 Oil Sheen
5 Suds
6 Excessive Algae
7 Other

Abnormal_Vegetation — *Abnormal vegetation observed*

0 None
1 Excessive
2 Inhibited

Pipe Flow — *Direction pipe flows from*

0 Unknown
1 North
2 Northeast
3 East
4 Southeast
5 South
6 Southwest
7 West
8 Northwest

In_Catch_Basin — *Is feature in catch basin - yes or no*

0 No
1 Yes

# Appendix D: Dry Weather Screening Criteria by Feature: Non- Flowing Pipes - cont.

| | |
|---|---|
| Catch Basin Flow | *Direction pipe flows from*<br>0 Unknown<br>1 North<br>2 Northeast<br>3 East<br>4 Southeast<br>5 South<br>6 Southwest<br>7 West<br>8 Northwest |

## General Information

| | |
|---|---|
| Investigator | Agency collecting the data |
| Notes | Relevant notes about observations |
| Photo | Photo of feature |

# Appendix D: Dry Weather Screening Criteria by Feature: Flowing Channel

## Dry Weather Screen for Flowing Channels

### Background Data

| | |
|---|---|
| Landuse | *Predominant landuse where screening*<br>0 Other<br>1 Industrial<br>2 Ultra-Urban Residential<br>3 Suburban Residential<br>4 Commercial<br>5 Open Space<br>6 Institutional |
| Rainfall | *Time elapsed since last rainfall*<br>1 <24 hours<br>2 <48 hours<br>3 >48 hours<br>4 >72 hours |
| Air Temperature | Current air temperature |

### Outfall Description

| | |
|---|---|
| Channel_Material | *Predominant open channel material*<br>1 Earthen<br>2 Rip-Rap<br>3 Concrete<br>4 Other |
| Channel_Shape | *Shape of open channel*<br>1 Trapezoid<br>2 Parabolic<br>3 Other |
| Channel Depth | Depth of channel in inches |
| Top Width | Width at top of channel in inches |
| Flow Width | Width of flow in inches |
| Flow Depth | Depth of flow in inches |

### Physical Indicators

| | |
|---|---|
| Deposits_and_Stains | *Deposits or stains observed during screening*<br>0 None<br>1 Oily<br>2 Flow Line<br>3 Pain<br>4 Other |
| Benthic_Growth | *Color of benthic growth observed*<br>0 None<br>1 Brown<br>2 Orange<br>3 Green<br>4 Gray<br>5 Other |

# Appendix D: Dry Weather Screening Criteria by Feature: Flowing Channel - cont.

Poor_Pool_Quality — *Poor pool conditions observed*
0 None
1 Odors
2 Colors
3 Floatables
4 Oil Sheen
5 Suds
6 Excessive Algae
7 Other

Abnormal_Vegetation — *Abnormal vegetation observed*
0 None
1 Excessive
2 Inhibited

Odor — *Odor present during screening*
0 None
1 Sewage
2 Sulfide
3 Rancid/Sour
4 Petroleum/Gas
5 Other

Odor_Index — *Extent of odor present during screening*
0 None
1 Faint
2 Easily Detected
3 Notice at a Distance

Color — *Color of water during screening*
0 Clear
1 Brown
2 Gray
3 Yellow
4 Green
5 Orange
6 Red
7 Other

Color_Index — *Extent of color observed during screening*
0 None
1 Faint in Bottle
2 Clearly Visible
3 Colored Flow

Floatables — *Floatables present during screening*
0 None
1 Sewage-Toilet Paper
2 Petroleum Sheen
3 Other

Floatables_Index — *Extent of floatables present during screening*
0 None
1 Few or Slight
2 Some
3 Clear Origin

# Appendix D: Dry Weather Screening Criteria by Feature: Flowing Channel - cont.

| | |
|---|---|
| Turbidity | *Turbidity of water during screening*<br>0 Clear<br>1 Slightly Cloudy<br>2 Cloudy<br>3 Opaque |

## General Information

| | |
|---|---|
| Investigator | Agency collecting the data |
| Notes | Relevant notes about observations |
| Photo | Photo of feature |

# Appendix D: Dry Weather Screening Criteria by Feature: Non-Flowing Channel

## Dry Weather Screen for Non-Flowing Channels

### Background Data

| | |
|---|---|
| Landuse | *Predominant landuse where screening*<br>0 Other<br>1 Industrial<br>2 Ultra-Urban Residential<br>3 Suburban Residential<br>4 Commercial<br>5 Open Space<br>6 Institutional |
| Rainfall | *Time elapsed since last rainfall*<br>1 <24 hours<br>2 <48 hours<br>3 >48 hours<br>4 >72 hours |
| Air Temperature | Current air temperature |

### Outfall Description

| | |
|---|---|
| Channel_Material | *Predominant open channel material*<br>1 Earthen<br>2 Rip-Rap<br>3 Concrete<br>4 Other |
| Channel_Shape | *Shape of open channel*<br>1 Trapezoid<br>2 Parabolic<br>3 Other |
| Channel Depth | Depth of channel in inches |
| Top Width | Width at top of channel in inches |
| Flow Width | Width of flow in inches |
| Flow Depth | Depth of flow in inches |

### Physical Indicators

| | |
|---|---|
| Deposits_and_Stains | *Deposits or stains observed during screening*<br>0 None<br>1 Oily<br>2 Flow Line<br>3 Pain<br>4 Other |
| Benthic_Growth | *Color of benthic growth observed*<br>0 None<br>1 Brown<br>2 Orange<br>3 Green<br>4 Gray<br>5 Other |

# Appendix D: Dry Weather Screening Criteria by Feature: Non-Flowing Channel - cont.

| | |
|---|---|
| Poor_Pool_Quality | *Poor pool conditions observed*<br>0 None<br>1 Odors<br>2 Colors<br>3 Floatables<br>4 Oil Sheen<br>5 Suds<br>6 Excessive Algae<br>7 Other |
| Abnormal_Vegetation | *Abnormal vegetation observed*<br>0 None<br>1 Excessive<br>2 Inhibited |

### General Information

| | |
|---|---|
| Investigator | Agency collecting the data |
| Notes | Relevant notes about observations |
| Photo | Photo of feature |

# Appendix D: Dry Weather Screening Criteria by Feature: Point Generic

## Dry Weather Screen for Point Generics

### Background Data

| | |
|---|---|
| Landuse | *Predominant landuse where screening*<br>0 Other<br>1 Industrial<br>2 Ultra-Urban Residential<br>3 Suburban Residential<br>4 Commercial<br>5 Open Space<br>6 Institutional |
| Rainfall | *Time elapsed since last rainfall*<br>1 <24 hours<br>2 <48 hours<br>3 >48 hours<br>4 >72 hours |
| Air Temperature | Current air temperature |

### General Information

| | |
|---|---|
| Investigator | Agency collecting the data |
| Notes | Relevant notes about observations |
| Photo | Photo of feature |

# Appendix E: Criteria for Classifying Illicit Discharges

# Appendix E: Criteria for Classifying Illicit Discharges

Features are classified by their potential to be a source of illicit discharge and whether or not they are an obvious (severe) source of an illicit discharge. The criteria used to identify potentially illicit discharges are considered stand-alone indicators. These are odor, color, floatables, poor pool quality, benthic growth, and deposits and stains. The presence of at least one of these criteria can designate the outfall as potentially illicit.

It is important to identify obvious (severe) sources of illicit discharge during dry weather screening, because the presence of obvious indicators (e.g. raw sewage) allows that feature to be prioritized for future follow-up investigation and resolution. For a location to be determined as an obvious (severe) source of an illicit discharge, it must have at least one of several specific, pre-defined stand-alone indicators.

**Indexed and non-indexed stand-alone indicators for identifying illicit discharge potential.**

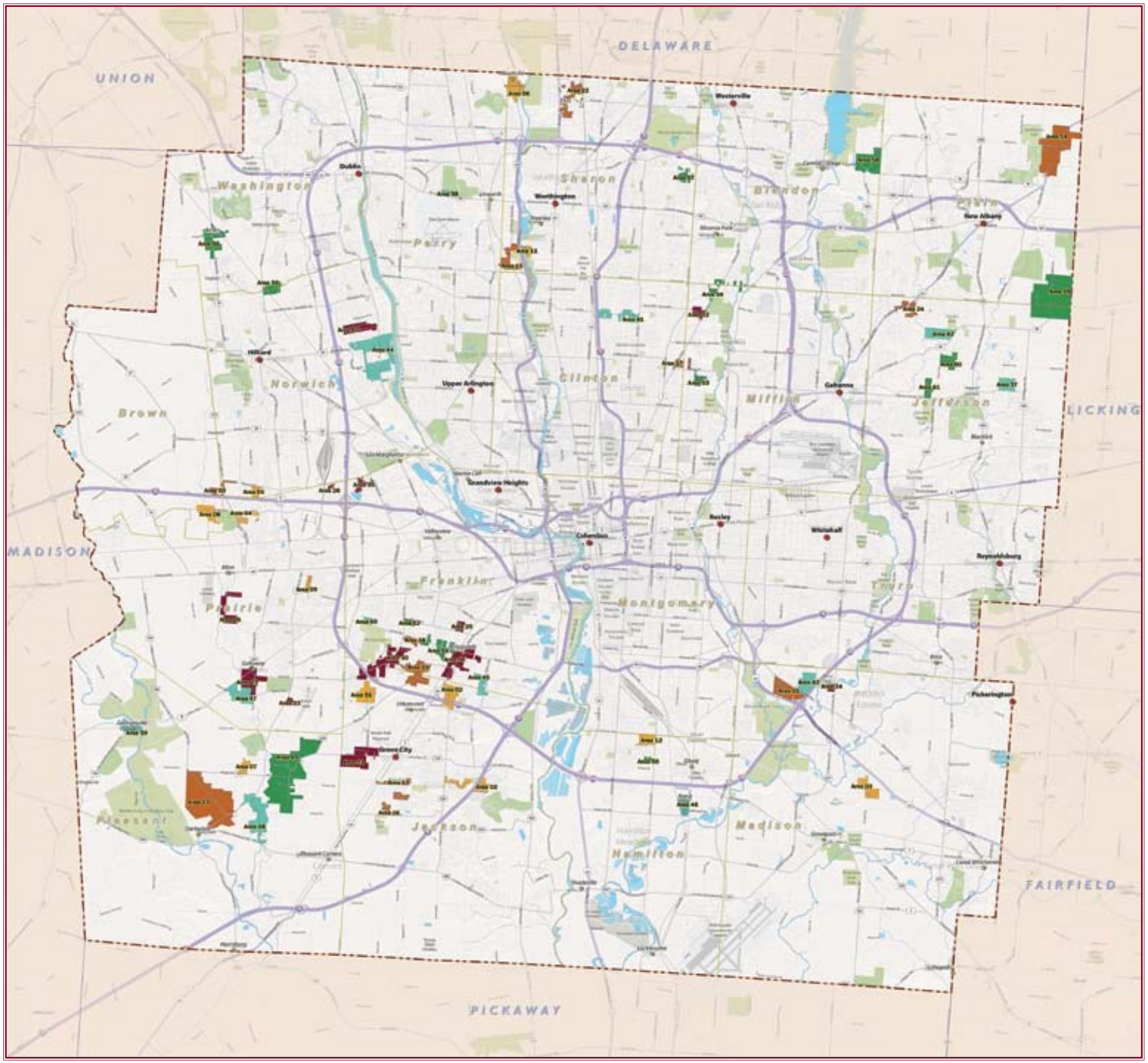
| Stand-alone Indicators | Indicator quality / index score |
|---|---|
| Odor | None [0]<br>Faint [1]<br>Easily detected [2]<br>Noticeable at distance [3] |
| Color | None [0]<br>Faint in bottle [1]<br>Clearly visible [2]<br>Colored flow [3] |
| Floatables | None [0]<br>Few or slight [1]<br>Some [2]<br>Some, clear origin [3] |
| *Benthic Growth<br>Not indexed (Non-flowing indicator) | None<br>Brown<br>Orange<br>Green<br>Gray<br>Other |
| *Deposits and stains<br>Not indexed (Non-flowing indicator) | None<br>Oily<br>Flow line<br>Paint<br>Other |
| * Poor pool quality<br>Not indexed (Non-flowing indicator) | None<br>Odors<br>Colors<br>Floatables<br>Oil sheen<br>Suds<br>Excessive algae<br>Other |

**Note:**

* Flowing and non-flowing outfalls possess different criteria for illicit discharge detection. Non- flowing outfall data are not indexed and therefore cannot be determined to be obvious sources of illicit discharge unless otherwise noted by the field crew, with the exception of gray benthic growth (sewage fungus indicator). Also, sampling of non-flowing outfalls may not be possible if upon return to the site there is still no flow and no existing pool from which to collect sample.

# Appendix F: Identified Areas of Concern for Storm Water Public Health Risks

# Identified Areas Of Concern




Miles
0 0.5 1 2 3 4

## LEGEND

- Franklin County Boundary
- Historic Township Boundaries
- Other County Boundaries

**Identified Areas of Concern**

- Group 1
- Group 2
- Group 3
- Group 4
- Group 5

## Note:

Due to the dynamic nature of the conditions related to these data, the information shown is considered the best available data and is being used as such. As additional data is collected and analyzed, various efforts are refined, regulatory documents are updated, and funding related to projects and personnel are allocated, the existence of and the categorization of the data represented is subject to change.



Franklin Soil and Water Conservation District
*Creating Conservation Solutions for Over 60 Years*

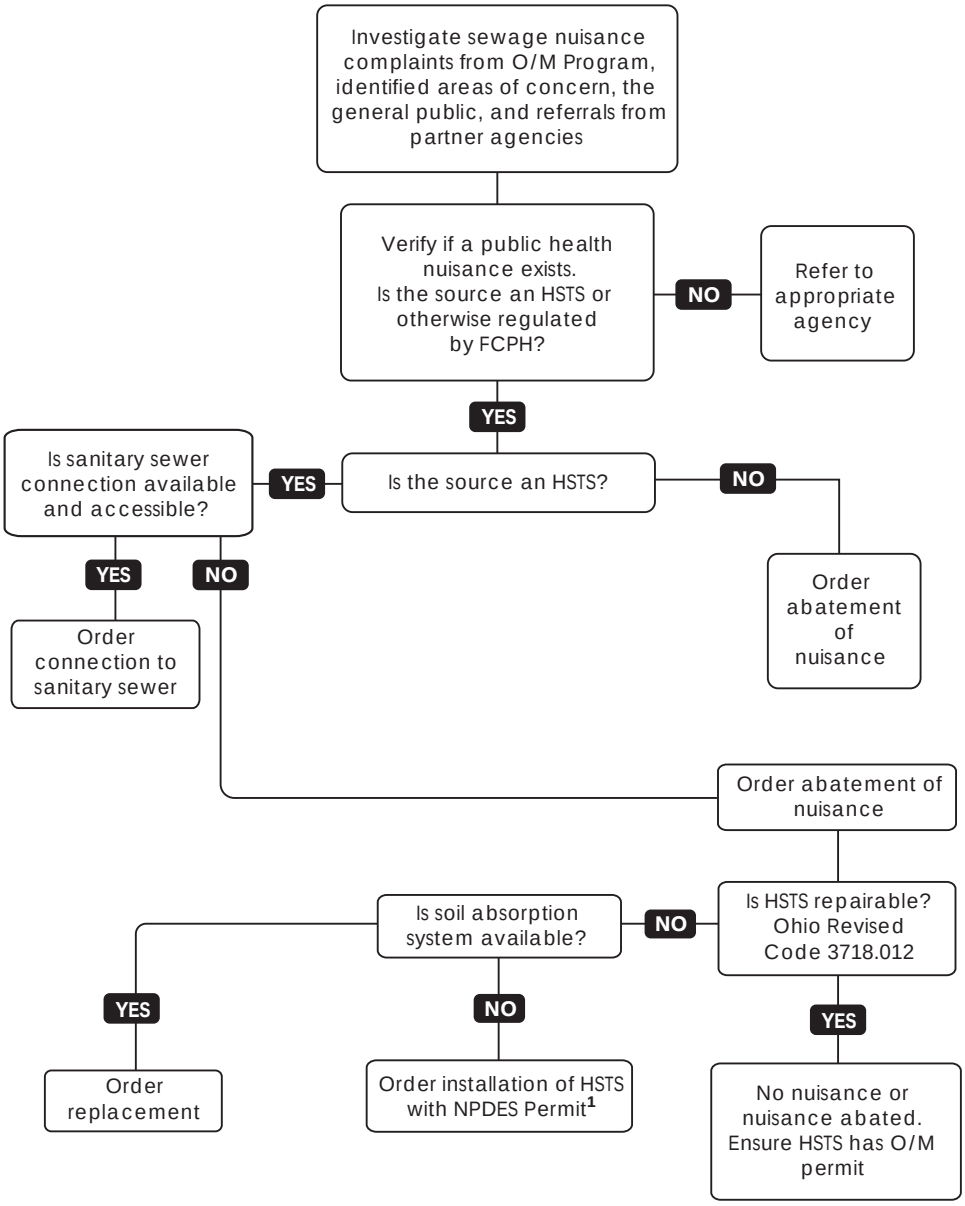
# Appendix G: Idenified Areas of Concern for Storm Water Public Health Risks

# Appendix G: Flow Chart of Public Health Nuisance Abatement Process

# Appendix H: Flow Chart of Public Health Nuisance Abatement Process

Franklin County Public Health
280 East Broad Street
Columbus, Ohio 43215-4562
(614) 525-3160
www.myfcph.org

**Household Sewage Treatment Systems (HSTS)**
**Public Health Nuisance Abatement**
November 2013




[1] *NPDES: National Pollutant Discharge Elimination System*

Dublin, Ohio Code of Ordinances

TITLE V: PUBLIC WORKS

CHAPTER 51: SEWER REGULATIONS

# CHAPTER 51: SEWER REGULATIONS

Section



## GENERAL PROVISIONS

### § 51.01 DEFINITIONS.

For the purpose of this chapter, the following definitions shall apply unless the context clearly indicates or requires a different meaning.

***BIOCHEMICAL OXYGEN DEMAND (BOD).*** The quantity of oxygen utilized in the biochemical oxidation of organic matter under standard laboratory procedure in five days at 20° C., expressed in milligrams per liter.

***BUILDING DRAIN.*** That part of the lowest horizontal piping of a drainage system which receives the discharge from soil, waste and other drainage pipes inside the walls of the building and conveys it to the building sewer, beginning five feet (1.5 meters) outside the inner face of the building wall.

***BUILDING SEWER.*** The extension from the building drain to the public sewer or other place of disposal, also called "house connection".

***EASEMENT.*** An acquired legal right for the specific use of land owned by others.

***ENGINEER.*** The Engineer of the Municipality of Dublin.

***FLOATABLE OIL.*** Oil, fat or grease in a physical state such that it will separate by gravity from wastewater by treatment in an approved pretreatment facility. Wastewater shall be considered free of floatable fat it if is properly pretreated and the wastewater does not interfere with the collection system.

***GARBAGE.*** The animal and vegetable waste resulting from the handling, preparation, cooking and serving of foods.

***INDUSTRIAL WASTES.*** The wastewater from industrial processes, trade or business as distinct from domestic or sanitary wastes.

***MAY.*** Is permissive. (See ***SHALL.***)

***NATURAL OUTLET.*** Any outlet, including storm sewers, into a watercourse, pond, ditch, lake or other body of surface or groundwater.

***PERSON.*** Any individual, firm, company, association, society, corporation or group.

***pH.*** The reciprocal of the logarithm of the hydrogen-ion concentration. The concentration is the weight of hydrogen-ions, in grams, per liter of solution. Neutral water, for example, has a pH value of seven and a hydrogen-ion concentration of $10^{-7}$.

***PROPERLY SHREDDED GARBAGE.*** The wastes from the preparation, cooking and dispensing of food that have been shredded to such a degree that all particles will be carried freely under the flow conditions normally prevailing in public sewers, with no particle greater than one-half inch (1.27 centimeters) in any dimension.

***PUBLIC SEWER.*** A common sewer controlled by a governmental agency or public utility.

***SANITARY SEWER.*** A sewer that carries liquid and water-carried wastes from residences, commercial buildings, industrial plants, and institutions together with minor quantities of ground, storm and surface waters that are not admitted intentionally.

***SEWAGE.*** The spent water of a community. The preferred term is "wastewater".

***SEWER.*** A pipe or conduit that carries wastewater or drainage water.

***SHALL.*** Is mandatory. (See ***MAY***).

***SLUG.*** Any discharge of water or wastewater which in concentration of any given constituent, or in quantity of flow exceeds for any period of duration longer than fifteen minutes more than five times the average twenty-four hour concentration, or flows during normal operation and shall adversely affect the collection system and/or performance of the wastewater treatment works.

***STORM DRAIN*** or ***STORM SEWER.*** A drain or sewer for conveying water, groundwater, subsurface water or unpolluted water from any source.

***SUPERINTENDENT.*** The Superintendent of the wastewater facilities of the municipality or his authorized deputy, agent or representative as designated by

Council. Unless otherwise designated, the Superintendent shall be the Manager or his duly authorized representative.

***SUSPENDED SOLIDS.*** Total suspended matter that either floats on the surface of, or is in suspension in, water, wastewater or other liquids, and that is removable by laboratory filtering as prescribed in "Standard Methods for the Examination of Water and Wastewater" as referred to as nonfilterable residue.

***UNPOLLUTED WATER.*** Water of quality equal to or better than the effluent criteria in effect or water that would not cause violation of receiving water quality standards and would not be benefited by discharge to the sanitary sewers and wastewater treatment facilities provided.

***WASTEWATER.*** The spent water of a community. From the standpoint of source, it may be a combination of the liquid and water-carried wastes from residences, commercial buildings, industrial plants and institutions, together with any groundwater, surface water and storm water that may be present.

***WASTEWATER FACILITIES.*** The structures, equipment and processes required to collect, carry away and treat domestic and industrial wastes and dispose of the effluent.

***WASTEWATER TREATMENT WORKS.*** An arrangement of devices and structures for treating wastewater, industrial wastes and sludge. Sometimes used as synonymous with "waste treatment plant" or "wastewater treatment plant" or "water pollution control plant."

***WATERCOURSE.*** A natural or artificial channel for the passage of water either continuously or intermittently.

('80 Code, § 921.01) (Ord. 59-74, passed 11-18-74)

## § 51.02 PRIVATE WASTEWATER DISPOSAL.

(A) Except as herein provided, no person shall construct or maintain any privy, privy vault, septic tank, cesspool or other facility intended or used for the disposal of wastewater.

('80 Code, § 921.02(c))

(B) Where a public sanitary sewer is not available under the provisions of § 51.40, the building sewer shall be connected to a private wastewater disposal system in compliance with the provisions of this section.

(C) Before commencement of construction of a private wastewater disposal system, the owner shall first obtain a written permit signed by the Superintendent. The application for such permit shall be made on a form furnished by the municipality which the applicant shall supplement by any plans, specifications and other information as are deemed necessary by the Superintendent. A permit and inspection fee of $25 shall be paid to the municipality at the time the application is filed.

(D) A permit for a private wastewater disposal system shall not become effective until the installation is completed to the satisfaction of the Superintendent. The Superintendent shall be allowed to inspect the work at any stage of construction, and, in any event the applicant for the permit shall notify the Superintendent when the work is ready for final inspection, and before any underground portions are covered. The inspection shall be made within 24 hours of the receipt of notice by the Superintendent.

(E) The type, capacities, location and layout of a private wastewater disposal system shall comply with all requirements of and shall be approved by the Ohio Environmental Protection Agency and by the Franklin County Health Department. No permit shall be issued for any private wastewater disposal

system employing subsurface soil absorption facilities where the area of the lot is less than that required in the Zoning Ordinance of the municipality. No septic tank or cesspool shall be permitted to discharge to any natural outlet.

(F) At such time as a public sewer becomes available to a property served by a private wastewater disposal system, as provided in division (E) above, a direct connection shall be made to the public sewer within 180 days in compliance with this chapter and any septic tanks, cesspools and similar private wastewater disposal facilities shall be cleaned of sludge and filled with suitable material.

(G) The owner shall operate and maintain the private wastewater disposal facilities in a sanitary manner at all times, at no expense to the municipality.

(H) No statement contained in this section shall be construed to interfere with any additional requirement that may be imposed by the Health Officer.

('80 Code, § 921.03) (Ord. 59-74, passed 11-18-74)

### § 51.03 UNSANITARY DISCHARGES; DISCHARGES OF POLLUTED WATERS.

(A) No person shall place, deposit or permit to be deposited in any unsanitary manner on public or private property within the municipality or in any area under the jurisdiction of the municipality any human or animal excrement garbage or objectionable wastes.

(B) No person shall discharge into any natural outlet within the municipality, or in any area under the jurisdiction of the municipality, any wastewater or other polluted waters except where suitable treatment has been provided in accordance with subsequent provisions of this chapter.

('80 Code, § 921.01(a), (b)) (Ord. 59-74, passed 11-18-74)

### § 51.04 TAMPERING PROHIBITED.

No person shall maliciously, willfully or negligently break, damage, destroy, uncover, deface or tamper with any structure, appurtenance or equipment which is a part of the wastewater facilities. Any person violating this section shall be punished as provided in § 51.99.

('80 Code, § 921.06) Penalty, see § 51.99

***Cross-reference:***

*Tampering with and theft of utilities, see § 131.28*

### § 51.05 APPLICATION, ADMINISTRATION AND ENFORCEMENT OF COLUMBUS SEWER USAGE ORDINANCES.

(A) So long as the City of Dublin discharges its sewage, industrial waste, water and other liquid waste into the transportation, pumping and treatment system of the City of Columbus, all of the provisions of Chapter 1145 of the City of Columbus Code, both as it now exists and as they are hereinafter amended, related to the regulation of sewage use are hereby adopted by reference and made applicable within the City of Dublin.

(B) The officers and employees of the City of Columbus are hereby empowered to enforce the provisions of Chapter 1145 of the Columbus City Code, both as it now exists and as it is hereinafter amended, within the boundaries of the City of Dublin.

('80 Code, § 921.08) (Ord. 63-90, passed 8-20-90)

## BUILDING SEWERS AND CONNECTIONS

### § 51.20 PERMIT REQUIRED; COSTS AND EXPENSES.

(A) No unauthorized person shall uncover, make any connections with or opening into, use, alter or disturb any public sewer or appurtenance thereof without first obtaining a written permit from the Superintendent.

(B) There shall be two classes of building sewer permits:

(1) For residential and commercial service, and

(2) For service to establishments producing industrial wastes.

In either case, the owner or his agent shall make application on a special form furnished by the municipality. The permit application shall be supplemented by any plans, specifications or other information considered pertinent in the judgment of the Superintendent. A permit and inspection fee of $25 for a residential or commercial building sewer permit and $35 for an industrial building sewer permit shall be paid to the municipality at the time the application is filed.

(C) All costs and expenses incidental to the installation and connection of the building sewer shall be borne by the owner. The owner shall indemnify the municipality from any loss or damage that may directly or indirectly be occasioned by the installation of the building sewer.

('80 Code, § 921.04(a) - (c)) (Ord. 59-74, passed 11-18-74)

***Editor's Note:***

*A copy of the most recent ordinance establishing current city fees and service charges is available at city offices during normal business hours.*

### § 51.21 SEPARATE BUILDING SEWER FOR EACH BUILDING; OLD BUILDING SEWERS.

(A) A separate and independent building sewer shall be provided for every building, except where one building stands at the rear of another on an interior lot and no private sewer is available or can be constructed to the rear building through an adjoining alley, court, yard or driveway, the front building may be extended to the rear building and the whole considered as one building sewer. However, the municipality does not and will not assume any obligation or responsibility for damage caused by or resulting from any such single connection.

(B) Old building sewers may be used in connection with new buildings only when they are found, on examination and test by the Superintendent, to meet all requirements of this chapter.

('80 Code, § 921.04(d), (e)) (Ord. 59-74, passed 11-18-74)

### § 51.22 BUILDING SEWER INSTALLATION REQUIREMENTS.

(A) The size, slope, alignment, materials of construction of a building sewer, and the methods to be used in excavating, placing of the pipe, jointing, testing and backfilling the trench, shall all conform to the requirements of the Building Code or other applicable rules and regulations of the municipality.

(B) The connection of the building sewer into the public sewer shall conform to the requirements of the Building Code or other applicable rules and regulations of the municipality. All such connections shall be made gastight and watertight and verified by proper testing. Any deviation from the prescribed procedures and materials must be approved by the Superintendent before installation. All sewer joints shall have premium joints.

(C) Building sewer installation shall conform to the following requirements:

(1) Connections made to a sewer line without an existing wye branch shall be made using a saddle wye connection by experienced workmen under the supervision of the Superintendent.

(2) Connections to a wye with a depth greater than needed to obtain proper slope on the building sewer may be resolved by constructing a riser connection. The riser pipe shall consist of the sewer pipe placed on a steep slope by the use

of 45 degree bends. The riser pipe shall then be encased with concrete at a minimum thickness of six inches around the pipe. The placement of riser pipe shall be made by experienced workman under the supervision of the Superintendent.

(3) The building sewer shall not be less than six inches in diameter with a slope of not less than 1/8 inch per foot.

(4) Sewer pipe shall have a bedding of No. 67 or No. 8 stone extending from a point four inches below the bottom of the pipe to a point six inches above the pipe.

(5) Backfill outside of paved areas shall consist of carefully selected excavated material free from debris, frozen material or stones larger than two inches in diameter.

(6) Backfill under paved areas shall consist of approved granular material placed and compacted as directed by the Superintendent.

(7) Sewer materials shall conform to the following American Society for Testing and Materials specifications as follows:

C-700-78(a) Standard strength clay sewer pipe C-700-78(a)
Extra strength clay pipe C-425-77
Compression joints for vitrified clay bell and spigot pipe
C-76-78 Reinforced concrete sewer pipe (eight-inch pipe and above)
C-443-78 joints for circular concrete pipe
Six-inch P.V.C. ASTM F-789-82
Six-inch P.V.C. S.D.R. 35 ASTM D-3034

(D) Whenever possible, the building sewer shall be brought to the building at an elevation below the basement floor. In all buildings, in which any building drain is too low to permit gravity flow to the public sewer, sanitary sewage carried by such building drain shall be lifted by an approved means and discharged to the building sewer.

(E) The applicant for the building sewer permit shall notify the Superintendent when the building sewer is ready for inspection and connection to the public sewer. The connection and testing shall be made under the supervision of the Superintendent or his representative.

('80 Code, § 921.04(f), (j), (g), (h), (k)) (Ord. 59-74, passed 11-18-74; Ord. 12-85, passed 3-18-85)

### § 51.23 CONNECTION OF SURFACE RUNOFF OR GROUNDWATER SOURCES **PROHIBITED.**

No person shall make connection of roof downspouts, foundation drains, areaway drains or other sources of surface runoff or groundwater to a building sewer or building drain which in turn is connected directly or indirectly to a public sanitary sewer.

('80 Code, § 921.04(i)) (Ord. 59-74, passed 11-18-74)

### § 51.24 EXCAVATIONS TO BE BARRICADED AND LIGHTED.

All excavations for building sewer installation shall be adequately guarded with barricades and lights so as to protect the public from hazard. Streets, sidewalks, parkways and other public property disturbed in the course of the work shall be restored in a manner satisfactory to the municipality.

('80 Code, § 921.04(l)) (Ord. 59-74, passed 11-18-74)

PUBLIC SEWER USE

### § 51.40 USE OF PUBLIC SEWERS REQUIRED.

(A) The owners of all houses, buildings or properties used for human occupancy, employment, recreation or other purposes, situated within the municipality and abutting on any street, alley, or right-of-way in which there is now located, or may in the future be located, a public sanitary sewer of the municipality, is hereby required at the owners' expense to install suitable toilet facilities therein, and to connect such facilities directly with the proper public sewer in accordance with the provisions of this chapter, within 90 days after the date of official notice to do so, provided that such public sewer is within 100 feet or 30.5 meters of the property line.
(Ord. 59-74, passed 11-18-74)

(B) In the case of proven hardship or extraordinary circumstances or proven excessive costs to make the required connection to sanitary sewerage facilities, the Manager, with concurrence of Council, may grant relief from such required connection to the sanitary sewerage facilities.
('80 Code, § 921.02(d)) (Ord. 32-78, passed 5-1-78)

### § 51.41 DISCHARGE OF UNPOLLUTED WATERS.

(A) No person shall discharge or cause to be discharged any unpolluted waters, such as storm water, groundwater, roof runoff, subsurface drainage or cooling water to any sewer.

(B) Storm water and all other unpolluted drainage shall be discharged to such sewers as are specifically designated storm sewers or to a natural outlet approved by the Engineer and other regulatory agencies. Unpolluted industrial cooling water or process waters may be discharged, on approval of the Engineer, to a storm sewer or natural outlet.
('80 Code, § 921.05(a), (b)) (Ord. 59-74, passed 11-18-74)

### § 51.42 PROHIBITED DISCHARGES.

No person shall discharge or cause to be discharged any of the following described waters or wastes to any public sewers:

(A) Any gasoline, benzene, naphtha, fuel oil or other flammable or explosive liquid, solid or gas.

(B) Any waters containing toxic or poisonous solids, liquids or gases in sufficient quantity, either singly or by interaction with other wastes, to injure or interfere with any waste treatment process, constitute a hazard to humans or animals, create a public nuisance, or create any hazard in the receiving waters of the wastewater treatment plant.

(C) Any waters or wastes having a pH lower than 5.5, or having any other corrosive property capable of causing damage or hazard to structures, equipment and personnel of the wastewater works.

(D) Solid or viscous substances in quantities or of such size capable of causing obstruction to the flow in sewers or other interference with the proper operation of the wastewater facilities such as, but not limited to, ashes, bones, cinders, sand, mud, straw, shavings, metal, glass, rags, feathers, tar, plastics, wood, unground garbage, whole blood, paunch manure, hair and fleshings, entrails and paper dishes, cups, milk containers, etc., either whole or ground by garbage grinders.
('80 Code, § 921.05(c)) (Ord. 59-74, passed 11-18-74)

### § 51.43 LIMITATION ON DISCHARGES.

(A) The discharge of substances, materials, waters or waste shall be limited in the system to concentrations or quantities which will not harm either the sewers, wastewater treatment process or equipment, will not have an adverse effect on

the receiving stream, or will not otherwise endanger lives, limb, public property or constitute a nuisance.

(B) The limitations on such discharges shall be in accordance with the more restrictive limitations imposed by the National Pollutant Discharge Elimination System permit; industrial wastes ordinances adopted by the City of Columbus; or ordinances adopted by the municipality. Until such time as any of the preceding limitations are established, the limitations in division (C) below shall prevail.

(C) The Engineer may set limitations lower than the limitations established in the regulations below if in his opinion the more severe limitations are necessary to meet the objectives of this section. In forming his opinion as to the acceptability, the Engineer will give consideration to such factors as the quantity of subject waste in relation to flows and velocities in the sewers, materials of construction of the sewers and other pertinent factors. The limitations or restrictions on materials or characteristics of waste or wastewaters discharged to the sanitary sewer which shall not be violated without approval of the Engineer are as follows:

(1) Wastewater having a temperature higher than 150° F. (65° C.)

(2) Wastewater containing more than 25 milligrams per liter of petroleum oil, non-biodegradable cutting oils or product of mineral oil origin.

(3) Wastewater from industrial plants containing floatable oils, fat or grease.

(4) Any garbage that has not been properly shredded as defined in § 51.01. Garbage grinders may be connected to sanitary sewers from homes, hotels, institutions, restaurants, hospitals, catering establishments or similar places where garbage originates from the preparation of food in kitchens for the purpose of consumption on the premises or when served by caterers.

(5) Any waters or wastes containing iron, chromium, copper, zinc and similar objectionable or toxic substances to such degree that any such material received in the composite wastewater at the wastewater treatment works exceeds the limits established by the Engineer for such materials.

(6) Any waters or wastes containing odor-producing substances exceeding limits which may be established by the Engineer.

(7) Any radioactive wastes or isotopes of such half-life or concentration as may exceed limits established by the Engineer in compliance with applicable state or federal regulations.

(8) Quantities of flow, concentrations or both which constitute a "slug" as defined in § 51.01.

(9) Waters or wastes containing substances which are not amenable to treatment or reduction by the wastewater treatment processes employed or are amenable to treatment only to such degree that the wastewater treatment plant effluent cannot meet the requirements of other agencies having jurisdiction over discharge to the receiving waters.

(10) Any water or wastes which, by interaction with other water or wastes in the public sewer system, release obnoxious gases, form suspended solids which interfere with the collection system or create a condition deleterious to structures and treatment processes.

(D) If any waters or wastes are discharged or are proposed to be discharged to the public sewers, which waters contain the substances or possess the characteristics enumerated in divisions (A), (B) and (C) above, and which in the

judgment of the Engineer may have a deleterious effect upon the wastewater facilities, processes, equipment or receiving waters, or which otherwise create a hazard to life or constitute a public nuisance, the Engineer may:

(1) Reject the wastes;

(2) Require pretreatment to an acceptable condition for discharge to the public sewers;

(3) Require control over the quantities and rates of discharge; and/or

(4) Require payment to cover added cost of handling and treating the wastes not covered by existing taxes or sewer charges under the provisions of § 51.47.

If the Engineer permits the pretreatment or equalization of waste flows, the design and installation of the plants and equipment shall be subject to the review and approval of the Engineer.

('80 Code, § 921.05(d) - (g)) (Ord. 59-74, passed 11-18-74)

### § 51.44 GREASE, OIL AND SAND INTERCEPTORS.

Grease, oil and sand interceptors shall be provided when, in the opinion of the Superintendent, they are necessary for the proper handling of liquid wastes containing floatable grease in excessive amounts, as specified in § 51.43(C)(3), or any flammable wastes, sand or other harmful ingredients; except that such interceptors shall not be required for private living quarters or dwelling units. All interceptors shall be of a type and capacity approved by the Superintendent, and shall be located as to be readily and easily accessible for cleaning and inspection. In the maintaining of these interceptors, the owners shall be responsible for the proper removal and disposal by appropriate means of the captured material and shall maintain records of the dates and means of disposal which are subject to review by the Superintendent. Any removal and hauling of the collected materials not performed by owners' personnel must be performed by currently licensed waste disposal firms.

('80 Code, § 921.05(h)) (Ord. 59-74, passed 11-18-74)

### § 51.45 PRETREATMENT FACILITIES TO BE MAINTAINED BY OWNER.

Where pretreatment or flow-equalizing facilities are provided or required for any waters or wastes, they shall be maintained continuously in satisfactory and effective operation by the owner at his expense.

('80 Code, § 921.05(i)) (Ord. 59-74, passed 11-18-74)

### § 51.46 MEASUREMENTS, TESTS AND SAMPLING; FACILITIES REQUIRED.

(A) All measurements, tests and analyses of the characteristics of waters and wastes to which reference is made in this chapter shall be determined in accordance with the latest edition of "Standard Methods for the Examination of Water and Wastewater," published by the American Public Health Association. Sampling methods, location, times, durations and frequencies are to be determined on an individual basis subject to approval by the Superintendent.

(B) When required by the Superintendent, the owner of any property serviced by a building sewer carrying industrial wastes shall install a suitable structure together with such necessary meters and other appurtenances in the building sewer to facilitate observation, sampling and measurement of the wastes. Such structure, when required, shall be accessibly and safely located and shall be constructed in accordance with plans approved by the Superintendent. The structure shall be installed by the owner at his expense and shall be maintained by him so as to be safe and accessible at all times.

('80 Code, § 921.05(k), (j)) (Ord. 59-74, passed 11-18-74)

§ 51.47 SPECIAL AGREEMENTS.

No statement contained in this section shall be construed as preventing any special agreement or arrangement between the municipality and any industrial concern whereby an industrial waste of unusual strength or character may be accepted by the municipality for treatment.

('80 Code, § 921.05(l)) (Ord. 59-74, passed 11-18-74)

FEES AND CHARGES

§ 51.60 DEFINITIONS.

For the purpose of this chapter, the meaning of the following terms shall be defined in this section:

(A) ***DEBT SERVICE CHARGE*** shall mean the charge assessed to users of the sewerage system for the retirement of principal and interest payments on outstanding debt authorized and issued by the city to construct sewage system facilities.

(B) ***OPERATION AND MAINTENANCE COSTS*** shall mean the costs in keeping all equipment facilities used in collecting and pumping sewage in a good state of repair and functioning properly.

(C) ***REPLACEMENT*** shall mean expenditures for obtaining and installing equipment, accessories, or appurtenances that are necessary during the useful life of the sewerage system to maintain the capacity and performance for which such system was designed and constructed.

(D) ***SEWER SERVICE CHARGE*** shall mean the total charge levied against users of the sewerage system for sewer service. This includes debt service, operation and maintenance costs, replacement costs, plus the rates charged by the City of Columbus.

(E) ***SEWERAGE SYSTEM*** shall mean all of the facilities required to transport sewage from the premises of the source to a sewage treatment facility.

(F) ***USER CHARGES*** shall mean the costs to users by the city for operation and maintenance costs, and replacement costs. This excludes any charges by the City of Columbus.

(G) ***USER CLASSES*** shall mean the following groups of users as hereby defined.

(1) ***RESIDENTIAL*** shall mean a principal family residence classified as single family, multi-family, or apartment dwelling, discharging normal domestic wastewater into the sewerage system.

(2) ***COMMERCIAL USER*** shall mean all users who discharge wastewater from a non-industrial business establishment into the sewerage system.

(3) ***INDUSTRIAL USER*** shall mean users discharging wastewater resulting from manufacturing activities involving the mechanical or chemical transformation of materials or substance into other products. This user class includes facilities such as plants, factories, or mills, and characteristically use power-driven machines and material handling equipment.

(4) ***GOVERNMENTAL/INSTITUTIONAL*** usually include users such as hospitals, nursing homes, schools, city, county, state, or federal buildings or facilities that discharge wastewater to the sewerage system.

(H) ***NORMAL DOMESTIC SEWAGE*** shall mean the wastewater discharged by the average residential user and excludes trade or process waters. The strength, in terms of Biochemical Oxygen Demand and Suspended Solids, for normal domestic sewage is used to determine the surcharge for industrial users

and/or commercial users discharging higher than normal domestic strength wastewater.

(I) ***NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT*** shall mean any permit or equivalent document or requirements issued by the state water pollution control agency to regulate the discharge of pollutants.

(Ord. 47-97, passed 4-14-97)

§ 51.61 NECESSITY FOR CHARGES.

It is hereby determined necessary that a system of charges for sewage service be established which allocates the cost of providing sewer service to each user in such a manner that the allocated costs are proportionate to the cost of providing sewer service to that user, insofar as those costs can reasonably be determined.

(Ord. 47-97, passed 4-14-97)

§ 51.62 RATE ESTABLISHMENT PROCEDURES.

The city will review annually, its system of charges for operation and maintenance costs, and replacement costs to determine whether or not the rates are sufficient to produce the needed revenue to defray these costs rates shall be established so as to maintain adequate fund reserves to provide for reasonably expected variations in the cost of providing services, as well as variations in the demand for services.

(Ord. 47-97, passed 4-14-97)

§ 51.63 SEWER AND WATER BENEFIT SURCHARGE CAPACITY FEES.

(A) *Purpose.* To levy a surcharge capacity fee based on residential units and square footage fees for areas zoned commercial or industrial to recover some portion of the cost of sewer or water projects constructed via municipal contracts, wherein either of these utilities was constructed partially in unincorporated areas where the property owners could not be assessed or a sewer or water utility constructed by private enterprise wherein the municipality has entered into payback agreements but no assessments were levied, or a sewer or water utility constructed by the municipality within its corporate limits where no assessments were levied, the following fees are established.

(B) *Direct benefit.* Wherein a sewer or water line is immediately accessible to existing residences, each new residential unit proposed or nonresidential use where the property line is within 300 feet of a water line or a sewer line, the surcharge capacity fee shall be $2,500 for existing residences, payable upon application for a sewer tap permit, and $11 per front foot upon application for a water tap permit. The fee shall be $2,500 for each unit proposed for new residential developments, payable upon application for a sewer tap permit. The sewer tap fee for nonresidential (commercial-industrial) shall be based on a proportionate calculation equivalent to residential users, which usage shall be determined from information provided on the building plans as submitted by the applicant and as computed by the Municipal Building Department. For example, a residential use equals 600 gallons per day; a nonresidential use contributing 3,000 gallons per day would be five times the residential fee, etc. The water tap benefit surcharge fee for nonresidential shall be $11 for each lineal front foot.

(C) *Indirect benefit.* For nonresidential users not directly accessible to the sewer or water line, but wherein the imminent discharge source for sewerage disposal or source of water availability is into a sewer line or onto a water line constructed under the conditions defined in this section, a surcharge capacity fee

of $.10 for both utilities per square foot of each facility constructed shall be due and payable upon application for a sewer or water tap permit, such $.10 per foot fee being allocated proportionately as follows: $.06 for sewer, $.04 for water. If only one facility will be tapped, then the fee shall be either $.06 per square foot if a sewer tap, or $.04 per square foot if a water tap.

(D) *Fees to be supplemental.* All surcharge capacity fees defined in this section shall be in addition to other required sewer and water tap fees, unless specifically excepted.

(E) *Exemptions.* Council may, by a majority vote, in such cases where unusual circumstances and an imminent hardship warrant it, waive all or part of the surcharge capacity fees herein.

('80 Code, § 925.04) (Ord. 57-84, passed 11-5-85)

## § 51.64 RATE SCHEDULE FOR USER CHARGES.

(A) The following rate is the charge for sewer service and use and is based on metered consumption of water for the area of the city served by the City of Columbus:

| Rate Per 1,000 Cubic Feet | | | |
|---|---|---|---|
| Effective Date | OM&R | Debt Service | Total |
| 01-01-14 | $7.22 | $3.63 | $10.85 |
| 01-01-15 | $7.54 | $3.56 | $11.10 |

(B) These rates are in addition to the sewer rates charged by the City of Columbus.

(C) The following rate is the charge for sewer service and use for the area of the city serviced by Delaware County:

| Flat Rate Per Month | | | |
|---|---|---|---|
| Effective Date | OM&R | Debt Service | Total |
| 01-01-14 | $7.95 | $4.00 | $11.95 |
| 01-01-15 | $8.28 | $3.92 | $12.20 |

(D) These rates are in addition to the sewer rates charged by Delaware County.

(E) Fees received from use of the sewer system shall be deposited in the Sewer Fund and used for the operation and maintenance of the system, including capital improvements and any related debt service.

(Ord. 47-97, passed 4-14-97; Am. Ord. 94-07, passed 12-10-07; Am. Ord. 64-09, passed 11-16-09; Am. Ord. 56-11, passed 10-24-11; Am. Ord. 95-13, passed 12-9-13)

## § 51.65 COLLECTION OF USER CHARGES.

The City of Columbus administers the billing and collecting of user charges for the city as provided by contract.

(A) A billing for sewer user charges is rendered on either a monthly or quarterly basis.

(B) Each sewer user charge rendered under or pursuant to this chapter is hereby made a lien upon the corresponding lot, parcel of land, building or

premises served by a connection to the sewerage system of the city, and, if the same is not paid within 90 days after it is due and payable, it shall be certified to the appropriate County Auditor by the City of Columbus, who shall place the same on the tax duplicate of the county with the interest and penalties allowed by law and be collected as other taxes are collected.
(Ord. 47-97, passed 4-14-97)

§ 51.66 ANNUAL NOTIFICATION OF CHARGES; CAPACITY CHARGES.

(A) The city will notify each user, at least annually, in conjunction with a regular bill or other acceptable means, what portion of the sewer service charge is attributable to the operation and maintenance costs, and replacement costs for sewer service. All users discharging wastes to the sewerage system shall be billed for usage of the city's sewerage system and for treatment provided by the City of Columbus.

(B) For the purpose of providing revenue to help finance and to more equitably distribute the cost of the construction of necessary additions to the sewerage system, it is necessary to provide for the establishment of a sewer capacity charge with such charge in addition to any and all other fees which may be imposed with respect to the sewerage system.

(1) No person shall make a service connection to the city's sewerage system or any part thereof, unless he has been issued a permit to do so by the city.

(2) The fees to be charged for permits to connect to the sewerage system shall be based upon the domestic supply water tap size as follows:

| Diameter of Water Tap | Effective Date 01/01/13 |
|---|---|
| 3/4" | $2,210 |
| 1" | 3,580 |
| 1-½" | 9,180 |
| 2" | 15,900 |
| 3" | 33,150 |
| 4" | 51,740 |
| 6" | 117,600 |
| 8" | 206,980 |
| 10" | 322,560 |
| 12" | 464,580 |
| 16" | 517,660 |

(3) In the event a tap is subsequently enlarged, the difference between the charges for the two tap sizes shall be paid.

(4) These fees are in addition to any charges made by any other governmental agency. The City of Columbus charges a capacity charge which is collected by the city. The city retains a percentage of those fees, as outlined in the sewer contract. After December 31, 2000, the city will not retain any portion of the Columbus capacity charge.

(5) City Council may, by a majority vote, in such cases where unusual circumstances and an imminent hardship warrant it, waive all or part of the capacity charges herein.

(Ord. 47-97, passed 4-14-97; Am. Ord. 07-05, passed 2-7-05; Am. Ord. 94-07, passed 12-10-07; Am. Ord. 64-12, passed 11-5-12)

(C) *Shawnee Hills.* The city fees charged for Shawnee Hills residents to connect to the sewerage system will be the capacity charge fee in effect at the time a sewer permit is requested.

(1) Financial assistance will be available to residents living in Shawnee Hills based on documented need, as determined by income levels and property values. Eligibility for financial assistance will be determined by using the Income Guidelines for Franklin County Housing Programs in effect at the time the sewer permit is requested. The financial assistance available will be as follows:

80% level - capacity charge fee may be paid over a period of three years.

65% level - capacity charge fee may be paid over a period of five years.

60% level - capacity charge fee will be discounted by 10% and the discounted fee may be paid over a period of five years.

50% level - capacity charge fee will be discounted by 30% and the discounted fee may be paid over a period of five years.

Under 50% level - capacity charge fee will be discounted by 50% and the discounted fee may be paid over a period of five years.

(2) Eligibility for financial assistance will also be limited to owner occupied property with a total market value of the property, as determined by the Delaware County Auditor, of less than $75,000.

(3) Income is defined as total Medicare wages reported on the property owners' W-2(s) plus other income reported on their federal tax return(s) for the most recent year.

(4) Fees paid over time will be assessed on the property owner's real estate tax bills through the Delaware County Auditor's office. Payment of any outstanding balance must be made in full if the property is sold. In addition to paying any unpaid assessment, any discount received must be remitted to the city.

(5) The City Council of Shawnee Hills may appeal a denial of eligibility, if the denial is based on the total market value of the property exceeding $75,000. The appeal shall be made to the City Manager and shall be limited to property owners at or below the 60% level of the Income Guidelines for Franklin County Housing Programs. The appeal will be reviewed by a committee that will be established by administrative order.

(Ord. 92-99, passed 9-7-99)

## § 51.67 DISTRIBUTION OF SEWERAGE SYSTEM REVENUES AND UTILIZATION OF FUNDS.

Revenues received from the user charges and capacity charges shall be credited to the Sewer Fund and utilized to operate and maintain the sewerage system, replace equipment as necessary, retire sewerage system debt and make capital improvements to the system as determined necessary.

(Ord. 47-97, passed 4-14-97)

ADMINISTRATION AND ENFORCEMENT

## § 51.80 RIGHT OF ENTRY FOR CITY OFFICIALS.

(A) The Superintendent, Engineer and other duly authorized employees of the municipality bearing proper credentials and identification shall be permitted to enter all properties for the purposes of inspection, observation, measurement,

sampling and testing pertinent to discharge to the community system in accordance with the provisions of this chapter.

(B) The Superintendent, Engineer or other duly authorized employees are authorized to obtain information concerning industrial processes which have a direct bearing on the kind and source of discharge to the wastewater collection system. The industry may withhold information considered confidential. The industry must establish that the revelation to the public of the information in question might result in an advantage to competitors.

(C) While performing the necessary work on private properties referred to in division (A) above, the Superintendent, Engineer or duly authorized employees of the municipality shall observe all safety rules applicable to the premises established by the company. The company shall be held harmless for injury or death to the Municipal employees and the Municipality shall indemnify the company against loss or damage to its property by Municipal employees and against liability claims and demands for personal injury or property damage asserted against the company and growing out of the gauging and sampling operation, except as such may be caused by negligence or failure of the company to maintain safe conditions as required in § 51.46(B).

(D) The Superintendent, Engineer and other duly authorized employees of the municipality bearing proper credentials and identification shall be permitted to enter all private properties through which the municipality holds a duly negotiated easement for the purposes of, but not limited to, inspection, observation, measurement, sampling, repair and maintenance of any portion of the wastewater facilities lying within such easement. All entry and subsequent work, if any, on the easement, shall be done in full accordance with the terms of the duly negotiated easement pertaining to the private property involved.

('80 Code, § 921.07) (Ord. 59-74, passed 11-18-74)

### § 51.81 VIOLATIONS.

(A) Any person who violates any provision of this chapter except § 51.04 shall be served by the municipality with written notice stating the nature of the violation and providing a reasonable time limit for the satisfactory correction thereof. The offender shall, within the period of time stated in such notice, permanently cease all violations.

(B) Any person who violates any provision of this chapter shall become liable to the municipality for any expense, loss or damage occasioned the municipality by reason of such violation.

('80 Code, § 921.99(b), (c))

### § 51.99 PENALTY.

(A) Any person who continues any violation beyond the time limit provided for in the notice as set forth in § 51.81 is guilty of a minor misdemeanor, and shall be fined not more than $100 for each violation. Each day on which any such violation continues shall be deemed a separate offense.

('80 Code, § 921.99(b))

(B) Whoever violates § 51.04 is guilty of a misdemeanor of the third degree and shall be imprisoned not more than 60 days or fined not more than $500 or both.

('80 Code, § 921.99(a))

### APPENDIX: SEWER APPLICATIONS

Section

2. Residential or commercial building sewer application
3. Industrial sewer connection application

**§ 1. PRIVATE WASTE DISPOSAL APPLICATION.**

To the Municipality of Dublin, Ohio:

The undersigned, being the _____ of the property
(owner, owner's agent)
located at _____ does hereby request a
(number) (street)
permit to install sanitary sewage disposal facilities to serve the
(residence, commercial building, etc.)
at the location.

1. The proposed facilities include: _____
_____
to be constructed in complete accordance with the plans and specifications attached hereunto as Exhibit "A".
2. The area of the property is _____ square feet (or square meters).
3. The name and address of the person or firm who will perform the work is _____
4. The maximum number of persons to be served by the proposed facilities is _____
5. The locations and nature of all sources of private or public water supply within one hundred (100) feet (30.5 meters) of any boundary of said property are shown on the plat attached hereunto as Exhibit "B".

In consideration of the granting of this permit, the undersigned agrees:

1. To furnish any additional information relating to the proposed work that shall be requested by the superintendent.
2. To accept and abide by all provisions of Ordinance No. 59-74 of the Municipality of Dublin, Ohio, and of all other pertinent ordinance or regulations that may be adopted in the future.
3. To operate and maintain the wastewater disposal facilities covered by this application in a sanitary manner at all times, in compliance with all requirements of the Franklin County Health Department and the Ohio Environmental Protection Agency, and at no expense to the Municipality.
4. To notify the superintendent at least twenty-four (24) hours prior to commencement for the work proposed, and again at least twenty-four (24) hours prior to the covering of any underground portions of the installation.

Date: _____ Signed _____
(applicant)
$_____ inspection fee paid. _____
Application approved and permit issued: (address of applicant)
Date: _____ _____
(certification by Clerk)
Signed _____
(Superintendent)

('80 Code, Ch. 921, Appendix A) (Ord. 59-74, passed 11-18-74)

§ 2. RESIDENTIAL OR COMMERCIAL BUILDING SEWER APPLICATION.

To the Municipality of Dublin, Ohio:

The undersigned, being the _____ of
(owner, owner's agent)
the property located at _____ does
(number) (street)
hereby request a permit to install and connect a building sewer to serve the _____ at said location.
(residence, commercial building, etc.)

1. The following indicated fixtures will be connected to the proposed building sewer:

| Number | Fixture | Number | Fixture |
|---|---|---|---|
| _____ | Kitchen sinks | _____ | Water closets |
| _____ | Lavatories | _____ | Bathtubs |
| _____ | Laundry tubs | _____ | Showers |
| _____ | Urinals | _____ | Garbage grinders |

Specify other fixtures _____

2. The maximum number of persons who will use the above fixtures is __.
3. The name and address of the person or firm who will perform the proposed work is _____
4. Plans and specifications for the proposed building sewer are attached hereunto as Exhibit "A".

In consideration of the granting of this permit the undersigned agrees:

1. To accept and abide by all provisions of Ordinance No. 59-74 of the Municipality of Dublin, Ohio, and of all other pertinent ordinances or regulations that may be adopted in the future.
2. To maintain the building sewer at no expense to the Municipality.
3. To notify the superintendent when the building sewer is ready for inspection and connection to the public sewer, but before any portion of the work is covered.

Date: _____ Signed _____
(applicant)

_____
(address of applicant)

Applicant approved: _____
Date: _____ _____
(certification by Clerk)

Signed _____
(Superintendent)

('80 Code, Ch. 921, Appendix B) (Ord. 59-74, passed 11-18-74)

§ 3. INDUSTRIAL SEWER CONNECTION APPLICATION.

To the Municipality of Dublin, Ohio:

The undersigned being the _____
(owner, lessee, tenant, etc.)
of the property located at _____
does hereby request a permit to_____ an industrial sewer connection
(install, use)

serving the _____, which company
(name of company)
is engaged in _____ at said location.

1. A plan of the property showing accurately all sewers and drains now existing is attached hereunto as Exhibit "A".
2. Plans and specifications covering any work proposed to be performed under this permit is attached hereunto as Exhibit "B".
3. a complete schedule of all process waters and industrial wastes produced or expected to be produced at said property, including a description of the character of each waste, the daily volume and maximum rates of discharge, and representative, analyses, is attached hereunto as Exhibit "C".
4. The name and address of the person or firm who will perform the work covered by this permit is __.

In consideration of the granting of this permit the undersigned agrees:

1. To furnish any additional information relating to the installation or use of the industrial sewer for which this permit is sought as may be requested by the superintendent.
2. To accept and abide by all provisions of the Municipality of Dublin, Ohio and of all other pertinent ordinances or regulations that may be adopted in the future.
3. To operate and maintain any waste pretreatment facilities, as may be required as a condition of the acceptance into the public sewer of the industrial wastes involved, in an efficient manner at all times, and at no expense to the municipality.
4. To cooperate at all times with the Superintendent and his representatives in their inspecting, sampling, and study of the industrial wastes, and any facilities provided for pretreatment.
5. To notify the Superintendent immediately in the event of any accident, negligence, or other occurrence that occasions discharge to the public sewers of any wastes or process waters not covered by this permit.

Date: _____ Signed _____
(applicant)

_____
(address of applicant)

Applicant approved: _____
Date: _____ _____
(certification by Clerk)

Signed _____
(Superintendent)

('80 Code, Ch. 921, Appendix C) (Ord. 59-74, passed 11-18-74)

800-445-5588.